Annual Report

2016

NOVARTIS

Our mission

Our mission is to discover new ways to improve and extend people's lives. We use science-based innovation to address some of society's most challenging healthcare issues. We discover and develop breakthrough treatments and find new ways to deliver them to as many people as possible. We also aim to provide a shareholder return that rewards those who invest their money, time and ideas in our company.

PHOTO ESSAYS

A fitness trainer strives to keep his mother's mind limber → page 12

Fighting respiratory disease at the source → page 20

A cellular drama at the heart of a researcher's family → page 38

Helping Syrian refugees manage chronic diseases → page 58

Cover image: Nurse Evelin Alvarado Fuentes drew blood from Maria Magdelena Vasquez Lopez as part of a study of chronic obstructive pulmonary disease in rural Guatemala, where widespread use of wood fires for cooking contributes to respiratory disease.

Contents

Coping with eye disease and fading vision late in life → page 74

A researcher seeks the roots of plants' healing power → page 108

A groundskeeper tackles cancer in several ways → page 145

Chairman's letter

Dear shareholder,

In 2016, Novartis continued to strengthen its business, accelerate innovation and further sharpen its organizational structure. These steps are primarily designed to enhance our scientific and operating capabilities. They are also intended to help us address the medical and economic challenges of a rapidly aging global population, as well as improve our ability to develop important healthcare solutions and make them available to as many patients as possible around the world. We are confident that our strategy of using science-based innovation to deliver better health outcomes for patients will reinforce our market position and increase sales, profits and shareholder value in the long term.

Novartis continued to strengthen its business, accelerate innovation and further sharpen its organizational structure

Joerg Reinhardt

Last year Novartis confronted several pressing issues, including the loss of US patent protection for our cancer therapy *Gleevec*, returning our eye care division to growth, and accelerating the uptake of our heart failure medicine *Entresto*. We were able to maintain our sales momentum despite these challenges, although we saw a decline in operating income.

Guided by a strong executive team with five new leaders, we launched new products, stepped up cross-divisional collaboration, and paved the way for future efficiency gains following the global integration of our technical and service functions.

As part of our efforts to accelerate collaboration across our organization, we are strengthening the connection between the Novartis Institutes for BioMedical Research and our newly formed Global Drug Development unit. These efforts are intended to expedite the transition of experimental therapies from our labs in Cambridge, Basel and Shanghai to the clinical setting, and broaden our industry-leading pipeline. Last year we received five breakthrough therapy designations from the US Food and Drug Administration in inflammatory diseases and oncology, including our investigational cancer compound LEE011 (ribociclib).

To stay at the forefront of medical science, we are also expanding our partnerships with leading academic and private research institutes, with the aim of advancing developments in emerging frontiers such as gene editing

Our strategic approach

Our mission is to discover new ways to improve and extend people's lives.

Our focus on scientific research and willingness to partner with global technology leaders aim to keep Novartis at the forefront of medical innovation, and support our efforts to create long-term value for our shareholders and society.

We strive to be a trusted global healthcare leader and cultivate a corporate culture of high ethical standards. We promote innovation, quality, collaboration, performance, courage and integrity, which we regard as essential values and behaviors in our interactions with patients, healthcare partners and society at large.

For further detail, see
→ **Our strategy** page 17

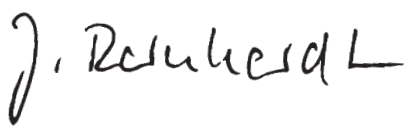
and immuno-oncology. Partnerships are also vital for our activities in digital health, where we are working to improve evidence-based information about our products and to continue exploring pay-for-performance pricing models.

Improving access to healthcare in developing countries is a priority for us, and we are playing our part in helping to achieve the United Nations Sustainable Development Goals. We focus on our longstanding work in the area of tropical diseases, where we advanced the development of our investigational malaria treatment KAF156. We have also made encouraging progress with our recently launched Novartis Access portfolio, which aims to help combat the rise of noncommunicable diseases in lower-income countries.

We constantly evolve our corporate governance in an open dialogue with our stakeholders. In consultation with them, the Board of Directors has worked to further refine the compensation system and compliance framework of Novartis to position our company as a trusted global healthcare leader and strengthen our market position in 2017.

I thank you for the confidence you have placed in our company and am pleased to be able to propose a dividend increase of 2% to CHF 2.75 at the next Annual General Meeting.

Sincerely,



Joerg Reinhardt
Chairman of the Board of Directors

Chief Executive Officer's letter

Dear shareholder,

Recently, a heart failure patient named John wrote me a letter. He wanted to thank our company for making him feel like he had a new lease on life at the age of 54. He explained how quickly his diagnosis turned his life upside down, but he now hopes to be around for a long time thanks to Novartis.

Stories like John's remind us of our mission, which is to discover new ways to improve and extend people's lives. Last year our products touched nearly a billion people globally. This is incredible reach. But when you think that there are 6 billion people who haven't had the benefit of a Novartis product, there's still huge opportunity to touch the lives of many more people.

This is why I am excited about the future of our company. Our focus on innovation will be especially important as the world's population grows and ages, driving an increase in chronic illnesses like heart disease and cancer. This is where Novartis can have even greater impact, as we strive to use the power of science to address tough healthcare challenges.

However, the same factors that are driving increased demand for healthcare are also putting unprecedented pressure on healthcare systems around the world. The result is greater focus on cost control and increasing pressure on prices.

In an effort to build Novartis into a company that can thrive no matter what the future holds, we made significant changes in 2016 to create a more sustainable company. We are working to ensure we have the global scale and innovation power needed to remain competitive in a changing world.

Joseph Jimenez

In an effort to build Novartis into a company that can thrive no matter what the future holds, we made significant changes in 2016 to create a more sustainable company

Last year we reshaped Novartis from a group of loosely affiliated divisions into an integrated company, consolidating several functions. We created a Global Drug Development organization to better share expertise, ensure optimal resource allocation, and leverage new technology platforms across divisions. At the same time, we created a single drug manufacturing organization that can better optimize production capacity and utilization, while taking steps to lower our costs.

We also sharpened the focus of our business units. For example, within our Innovative Medicines Division, the Novartis Oncology business unit, with its unique customer base, now reports directly to me, given its growing importance. We also consolidated all of our eye care drugs into the Novartis Pharmaceuticals business unit, and focused Alcon solely on surgical and vision care. In addition, we shifted some mature products from Novartis Pharmaceuticals to Sandoz, where they can benefit from our generics division's expertise.

We continue to work hard to create the right culture in our company. The revised Novartis Values and Behaviors, introduced in 2015, are the foundation for our performance management and succession planning.

In the midst of these organizational changes, I'm proud that our teams delivered solid performance in 2016. Sales of USD 48.5 billion were in line with a year ago in constant currencies (cc) – a significant achievement given the loss of US patent protection for *Gleevec*. Products launched recently helped fill the gap. They included *Cosentyx*, a treatment for psoriasis and other autoimmune disorders, which became a billion-dollar product; and *Gilenya*, our oral therapy for multiple sclerosis, which continued double-digit growth. Our heart failure medication *Entresto* continued to grow

Our commitment to R&D continues to deliver results

Research and development (R&D) is at the core of our company and central to our strategy. The changes we are making to improve the efficiency and effectiveness of Novartis should free resources that will help us continue to make significant investments in innovation.

Our R&D teams made good progress in 2016. We had 16 approvals in major markets and 24 applications for marketing approval. We also received five breakthrough therapy designations from the US Food and Drug Administration.

We have a strong pipeline. We believe 12 of our compounds in development could become blockbusters. Among the most promising are LEE011 (ribociclib) in combination with letrozole for breast cancer patients with a specific genetic mutation; BAF312 (siponimod) for a type of multiple sclerosis with few effective treatment options; AMG 334 (erenumab) for chronic migraines; and RLX030 (serelaxin) for acute heart failure.

For further detail, see
→ **Innovation** page 40

steadily, with approvals in more than 70 countries to date and solid progress with reimbursement around the world. We also saw strong performance for oncology products *Tafinlar + Mekinist*, a combination therapy for advanced melanoma, and *Jakavi,* for blood cancers.

One area where we fell short in 2016 was Alcon. We started the year with the ambition of returning the business to growth. While we were successful in returning the Vision Care segment to growth in the second half, the Surgical business is taking longer than expected and is preventing a positive growth rate for the overall Alcon Division. We will continue to diligently execute the growth plan in 2017.

Our core operating income of USD 13.0 billion declined 2% (cc), as we expected, reflecting generic competition and growth investments, partially offset by productivity initiatives.

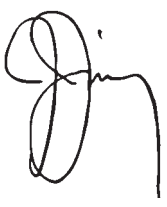
We made further progress on expanding access to healthcare. In its first full year of operation, our Novartis Access program launched in three lower-income countries, while laying the foundation for expansion to about 30 countries in a few years. Our efforts were reflected in the latest Access to Medicine Index, where we moved up one place to No. 3.

As we look ahead, we are excited about the future. We look forward to delivering further innovation that could change the practice of medicine for patients around the world.

We expect 2017 to be another challenging year as we continue to work through the *Glivec* patent expiration in Europe. But we also feel confident that we are positioned for a new phase of growth beginning in 2018.

I'd like to thank our employees for their dedication and you, our shareholders, for your continued confidence in the future of our company.

Sincerely,



Joseph Jimenez
Chief Executive Officer

Key performance indicators consolidated highlights

Financial

Key figures[1]

(in USD millions, unless indicated otherwise)

			% Change	
	2016	2015	USD	Constant currencies
Net sales to third parties from continuing operations	48 518	49 414	– 2	0
Operating income from continuing operations	8 268	8 977	– 8	– 3
Return on net sales (%)	17.0	18.2		
Net income from continuing operations	6 698	7 028	– 5	1
Net income from discontinued operations[2]		10 766		
Net income[2]	6 698	17 794	– 62	– 59
Basic earnings per share[3] (USD) from continuing operations	2.82	2.92	– 3	2
Basic earnings per share[2,3] (USD) from discontinued operations		4.48		
Total basic earnings per share[2,3] (USD)	2.82	7.40	– 62	– 59
Core operating income from continuing operations	12 987	13 790	– 6	– 2
Core return on net sales (%)	26.8	27.9		
Core net income from continuing operations	11 314	12 041	– 6	– 3
Core earnings per share[3] (USD) from continuing operations	4.75	5.01	– 5	– 2
Free cash flow from continuing operations	9 455	9 259	2	
Free cash flow	9 455	9 029	5	

Share information

	2016	2015	% Change
Share price at year-end (CHF)	74.10	86.80	– 15
ADR price at year-end (USD)	72.84	86.04	– 15
Dividend[4] (CHF)	2.75	2.70	2
Payout ratio[5] based on continuing operations (%)	96	92	
Payout ratio[5] (%)	96	36	

For further detail, see
→ **Our performance** page 22
→ **Our Financial Report** page 146

[1] This Annual Report includes non-IFRS financial measures such as core results, constant currencies and free cash flow. Novartis believes that investor understanding of the Group's performance is enhanced by disclosing these non-IFRS measures. A definition of non-IFRS measures used by Novartis, and further details, including reconciliation tables, can be found starting on page 171.

[2] Net income from discontinued operations and net income of the Group in 2015 include exceptional divestment gains. Continuing and discontinued operations are defined on page 154.

[3] 2016 weighted average number of shares outstanding: 2 378 million (2015: 2 403 million)

[4] Dividend 2016: proposal to shareholders for approval at the Annual General Meeting on February 28, 2017

[5] Payout ratio 2016 is calculated by converting into USD the proposed total gross dividend amount in CHF at the CHF-USD exchange rate of December 31, 2016, based on an estimated number of shares outstanding on dividend payment date, and dividing it by the USD consolidated net income from continuing operations and net income attributable to shareholders of Novartis AG in the Group's 2016 consolidated financial statements.

Innovation

Key figures [1]

	2016	2015
Projects entering development pipeline [2,3]	**5**	8
Ongoing Phase III programs [4]	**29**	37
US FDA breakthrough therapy designations [5]	**5**	0
Major submissions (US, EU, JP) [6]	**24**	14
Major approvals (US, EU, JP) [6]	**16**	20
New molecular entity (NME) approvals [7]	**3**	6

Social[8]

Access

	2016	2015
Total patients reached (millions)	**965**	972
Patients reached through access programs (millions)	**52**	66
People reached through training, health education and service delivery (millions)	**17**	12

People

Full-time equivalent positions / headcount [9]	**118 393 / 122 985**	118 700 / 122 966
Turnover: % voluntary / % overall	**7.4 / 12.2**	7.3 / 13.5
Women in management: % of management[10] / % of Board of Directors	**42 / 25**	41 / 27

Ethics

Misconduct cases reported / allegations substantiated [11]	**1 707 / 893**	1 300 / 1 010

Health, safety and environment [12]

Lost-time injury and illness rate (per 200 000 hours worked) [13]	**0.08**	0.11
Greenhouse gas emissions, total Scope 1 and Scope 2 (1 000 t) [14]	**1 352.7**	1 362.1

For further detail, see
→ **Innovation** page 40
→ **Social** page 60 (corporate responsibility)

[1] Includes Innovative Medicines and Sandoz biosimilars only
[2] Includes programs entering confirmatory development, based on internal R&D activities. First patient, first visit (FPFV) has occurred in post-proof-of-concept stage. Includes small molecules, biologics; new fixed-dose combinations of existing active pharmaceutical ingredients (APIs); and new target indications, defined as new disease or new line of treatment (e.g., first line vs. second line). Counted by indication and not compound
[3] This number has been adjusted due to the revised definition of projects entering portfolio. In 2015, we reported it as 25.
[4] Includes projects with FPFV in a Phase III study but not yet filed in the US, EU or Japan
[5] Number of breakthrough therapy designations by the US Food and Drug Administration for therapies under development by Novartis
[6] Includes small molecules, biologics; new fixed-dose combinations of existing APIs; and new target indications, defined as new disease or new line of treatment (e.g., first line vs. second line)
[7] Includes NMEs such as small molecules, biologics; in the EU, new fixed-dose combinations of existing APIs
[8] Continuing operations
[9] Headcount reflects the total number of associates in our payroll systems. Full-time equivalent adjusts headcount for associates working less than 100%. All data as of December 31
[10] Management defined locally
[11] The number of misconduct cases reported may change as matters may be reassessed in the course of the case lifecycle. The number of substantiated allegations may change due to the fact that investigation reports with assessments are received on an ongoing basis, which potentially leads to a difference in numbers at a later stage. In 2016, the Business Practices Office (BPO) received a total of 3 595 complaints of alleged misconduct, of which 1 888 were deemed not to be related to misconduct and were delegated for review and action outside the BPO investigative process. The BPO initiated investigations of 1 707 reported cases related to misconduct; 893 were substantiated, including 401 that resulted in dismissals or resignations.
[12] 2016 environmental sustainability data published in the Annual Report are actual data for the period from January through September, and best estimates for the period from October through December. They will be updated with actual data in the first quarter of 2017. Significant deviations will be reported on our website and restated in next year's Annual Report.
[13] Data include Novartis associates and third-party personnel managed by Novartis associates.
[14] Scope 1: combustion and process, and vehicles; Scope 2: purchased energy

2016 at a glance

Who we are

123 000
Employees worldwide (headcount)

155
Countries where Novartis products are available

48.5 bn
Net sales (USD)

172.0 bn
Market capitalization (USD) on Dec. 31, 2016

Novartis is a global healthcare company based in Basel, Switzerland, with a history going back more than 150 years. We provide healthcare solutions that address the evolving needs of patients and societies worldwide. Novartis products are available in about 155 countries and they reached nearly 1 billion people globally in 2016. About 123 000 people of 142 nationalities work at Novartis around the world.

For further detail, visit
→ **www.novartis.com/about-us**

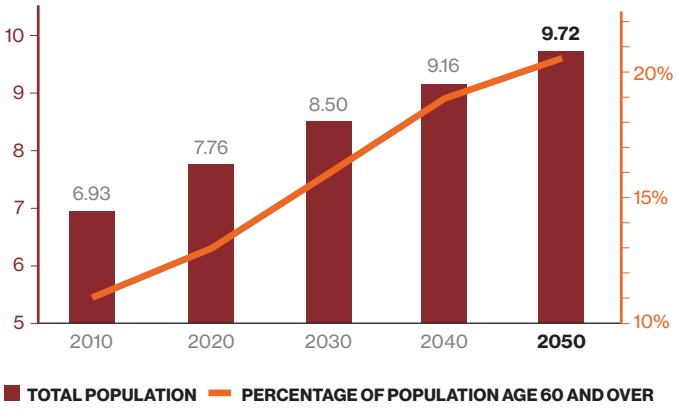
Our environment

Growing and aging populations worldwide are driving change in healthcare, presenting both new opportunities and new challenges for Novartis. The global population will increase by more than 1 billion people by 2030, predicts the United Nations, with most of that growth occurring in developing countries. People over age 60 are the fastest-growing population segment, expected to add 500 million people and reach 1.4 billion by 2030. This is driving an increase in chronic illnesses across the globe.

These factors contribute to increasing demand for healthcare worldwide, which is putting cost pressure on health systems. Governments and health insurers are increasingly searching for ways to keep spending in check. They are focusing on the value they receive, based on the benefits for patients and healthcare systems.

These developments validate our focus on innovation to produce significant medical advances, and global scale to further improve our efficiency and effectiveness.

Growing and aging populations
2010–2050 (in billions) and % of population over 60



Source: United Nations

For further detail, see
→ **Our environment** page 15

Our strategy

We believe Novartis is well prepared for a world with a growing, aging population and evolving healthcare needs. Our mission, vision and strategy support the creation of long-term value for our company, our shareholders and society.

Our mission is to discover new ways to improve and extend people's lives. Our vision is to be a trusted leader in changing the practice of medicine. Our strategy is to use science-based innovation to deliver better patient outcomes in growing areas of healthcare.

We maintain strong investment in research and development focused on areas of unmet medical need.

Our mission is to discover new ways to improve and extend people's lives. Our vision is to be a trusted leader in changing the practice of medicine

Our values

Strong values shape our culture and help us implement the Novartis strategy in line with our mission and vision. They describe the professional behavior we expect from employees: innovation, quality, collaboration, performance, courage and integrity.

Our structure

Integrated company
Novartis made organizational changes in 2016 aimed at reinforcing innovation and improving the efficiency and effectiveness of our operations. Novartis is now a more integrated company with a revised operating model. We created global functional organizations for drug development and manufacturing, combining units that were previously dedicated to individual divisions.

The Global Drug Development organization and Novartis Technical Operations join the Novartis Institutes for BioMedical Research and Novartis Business Services as global functional units that are better able to exploit the company's scale, share best practices, and pursue excellence in their areas of expertise.

We adjusted the structure of Novartis divisions and business units, reinforcing their focus on our customers and on patients.

In our Innovative Medicines Division, we created two business units reporting to the CEO of Novartis: Novartis Oncology and Novartis Pharmaceuticals. This new structure reflects the increasing scale and importance of our Oncology business. We sharpened the focus of our Alcon Division on eye care devices, and shifted responsibility for ophthalmic pharmaceuticals to Novartis Pharmaceuticals. Our Sandoz Division remains dedicated to high-quality, more affordable generic medicines and biosimilars.

Functional organizations with global scale
Our global functional organizations help drive efficiency and promote functional excellence.

The **Novartis Institutes for BioMedical Research (NIBR)** is the innovation engine of Novartis, focused on discovering new drugs that can change the practice of medicine.

The **Global Drug Development (GDD)** organization oversees the clinical development of new medicines discovered by our research teams and external partners.

Novartis Technical Operations (NTO) brings together all drug manufacturing at Novartis.

Novartis Business Services (NBS) consolidates support services across the company.

For further detail, see
→ **Our strategy** page 17
→ **Our culture and values** page 18
→ **Our structure** page 19
→ **Global functions** page 19

2016 at a glance
continued

Performance highlights

Financial

48.5 bn
Net sales (USD)

9.5 bn
Total free cash flow (USD)

13.0 bn
Core operating income (USD)

8.3 bn
Operating income (USD)

6.7 bn
Net income (USD)

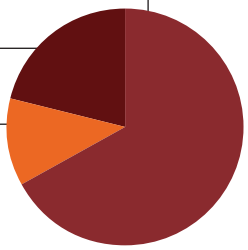
Novartis had solid performance in 2016, supported by a 20% increase in sales of our growth products[1] as we navigated the US patent expiration of our pioneering cancer drug *Gleevec*. This underscores our ability to refresh our product portfolio. Our Innovative Medicines and Sandoz Divisions performed well in a challenging environment. We were unsuccessful in returning our Alcon Division to growth, but the growth plan initiated in 2016 is starting to bear fruit.

Novartis net sales in 2016 were USD 48.5 billion, down 2% in reported terms, but flat in constant currencies (cc). Our growth products[1] – including *Gilenya, Cosentyx* and several cancer treatments acquired in 2015 – contributed USD 17.1 billion, or 35% of net sales. Operating income in 2016 was USD 8.3 billion (–8%, –3% cc), down mainly due to patent expirations, and increased investments related to new product launches and the Alcon growth plan.

2016 net sales from continuing operations by division

(in USD millions, growth in % cc[2] and divisional share of net sales)

INNOVATIVE MEDICINES 67%	32 562 / 0%	
SANDOZ 21%	10 144 / 2%	
ALCON 12%	5 812 / – 2%	
TOTAL	**48 518 / 0%**	



Net income was USD 6.7 billion, down 5% in reported terms, but up 1% in constant currencies, due to higher income from associated companies. Earnings per share were USD 2.82 (–3%, +2% cc), up more than net income due to fewer outstanding shares. Free cash flow was USD 9.5 billion, up 2%, reflecting lower net investment in property, plant and equipment.

We also present core results,[3] which exclude the impact of significant disposals, acquisitions, restructurings and other items. Core operating income was USD 13.0 billion (–6%, –2% cc). Core operating income margin (cc) declined 0.7 percentage points, due to the *Gleevec* patent expiration and our investments in new product launches and the Alcon growth plan. Exchange rates had a further negative impact of 0.4 percentage points, resulting in a net decrease of 1.1 percentage points to 26.8% of net sales. Core net income was USD 11.3 billion (–6%, –3% cc). Core earnings per share were USD 4.75 (–5%, –2% cc).

Innovation

200 +
Projects in clinical development

9.0 bn
Research and development spend (USD)

Research and development activities produced 16 major approvals and 24 major submissions in 2016. We received US regulatory approval for *Cosentyx* to treat ankylosing spondylitis and psoriatic arthritis. We filed for approval

[1] "Growth products" are an indicator of the rejuvenation of the portfolio, and comprise products launched in a key market (EU, US, Japan) in 2011 or later, or products with exclusivity in key markets until at least 2020 (except Sandoz, which includes only products launched in the last 24 months). They include the acquisition effect of the GSK oncology assets.

[2] In constant currencies and for continuing operations

[3] Core results are a non-IFRS measure. A definition of non-IFRS measures used by Novartis, and further details, including reconciliation tables, can be found starting on page 171.

in the US and EU for our *Tafinlar* + *Mekinist* combination to treat non-small cell lung cancer; for PKC412 (midostaurin) in combination with standard chemotherapy to treat acute myeloid leukemia; and for LEE011 (ribociclib) in combination with letrozole for the treatment of a particular type of breast cancer.

Novartis received five breakthrough therapy designations from the US Food and Drug Administration in 2016.

Sandoz continued to lead in biosimilars with US approval for *Erelzi* (etanercept-szzs) to treat inflammatory diseases, although its launch has been delayed by litigation. Our biosimilar *Binocrit* (epoetin alfa) was approved in the EU for a new route of administration. And our filings seeking marketing approval were accepted in the EU for biosimilars pegfilgrastim and rituximab.

Alcon received US regulatory approval for the *CyPass* Micro-Stent to treat glaucoma, and launched the *NGENUITY* 3D Visualization System for vitreoretinal surgery.

Social

52 m
Patients reached through access programs

17 m
People reached through health education programs

Novartis Access, our portfolio of medicines to fight key chronic diseases in lower-income countries, is offered to governments and public-sector customers at a price of USD 1 per treatment per month. Since launch, it has delivered more than 120 000 treatments to Kenya, Lebanon and Ethiopia, each providing a one-month supply of medicine. In September, we signed a memorandum of understanding for the implementation of Novartis Access in Rwanda, and we expect the first product delivery in early 2017. To prepare for implementation elsewhere, we filed for approval to sell Novartis Access drugs in 21 countries.

The Novartis Malaria Initiative achieved another milestone in 2016, having delivered more than 800 million treatments without profit since 2001. Novartis expanded its partnership with the Medicines for Malaria Venture to develop antimalarial compound KAF156. SMS for Life 2.0 launched in Kaduna State, Nigeria's third most populous region. The program uses smartphones and tablet computers to improve access to medicines and increase disease surveillance.

We improved the environmental footprint of our operations, reducing carbon emissions by 10 kilotons in 2016.

We continue our efforts to strengthen integrity and compliance across Novartis. We updated our Anti-Bribery Policy and launched a global online tool to handle conflicts of interest across the company. To ensure accountability of local country organizations, we include integrity and compliance in standard business reviews. We began using virtual meeting technology to supplement face-to-face meetings as we develop better, more inclusive ways of educating medical professionals about our products.

In 2016, Novartis was recognized in several corporate responsibility rankings, including the Access to Medicine Index, where Novartis ranked No. 3, moving up one place versus 2014. And we received an A- rating and were recognized among category leaders in healthcare in the 2016 CDP Climate Score.

For further detail, see
→ **Our performance** page 22

Governance and compensation

We maintained our excellence in corporate governance in 2016. We refreshed the Board of Directors with new members, adding Elizabeth Doherty and Ton Buechner, and reinforcing our Board's experience in the areas of accounting and management.

Key focus areas for our Board in 2016 included strategy, the culture of our company, our corporate responsibility programs, compliance and our compensation system.

In 2016, we continued to evaluate the effectiveness of our compensation programs to further align with our business strategy and shareholder interests. We also reported the results from the first cycle of our Long-Term Incentive plan introduced in 2014.

For further detail, see
→ **Governance** page 76
→ **Compensation** page 110

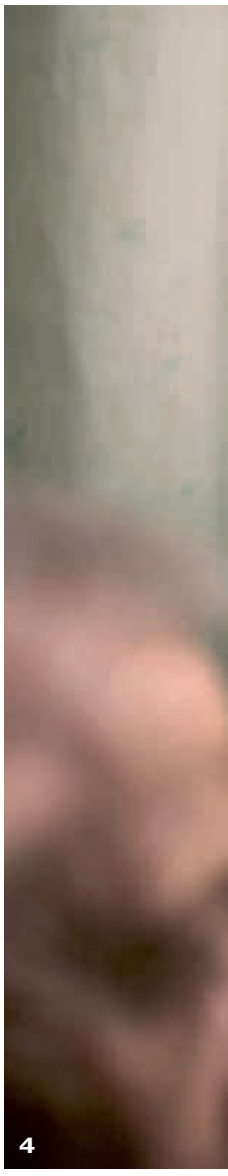
PHOTO ESSAY

A fitness trainer strives to keep his mother's mind limber

On Friday nights, 41-year-old Juan Pedro García Hernández goes dancing. From a working-class suburb of Madrid, Spain, he takes the Metro downtown where a friend DJs. "I escape by dancing," he says.


1


2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It's a precious getaway. Mr. García spends most of his waking hours caring for his 81-year-old mother, Antonina Hernández, who suffers from Alzheimer's disease.

Mr. García, a fitness trainer, first noticed her decline four years ago. Every day on the phone she described eating identical meals. He checked her refrigerator and it was nearly empty. He saw that she was losing track of time and forgetting to eat. A neurologist soon diagnosed Alzheimer's, a disease Ms. Hernández shares with an estimated 44 million others around the world.

In the early days, she could manage on her own, with steady prompts and visits from Mr. García, who lived next door. But two years ago, he saw that she needed help with the most basic tasks and so he moved into her two-bedroom apartment. He dropped most of the clients in his fitness classes and became a full-time caregiver.

Mr. García relentlessly consults the Internet for advice. The most important point, he says, is to build routines for his mother, to keep her engaged. "If I'm cooking, I have her peel the vegetables, and when I wash the dishes, she dries them," he says. "It takes much more time than it would to do it myself." But the activities keep her busy and distract her from the growing gaps in her memory, which can produce frustration, anger and despair.

He creates daily worksheets for her, and has her circle words or draw a wavering line through a maze. He also leads her in exercises. She mirrors her son's movements, lifting small pink weights in each hand.

Ms. Hernández is vaguely aware of her situation. She struggles to remember basic words and is aware and embarrassed that she forgets so much. She often hallucinates, returning in her mind to the farm where she grew up in the tiny town of Villatoro, northwest of Madrid. She worries if the chickens are fed, and even on sweltering summer days, she bundles up for the cold mountain nights of her childhood.

Like so many other caregivers, Mr. García feels terribly alone and vulnerable. "The worst part is the stress," he says. He frets that his mother will slip out of the house when he's not looking and get lost or suffer an accident. "You're on alert for 24 hours," he says.

The impact of this disease on people and society will likely increase, unless research now underway at Novartis and elsewhere yields a breakthrough in treatment options. As the world's population ages, Alzheimer's cases are projected to grow rapidly, reaching 65 million by 2030. This will require more caregivers, who may face increasing stress and their own medical problems. Some 40% of caregivers, according to the Alzheimer's Association, report suffering from depression. And there are financial concerns, as many of them forfeit paying jobs to care for loved ones.

Indeed, this is one of Mr. García's challenges. He scrapes together enough money to send his mother for a few hours every week to a therapeutic center run by the city. That frees him up to give a few fitness classes. He also makes some money by selling comic books on eBay. But for now, his full-time job is taking care of his mother. She stands by the sink with a dish towel and a far-away expression. She's waiting, and it's up to him to give her tomatoes to wash or bowls to dry.

For detail on **Alzheimer's** research → page 49

3

1 For Juan Pedro García Hernández, getting his mother out into their neighborhood in Madrid, Spain, is a daily routine.

2 Mr. García started to notice her memory lapses four years ago, and moved into her apartment to give full-time care two years later.

3 Mr. García leads his mother through regular exercises. They keep her engaged and raise her spirits.

4 Ms. Hernández and her son inspect the haircut he has just given her. As her disease progresses, she relies more on him for routine care.

Strategic overview

Strong demographic and economic trends continue to transform societies worldwide and shape the future of healthcare. These trends are opening opportunities for Novartis, while at the same time raising new challenges.

1 bn
The expected increase in the global population by 2030, to a total of 8.5 billion people

500 m
The expected increase in people over the age of 60 worldwide by 2030, to a total of 1.4 billion people

+46 %
The rise in the average yearly number of US approvals for new molecules in the years 2012-2016, compared to 2007-2011

Our strategic framework

Our mission
Discover new ways to improve and extend people's lives

Our vision
Be a trusted leader in changing the practice of medicine

Our strategy
Science-based innovation
Better patient outcomes
In growing areas of healthcare

Our values
Innovation
Quality
Collaboration
Performance
Courage
Integrity

Long-term value creation

→ page 17

Our culture and values

Our culture supports the success of the enterprise through clear values to guide our people in their work.

→ page 18

Our structure

Novartis took significant further steps in a transformation begun three years ago, resulting in revisions to our structure and operating model.

→ page 19

Our environment

Powerful trends in society and our industry continue to shape healthcare globally, and these trends seem in some cases to be accelerating. Medical innovation is racing ahead at a time when populations are growing and graying, boosting demand for healthcare. The increasing cost of caring for people around the world is raising pressure on healthcare systems.

Golden age for medical research

Innovation in medical science is accelerating, driven by new therapeutic approaches. The number of new treatments underscores this trend. For instance, the average annual number of new drug molecules approved by the US Food and Drug Administration from 2012 through 2016 increased 46% compared to the prior five years.

Researchers are developing exciting new ways to treat diseases. Examples include gene editing and gene therapies, as well as RNA-based treatments that can intervene in how cells create specific proteins. Oncology is a particularly fast-evolving field and includes advances such as cell therapies to attack cancer cells, and vaccines that help people ward off the development of cancer in the first place.

The sophisticated new treatment approaches emerging from this golden age of medical research offer society and patients new hope for tackling the many diseases that still lack effective treatments.

Digital technology is also playing an increasingly important role in healthcare. Remote monitoring of patients, advanced data analytics, and other digital applications are changing the way clinical trials are conducted, as well as the way patients are treated. Technology is also being used to augment the effectiveness of traditional medicines.

The sophisticated new treatment approaches emerging from this golden age of medical research offer society and patients new hope for tackling the many diseases that still lack effective treatments

This opens new possibilities for healthcare companies to further improve health outcomes for patients. It is also attracting technology companies to the healthcare industry. Their special skills make them potential partners for science-based companies like Novartis, which have skills they lack, such as deep clinical and regulatory expertise.

Growing and graying populations

The world's population continues to grow, with an additional 1 billion people expected to join the human race by 2030, bringing the total number of inhabitants to about 8.5 billion, predicts the United Nations. Most of this population growth is expected to be in the developing world, where there continues to be tremendous unmet medical need. The world's population also continues to age rapidly, with the number of people aged 60 or older expected to increase by more than 500 million by 2030, to 1.4 billion people.

At the same time, millions of people are migrating from rural areas to cities, sparking changes in lifestyle and diet that over time can affect their health. More than half the world's population now lives in cities and towns, and this number is expected to grow to about 5 billion people by 2030.

These trends are fueling a global increase in chronic diseases such as diabetes and heart disease that may require patients to follow years or even decades of treatment. Cancer and cardiovascular diseases will cause half of all deaths worldwide by 2025, predicts the World Health Organization.

Rising pressure on healthcare costs

These factors are contributing to higher demand for healthcare worldwide and putting healthcare systems under increasing cost pressure. Healthcare costs globally have risen at a rate of about 10% annually in recent years, according to Aon Hewitt, well above the general inflation rate. In many countries, overall spending on healthcare continues to grow as a proportion of total economic activity. The US spends the most, at 17% of all the goods and services produced in the country, according to the Organization for Economic Cooperation and Development.

Responding to the world's rising healthcare needs represents a significant opportunity for healthcare companies such as Novartis in the coming years and decades. However, healthcare companies also have an important role to play in ensuring healthcare systems are sustainable over the long haul.

Our environment
continued

The pressure on healthcare systems already has governments and health insurers looking for ways to slow the rise in spending, while still providing quality care for as many people as possible. In some cases, they are employing tough tactics, from limiting access to treatment and slowing the uptake of innovative new medicines, to shifting more of the cost to individual patients.

This trend means healthcare companies increasingly find themselves squeezed by conflicting demands to provide cost-effective treatments, while at the same time continuing to use the latest technology to pursue breakthrough medicines and devices. Rising costs have also helped fuel a heated public debate about the pharmaceutical industry's pricing practices and have prompted a heightened level of scrutiny.

Indeed, the possibility of political or regulatory action on drug prices has become a greater risk for the entire industry, including Novartis. Such action could take a variety of forms, from restrictions on price increases and mandates to provide broad access to treatments, to changes in intellectual property laws. For more on the risks Novartis faces and the steps we are taking to address them, please see page 167. One response to rising costs that is gaining momentum with governments, insurers and healthcare companies is to shift healthcare systems toward a focus on producing better health outcomes, rather than simply paying for pills and healthcare services.

For instance, the European Commission has sanctioned a value-based tendering approach for medical devices that allows companies to include measures of health outcomes in their price calculations. Elsewhere, the US Centers for Medicare & Medicaid Services is a year ahead of schedule in reaching its target of converting 50% of spending to quality-based payments that take into account both health outcomes and cost-effectiveness.

Novartis has also advocated a value-based approach as a way of improving efficiency in healthcare, and has agreed to be reimbursed for certain products based partly on health outcomes.

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Taken together, the evolving trends we see in society and the healthcare industry reinforce our conviction that our strategy of focusing on innovation and improved health outcomes for patients is the correct one to steer us through a shifting healthcare landscape. Our attention remains on executing our strategy as effectively as possible.

Yuko Yoshikawa participates in daily morning exercises near her home in Tokyo, Japan. She has been treated for age-related macular degeneration for more than 10 years.

Our strategy

We have a consistent strategy that helps us navigate a world with a growing, aging population and evolving healthcare needs. Our mission and vision complement our strategy, and together they support the creation of value over the long term for our company, our shareholders and society.

The Novartis mission, vision and strategy are all anchored in our company's tradition of leadership in innovation. We believe our mission accurately describes why we exist as a company, while our vision expresses an ambitious aspiration to strive for. Along with our strategy, they effectively guide our path to the future.

Our mission is to discover new ways to improve and extend people's lives

Our vision is to be a trusted leader in changing the practice of medicine

Our strategy is to use science-based innovation to deliver better patient outcomes in growing areas of healthcare

Our strategy has remained consistent. The trends we see in society and the healthcare industry convince us our direction is appropriate. Our strategy and its implementation have been strongly endorsed in annual reviews by the Executive Committee of Novartis and the Board of Directors.

SCIENCE-BASED INNOVATION

Innovation that produces breakthrough medicines and products will be more important than ever in the healthcare industry in the coming years. We maintain strong investment in research and development to address unmet medical needs. Our product pipeline is fed by a research and development approach that uses the latest science to advance the most promising projects.

Our research strategy aims to increase collaboration across traditional scientific and organizational boundaries, and focus on powerful new technologies that have the potential to help produce therapeutic breakthroughs. We are organizing our early discovery efforts around chemical biology, a scientific approach that brings together experts from different fields, including biology, chemistry and computer science, to create new types of molecules and use them to probe biological systems.

In drug development, we pursue promising therapies where we can leverage the scale and expertise of Novartis to bring important treatments to patients globally.

BETTER PATIENT OUTCOMES

We seek to develop medicines and products that can produce positive real-world outcomes for patients and healthcare providers. The benefits can range from improving the cost-effectiveness of high-quality care to prolonging lives. We are developing services and technologies to augment the benefits of our core products, often in collaboration with healthcare providers and technology companies.

GROWING AREAS OF HEALTHCARE

We aim to develop innovative products in growing areas of healthcare where we can make a real difference. We focus on patented medicines, generic medicines and eye care – segments where we have the innovation power and global scale necessary to compete effectively. At the same time, we are expanding our presence in the emerging markets of Asia, Africa and Latin America, where populations are growing fastest and where demand for access to high-quality medicines and healthcare is also likely to continue to increase.

For further detail, see
→ **Innovation** page 40

Our culture and values

Talented, committed and responsible people from diverse backgrounds are essential for successfully implementing our strategy. We foster a company culture that supports the success of the enterprise through clear values to guide our people in their work.

Our culture

We continue to reinforce a company culture that supports our people as they face new challenges in a rapidly evolving healthcare environment.

Our values define our culture and help us execute the Novartis strategy in line with our mission and vision. They describe the professional behavior we expect from our employees. We use six values to inform our recruitment activities, shape employee development programs, and help guide individual performance assessments and decisions about bonuses and other rewards. Comprehensive training programs ensure our people are familiar with these values and know how to apply them in their jobs.

Jennifer Allport-Anderson, a cell biologist who leads a heart failure and in vivo pharmacology team at the Novartis Institutes for BioMedical Research (NIBR) in Cambridge, Massachusetts in the US, walks through one of NIBR's new buildings.

Our values

INNOVATION

Innovation founded in strong science is at the heart of Novartis and key for our strategy and success. We nurture a culture of innovation by encouraging people to experiment and take smart risks. Our aim is to foster creative thinking that leads to practical solutions to healthcare and business challenges.

QUALITY

Delivering high quality is critical to ensuring a reliable supply of important medicines and earning the trust of our customers and society. Our focus on quality excellence includes continuously enhancing our standards, technology and training for our people.

COLLABORATION

We foster teamwork among our employees to swiftly and efficiently deliver innovative new products to patients and healthcare providers. This capitalizes on the diversity and creativity of our global staff.

PERFORMANCE

People at Novartis are known for their focus on delivering results – and they often make extraordinary efforts to achieve their goals. We aim to reinforce that focus on personal and collective achievement, while maintaining high ethical standards.

COURAGE

We want our associates to speak out, challenge conventional thinking, and stand up for their ideas. We also want them to have the courage to do the right thing in the face of resistance or moral dilemmas. They need the fortitude to take smart risks, even when the chance of failure is high.

INTEGRITY

High performance with integrity is fundamental to the way we operate at Novartis and is critical to maintaining the support of society and governments. Our Code of Conduct sets high ethical standards, and comprehensive training ensures our associates know how to apply these standards in their work. We also enforce our code, investigating allegations of wrongdoing and taking decisive corrective action when needed.

For further detail, see
→ **People** page 27

Our structure

In 2016, Novartis took significant further steps in a transformation we began three years ago. The changes represent a shift in our operating model – one that we believe enables us to more effectively implement our strategy and create long-term value. The company has been reshaped from a diverse group of largely independent divisions into a more focused, more integrated company that is better able to deliver innovative products, exploit global scale, and respond to new opportunities and risks.

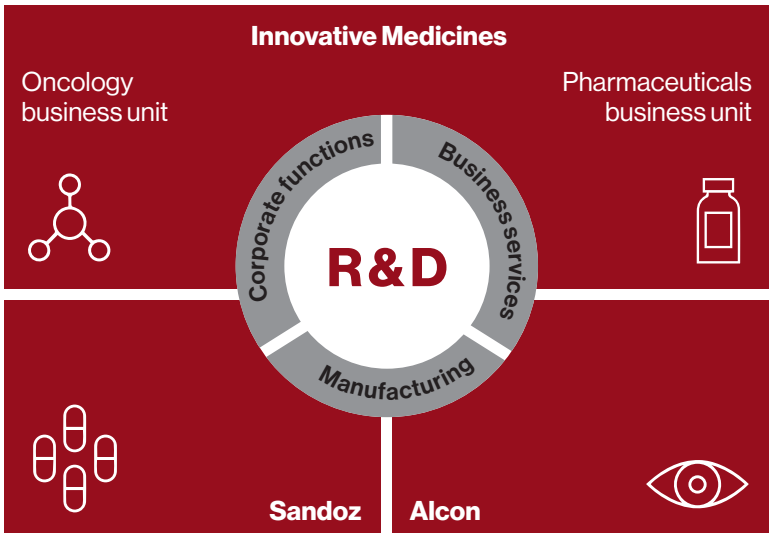
Revised structure

Novartis completed a series of organizational changes in 2016 aimed at reinforcing innovation and making the company more efficient and more nimble. We created two new global functional organizations – one for drug development and one for manufacturing – combining units that were previously dedicated to individual divisions. The Global Drug Development organization and Novartis Technical Operations join the Novartis Institutes for BioMedical Research and Novartis Business Services as global functional units that are better able to exploit the company's scale, share best practices, and pursue excellence in their areas of expertise. The Head of Global Drug Development also joined the Executive Committee of Novartis, adding the new development organization's insights to the company's top leadership team.

We adjusted the structure of Novartis divisions and business units in 2016 to reinforce their focus on our customers and patients, as well as to speed decision-making. In our Innovative Medicines Division, we created two business units reporting to the CEO of Novartis: Novartis Oncology and Novartis Pharmaceuticals. The new structure reflects the scale and importance to Novartis of our Oncology business, which is one of the world's biggest providers of cancer treatments, following the acquisition of oncology products from GlaxoSmithKline in 2015. The Novartis Pharmaceuticals business unit focuses on patented treatments in the areas of cardio-metabolic, respiratory, neuroscience, ophthalmology, and immunology and dermatology. Both units are represented on the Executive Committee of Novartis.

We sharpened the focus of our Alcon Division on eye care devices, and shifted responsibility for ophthalmic pharmaceuticals to Novartis Pharmaceuticals, where they can benefit from the scale and expertise of that business unit.

Our Sandoz Division remains dedicated to the fast-growing market for more affordable, high-quality generic medicines and biosimilars, which help health systems broaden access to treatment while managing their costs. During 2016, we shifted some established medicines from Novartis Pharmaceuticals to Sandoz, where there is a better fit with the portfolio.



Functional organizations with global scale

NOVARTIS INSTITUTES FOR BIOMEDICAL RESEARCH

The Novartis Institutes for BioMedical Research (NIBR), with more than 6 000 scientists, physicians and business professionals worldwide, is the innovation engine of Novartis. NIBR focuses on discovering new drugs that can change the practice of medicine.

GLOBAL DRUG DEVELOPMENT

The Global Drug Development organization oversees the development of new medicines discovered by our research teams and external partners. Bringing together drug development at Novartis facilitates regular evaluation of the new products in our pipeline, as well as optimum allocation of resources to the most promising projects. It also supports common standards and procedures, and the broad adoption of best practices, all of which we believe will lead to greater efficiency and effectiveness.

NOVARTIS TECHNICAL OPERATIONS

The global Technical Operations unit brings together all drug manufacturing at Novartis. We expect this organization to improve resource allocation, optimize capacity planning, and further improve quality.

NOVARTIS BUSINESS SERVICES

Novartis Business Services (NBS) consolidates support services across Novartis divisions, helping drive efficiency, simplification, standardization and quality. NBS includes six service domains: financial reporting and accounting operations, human resources services, information technology, procurement, product lifecycle services, and real estate and facility management. Its role in generating productivity gains supports our continued investment in research and development, and underpins our financial results.


1


2


3

PHOTO ESSAY

Fighting respiratory disease at the source

When Guatemalan social worker Eduardo Canuz teaches rural women how to cook their tamales on a gas stove, he is taking on more than a thousand years of history. The Maya people of Guatemala's highlands have been cooking over wood fires and bathing in wood-heated saunas, known as temazcales, since the dawn of their civilization. But the smoke is unhealthy and especially dangerous for women and children.

That's where Mr. Canuz comes in, with his supply of gas stoves and tanks of liquid propane. He's the field coordinator for a pilot research program called NACER ("to be born" in Spanish). In San Lorenzo and nearby mountain villages, Mr. Canuz and his team have installed gas stoves in the homes of 50 pregnant women. The goal is to monitor air quality in their homes through the course of their pregnancies, and then to study the health and development of their babies.

This is a crucial challenge, one that extends far beyond Guatemala. More than 3 billion people around the world cook and heat their homes with open fires and simple stoves, according to the World Health Organization (WHO). This contributes to respiratory illness, including lung cancer, asthma and chronic obstructive pulmonary disease. The WHO estimates that these diseases kill as many as 2 million people every year.

Guatemala's Department of Public Health dispatches young doctors to monitor pulmonary disease in rural villages like those around San Lorenzo. They administer common medicines and send more serious cases to hospitals. But they're understaffed and many villagers continue to treat diseases with traditional remedies, including nearly 60 different plants. Studies indicate that some of them have antibacterial powers – but often not enough.

1 Smoke from fires used for cooking and heating in Guatemala and much of the developing world contributes to respiratory illness, especially among infants.
2 Project manager Eduardo Canuz helps families in San Lorenzo and nearby villages replace wood fires with cleaner burning gas stoves.
3 Field worker Expedita Ramírez Marroquín fits a woman with a vest to monitor the levels of carbon monoxide she experiences during the day.
4 The hope is that cleaner household air, along with better care, will improve infant health.
5 A new gas stove attracts a crowd.

In Guatemalan health clinics, infants account for more than 60% of respiratory cases. However, coaxing their families away from stoves isn't easy. First, there's the challenge of establishing a distribution network for propane canisters so that the women can count on timely refills and at prices that compete with wood. The NACER team also struggles to open up space in small kitchens for the new equipment. And they must remind the women to wear small backpacks equipped with sensors to monitor the air and measure the particulates floating in it.

But perhaps the biggest challenge is cultural. Most of the people around San Lorenzo speak a Mayan language, Mam, and view the Spanish-speaking researchers as outsiders. And traditionalists – often husbands and mothers-in-law – tend to resist the new and cleaner technology. "It's hard to convince people over 50," Mr. Canuz says. "They want to keep burning wood." To convince these die-hards, NACER gives cooking classes and holds contests where people compete to make gas-cooked delicacies.

Lisa Thompson, coordinator of the doctoral program in global health services at the University of California, San Francisco, in the US, is running the pilot project around San Lorenzo. In the early 2000s, she led a preliminary effort to reduce smoke in villages by replacing open fires with wood-burning stoves called planchas. These stoves had chimneys, which routed some of the smoke out of the homes. Still, San Lorenzo and nearby villages remained polluted, with lots of smoke making its way into homes – and young lungs. So Ms. Thompson turned to gas.

The work, she says, doesn't end when babies are born. Field workers pay home visits to check on the babies' health, and new mothers are taught to look for early symptoms of pneumonia. If their babies are feverish and breathing fast, they're urged to rush to a clinic for treatment.

In addition to installing stoves, the NACER team is working to discourage pregnant women from bathing in the temazcales. These steamy huts, where water is splashed on heated stones, have sky-high levels of carbon monoxide (CO), which is especially dangerous for developing fetuses. Pregnant women often take a bath in the evening, right before going to bed. The combination of heat and CO induces sleep, Ms. Thompson says. "It's a very hard thing to change."

The San Lorenzo project is tiny, but the health risk of smoke inhalation is global. Ms. Thompson hopes that data from San Lorenzo, as well as lessons learned, will pave the way for a much larger effort featuring 3 200 pregnant women in Ghana, Rwanda, India and Peru.

For detail on **respiratory disease** research → page 47

Performance

Novartis delivered solid performance in 2016 while navigating the patent expiration of our biggest-selling drug. Growth products helped offset the impact of generic competition. Research and development continued to yield good results, with 16 major product approvals in 2016 and important advances in our pipeline. We also made progress with efforts to improve access to medicines worldwide.

48.5 bn
Net sales (USD)

9.5 bn
Free cash flow (USD)

6.7 bn
Net income (USD)

Key figures[1]

(in USD millions, unless indicated otherwise)

			% Change	
	2016	2015	USD	Constant currencies
Net sales to third parties from continuing operations	48 518	49 414	– 2	0
Operating income from continuing operations	8 268	8 977	– 8	– 3
Return on net sales (%)	17.0	18.2		
Net income from continuing operations	6 698	7 028	– 5	1
Net income from discontinued operations[2]		10 766		
Net income[2]	6 698	17 794	– 62	– 59
Basic earnings per share[3] (USD) from continuing operations	2.82	2.92	– 3	2
Basic earnings per share[2,3] (USD) from discontinued operations		4.48		
Total basic earnings per share[2,3] (USD)	2.82	7.40	– 62	– 59
Core operating income from continuing operations	12 987	13 790	– 6	– 2
Core return on net sales (%)	26.8	27.9		
Core net income from continuing operations	11 314	12 041	– 6	– 3
Core earnings per share[3] (USD) from continuing operations	4.75	5.01	– 5	– 2
Free cash flow from continuing operations	9 455	9 259	2	
Free cash flow	9 455	9 029	5	

[1] This Annual Report includes non-IFRS financial measures such as core results, constant currencies and free cash flow. Novartis believes that investor understanding of the Group's performance is enhanced by disclosing these non-IFRS measures. A definition of non-IFRS measures used by Novartis, and further details, including reconciliation tables, can be found starting on page 171.

[2] Net income from discontinued operations and net income of the Group in 2015 include exceptional divestment gains. Continuing and discontinued operations are defined on page 154.

[3] 2016 weighted average number of shares outstanding: 2 378 million (2015: 2 403 million)

Performance summary

Financial performance

Novartis delivered solid results in 2016, countering much of the effects of the loss of US patent protection during the year for our pioneering leukemia drug, *Gleevec*. This underscores the strength of our pipeline and our ability in recent years to renew our product portfolio and control costs to manage through important patent expirations. *Gleevec* follows *Diovan*, which lost exclusivity in 2011 in the EU and in 2012 in the US.

Our Innovative Medicines and Sandoz Divisions performed well under challenging circumstances. We were not successful in returning Alcon to growth in 2016, although we have begun to see the first results from the growth plan implemented during the year.

Net sales for Novartis in 2016 were USD 48.5 billion, down 2% in reported terms, but flat measured in constant currencies (cc) to remove the impact of fluctuations in exchange rates. While volumes grew 6 percentage points, that was offset by the negative impacts of 4 percentage points due to generic competition and 2 percentage points from lower prices.

We continued to face headwinds in 2016 from currency fluctuations, with the rising value of the dollar adversely affecting our reported sales and income. This continues a trend we have seen for several years, particularly in 2015 when currency fluctuations had a negative 10% impact on sales. To help investors assess the impact of exchange rates on our performance, we also indicate growth rates in constant currencies.

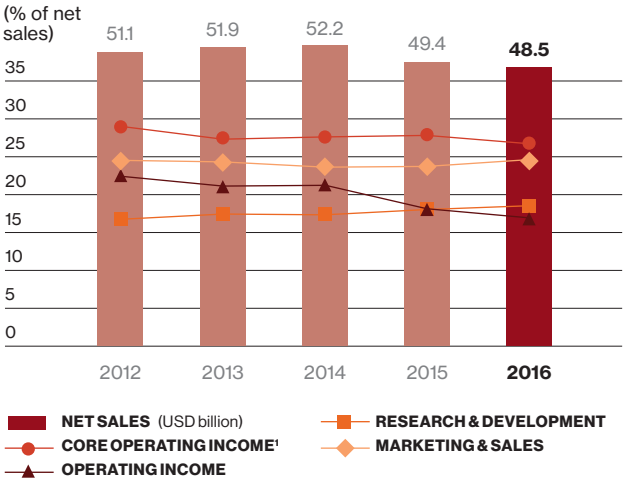
In 2016, our growth products[2] contributed USD 17.1 billion, or 35% of net sales. These include *Gilenya* for multiple sclerosis, up 14% (cc) to USD 3.1 billion; *Cosentyx* for psoriasis and two other immune-related illnesses, which reached blockbuster status with sales of USD 1.1 billion; *Jakavi* for blood cancer, up 45% to USD 581 million; and the combination cancer therapy *Tafinlar* + *Mekinist*, acquired from GSK during 2015 (USD 672 million).

Biopharmaceutical products from Sandoz also continued to be a bright spot, rising 31% (cc) to USD 1.0 billion.

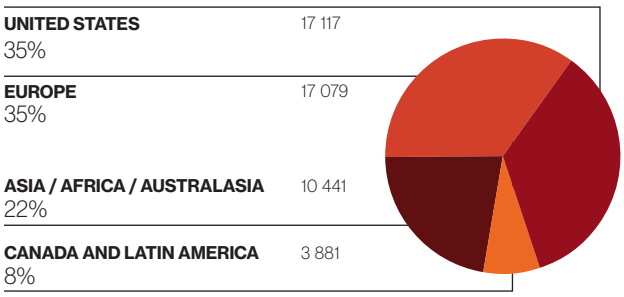
Sales of heart failure drug *Entresto* grew steadily during the year and totaled USD 170 million. We continued to increase our investment in its launch, devoting additional resources during the year to educating doctors and patients about its benefits.

Operating income in 2016 was USD 8.3 billion (–8%, –3% cc), down mainly due to the effects of patent expirations and increased investments related to new product launches, including *Entresto* and *Cosentyx*, and the Alcon growth plan.

Net sales, operating income, core operating income,[1] research & development, marketing & sales from continuing operations as % of net sales



2016 net sales from continuing operations by geographical region
(% of net sales and in USD millions)



UNITED STATES	35%	17 117
EUROPE	35%	17 079
ASIA / AFRICA / AUSTRALASIA	22%	10 441
CANADA AND LATIN AMERICA	8%	3 881
TOTAL		**48 518**

[1] This Annual Report includes non-IFRS financial measures such as core results, constant currencies and free cash flow. Novartis believes that investor understanding of the Group's performance is enhanced by disclosing these non-IFRS measures. A definition of non-IFRS measures used by Novartis, and further details, including reconciliation tables, can be found starting on page 171.

[2] "Growth products" are an indicator of the rejuvenation of the portfolio, and comprise products launched in a key market (EU, US, Japan) in 2011 or later, or products with exclusivity in key markets until at least 2020 (except Sandoz, which includes only products launched in the last 24 months). They include the acquisition effect of the GSK oncology assets.

Performance summary
continued

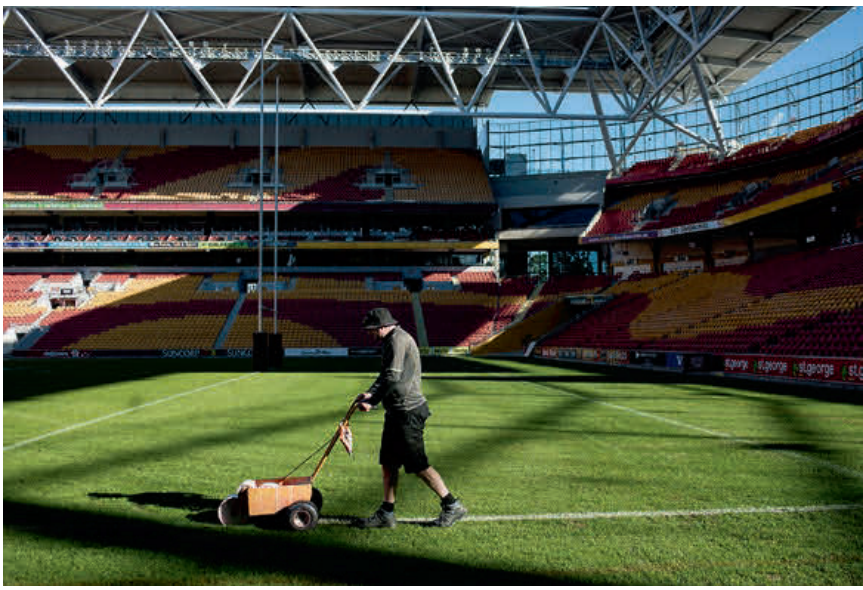
Net income from continuing operations was USD 6.7 billion, down 5% in reported terms, but up 1% in constant currencies, due to higher income from associated companies. Earnings per share from continuing operations were USD 2.82 (–3%, +2% cc), up more than net income due to a reduction in the average number of shares outstanding.

Free cash flow from continuing operations was USD 9.5 billion, up 2%, reflecting lower net investment in property, plant and equipment.

To help investors track our underlying performance, we also present our core results, which exclude the impact of disposals, acquisitions, restructurings and other significant items.

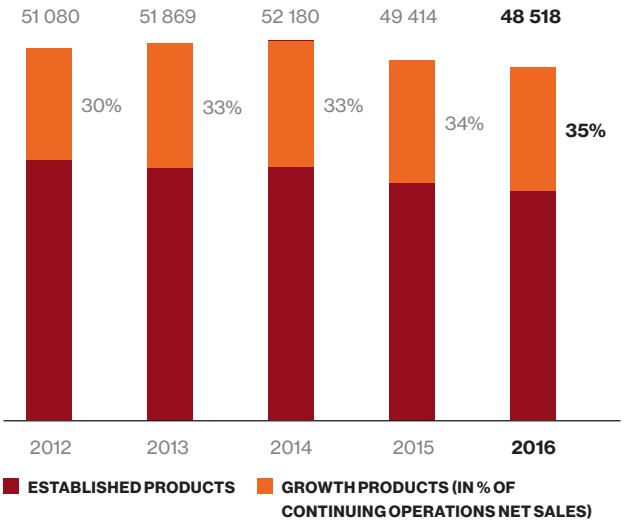
Core operating income was USD 13.0 billion (–6%, –2% cc). Our core operating income margin measured in constant currencies declined 0.7 percentage points, due to the *Gleevec* patent expiration and our investments in new product launches and the Alcon growth plan. Changing exchange rates had a further negative impact of 0.4 percentage points, resulting in a net decrease of 1.1 percentage points to 26.8% of net sales.

Core net income was USD 11.3 billion (–6%, –3% cc). Core earnings per share were USD 4.75 (–5%, –2% cc), declining less than core net income due to fewer outstanding shares.



In Brisbane, Australia, groundskeeper and skin cancer survivor Malcolm Caddies protects himself from the sun as he prepares the field for a rugby match at Suncorp Stadium.

Contribution of growth products[1]
(continuing operations net sales in USD millions, % of continuing operations net sales)



[1] Since 2010, to demonstrate the rejuvenation of our portfolio, we have separately reported the net sales and growth rate of our newer products. During the years 2010 through 2012, these included products launched in 2007 or later (except for Sandoz products, which were included only if launched within the preceding one to two years). Beginning in 2013, we moved to a slightly different definition of "growth products," which included products launched within the preceding five years, or products with exclusivity in key markets (EU, US, Japan) for at least the next four years (except for Sandoz products, which were included only if launched within the preceding 24 months).

Productivity

Efforts to improve productivity are delivering results. Novartis Business Services (NBS), our shared services organization, continued to leverage the global scale of Novartis to streamline and consolidate our operations. For example, we reduced the number of information technology applications we use, consolidated facilities services from more than 100 suppliers to just three, and initiated the standardization of infrastructure services at selected manufacturing sites, among other steps. In addition, NBS continued to optimize its footprint through selective offshoring to five global service centers.

NBS, as well as our newly created Global Drug Development (GDD) organization and global Novartis Technical Operations (NTO) group, will continue to drive the pursuit of greater efficiency and effectiveness. We anticipate that the benefits of the new GDD and NTO organizations will yield more than USD 1 billion in annual cost savings by 2020.

Innovation performance

We made significant progress in research and development in 2016, with 16 major approvals in key markets and 24 major submissions. We also reported positive clinical data for key molecules, helping to bolster our broad pipeline of products in development. We believe we have up to 12 drugs in our pipeline with the potential to become blockbusters.

We believe we have up to 12 drugs in our pipeline with the potential to become blockbusters

Oncology

Several targeted therapies designed to tackle abnormalities in cancer cells achieved significant milestones in 2016. We filed for regulatory approval in the US and EU to market LEE011 (ribociclib) in combination with letrozole for the treatment of a particular type of breast cancer. In a pivotal Phase III trial, LEE011 plus letrozole significantly extended progression-free survival over letrozole alone in postmenopausal women with hormone receptor-positive (HR+)/human epidermal growth factor receptor 2-negative (HER2-) advanced or metastatic breast cancer, which tends to be aggressive and difficult to treat. The study evaluated the combination as a first-line treatment. The US Food and Drug Administration (FDA) granted priority review for LEE011 plus letrozole after designating the combination a breakthrough therapy for the disease. Such designations are intended to expedite the development and review of potential new medicines that treat serious or life-threatening conditions.

We also filed to market targeted therapies in lung and blood cancer. We filed our ALK inhibitor *Zykadia* in the US and EU for a new indication as a first-line treatment for ALK+ non-small cell lung cancer. Approximately 2–7% of people with the disease have the ALK gene rearrangement. Our *Tafinlar* + *Mekinist* combination was filed in the US and EU with a new indication as a first-line treatment for non-small cell lung cancer patients with a BRAF V600 mutation. BRAF V600 mutations promote tumor growth. In addition, PKC412 (midostaurin) in combination with standard induction and consolidation chemotherapy was filed in the US and EU for adult patients with newly diagnosed acute myeloid leukemia (AML) with an FLT3 mutation. Like BRAF V600 mutations, FLT3 mutations promote tumor growth.

Ruxolitinib was designated a breakthrough therapy by the FDA for acute graft-versus-host disease (GVHD), a dangerous complication of stem cell transplants. Ruxolitinib, originally developed by Incyte Corporation, is marketed by Incyte Corporation as Jakafi® in the US and by Novartis as *Jakavi* outside the US to treat blood cancers myelofibrosis and polycythemia vera. We have now acquired rights to develop and commercialize this therapy for GVHD outside the US.

Novartis also made progress beyond targeted therapies for cancer. We reported pivotal clinical data on CTL019 – a personalized cell therapy developed in collaboration with the University of Pennsylvania in the US – in pediatric and young adult patients with relapsed/refractory B-cell acute lymphoblastic leukemia, and we plan to file for marketing approval in early 2017. CTL019 harnesses the body's immune system to fight cancer cells and is among the first personalized cell therapies for cancer to be developed in the world.

Immunology and dermatology

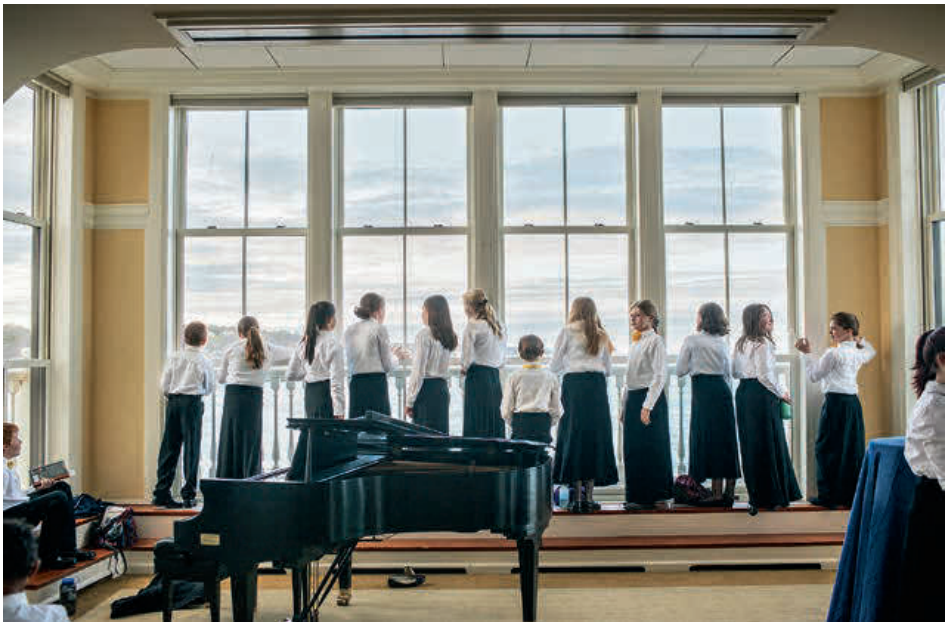
We continue to build on the launch of *Cosentyx*, the first approved fully human monoclonal antibody that selectively binds to circulating interleukin-17A, which plays an important role in driving the body's immune response in several disorders. In 2016, we received FDA approval for *Cosentyx* to treat patients with ankylosing spondylitis (AS) and psoriatic arthritis (PsA), which are both painful and debilitating inflammatory diseases that affect the joints and/or spine. The two new indications follow FDA and EU approvals in January 2015 for *Cosentyx* to treat moderate-to-severe plaque psoriasis, and European approval in November 2015 to treat AS and PsA.

Novartis also expanded the use of *Ilaris*, an interleukin-1 beta inhibitor. In 2016, the European Commission approved a license extension for *Ilaris* to treat patients with adult-onset Still's disease, and the FDA approved the drug for three rare and distinct types of periodic fever syndromes, also known as hereditary periodic fevers. Earlier in the year, *Ilaris* was granted breakthrough therapy status and priority review by the FDA for each of the three periodic fever syndromes.

Neuroscience

We reported positive clinical trial results for two important molecules in our neuroscience pipeline: BAF312 (siponimod) and AMG 334 (erenumab). A Phase III study showed that BAF312 reduces the risk of disability progression in patients with secondary progressive multiple sclerosis, a condition with few available treatment options. We also announced positive results for two Phase III studies of AMG 334 in episodic migraine prevention, and for a Phase II study of AMG 334 in chronic migraine prevention. In these studies, patients who received AMG 334 experienced fewer monthly migraine days than patients who received placebo.

Performance summary
continued



Elsa Anderson and her classmates prepare for a choral performance in Rockport, Massachusetts in the US. Her mother, Jennifer Allport-Anderson, is a researcher at the Novartis Institutes for BioMedical Research (NIBR) in Cambridge, Massachusetts.

Eye care
In 2016, we received EU approval for *Lucentis* (ranibizumab) – an anti-vascular endothelial growth factor agent – in a new indication. Originally approved for wet age-related macular degeneration, the drug can now be used to treat a wide range of conditions that share a common feature: the growth of abnormal blood vessels under the retina. The latest approval is for the treatment of visual impairment due to choroidal neovascularization associated with causes other than neovascular age-related macular degeneration or secondary pathologic myopia. Genentech has commercial rights to *Lucentis* in the US, and Novartis has exclusive rights in the rest of the world.

Our eye care division, Alcon, launched two new surgical technologies – the *CyPass* Micro-Stent and the *NGENUITY* 3D Visualization System – for the treatment of eye diseases. The *CyPass* Micro-Stent, approved by the FDA in July, is a minimally-invasive glaucoma surgery device that is implanted at the time of cataract surgery. It is designed to lower pressure in the eye and thereby help reduce the potential for tissue damage that's characteristic of primary open-angle glaucoma. The *NGENUITY* 3D Visualization System is an imaging platform that helps vitreoretinal surgeons better visualize the delicate tissues at the back of the eye during surgery.

We also launched *Dailies Total1* Multifocal and *Air Optix plus HydraGlyde*, contact lenses featuring new technologies.

Biosimilars
The FDA approved our biosimilar *Erelzi* (etanercept-szzs) to treat multiple inflammatory diseases. *Erelzi* is the second biosimilar from our Sandoz Division to be approved in the US under the new biosimilar pathway created in the Biologics Price Competition and Innovation Act of 2009. A confirmatory clinical safety and efficacy study demonstrated that *Erelzi* is equivalent to reference product Enbrel®. The biosimilar launch is pending litigation with Amgen, the manufacturer of Enbrel®.

Our biosimilar *Binocrit* (epoetin alfa) was approved in the EU for a new route of administration based on data from a study in pre-dialysis and dialysis patients with anemia associated with chronic kidney disease. We are currently evaluating options for an epoetin alfa filing in the US.

Filings were accepted in the EU in 2016 for our pegfilgrastim and rituximab biosimilars. In 2017, we plan to submit filings for adalimumab in the US and EU, rituximab in the US, and infliximab in the EU. We remain on track to launch five major biosimilars across both key geographies by 2020, adding to the three Sandoz biosimilars already on the market worldwide.

Operations

In 2016, we centralized all drug manufacturing operations into a new organization with the aim of optimizing capacity planning and improving efficiency and effectiveness, further supporting our ability to implement the Novartis strategy. Novartis Technical Operations (NTO) includes about 28 000 employees and nearly 70 manufacturing sites supplying products worldwide.

The new unit has been organized by technology platforms to facilitate simplification, standardization and procurement savings. The technology platforms include Chemical Operations, Anti-Infectives, Aseptics, Biologics, Solids and External Supply Operations. They are supported by the Global Engineering and Supply Chain Management functions.

An early benefit of integration has been better resource allocation. The larger scale of NTO allows for more flexible capacity planning, and provides the opportunity to further consolidate our supplier base and improve cost and performance. For instance, the Biologics platform, which was formed before the official launch of NTO, has used its experience in balancing manufacturing capacity and sharing knowledge across its network to respond to greater-than-expected demand for products such as *Cosentyx*.

Additionally, the new structure has made it easier to invest in future manufacturing technologies, such as innovative solutions in biologics.

Novartis also began a realignment of its quality organization in 2016. We are creating an integrated, enterprise-wide organization, replacing the prior divisional structure. This change, like others Novartis made last year, aims to maximize the benefits of the company's global scale.

Out of a total of 206 inspections in 2016, all but four (98%) were without major findings

The Group Quality function operates under single leadership within Novartis, built around teams responsible for quality within GDD, NTO and NBS, and for coordinating quality activities in the countries. New leadership positions were created, including Head of Quality for GDD, Head of Quality for NTO, and Head of Country Quality.

This integrated model enables the quality organization to simplify and standardize processes and systems, strengthening its partnership with other functions in the company. It also supports our long-standing commitment to quality improvement, offering new opportunities for sharing knowledge and best practices, and facilitating the exchange of skills and expertise.

The results of inspections by regulatory agencies in 2016 were consistent with the year before. Out of a total of 206 inspections, all but four (98%) were without major findings.

People

Our ability to effectively implement the Novartis strategy depends on the performance of our people. In 2016, we focused on introducing our company's new operating model in a way that enables employees to respond to new opportunities and challenges. We also strengthened the company's leadership team and made progress in developing our diverse pipeline of talented people.

People performance indicators [1]

	2016	2015
Full-time equivalent positions / headcount [2]	**118 393 / 122 985**	118 700 / 122 966
Turnover: % voluntary / % overall	**7.4 / 12.2**	7.3 / 13.5
Voluntary turnover of high performers (%) [3]	**5.8**	5.5
Internal hires / external hires (%)	**47.0 / 53.0**	44.8 / 55.2
Women in management: % of management [4] / % of Board of Directors	**42 / 25**	41 / 27
Associate nationalities / associate nationalities in management [4]	**142 / 109**	145 / 109
Annual training hours per employee	**27.8**	27.3

[1] Continuing operations
[2] Headcount reflects the total number of associates in our payroll systems. Full-time equivalent adjusts headcount for associates working less than 100%. All data as of December 31
[3] We have refined the high-performer definition methodology to reflect the focus on Values and Behaviors, and have restated 2015 data.
[4] Management defined locally

Performance summary

continued

Organizational design and change management

In 2016, Novartis implemented significant changes to the company structure. When our new structure went live on July 1, 38 000 employees – or about a third of the workforce – were realigned to new business organizations. We took significant steps to prepare for this transition for our employees and our business. Human resources professionals received tools to help them partner effectively with business managers. In addition, online training courses guided managers and employees through the challenges they could encounter. More than 9 300 managers and staff have completed this training since it was introduced in 2014.

Throughout the year, we sought feedback from employees in a series of surveys, focus groups and interviews. For example, a survey of leadership teams found that 84% of respondents understood the rationale behind the changes at Novartis.

Our new structure and operating model require employees to work in new ways, collaborating across organizational boundaries. The cultural shift is being driven by our senior leaders, 260 of whom met in September to align on the future direction of the company, define roles and responsibilities, and discuss how the culture needed to evolve with an emphasis on collaboration. Following the meeting, participants received materials and workshop tools that enabled them to educate and motivate their teams about the new operating model and to align their teams around strategic priorities. The rollout began in late 2016 and will extend into early 2017.

Our new structure and operating model require employees to work in new ways, collaborating across organizational boundaries

Reinforcing talent, capabilities and leadership

In 2016, Novartis also made significant changes to its leadership team, including establishing new heads of the Novartis Institutes for BioMedical Research (NIBR), the Novartis Pharmaceuticals business unit and our Alcon Division, as well as a new Chief Ethics and Compliance Officer and Head of Litigation. In addition, the heads of GDD and the Novartis Oncology business unit became members of the Executive Committee of Novartis (ECN), in view of those organizations' importance to the company's future.

The Board of Directors had a detailed review of succession plans for the ECN and also received an update on our overall progress in the area of talent management.

Our five-year integrated talent and leadership strategy, introduced in 2015, guides the identification, assessment and development of high-potential employees. Some 74% of Novartis Top Leader positions (the company's 360 most senior executives) were filled internally in 2016, reflecting our commitment to developing talented individuals within the organization and accelerating their careers. To further strengthen succession plans for key leadership positions, we introduced assessment centers to identify and develop people with high potential. In 2016, 48 people were enrolled.

In tandem, the strategy focuses on identifying talented individuals outside the organization. This enables the proactive management of openings, and reduces the time necessary to fill senior positions.

The company is investing in data analytics to predict future workforce needs and help understand recruitment trends. Two pilots were conducted with NIBR in 2016. The first examined turnover data to identify people who were more or less likely to leave, and helped us to engage and retain key staff. The second addressed diversity, and identified ways to attract more female employees and help them progress further in the organization. We will scale up the use of data analytics tools in 2017.

The talent strategy also aims to increase management accountability for developing diverse teams and creating an inclusive work environment. Starting in 2016, the appraisal framework for all managers included a mandatory 20% objective measuring their people-related performance.

Reflecting this priority, we launched the Novartis Leadership Series in 2016 to improve the management capabilities of everyone leading a team of five or more people. These online training materials feature Novartis leaders and external experts sharing their experience and giving practical advice to help managers expand their knowledge and skills. The materials were used by 9 100 employees.

We made further progress in 2016 in diversifying our workforce. We achieved our initial aspiration of 25% female representation among Novartis Top Leaders. And we have 42% female representation in management. Measures we are taking include acquiring new talent, using focus group discussions to identify potential barriers to advancement, mentoring, and expanding leadership programs.

For example, we are expanding the Executive Female Leadership Program (EFLP) begun in the Pharmaceuticals Division in 2010. This year-long program offers intensive leadership experience for women, including coaching, workshops, and senior sponsorship and mentorship. Since inception, 147 female leaders have been involved

NIBR researcher Jennifer Allport-Anderson participates in a half-marathon in Ipswich, Massachusetts in the US.

in the program. Of these, 74% have since been promoted or moved roles, with a 91% retention rate. The EFLP and similar programs in other parts of the company are being expanded in 2017 to cover the whole of Novartis.

We are also pursuing greater cultural diversity. We implemented Emerging Market Talent Boards in Asia and Latin America, which facilitated 37 senior-level moves of talented individuals to new roles in 2016. In addition, our 12-month Emerging Market Early Talent Program had 22 participants in 2016.

Novartis continues to be recognized for its efforts in diversity and inclusion. Novartis Pharmaceuticals Corporation placed second in the US on DiversityInc's 2016 "Top 50 Companies for Diversity" list. Additionally, we ranked third in the Thomson Reuters global Diversity & Inclusion Index, and we were included in Working Mother's 2016 "100 Best Companies" list in the US. Novartis also ranked No. 11 on a list of the most empathetic global companies that was published in the Harvard Business Review.

Staff turnover rose modestly in 2016. Voluntary turnover of all staff was 7.4% in 2016 – versus 7.3% the prior year. That compares with an average 9.7% for the industry. However, we saw pockets of higher turnover in areas such as our global sales force and in some emerging markets with sharp competition for talent, including Thailand, Taiwan and China. Regular analysis has helped us better forecast groups at higher risk of leaving and enabled targeted retention efforts.

Voluntary turnover of high performers was 5.8% – compared to 5.5% in 2015. Voluntary turnover of Novartis Top Leaders was 5.6%. The ECN analyzed the risk of these people leaving and initiated mitigation plans where appropriate.

Strengthening the Novartis culture

The new Novartis structure and operating model have led to an even greater focus on the revised set of Novartis Values and Behaviors (V&Bs) introduced in 2015. These define the professional behavior we expect from our employees and highlight the need for collaboration, as well as innovation, quality, performance, courage and integrity. V&Bs are now incorporated into all people processes at Novartis, from recruitment to performance assessment. For more on our culture and values, see page 18. For more on doing business responsibly, see page 68.

Social performance

Expanding access to healthcare

In 2016, we combined several of our innovative access programs into a single group under unified leadership. Novartis Access, the Novartis Malaria Initiative, and Group social business (which operates in four countries under the name Healthy Family) now belong to a new unit called Novartis Social Business, led by a single individual: the Global Head of Novartis Social Business. Each program uses innovative approaches and business models to increase the health and well-being of patients in lower-income countries. By combining them, we aim to better leverage experience, learning and synergies across the programs.

More than 120 000 Novartis Access treatments were delivered to Kenya, Lebanon and Ethiopia since launch

Novartis Access, which focuses on the affordability and availability of 15 on- and off-patent medicines addressing key noncommunicable diseases (NCDs), launched in Kenya in 2015. It is offered to governments and public-sector customers in low- and lower-middle-income countries at a price of USD 1 per treatment per month. The first treatments were delivered to Kenya in February 2016. In total, more than 120 000 Novartis Access treatments were delivered to Kenya, Lebanon and Ethiopia since launch, each providing a one-month supply of medicine.

Performance summary
continued

In September, we signed a memorandum of understanding for the implementation of Novartis Access in Rwanda, and we expect the first product delivery in early 2017. We also signed a broad memorandum of understanding with the government of Vietnam, which covers NCD interventions such as Novartis Access. At the same time, to prepare for implementation elsewhere, we filed 370 applications for marketing authorizations for Novartis Access drugs with health authorities in 21 countries.

In 2016, the Novartis Malaria Initiative achieved another treatment milestone, having delivered more than 800 million treatments without profit – including more than 300 million dispersible pediatric treatments – mostly to the public sector of malaria-endemic countries since 2001. In December, we launched SMS for Life 2.0 in Kaduna State, Nigeria's third most populous region, in collaboration with the Kaduna State Ministry of Health. The program aims to increase the availability of essential medicines and to improve care for patients across the region by using simple, available and affordable technology.

In June, Novartis expanded its partnership with the Medicines for Malaria Venture (MMV) to develop next-generation antimalarial treatments. Novartis will lead the development of antimalarial compound KAF156 with scientific and financial support from MMV (in collaboration with the Bill & Melinda Gates Foundation).

The results of a small proof-of-concept study of our experimental antimalarial compound KAF156 were published in The New England Journal of Medicine in September, showing that KAF156 demonstrated activity against both vivax and falciparum malaria, including parasites resistant to today's artemisinin-based therapies. KAF156 is currently entering Phase IIb clinical development.

Our Healthy Family programs, which are innovative business models to reach more patients in rural areas in the developing world, continued their expansion. In 2016, they reached more than 7.7 million people through health education sessions in India, Kenya, Vietnam and Indonesia. Nearly 610 000 people attended specific health camps.

Novartis Oncology Access – a patient assistance program in emerging countries for *Glivec*, *Tasigna* and *Exjade* (our treatments for certain cancers and blood disorders) – and the *Glivec* International Patient Assistance Program (GIPAP) together reached more than 80 000 patients worldwide in 2016. Given changes in the healthcare environment since GIPAP was launched 14 years ago, starting in 2017, our longtime partner The Max Foundation will assume full responsibility for development and management of the program. Novartis Oncology will donate *Glivec* to The Max Foundation to supply patients currently eligible for GIPAP, and provide funding to The Max Foundation to support program operations.

Researcher Edmund Ekuadzi, an expert on the medical properties of plants, examines a specimen gathered in his homeland of Ghana.

In 2016, Sandoz further expanded New Life & New Hope, a program launched in 2015 in Ethiopia to improve maternal and child health and to reduce mortality associated with childbirth. The company supported a second wave of training for another 100 midwives in three new regions where the highest need to improve delivery skills was identified.

In 2016, our eye care division Alcon supported 646 medical missions, reaching more than 480 000 patients with eye conditions, and restoring sight for 58 000 patients through surgery. Through the US patient assistance program, Alcon also helped nearly 6 000 patients get the sight-saving medications they needed.

Doing business responsibly

In late 2015, we launched our Vision 2030 on Environmental Sustainability, which is underpinned by a set of environmental sustainability targets in four areas: energy and climate, water and micropollutants, materials and waste, and environmental sustainability management. Throughout 2016, a cross-divisional team began to select major facility and infrastructure projects and measures necessary to achieve our 2020 goals, based on the savings as determined by our internal carbon price

of USD 100/tCO_2e. We are identifying opportunities for contracting renewable wind and solar electricity as priority actions. At the same time, we found ways to improve our environmental footprint in our day-to-day operations, contributing to a reduction in carbon emissions of 10 kilotons in 2016.

Novartis has a number of initiatives to engage our associates, helping us to attract and develop talented people, strengthen our company's culture, and support our ability to execute our strategy. In 2015, we put in place a corporate volunteering platform through which Novartis associates can register a potential corporate responsibility project idea or sign up to become a corporate volunteer. The program expanded significantly in 2016, launching in several markets including low- and middle-income countries. The scope of projects in the platform is broad and includes partnerships with global charitable organizations, remote and on-the-ground capability building, one-time and recurring pro bono services, and local efforts to support smaller-scale foundations and institutions.

Ethics

To achieve our aspiration of being a trusted leader in changing the practice of medicine, we must act in ways that earn and maintain the trust of patients, governments and society. Operating ethically is simply the right thing to do and is fundamental to our success as a business.

Strengthening our culture of integrity

To continue to strengthen integrity and compliance across the company, we took a series of new steps in 2016. We updated and re-launched our Anti-Bribery Policy. We also launched a global online tool to handle actual, potential and perceived conflicts of interest transparently across the company. Additionally, we developed integrity case studies, inspired by real-life scenarios, for managers to use in discussions with their teams. To ensure accountability of local country organizations, our management includes integrity and compliance questions as part of standard business reviews.

One of our goals in 2016 was to find better and more inclusive ways to reach a broader cross-section of the medical community with information about our products. We began employing technology to supplement face-to-face meetings. For example, at meetings for the American Society of Clinical Oncology, the European School for Advanced Studies in Ophthalmology, and the American Society of Hematology, we used virtual conference platforms so that more doctors could access evidence-based data and product information without traveling to the venue.

Integrity and compliance training

All Novartis Group company associates are required to complete integrity and compliance training. The compliance e-training curriculum provides information to enable associates to make the right choices within their role and to perform with integrity.

In 2016, three courses were available: Code of Conduct, Social Media and Information Management. Three shorter and/or refresher courses were also delivered: Adverse Events, Data Privacy and Anti-Bribery.

Cases of misconduct

We take allegations of any inappropriate behavior very seriously, actively investigate them, and take appropriate disciplinary action. Associates can report suspected misconduct to the Business Practices Office (BPO) – an independent team that reports to the Group General Counsel. In 2016, the BPO initiated investigations of 1 707 reported cases related to misconduct; 893 were substantiated, including 401 that resulted in dismissals or resignations.

We will continue to invest significant efforts to embed a culture of compliance throughout our organization. For instance, we are strengthening the Integrity & Compliance (I&C) function, which now has approximately 375 full-time-equivalent employees who are dedicated to integrity and compliance at the local, regional and global levels. Of these employees, 175 were added in the past three years.

Recognition

In 2016, Novartis was recognized in several corporate responsibility rankings, including the Access to Medicine Index, where Novartis ranked No. 3, moving up one place versus 2014; Newsweek's Green Rankings; Corporate Knights' Global 100 Most Sustainable Corporations in the World Index; and the Dow Jones Sustainability World Index. Novartis also ranked as the second-highest pharmaceutical company in Fortune's 2016 "World's Most Admired Companies" list, and received an A- rating and recognition among category leaders in healthcare in the 2016 CDP Climate Score.

Novartis ranked No. 3 in the Access to Medicine Index, moving up one place versus 2014

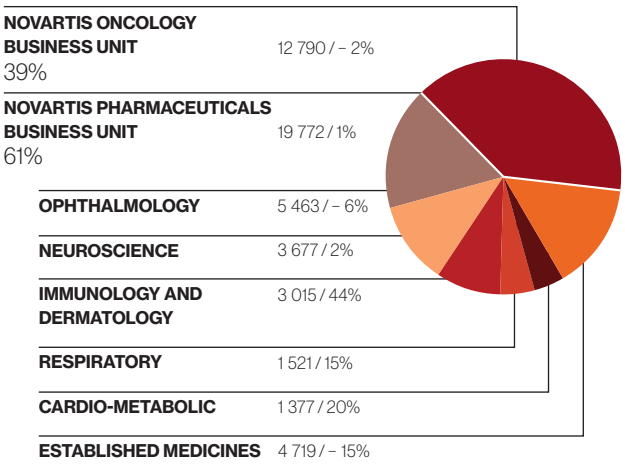
Innovative Medicines

In 2016, the Innovative Medicines Division offset the effects of the US patent expiration of *Gleevec* with increased sales of growth products, measured in constant currencies. This was a significant achievement and underscores our ability to renew our product portfolio.

The Innovative Medicines Division includes the Novartis Oncology and Novartis Pharmaceuticals business units. Novartis Pharmaceuticals focuses on the franchises of Neuroscience, Ophthalmology, Immunology and Dermatology, Respiratory, Cardio-Metabolic and Established Medicines. Novartis Oncology focuses on treatments for a variety of cancers and rare diseases.

Following changes to the divisional structure of Novartis in 2016, results for the Innovative Medicines Division include ophthalmic pharmaceuticals products transferred from Alcon. They also exclude some mature products that were transferred to Sandoz.

Innovative Medicines 2016 net sales by business unit and franchise
(in USD millions and growth in % cc[2])



Performance

Innovative Medicines Division sales were USD 32.6 billion, down 2% in reported terms, but in line with the prior year in constant currencies (cc). A 7% increase in volume was offset by the impact of generic competition (–6 percentage points) and price declines (–1 percentage point).

Sales performance varied by geography. Sales in Europe were USD 11.2 billion, up 7% in constant currencies, and reached USD 8.1 billion in emerging growth markets, up 6% (cc). In the US, sales declined 8% (cc) to USD 10.9 billion, mainly due to generic competition for *Gleevec* following loss of patent protection there in February. And in Japan, sales declined 10% (cc), due to generic competition and divestments.

Growth products contributed USD 14.8 billion, up 24% in constant currencies. These products – which include *Gilenya*, *Cosentyx*, *Entresto*, *Tasigna*, *Jakavi*, and the combination of *Tafinlar* + *Mekinist* – represented 45% of net sales, compared to 37% in 2015.

Operating income was USD 7.4 billion (–5%, 0% cc).

Core operating income, which excludes certain items, was USD 10.4 billion (–5%, –1% cc). Core operating income margin decreased 0.2 percentage points, mainly due to launch investments for *Entresto* and *Cosentyx*, but partially offset by productivity improvements. Fluctuations in exchange rates had a further negative impact of 0.6 percentage points, resulting in a net decrease of 0.8 percentage points to 31.8% of net sales.

Key figures

(in USD millions, unless indicated otherwise)

			% Change	
	2016	2015[1]	USD	cc[2]
Net sales	32 562	33 345	– 2	0
Operating income	7 426	7 815	– 5	0
Return on net sales (%)	22.8	23.4		
Core operating income[2]	10 354	10 862	– 5	– 1
Core return on net sales (%)	31.8	32.6		
Core Research & Development[2]	7 112	7 502	5	4
As a % of net sales	21.8	22.5		
Net operating assets	41 904	43 971	– 5	

[1] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016

[2] Constant currencies (cc) and core results are non-IFRS measures. A definition of non-IFRS measures used by Novartis, and further details, including reconciliation tables, can be found starting on page 171.

14.8 bn (USD) Sales of growth products such as *Gilenya*, *Cosentyx*, *Entresto*, *Tasigna*, *Jakavi*, and *Tafinlar* + *Mekinist*

Novartis Pharmaceuticals business unit

Ophthalmology
Sales in Ophthalmology were USD 5.5 billion (–8%, –6% cc), primarily reflecting declines in *Lucentis* (–11%, –8% cc), which continues to see increasing competitive pressure in Japan and some European countries.

Neuroscience
Neuroscience sales were USD 3.7 billion (+1%, +2% cc), with increases for *Gilenya* (+12%, +14% cc) being offset by lower sales of *Exelon* and *Exelon* Patch (–39%, –39% cc), due to generic competition for *Exelon* Patch in the US and EU.

Immunology and Dermatology
Sales in Immunology and Dermatology reached USD 3.0 billion (+41%, +44% cc). Sales of *Cosentyx* continued to accelerate, reaching USD 1.1 billion, versus USD 261 million in 2015. Gains for *Ilaris* (+20%, +22% cc) also helped offset declines in other products due to generic competition.

Respiratory
Respiratory sales were USD 1.5 billion (+11%, +15% cc). Our portfolio of drugs for chronic obstructive pulmonary disease (COPD) – including *Onbrez Breezhaler/Arcapta Neohaler*, *Seebri Breezhaler* and *Ultibro Breezhaler* – achieved sales of USD 655 million (+14%, +16% cc). Sales of *Xolair,* the first biologic drug approved for moderate-to-severe allergic asthma, reached USD 835 million (+11%, +15% cc), including as a treatment for chronic hives.

Cardio-Metabolic
Sales for the franchise were USD 1.4 billion (+19%, +20% cc). *Entresto* – which has been launched in more than 30 countries and benefited from a strong endorsement in updated clinical practice guidelines in the US and EU – continued to grow steadily and sales reached USD 170 million, up from USD 21 million in 2015. *Galvus* sales were USD 1.2 billion (+5%, +6% cc).

Established Medicines
Established medicines such as *Diovan* (USD 1.1 billion, –13% cc) and *Exforge* (USD 926 million, –8% cc) continued to see declines due to generic competition.

Novartis Oncology business unit

Oncology sales were USD 12.8 billion (–4%, –2% cc), nearly even with the prior year, despite declining sales of *Gleevec/Glivec* (–29%, –28% cc) due to generic competition in the US. That decline was largely offset by growth in other products. Products showing growth included the combination therapy *Tafinlar* + *Mekinist* (USD 672 million); *Votrient* (USD 729 million); *Promacta/Revolade* (USD 635 million); and *Jakavi*, up 45% (cc) to USD 581 million.

For further detail, see
→ **Condensed Financial Report at www.novartis.com/investors**

2016 news highlights

In January, Novartis received FDA approval for *Cosentyx* for the treatment of ankylosing spondylitis and psoriatic arthritis.

In May, *Entresto* was given a Class I recommendation – the strongest endorsement – in updated clinical practice guidelines simultaneously released by the American College of Cardiology, the American Heart Association and the Heart Failure Society of America in the US, as well as the European Society of Cardiology.

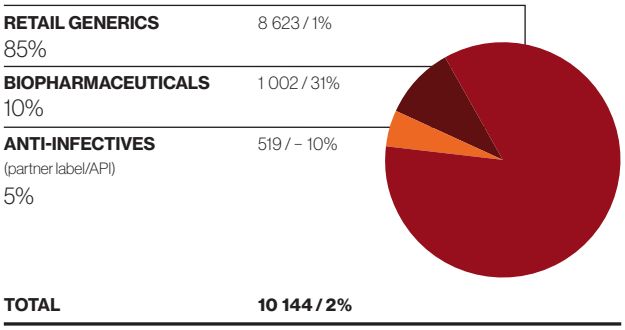
In November, Novartis announced that the FDA granted priority review for LEE011 (ribociclib) as first-line treatment of postmenopausal women with HR+/HER2- advanced or metastatic breast cancer in combination with letrozole.

Sandoz

Sandoz had solid performance in 2016, supported by continued growth in demand for its leading portfolio of generic and biopharmaceutical medicines. Sales increased in nearly every region, measured in constant currencies, contributing to higher earnings.

Sandoz makes an important contribution to the overall Novartis objective of expanding access to healthcare, offering approximately 1000 high-quality, affordable medicines to patients and healthcare professionals worldwide. The division has three global franchises: Retail Generics, Biopharmaceuticals and Anti-Infectives. Sandoz results include some mature products transferred from the Innovative Medicines Division during 2016.

Sandoz 2016 net sales by franchise
(in USD millions and growth in % cc[2])



Performance

Sandoz net sales in 2016 were USD 10.1 billion (+1%, +2% in constant currencies, or cc), with strong performance particularly in biopharmaceuticals (+31% cc). An 8 percentage-point increase in volume more than offset the negative 6 percentage-point effect of price erosion. Sales rose in Central and Eastern Europe (+7% cc), Western Europe (+3% cc), the US (+1% cc), Latin America (+11% cc), and the Middle East and Africa (+6% cc). Sales in Asia Pacific were comparable to the prior year (cc).

Operating income reached USD 1.4 billion, up 11% (+14% cc). Core operating income, which excludes certain items, was USD 2.1 billion (+1%, +4% cc). Core operating income margin in constant currencies increased 0.2 percentage points. However, that gain was partly offset by the negative 0.1 percentage-point impact of exchange rates, yielding a result of 20.4% of net sales.

Sandoz continued to build its portfolio of biopharmaceuticals, which now represents a USD 1 billion-plus business, with roughly half of that coming from the US. In 2016, our biosimilar *Erelzi* (etanercept-szzs) was approved in the US to treat the same inflammatory diseases as the reference product, Amgen's Enbrel®, with its launch pending litigation. In addition, our biosimilar *Binocrit* (epoetin alfa) was approved in the EU for a new route of administration. We are currently evaluating options for an epoetin alfa filing in the US. Filings were accepted in the EU for our pegfilgrastim and rituximab biosimilars.

Key figures
(in USD millions, unless indicated otherwise)

			% Change	
	2016	2015[1]	USD	cc[2]
Net sales	10 144	10 070	1	2
Operating income	1 445	1 300	11	14
Return on net sales (%)	14.2	12.9		
Core operating income[2]	2 071	2 045	1	4
Core return on net sales (%)	20.4	20.3		
Core Research & Development[2]	804	781	– 3	– 4
As a % of net sales	7.9	7.8		
Net operating assets	14 443	14 985	– 4	

[1] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016
[2] Constant currencies (cc) and core results are non-IFRS measures. A definition of non-IFRS measures used by Novartis, and further details, including reconciliation tables, can be found starting on page 171.

2.1 bn (USD) Sandoz core operating income, supported by strong sales growth in key markets

Mustafa plays in his temporary home in Bireh, Lebanon, where he and his extended family have lived since their home was destroyed in Homs, Syria, four years ago. His grandmother has diabetes and receives treatment at a local Red Cross clinic.

Retail Generics
Sandoz markets active ingredients, intermediates and finished dosage forms of pharmaceuticals. The Retail Generics franchise includes products in the therapeutic areas of dermatology, respiratory, oncology, transplantation and ophthalmics, plus finished dosage forms of anti-infectives sold under the Sandoz name. Franchise sales reached USD 8.6 billion (+1% cc).

Biopharmaceuticals
Sandoz markets protein- and other biotechnology-based products called biosimilars, as well as *Glatopa,* which treats a relapsing form of multiple sclerosis. Global sales of biopharmaceuticals grew 31% (cc) to USD 1.0 billion, benefiting from the US launches in 2015 of *Glatopa* and *Zarxio*, and the continued strong growth of other products already on the market.

Anti-Infectives
Sandoz sells pharmaceutical ingredients and intermediates (mainly antibiotics) under the Sandoz name and to third-party customers. Anti-infectives sold to third parties for sale under their own name were USD 519 million, down 10% (cc), because some low-margin products were discontinued and also due to a weak flu season in the first quarter of 2016. Total Anti-Infectives sales were USD 1.4 billion, down 2% (cc), and included sales of finished dosage forms sold under the Sandoz name of USD 860 million, up 4% (cc).

For further detail, see
→ **Condensed Financial Report at www.novartis.com/investors**

2016 news highlights

In May, Sandoz confirmed that the EMA had accepted our regulatory submission for rituximab, a biosimilar to Roche's EU-licensed MabThera®, a monoclonal antibody used in oncology and autoimmune diseases.

In August, the FDA announced that it had approved *Erelzi* (etanercept-szzs) as the second Sandoz biosimilar in the US. *Erelzi* is a biosimilar to Amgen's Enbrel®, which treats multiple inflammatory diseases.

In September, Sandoz confirmed that top-line results for a confirmatory clinical study showed that our biosimilar infliximab demonstrated equivalent efficacy to its reference product, Remicade®, used to treat autoimmune diseases. Sandoz announced in February that it had acquired rights from Pfizer to develop, commercialize and manufacture its biosimilar infliximab in the European Economic Area.

In September, Sandoz launched Sandoz HACk – short for Healthcare Access Challenge – a competition to generate, incubate and deliver innovative ideas with the potential to help solve global health problems. Winners will be announced in March 2017.

Alcon

2016 was a transition year at Alcon. The division concentrated its focus on eye care devices, invested in research and development to expand its product portfolio, and introduced new systems and capabilities to strengthen relationships with customers. Although we were unsuccessful in returning Alcon to growth in 2016, our efforts are starting to bear fruit.

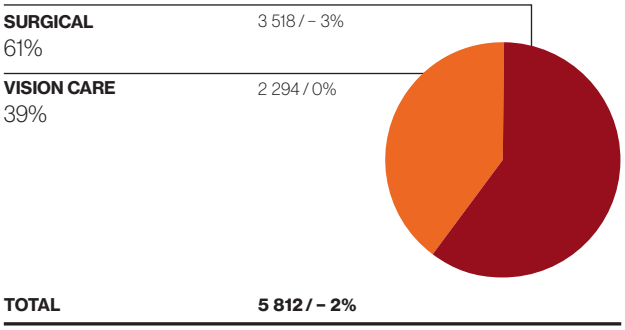
In a world with aging populations and growing needs for eye care, Alcon continues to enhance people's quality of life by helping them see better. Alcon's Surgical and Vision Care businesses together offer one of the world's widest selections of eye care devices – from sophisticated equipment for delicate eye surgery, to a wide portfolio of advanced contact lenses.

Results for the division no longer include ophthalmic pharmaceuticals products, which were transferred during 2016 to the Innovative Medicines Division as part of a change in the structure of Novartis.

Performance

Alcon implemented a growth plan in 2016 with emphasis on three areas: accelerating innovation and sales, strengthening customer relationships, and improving operations. Alcon launched new products during the year, including the *CyPass* Micro-Stent to treat glaucoma, the *NGENUITY* 3D Visualization System for retinal surgery, and a multifocal version of its innovative *Dailies Total1* contact lenses. Increased advertising and promotion for contact lenses helped return that segment to growth after several weak quarters.

Alcon 2016 net sales by franchise
(in USD millions and growth in % cc[2])



Alcon net sales in 2016 were USD 5.8 billion (–3%, –2% in constant currencies, or cc). Operating loss was USD 132 million, compared to income of USD 281 million the year before.

Core operating income, which excludes certain items, was USD 850 million (–31%, –27% cc), mainly due to increased investment in research and development, as well as higher spending on sales and marketing – both activities that were part of the Alcon growth plan. Core operating income margin in constant currencies decreased by 5.3 percentage points, and exchange rates added another 0.7 percentage points of negative impact, yielding a net decrease of 6 percentage points to 14.6% of net sales.

Key figures
(in USD millions, unless indicated otherwise)

			% Change	
	2016	2015[1]	USD	cc[2]
Net sales	5 812	5 999	– 3	– 2
Operating loss/income	– 132	281	nm	nm
Return on net sales (%)	– 2.3	4.7		
Core operating income[2]	850	1 235	– 31	– 27
Core return on net sales (%)	14.6	20.6		
Core Research & Development[2]	486	455	– 7	– 7
As a % of net sales	8.4	7.6		
Net operating assets	20 450	20 888	– 2	

nm = not meaningful
[1] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016
[2] Constant currencies (cc) and core results are non-IFRS measures. A definition of non-IFRS measures used by Novartis, and further details, including reconciliation tables, can be found starting on page 171.

5.8 bn (USD) Alcon net sales

Yuko Yoshikawa, whose vision is affected by eye disease, shelters her eyes from the sun as she shops near her home in Tokyo, Japan.

Surgical
Surgical sales declined 3% (cc) to USD 3.5 billion, mainly due to weaker performance of intraocular lenses, which faced competitive pressures, and slowing equipment sales (primarily *LenSx* for cataract surgery and *Wavelight* for refractive surgery, which have reached high penetration in their market segments). Those factors were partially offset by continued solid growth in sales of cataract disposable surgical supplies (4% cc). The Surgical business is making progress, improving service and supply levels in 2016 and laying the foundation for a return to growth.

Vision Care
Vision Care sales were flat in constant currencies at USD 2.3 billion. Growth in contact lenses offset a decline in contact lens care products. Increased advertising and promotion behind key brands helped return the contact lens segment to growth after several weak quarters. *Dailies Total1*, the first and only water-gradient lens, was the key driver.

For further detail, see
→ **Condensed Financial Report at www.novartis.com/investors**

2016 news highlights

In July, Alcon received FDA approval for *Air Optix plus HydraGlyde*, a silicone hydrogel contact lens featuring *HydraGlyde* Moisture Matrix technology for longer-lasting lens surface moisture.

In July, Alcon introduced *Dailies Total1* Multifocal contact lenses, which provide seamless distant, intermediate and near vision, and the comfort of the *Dailies Total1* water-gradient lens technology.

In September, Alcon launched the *NGENUITY* 3D Visualization System, a platform for vitreoretinal surgery. The system is designed to improve the surgeon experience through high-resolution 3D imaging of the back of the eye.

In October, Alcon launched the *CyPass* Micro-Stent, a surgical device to treat patients with glaucoma in conjunction with cataract surgery. Alcon announced its acquisition of Transcend Medical, which developed *CyPass*, in the first quarter of 2016 and received FDA approval for the device in July.

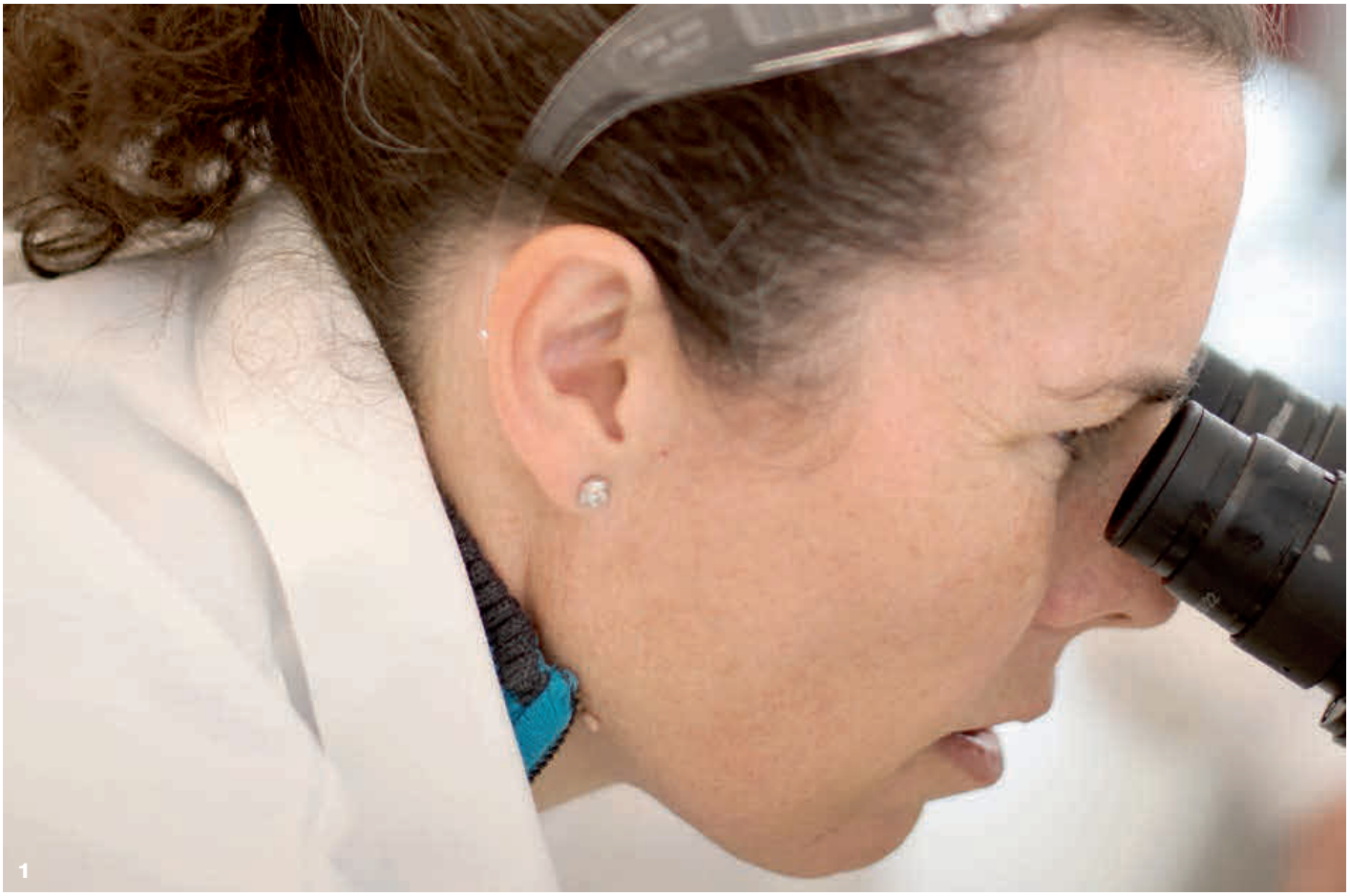


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PHOTO ESSAY

A cellular drama at the heart of a researcher's family

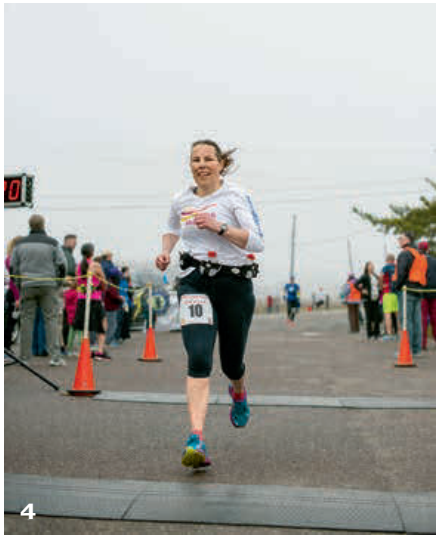
Early in her research career, Jennifer Allport-Anderson lived human dramas on two vastly different scales. One was at home, with her husband and growing family, and the other was in the laboratory, where she studied the biology and behavior of our cells. At first, these two worlds didn't appear to have much in common.

The cellular world, in many ways, provided more surprises. Ms. Allport-Anderson, a cell biologist who now leads a heart failure and in vivo pharmacology team at the Novartis Institutes for BioMedical Research (NIBR) in Cambridge, Massachusetts in the US, still describes cells as almost like people acting in sweeping dramas. "I tend to anthropomorphize," she says. "I love to think of cells going about their business."

Thirteen years ago, her two worlds started to merge as the cellular drama she was studying began to play out in her own family. It started in 2003, when her brother-in-law, Scott, barely in his 40s, suffered a massive heart attack.

A year later, Ms. Allport-Anderson joined NIBR to help discover new medicines for diseases such as heart failure. Their relevance to her life was acute and growing. Her mother-in-law fell into decline, eventually dying at age 77, most likely from heart arrhythmia or

1 Jennifer Allport-Anderson sees life dramas reflected in the cells she studies.
2 Her two daughters are on swimming teams, supporting good heart health. Here, 10-year-old Corinne heads to swim practice.
3 Over the last 15 years, some family members have suffered from cardiovascular disease and diabetes, adding to the sense of urgency behind Ms. Allport-Anderson's research.
4 Family health issues prompted Ms. Allport-Anderson to adopt an active lifestyle. Here she runs a half-marathon in Ipswich, Massachusetts in the US.



a stroke. And in 2005, her husband, Keith, was diagnosed with hypertension and prediabetes.

This led to changes. Ms. Allport-Anderson and her husband both wanted to maximize the chances that their two daughters would grow up healthy and with healthy parents. He dieted and she focused on healthy, home-cooked family meals. She also started running. Within a couple of years, he had lost 125 pounds and she was running marathons. (She has run five to date.)

Ms. Allport-Anderson's two worlds each offered their own response to cardiovascular disease. At home, it was exercise and diet. At work, it was carrying out early research for new treatments.

Heart failure is a complex disease, and the underlying cause can vary from person to person. Scientists – including Ms. Allport-Anderson and her team – are working to uncover the cellular mechanisms behind the disease and to identify new strategies for treatment. Her group is particularly interested in exploring cell-signaling pathways that drive heart failure and finding ways to intervene.

On a spring evening, Ms. Allport-Anderson and her family gather at their home in suburban Boston to watch the Kentucky Derby horse race on TV. From Ms. Allport-Anderson's perspective, the room might as well be a laboratory for coronary health. The adults seated around the TV are on medications for various illnesses, ranging from heart disease to diabetes.

But her two daughters appear poised to break the pattern. They're both competitive swimmers. Ten-year-old Corinne is in near-constant motion and at one point does a few pushups in front of the TV, clapping her hands between each one. And that very morning, Ms. Allport-Anderson ran a half-marathon. Her strategy, after all, is to battle heart disease from every angle, and the key – from home to the laboratory – is to take action.

Innovation

Our researchers are reimagining medicine, working to invent and develop treatments that could improve and extend people's lives. In 2016, we updated our research strategy in response to changes in the world of biomedical research. We also aligned our research and development (R&D) activities to more rapidly and efficiently translate discoveries into better options for doctors and patients. Our teams made progress toward fighting devastating diseases ranging from breast cancer to multiple sclerosis to malaria.

9.0 bn
Research and development spending in 2016, amounting to 18.6% of net sales (USD)

23 000
Scientists, physicians and business professionals working in research and development worldwide

200 +
Projects in clinical development

Updated research strategy

We updated our research strategy in an effort to ensure that we remain a discovery powerhouse. We are increasing collaboration across traditional scientific and organizational boundaries, and focusing on powerful new technologies.

→ page 41

Global Drug Development

In 2016, we created a Global Drug Development group to oversee clinical development of new medicines for all therapeutic areas, with the aim of improving our effectiveness and efficiency at delivering important new treatments to doctors and patients.

→ page 42

Progress in key disease areas

We focus our R&D efforts on disease areas where there is still significant need for better treatment options and where we believe our skills may help bring new solutions.

→ **Oncology** page 42
→ **Cardiovascular** page 46
→ **Respiratory** page 47
→ **Immunology and dermatology** page 47
→ **Neuroscience** page 48
→ **Eye care** page 50
→ **Biosimilars** page 51
→ **Infectious diseases** page 51

Research and development remains the core of the Novartis strategy and a foundation of our future. We invested USD 9.0 billion on research and development for new drugs and medical devices in 2016, or 18.6% of net sales.

We also took significant steps aimed at further improving the effectiveness and efficiency of our research and development activities, which harness the talent of 23 000 scientists, physicians and business professionals. We refreshed our research focus in response to a wave of scientific innovation that is opening new avenues to creating novel therapies. We formed a Global Drug Development (GDD) organization with representation on the Executive Committee of Novartis to gain economies of scale and facilitate optimum resource allocation to the most promising new drug candidates. And we moved to enhance collaboration between our research and development organizations in an effort to ensure that promising compounds coming out of the lab make it more quickly into clinical development, with large-scale testing in patients.

Our overall aim is to better leverage the scale of our organization to bring important new treatments to market faster and at a lower cost.

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To focus our resources, we completed a portfolio prioritization exercise for projects in development, which led to the acceleration of certain projects and the termination of others. For instance, we increased support for the development of a molecule in early-phase testing for fatty liver disease, a growing problem tied to the global obesity epidemic, as well as for a portfolio of biosimilars – biological medicines with comparable quality, safety and efficacy to existing products – that could improve access to important treatments. We're concentrating on therapies we believe have the greatest potential to change the practice of medicine, with more than 200 projects in progress.

Discovery

The Novartis Institutes for BioMedical Research (NIBR) is the innovation engine of Novartis. In 2016, we updated our research strategy in an effort to ensure that we remain a discovery powerhouse. We are increasing collaboration across traditional scientific and organizational boundaries, with a focus on powerful new technologies that have the potential to help produce therapeutic breakthroughs.

Researchers have used the standard tools of biology and chemistry to develop many successful treatments, and we'll continue to employ them. But we recognize that these tools leave many drug targets – key proteins and nucleic acids known to play a role in disease – out of reach. We would like to hit these targets to fight disease, but they've dodged the conventional molecules in our arsenal. To address this challenge, we are blazing a new path: organizing our early discovery efforts around a scientific approach called chemical biology.

Chemical biology brings together experts from different fields – including biology, chemistry and computer science – to create new types of molecules and use them to probe biological systems. Our teams are increasingly breaking down barriers between fields to make progress toward tackling difficult targets. For instance, one team includes biochemists, structural biologists and others, all working to invent molecules that could influence the cell's own system for degrading proteins. The goal is to degrade particular proteins that we can't approach with conventional molecules.

This approach to drug discovery requires researchers to make connections across the company and beyond. We aim to strengthen ties to academic labs and biotechnology companies generating disruptive tools and technologies that may significantly accelerate our work.

To encourage collaboration, we're recruiting a faculty of scholars, inviting some of the brightest minds in academia to work in our labs. We're making it easier for Novartis teams to share compounds with labs outside the company to help advance science more quickly. And we continue to form strategic alliances when appropriate. In 2016, for example, Novartis signed a deal with Xencor to access bispecific antibodies for immuno-oncology. These antibodies latch onto two targets instead of one to harness and direct the power of the immune system against cancer.

Our brand of chemical biology is directed at the discovery of potential therapies. When molecules are ready for testing in humans, we organize proof-of-concept studies enrolling small numbers of patients to make an early assessment of a drug's safety and effectiveness.

Innovation
continued

Development

After a successful proof-of-concept study, our development team decides whether to begin larger clinical trials to test effectiveness and safety in additional patients. Development leaders attend key NIBR meetings so they're familiar with projects headed their way, enabling them to act quickly. We pursue therapies where we can leverage the scale and expertise of Novartis development to bring important treatments to patients globally.

In 2016, we created a single GDD group to manage development for all of our therapeutic areas, advancing molecules ranging from checkpoint inhibitors for cancer to a peptide for heart failure to biosimilars for a variety of diseases. This work was previously conducted separately by several organizations within the company. By integrating our development organization, we aim to leverage our collective strength. We can now look at our entire mid-stage pipeline across our Innovative Medicines and Sandoz businesses to identify projects that hold the most promise and take steps to ensure they are properly resourced.

We are also rethinking how we execute clinical trials, seeking opportunities to improve and streamline our processes. We're evaluating how we structure teams, design studies, select clinical sites, gather data and perform other tasks, sharing lessons learned across GDD. We're also building world-class functions, including in clinical sciences, biostatistics and project management, by bringing together experts who were previously isolated in pockets of the company.

Digital technologies play a major role in our efforts. For example, they are helping us expand clinical trial access beyond patients who can easily visit conventional study sites. Through automated data capture and advanced analytics, we can perform certain procedures remotely, reducing the need for frequent in-person visits. Such technologies have the potential to make an important contribution to improving the quality and efficiency of our clinical trial operations.

Our goal is to bring more innovative medicines to more patients more efficiently than any other drug development organization in the world. By assessing our operations and making adjustments, we can accelerate the delivery of innovation across our therapeutic areas.

In 2016, we saw significant progress in several areas, with important clinical trial readouts still on the horizon. Highlights include filing for regulatory approval for LEE011 (ribociclib) in hormone receptor-positive (HR+)/human epidermal growth factor receptor 2-negative (HER2-) advanced or metastatic breast cancer; gaining approval of the *CyPass* Micro-Stent, a minimally-invasive glaucoma surgery device; and achieving positive clinical trial results for BAF312 (siponimod) in secondary progressive multiple sclerosis. We also look forward to reporting pivotal data on RLX030 (serelaxin), a potential treatment for heart failure, and on other key molecules, including biosimilars, in 2017.

Oncology

Although cancer death rates have decreased in some countries, the disease remains the world's No. 2 killer. New cases are expected to rise as the global population grows and ages. In Europe, cancer recently passed cardiovascular disease as the No. 1 killer.

Novartis remains a leader in developing targeted therapies, which have improved the prognosis for certain cancers. We currently have 17 such compounds – designed to exploit the genetic mutations of cancer cells – in confirmatory development. We're also investing in a different approach: immunotherapy. A new wave of cancer treatments harnesses the immune system to fight the disease, and we're growing a portfolio in this space, with 12 assets in clinical testing.

A new wave of cancer treatments harnesses the immune system to fight the disease, and we're growing a portfolio in this space, with 12 assets in clinical testing

Existing immunotherapies work well in certain types of cancer. In an effort to help more patients, we're exploring combinations of targeted therapies and immunotherapies, drawing on our deep pipeline to accelerate this work. We're concentrating on five tumor types: breast, lung, skin, blood and kidney. Beyond these tumor types, we are pursuing opportunities – including in rare diseases – as they arise. The goal is to find the right molecule, or combination of molecules, for each patient.

Breast cancer

Breast cancer is the most common cancer in women and is responsible for more than 500 000 deaths worldwide per year. We have six compounds in development for the disease, with a focus on HR+ breast cancer. We're testing these compounds in more than 25 combinations, which have the potential to prevent tumors from

becoming drug-resistant. While tumor cells can dodge a targeted therapy by acquiring new mutations, lab studies show that they struggle to evolve resistance when faced with more than one therapy at a time.

In November, we announced that the US Food and Drug Administration (FDA) granted priority review for LEE011 as first-line treatment of postmenopausal women with HR+/HER2- advanced or metastatic breast cancer in combination with letrozole. A priority review designation requires the FDA to take action on an application within six months of its filing, compared to 10 months under standard review. We also announced in November that the European Medicines Agency has accepted the marketing authorization application for LEE011 plus letrozole for review in the same patient population.

LEE011 – which is taken orally, once per day – works by inhibiting cyclin-dependent kinase 4 and 6 (CDK4/6), proteins that can enable cancer cells to grow and divide too quickly when they're over-activated. In a pivotal Phase III trial, LEE011 plus letrozole significantly extended progression-free survival over letrozole alone in postmenopausal women with HR+/HER2- advanced or metastatic breast cancer. The study evaluated the combination as a first-line treatment. Based primarily on the positive trial results, LEE011 plus letrozole was designated a breakthrough therapy by the FDA in August. According to the FDA, breakthrough therapy designation is intended to expedite the development and review of potential new medicines that treat serious or life-threatening conditions.

The FDA granted priority review for LEE011 (ribociclib) as first-line treatment of postmenopausal women with HR+/HER2- advanced or metastatic breast cancer in combination with letrozole

Phase III trials of the molecule are ongoing, including one evaluating LEE011 in combination with fulvestrant in men and postmenopausal women with HR+/HER2- advanced breast cancer, and another evaluating LEE011 in combination with endocrine therapy and goserelin in premenopausal women with HR+/HER2- advanced breast cancer.

Another molecule in late-phase development is BYL719 (alpelisib). It blocks the alpha version of a protein called phosphoinositide 3-kinase (PI3K), which is frequently mutated in HR+ breast cancer and is associated with resistance to endocrine therapy. New approaches are needed to prevent or delay resistance to existing agents. We are testing BYL719 in combination with fulvestrant in patients with HR+/HER2- advanced breast cancer in a Phase III trial.

Skin cancer survivor Malcolm Caddies, a groundskeeper at Suncorp Stadium in Brisbane, Australia, protects himself from the sun and encourages co-workers to do the same.

Innovation

continued

Lung cancer

Each year, 1.8 million people are diagnosed with lung cancer, a leading cause of death in many countries. We are investigating potential therapies for non-small cell lung cancer, which accounts for approximately 85% of lung cancer cases. Although a particular mutation may be relatively rare in non-small cell lung tumors, it can still represent a significant therapeutic opportunity because there are so many patients with the disease.

In December, we submitted applications in the US and EU to market *Zykadia* (ceritinib) as a first-line treatment for anaplastic lymphoma kinase-positive (ALK+) non-small cell lung cancer, based on data from a Phase III clinical trial. In previously untreated patients, *Zykadia*, our ALK inhibitor, extended progression-free survival when compared with standard chemotherapy. Approximately 2–7% of people with the disease have the ALK gene rearrangement. *Zykadia* is currently approved for use in patients whose disease has progressed after first-line therapy or who are intolerant to an existing therapy.

In addition to exploring the potential of *Zykadia* as a first-line treatment, we are investigating whether it can reduce brain metastases, a common and lethal complication of non-small cell lung cancer.

In 2016, we also filed in the US and EU to market our *Tafinlar* (dabrafenib) + *Mekinist* (trametinib) combination as a first-line treatment in non-small cell lung cancer patients with a mutation in BRAF V600

In 2016, we also filed in the US and EU to market our *Tafinlar* (dabrafenib) + *Mekinist* (trametinib) combination as a first-line treatment in non-small cell lung cancer patients with a mutation in BRAF V600, which occurs in 1–2% of cases. A study demonstrated that our combination slows tumor growth more than chemotherapy in patients with this aggressive form of the disease. *Tafinlar* and *Mekinist* are both targeted agents that block proteins – BRAF and MEK1/2, respectively – that are involved in cell growth and division.

Finally, we presented data from early-phase trials for INC280 (capmatinib), an oral c-MET inhibitor that we licensed from Incyte Corporation. C-MET mutations can play a role in driving both the disease and drug resistance. INC280 demonstrated clinical activity as a single agent and in combination with Iressa® (gefitinib), AstraZeneca's epidermal growth factor receptor (EGFR) inhibitor, in subsets of non-small cell lung cancer patients. It's currently in Phase II trials.

Melanoma

Metastatic melanoma is the most serious and life-threatening type of skin cancer and is associated with low survival rates. Following the 2015 approval of our *Tafinlar* + *Mekinist* combination for patients with a specific form of metastatic melanoma, we continue to study its effects in Phase III trials. In 2016, we reported that patients with BRAF V600 mutations who received the combination were significantly more likely to be alive at three years than patients who received *Tafinlar* alone.

We're exploring additional combinations with the potential to improve outcomes for melanoma patients, based on detailed knowledge of the biology driving the disease. For instance, we're testing *Tafinlar* + *Mekinist* in combination with Merck & Co.'s Keytruda® (pembrolizumab) in patients with advanced melanoma in a Phase II study.

Blood cancer

Acute myeloid leukemia (AML) has the lowest survival rate of all adult leukemias, with a treatment strategy that has remained unchanged for more than 25 years. In 2015, we reported the positive results of a Phase III study of PKC412 (midostaurin) in a form of AML, which enabled us to file in the US and EU. In AML patients with FLT3 mutations, which occur in one-third of patients, PKC412 significantly improved overall survival rates in newly diagnosed adults when administered with standard induction and consolidation chemotherapy followed by monotherapy for up to 12 months. PKC412 received FDA priority review for the treatment of this form of AML and advanced systemic mastocytosis, a rare disorder caused by the presence of too many mast cells (immune cells). The molecule was previously designated a breakthrough therapy by the FDA for this form of AML.

For some blood cancer patients, stem cell transplants offer the chance for a cure. Too often, however, the transplanted stem cells recognize patient tissue as "foreign" and attack the tissue, resulting in a life-threatening complication known as graft-versus-host disease (GVHD). In 2016, ruxolitinib, a Janus kinase 1 and 2 (JAK1/2) inhibitor originally developed by Incyte Corporation, was designated a breakthrough therapy by the

FDA for acute GVHD. Ruxolitinib is marketed by Incyte Corporation as Jakafi® in the US and by Novartis as *Jakavi* outside the US to treat blood cancers myelofibrosis and polycythemia vera. In April, we acquired rights from Incyte Corporation to research, develop and – upon regulatory approval – commercialize *Jakavi* for GVHD outside the US.

We're building on our work in chronic myelogenous leukemia (CML), and currently market two targeted therapies: *Tasigna* (nilotinib) and *Gleevec/Glivec* (imatinib). These products substantially prolong the lives of many CML patients, but drug resistance sometimes develops. We recently achieved a proof of concept with a novel agent, ABL001, which targets the BCR-ABL protein in a new way and may help combat resistance.

We're also developing a potential treatment for a debilitating complication of sickle cell disease, a hereditary blood disorder. Specifically, we're developing an anti-P-selectin antibody called SEG101 (crizanlizumab, formerly SelG1) for sickle cell pain crises. We acquired Selexys Pharmaceuticals Corporation and SEG101 in November.

Renal cell carcinoma

We're a leader in the development of medicines for renal cell carcinoma (RCC), the most common type of kidney cancer, with more than 300 000 new cases each year worldwide. We're exploring ways to combine targeted therapies with immunotherapies to extend the benefits of both in RCC. For example, one pairing that we're studying is *Votrient* (pazopanib), a vascular endothelial growth factor (VEGF) receptor inhibitor that we acquired in 2015, with Keytruda® (pembrolizumab), a programmed cell death-1 (PD-1) checkpoint inhibitor from Merck & Co.

Immuno-oncology

Our researchers explore immunotherapy approaches that fall into three main categories. First, they search for ways to prime or educate the immune system so that it can recognize cancer as a threat. Second, they attempt to unleash immune cells that have already been primed. This is called immunomodulation. And finally, they investigate ways to make the tumor more accessible to immune cells.

We're also looking for ways to bypass conventional immune activation. Our investigational chimeric antigen receptor T-cell (CAR-T) therapies fit the mold. These involve taking patients' white blood cells and reprogramming them to hunt cells – including cancer cells – that express a particular protein on their surface. We plan to file our most advanced investigational CAR-T therapy, CTL019, in the US in early 2017 for relapsed/refractory B-cell acute lymphoblastic leukemia (ALL) in pediatric and young adult patients. Although cancer in children and adolescents is rare, ALL is the most common cancer diagnosed in children, and new treatments are needed, especially for patients with relapsed or refractory ALL. In December, we presented positive results from a global multicenter registration study. CTL019 was developed in collaboration with the University of Pennsylvania in the US.

We have a total of 12 immunotherapy assets in the clinic, including three immunomodulators targeting the checkpoint proteins PD-1, T-cell immunoglobulin and mucin domain-3 (TIM-3), and lymphocyte activation gene-3 (LAG-3). We're studying these molecules as single agents and/or in combination with other agents.

In 2016, we announced collaborations and licensing agreements that bolster our cancer immunotherapy pipeline

In 2016, we also announced collaborations and licensing agreements that bolster our cancer immunotherapy pipeline. Our agreement with Surface Oncology provides access to four preclinical programs that are focused on making the tumor more accessible to immune cells. With Xencor, we will co-develop two bispecific antibodies designed to engage T-cells to fight AML and B-cell malignancies. We will also use Xencor's antibody engineering platform and potentially develop additional molecules.

Beyond our work in oncology and immuno-oncology, we are developing medicines for rare diseases where we have relevant expertise. For example, we are exploring the potential of *Votubia* (everolimus) in the treatment of refractory seizures in children and adults with tuberous sclerosis complex, a rare disease that can cause non-cancerous tumors to grow in vital organs. *Votubia* was recently recommended for EU approval in this indication, based on safety and efficacy data from a pivotal Phase III study.

Innovation
continued

Cardiovascular

Heart failure is a chronic condition that occurs when the heart is unable to pump enough blood to meet the needs of other organs in the body. It's the leading cause of hospitalization for older adults, and it's also a leading cause of death, with a mortality rate that is worse than many cancers. About 50% of patients with heart failure die within five years of diagnosis.

Following the 2015 approval of *Entresto* (sacubitril/valsartan) for patients with heart failure with reduced ejection fraction, we continue to explore its use for other indications. For example, we are testing the medicine in patients with heart failure with preserved ejection fraction, and in patients at high risk of heart failure after a heart attack.

Following the 2015 approval of *Entresto* for patients with heart failure with reduced ejection fraction, we continue to explore its use in other indications

RLX030 (serelaxin) is another compound that potentially holds promise in heart failure. RLX030 is a recombinant version of a human hormone that's believed to help reduce stress on critical organs such as the heart and kidneys during pregnancy. Our Phase III RELAX-AHF-2 trial in patients hospitalized with acute heart failure is expected to report results in 2017. The trial is designed to determine if RLX030 reduces cardiovascular death and worsening of heart failure.

Our cardiovascular research isn't limited to heart failure. After patients experience their first heart attack, they may be at increased risk of further cardiac problems due to vascular inflammation. We're running a Phase III trial, called CANTOS, of ACZ885 (canakinumab) – a selective interleukin-1 beta inhibitor currently marketed for the treatment of auto-inflammatory diseases – in patients with a previous heart attack and a high degree of vascular inflammation. The study, expected to read out in 2017, is designed to determine if ACZ885 can reduce the risk of stroke, heart attack or death.

Major risk factors for cardiovascular disease include obesity, hypertension, diabetes and poor lipid profiles. We are exploring potential therapies to help patients reduce and control their cardiovascular risk. LIK066, designed to block key receptors (SGLT1 and SGLT2) in the kidney and intestine, achieved proof of concept in a small clinical trial of overweight and obese patients with and without blood sugar imbalances. Patients who received the compound showed improvement in multiple risk factors. For instance, they experienced significant weight loss and were better able to control their blood sugar. Phase II clinical studies are scheduled to begin in 2017.

NIBR researcher Jennifer Allport-Anderson (left) speaks with a Novartis colleague before running a half-marathon in Ipswich, Massachusetts in the US.

Respiratory

Respiratory disease takes an immense toll on patients and society. More than 400 million people suffer from chronic obstructive pulmonary disease (COPD) or asthma, and the simple act of breathing can be a struggle for them. We are developing treatments that target both conditions.

Patients with COPD, a progressive disease caused mainly by smoking, experience symptoms ranging from coughing to chest tightness and difficulty breathing. In 2016, new data was published on QVA149, a combination of two active substances that's marketed as *Ultibro Breezhaler*. In a large clinical trial called FLAME, QVA149 helped patients manage their disease better than the standard treatment, Seretide® (fluticasone propionate/salmeterol xinafoate). Patients who received QVA149 reported fewer COPD exacerbations – attacks of breathlessness and wheezing – than those who received Seretide®.

Asthma patients experience recurrent exacerbations that can be life-threatening. We are investigating the potential of QAW039 (fevipiprant) to reduce the frequency and duration of such attacks, particularly in patients with severe asthma. Our compound is designed to block the activity of T-helper type 2 (Th2) cells, which are thought to contribute to the disease by releasing signals that maintain eosinophilic airway inflammation. In a recent Phase II study, QAW039 reduced the number of eosinophil cells in patients with persistent moderate-to-severe asthma. QAW039 is a small molecule taken as a pill, which is more convenient for patients than an inhaler or an injectable medication. Pivotal Phase III trials are underway in severe asthma.

QAW039 is a small molecule taken as a pill, which is more convenient for patients than an inhaler

In addition to focusing on COPD and asthma, we're exploring treatments for respiratory illnesses such as cystic fibrosis (CF), a disease that's well understood at a genetic level. Our scientists are targeting the CF transmembrane conductance regulator (CFTR) protein that's defective in patients, hoping to eventually improve and potentially extend their lives.

Immunology and dermatology

We continue to develop *Cosentyx* (secukinumab), an approved treatment for moderate-to-severe plaque psoriasis in adults. Psoriasis can significantly impact quality of life and even life expectancy. A recent global survey revealed that 84% of people with moderate-to-severe psoriasis suffer discrimination and humiliation.

In January 2016, our fully human monoclonal antibody was approved by the FDA for use in adult patients with ankylosing spondylitis (AS) and psoriatic arthritis (PsA), conditions that can lead to irreversible joint and/or spinal bone damage. This follows approval by EU health authorities for AS and PsA in 2015. In June, we presented new scientific evidence in these indications, showing that up to 80% of AS patients and 84% of PsA patients treated with *Cosentyx* at two years had no radiographic progression in the spine or joints, respectively. In November, we reported that *Cosentyx* delivers sustained improvements in the signs and symptoms of PsA – including patient-reported pain – over three years. We're also starting head-to-head studies in AS and PsA to determine if *Cosentyx* is more effective than another approved treatment for these diseases.

In December, we agreed to acquire Ziarco Group Ltd., a company focused on the development of novel treatments in dermatology. Ziarco's lead investigational product is ZPL389, a once-daily oral H_4 receptor antagonist that recently showed promise in atopic dermatitis, also known as eczema. Eczema – a condition in which skin becomes inflamed, red and itchy – poses a significant burden on healthcare resources and patients' quality of life.

Our interleukin-1 beta inhibitor *Ilaris* (canakinumab) was granted three simultaneous FDA approvals for the treatment of three rare and distinct periodic fever syndromes, expanding its use. These approvals were conducted under FDA priority review following breakthrough therapy designations received earlier in the year. *Ilaris* has been recommended for EU approval in the same new indications.

We are also exploring potential treatments for non-alcoholic steatohepatitis (NASH), which is an increasingly common disease due to the worldwide obesity epidemic. NASH is caused by the accumulation of fat in the liver. The fatty liver becomes inflamed and damaged, frequently resulting in scarring, or fibrosis. NASH is predicted to become the leading cause of liver transplantation by 2020. There are no approved therapies for the disease. We plan to test a farnesoid X receptor (FXR) agonist called LJN452 for NASH with liver fibrosis. The compound is now in a Phase II trial and recently received a fast track designation from the FDA. The purpose of fast track is to get important new drugs to the patient earlier.

Innovation
continued

We also signed an exclusive option, collaboration and license agreement with Conatus Pharmaceuticals Inc. to jointly develop emricasan – an investigational, oral pan-caspase inhibitor – for the treatment of NASH with advanced fibrosis and cirrhosis. Regulatory approval is required to exercise the option.

Neuroscience

Brain disorders affect hundreds of millions of people worldwide and represent a major threat to public health. We're discovering and developing therapies for a variety of mental and neurological diseases.

We're also working to overcome obstacles to innovation in neuroscience. It's always been difficult, for example, to access brain tissue from patients, so we're investing in stem cell technology to convert patients' skin cells – which are easy to harvest – into neurons. Our scientists are coaxing these neurons to self-organize and form structures that resemble those found in a human brain, providing a powerful tool for research.

Multiple sclerosis

Approximately 2.3 million people worldwide are affected by multiple sclerosis (MS). In this disease, the patient's immune system attacks the protective coating of nerve fibers, interfering with the transmission of electrical signals and causing symptoms ranging from fatigue to difficulty walking to memory issues. We are testing *Gilenya* (fingolimod) – a sphingosine 1-phosphate (S1P) receptor modulator approved for use in relapsing MS – in an important indication: pediatric MS. We are also testing other new experimental therapies, including one focused on patients with progressive forms of the disease for which there are limited treatment options.

In 2016, a Phase III study showed that BAF312 (siponimod) reduces the risk of disability progression in patients with secondary progressive multiple sclerosis (SPMS), a condition with few available treatments. The study, called EXPAND, included 1 651 people from 31 countries, and represents the largest randomized, controlled study of SPMS to date. BAF312 is a second-generation selective S1P1/5 receptor modulator.

In a Phase III trial, BAF312 (siponimod) reduced the risk of disability progression in patients with secondary progressive multiple sclerosis

We also started two Phase III trials to test ofatumumab, a human monoclonal antibody targeting the CD20 protein on B-cells, in patients with relapsing MS. B-cell therapies have the potential to play an important role in treating the disease. Ofatumumab can be administered by subcutaneous injection.

Novartis is collaborating with Microsoft Research and university hospitals to develop a device called Assess MS that will enable physicians to quantitatively assess motor function in MS patients. The device records patient movement in three dimensions and employs machine learning for data analysis. If the prototype proves successful, the new tool is expected to streamline clinical trials in MS, support clinical neurologists in monitoring their patients, and bring expert assessments to currently underserved areas.

Migraine

More than 10% of the population worldwide suffers from migraine headaches, which have a profound impact on the ability to carry out everyday tasks. Severe head pain – which is often accompanied by nausea and sensitivity to light, sound and odors – makes it difficult for people to function.

AMG 334 (erenumab) is a fully human monoclonal antibody designed to block the calcitonin gene-related peptide (CGRP) receptor, which is believed to play a critical role in mediating the incapacitating pain of migraine. We are exploring its potential in collaboration with Amgen. In 2016, we announced positive results for a Phase II study of AMG 334 in chronic migraine prevention and for two Phase III studies of AMG 334 in episodic migraine prevention. In these studies, patients who received AMG 334 experienced fewer monthly migraine days than patients who received placebo. The safety profile of the molecule was comparable to placebo in the trials.

In addition to developing AMG 334, Novartis is collaborating with Amgen to explore the therapeutic potential of a second monoclonal antibody called AMG 301. For both molecules, Novartis will have global co-development rights and commercial rights outside the US, Canada and Japan.

Antonina Hernández (left), who suffers from Alzheimer's disease, shares a two-bedroom apartment in Madrid, Spain, with her son Juan Pedro García Hernández, a fitness trainer who is also her full-time caregiver.

Novartis is preparing to start two Phase II studies to assess the potential of EMA401 – a novel angiotensin II type 2 receptor (AT2R) antagonist – in peripheral neuropathic pain

Neuropathic pain

When nerve fibers are damaged, they can send incorrect signals to the brain, producing a complex chronic pain state. Although the underlying cause of the nerve fiber damage varies among patients, the result is often the same: pain that makes it difficult to function and lead a normal life. Such neuropathic pain affects up to 7–8% of the adult population, and 40% of patients do not respond to existing treatments.

Novartis is preparing to start two Phase II studies to assess the potential of EMA401 – a novel angiotensin II type 2 receptor (AT2R) antagonist – in peripheral neuropathic pain. In the first study, EMA401 will be tested in patients with nerve damage caused by diabetes (diabetic neuropathy). In the second, the agent will be tested in patients with chronic nerve damage caused by shingles. EMA401 acts outside the blood brain barrier, so patients may avoid significant central nervous system side effects.

Alzheimer's disease

There are approximately 47 million people worldwide with dementia, and Alzheimer's disease is the most common cause. We are collaborating on compounds designed to interfere with the amyloid cascade, a biological process that researchers believe may be responsible for the development of Alzheimer's disease. Two experimental treatments, CNP520 and CAD106, are being administered in a trial to cognitively healthy adults who have a genetic risk of developing Alzheimer's disease. CNP520 is an oral therapy being developed in collaboration with Amgen. CAD106 is an immunotherapy. We are working with the Banner Alzheimer's Institute in the US, leader of the Alzheimer's Prevention Initiative, to identify trial participants – through an innovative genetic screening program – and test the molecules.

Innovation
continued

Eye care

Approximately 285 million people around the world live with low vision and blindness. Many more rely on corrective lenses. Our broad eye care portfolio includes pharmaceuticals, surgical devices and platforms, intraocular lenses, contact lenses and lens care solutions that enhance quality of life by helping people see better.

Ophthalmic pharmaceuticals

Retinal diseases are the primary cause of blindness in industrialized countries and are growing more common in developing countries. Novartis has compounds in development for retinal diseases, with a focus on a form of age-related macular degeneration (AMD).

Patients with AMD lose vision as the center of the retina, or macula, degenerates. In the wet form of the disease, abnormal blood vessels grow under the retina and leak, forming lesions. Our novel anti-VEGF agent RTH258 (brolucizumab) is being tested in wet AMD patients. RTH258 is a single chain antibody fragment that may be longer acting than approved treatments for AMD, potentially enabling patients to go longer between treatments. We expect to report the results of two Phase III trials in 2017.

We continue to develop *Lucentis* (ranibizumab), an anti-VEGF agent that was originally approved for wet AMD. In 2016, we received EU approval for the drug in a new indication. It can now be used to treat visual impairment due to choroidal neovascularization associated with causes other than wet AMD or secondary pathologic myopia. *Lucentis* is the only treatment available for a wide range of conditions that share a common feature: the growth of abnormal blood vessels under the retina. Genentech has commercial rights to *Lucentis* in the US, and Novartis has exclusive rights in the rest of the world.

In addition to addressing retinal diseases, we recently entered a new therapy area. In December, we announced an agreement for the acquisition of Encore Vision Inc. and UNR844, a potential treatment for presbyopia, the age-related loss of near-distance vision. More than 80% of adults over the age of 45 develop presbyopia. Administered as eye drops, UNR844 – a combination of lipoic acid and choline – recently showed promise in a proof-of-concept study.

We're also exploring potential new therapies for glaucoma, dry eye and other ocular conditions.

Surgical

In 2016, our eye care division, Alcon, launched new surgical technologies for the treatment of glaucoma and other diseases. Glaucoma – a leading cause of irreversible blindness globally – is characterized by optic nerve damage, which is associated with elevated intraocular pressure. Our *CyPass* Micro-Stent, approved by the FDA in July, is part of a new class of treatments known as minimally-invasive glaucoma surgery. It is intended for adult patients with mild to moderate open-angle glaucoma who are also receiving cataract surgery. Implanted just below the surface of the eye, the *CyPass* Micro-Stent is designed to lower intraocular pressure by enhancing the natural drainage pathways of the eye.

For vitreoretinal surgeons, viewing the delicate structures and tissue layers at the back of the eye is critical. To improve visualization during surgery, Alcon introduced the *NGENUITY* 3D Visualization System. It includes a high dynamic range camera that provides excellent resolution, image depth, clarity and color contrast, with real-time images displayed on a 55 inch (140 cm) 3D monitor placed in the operating room. The *NGENUITY* 3D Visualization System also enables surgeons to operate without having to bend or hunch over a traditional microscope, which may help minimize the back and neck issues that are common among ophthalmologists who have been operating for more than a decade.

Yuko Yoshikawa, who suffers from an eye disease that affects her vision, takes care while navigating the streets of Tokyo, Japan.

Our *CyPass* Micro-Stent, approved by the FDA in July, is part of a new class of treatments known as minimally-invasive glaucoma surgery

Vision care

Alcon develops and markets a variety of contact lenses designed for daily, weekly and monthly wear. In 2016, we launched *Dailies Total1* Multifocal, the first water-gradient, daily disposable contact lenses for people with presbyopia, which typically develops as people age. In presbyopia, the eye loses its ability to focus up close, resulting in the need for bifocals or reading glasses. *Dailies Total1* Multifocal lenses are designed to address both presbyopia and the end-of-day dryness and discomfort that many contact lens wearers experience after age 40.

We also launched *Air Optix plus HydraGlyde* for patients in the monthly replacement contact lens segment. These silicone hydrogel contact lenses feature technology that surrounds the lens with a layer of moisture to help improve comfort for users.

Biosimilars

Sandoz is the pioneer and global leader in biosimilars, which are biological medicines with comparable quality, safety and efficacy to approved reference products. Patents are due to expire on a number of important biological medicines in the next few years, creating a singular opportunity for us to further expand access to these high-quality, life-enhancing treatments. Biosimilars can generate significant savings for healthcare systems, freeing up resources for novel therapies. We plan to launch five major biosimilars in oncology and immunology in the EU and US by 2020, adding to the three Sandoz biosimilars already on the market worldwide.

Our biosimilar *Erelzi* (etanercept-szzs) was approved in the US to treat multiple inflammatory diseases

In 2016, our biosimilar *Erelzi* (etanercept-szzs) was approved in the US to treat multiple inflammatory diseases, all of the indications for which the reference product Enbrel® was approved. In addition, our biosimilar *Binocrit* (epoetin alfa) was approved in the EU for a new route of administration based on data from a study in pre-dialysis and dialysis patients with anemia associated with chronic kidney disease. Filings were accepted for our pegfilgrastim and rituximab molecules in the EU. We plan to build on this momentum in 2017 with additional biosimilar filings in key geographies.

Infectious diseases

Bacteria, viruses and other micro-organisms continue to wreak havoc on human health, despite major medical advances. Infectious diseases remain the leading cause of death in children and adolescents, and one of the leading causes of death in adults. We're working across the spectrum of these diseases.

We're researching potential therapies for tropical diseases that can be devastating. Malaria alone kills approximately 430 000 people each year, most of them children. Patients often fail to complete a full course of treatment, and drug-resistant parasites are spreading in certain regions, so new drugs are needed. We have two compounds in Phase II development for the disease: KAF156 and KAE609.

In September, the results of a proof-of-concept study for KAF156 were published. Malaria parasites, including parasites resistant to the standard treatment, were observed to disappear rapidly from the blood of patients who received either multiple or single doses of the compound in an exploratory Phase II clinical trial. We will lead the development of KAF156 with scientific and financial support from the Medicines for Malaria Venture (in collaboration with the Bill & Melinda Gates Foundation). We are exploring ways to combine it with another agent in an effort to achieve a new treatment option for malaria, activity against drug-resistant parasites, and potentially a single-dose malaria cure. KAE609 continues to be characterized for the role that it may play in the battle against the disease.

We also reported a new target for three neglected diseases: African sleeping sickness, leishmaniasis and Chagas disease. Clinically, these diseases – responsible for 50 000 deaths annually – seem quite distinct, but they're all caused by parasites called kinetoplastids that belong to the same class of single-celled organisms. Working in lab models, our researchers demonstrated that it may be possible to treat all three diseases with a single class of compound that blocks cellular machinery known as the proteasome.

Drug-resistant bacteria are an emerging threat to public health. In 2016, we began a first-in-human clinical trial to test an injectable compound designed to kill drug-resistant gram-negative bacteria.

Pipeline

Novartis is consistently rated as having one of the industry's most respected development pipelines, with more than 200 projects in clinical development, as of December 31, 2016.

Many of these projects, which include new molecular entities as well as additional indications and different formulations for marketed products, are for potentially best-in-class or first-in-class medicines that could significantly advance treatment standards for patients worldwide. This table provides an overview of selected projects in confirmatory development.

We use the traditional pipeline model as a platform (e.g., Phase I-III). However, we have tailored the process to be simpler, more flexible and more efficient.

Glossary

Project/product Project refers to the Novartis reference code (combination of three letters and three numbers) used for projects in development. Product refers to the brand name for a marketed product.

Common name Official international non-proprietary name or generic name for an individual molecular entity as designated by the World Health Organization

Glossary continued on page 54

Major development projects

Project/product	Common name	Mechanism of action
Oncology		
ABL001	asciminib	BCR-ABL inhibitor
PIM447	–	Pan-PIM inhibitor
CTL019	tisagenlecleucel-T	CD19-targeted chimeric antigen receptor T-cell immunotherapy
INC280	capmatinib	c-MET inhibitor
BYL719	alpelisib	PI3Kα inhibitor
Jakavi	ruxolitinib	JAK1/2 inhibitor
LCI699	osilodrostat	Aldosterone synthase inhibitor
Promacta/Revolade	eltrombopag	Thrombopoietin receptor agonist
SEG101	crizanlizumab	P-selectin inhibitor
Arzerra	ofatumumab	Anti-CD20 monoclonal antibody
LEE011	ribociclib	CDK4/6 inhibitor
PKC412	midostaurin	Signal transduction inhibitor
Signifor LAR	pasireotide	Somatostatin analogue
Tafinlar + Mekinist	dabrafenib + trametinib	BRAF inhibitor + MEK inhibitor
Zykadia	ceritinib	ALK inhibitor
Afinitor/Votubia	everolimus	mTOR inhibitor
Tasigna	nilotinib	BCR-ABL inhibitor

[1] Filings that have received approval in either the US or EU but are awaiting approval in the other market
[2] Phase and planned filing dates refer to the lead indication in development.
[3] Non-steroidal aromatase inhibitor
[4] Submission pending acceptance by the FDA

Potential indication/disease area	Route of administration	Planned filing dates[1,2]	PHASE I	PHASE II	PHASE III	SUBMISSION
Chronic myeloid leukemia (CML), 3rd line	Oral	2020	PHASE I			
Hematologic tumors	Oral	≥2021	PHASE I			
Pediatric acute lymphoblastic leukemia [lead indication]; diffuse large B-cell lymphoma	Intravenous infusion	2017		PHASE II		
Non-small cell lung cancer (NSCLC) [lead indication]; NSCLC (EGFRm)	Oral	2018		PHASE II		
Hormone receptor-positive (HR+)/human epidermal growth factor receptor 2-negative (HER2-) advanced breast cancer (postmenopausal women), 2nd line (+ fulvestrant)	Oral	2019			PHASE III	
Graft-versus-host disease [lead indication]; early myelofibrosis	Oral	2019			PHASE III	
Cushing's disease	Oral	2018			PHASE III	
Severe aplastic anemia, 1st line	Oral	2017			PHASE III	
Sickle cell disease	Intravenous infusion	2020			PHASE III	
Refractory non-Hodgkin's lymphoma	Oral	2018			PHASE III	
HR+/HER2- advanced breast cancer (postmenopausal women), 1st line (+ letrozole) [lead indication]; HR+/HER2- advanced breast cancer (postmenopausal women), 1st/2nd line (+ fulvestrant); HR+/HER2- advanced breast cancer (premenopausal women), 1st line (+ tamoxifen + goserelin or NSAI[3] + goserelin); HR+/HER2- breast cancer (adjuvant)	Oral	US/EU registration				SUBMISSION
Acute myeloid leukemia (AML) [lead indication]; advanced systemic mastocytosis; AML (FLT3 wild type)	Oral	US/EU registration				SUBMISSION
Cushing's disease	Long-acting release/ intramuscular injection	US/EU registration[4]				SUBMISSION
BRAF V600+ NSCLC [lead indication]; BRAF V600+ melanoma (adjuvant); BRAF V600+ colorectal cancer	Oral	US/EU registration				SUBMISSION
ALK+ advanced NSCLC (1st line, treatment naïve) [lead indication]; ALK+ NSCLC (brain metastases)	Oral	US/EU registration				SUBMISSION
Tuberous sclerosis complex seizures	Oral	EU registration US 2017				SUBMISSION
CML treatment-free remission	Oral	EU registration US 2017				SUBMISSION

Pipeline
continued

Mechanism of action Specific biochemical interaction with a molecular target such as a receptor or enzyme, through which a drug substance produces its pharmacological effect

Potential indication/indications Disease or condition for which a compound or marketed product is in development and is being studied as a potential therapy

Route of administration Path by which a medicinal preparation is administered into the body, such as oral, subcutaneous or intravenous

Phase I First clinical trials of a new compound, generally performed in a small number of healthy human volunteers, to assess the clinical safety and tolerability, as well as metabolic and pharmacologic properties of the compound

Phase II Clinical studies with patients who have the target disease, with the aim of continuing the Phase I safety assessment in a larger group, assessing the efficacy of the drug in the patient population, and determining the appropriate doses for further evaluation

Phase III Large-scale clinical studies with several hundred to several thousand patients, which are conducted to establish the safety and efficacy of the drug in specific indications for regulatory approval. Phase III trials also may be used to compare a new drug against a current standard of care to evaluate the overall benefit-risk relationship of the new medicine.

Glossary continued on page 56

Major development projects

Project/product	Common name	Mechanism of action
Cardiovascular and metabolism		
LIK066	–	SGLT1/2 inhibitor
ACZ885	canakinumab	Anti-interleukin-1ß monoclonal antibody
Entresto	valsartan, sacubitril (as sodium salt complex)	Angiotensin receptor/neprilysin inhibitor
RLX030	serelaxin	Recombinant form of human relaxin-2 hormone
Respiratory		
QBW251	–	CFTR potentiator
QMF149	indacaterol, mometasone furoate (in fixed-dose combination)	Long-acting beta2-agonist and inhaled corticosteroid
QAW039	fevipiprant	CRTH2 antagonist
QVM149	indacaterol, mometasone furoate, glycopyrronium bromide (in fixed-dose combination)	Long-acting beta2-agonist, long-acting muscarinic antagonist and inhaled corticosteroid
Immunology and dermatology		
CJM112	–	Anti-interleukin-17 monoclonal antibody
QAW039	fevipiprant	CRTH2 antagonist
LJN452	–	FXR agonist
VAY736	–	Anti-BAFF (B-cell-activating factor) monoclonal antibody
QGE031	ligelizumab	High-affinity anti-IgE monoclonal antibody
Cosentyx	secukinumab	Anti-interleukin-17 monoclonal antibody
Ilaris	canakinumab	Anti-interleukin-1ß monoclonal antibody
Neuroscience		
CAD106	amilomotide	Beta-amyloid-protein therapy
CNP520	–	BACE inhibitor
EMA401	–	Angiotensin II receptor antagonist
BYM338	bimagrumab	Inhibitor of activin type II receptor
BAF312	siponimod	Sphingosine-1-phosphate receptor modulator
FTY720	fingolimod	Sphingosine-1-phosphate receptor modulator
AMG 334	erenumab	Selective CGRP receptor antagonist
OMB157	ofatumumab	Anti-CD20 monoclonal antibody

[1] Filings that have received approval in either the US or EU but are awaiting approval in the other market
[2] Phase and planned filing dates refer to the lead indication in development.
[5] Ongoing discussions with health authorities to agree on next steps

Potential indication/disease area	Route of administration	Planned filing dates [1,2]	PHASE I	PHASE II	PHASE III	SUBMISSION
Weight loss	Oral	≥2021		PHASE II		
Secondary prevention of cardiovascular events	Subcutaneous injection	2017			PHASE III	
Chronic heart failure with preserved ejection fraction [lead indication]; post-acute myocardial infarction	Oral	2019			PHASE III	
Acute heart failure	Intravenous infusion	2017			PHASE III	
Cystic fibrosis	Oral	≥2021		PHASE II		
Asthma	Inhalation	2019			PHASE III	
Asthma	Oral	2019			PHASE III	
Asthma	Inhalation	2019			PHASE III	
Immune disorders	Subcutaneous injection	≥2021		PHASE II		
Atopic dermatitis	Oral	≥2021		PHASE II		
Non-alcoholic steatohepatitis	Oral	≥2021		PHASE II		
Primary Sjoegren's syndrome	Subcutaneous injection	≥2021		PHASE II		
Chronic spontaneous urticaria; chronic idiopathic urticaria	Subcutaneous injection	2020		PHASE II		
Non-radiographic axial spondyloarthritis [lead indication]; psoriatic arthritis head-to-head study versus adalimumab; ankylosing spondylitis head-to-head study versus adalimumab	Subcutaneous injection	2018			PHASE III	
Periodic fever syndromes	Subcutaneous injection	US approved EU registration				SUBMISSION
Alzheimer's disease	Intramuscular injection	≥2021		PHASE II		
Alzheimer's disease	Oral	≥2021		PHASE II		
Neuropathic pain	Oral	≥2021		PHASE II		
Hip fracture; sarcopenia	Intravenous infusion	≥2021		PHASE II		
Secondary progressive multiple sclerosis	Oral	2019[5]			PHASE III	
Pediatric multiple sclerosis	Oral	2017			PHASE III	
Migraine	Subcutaneous injection	2017			PHASE III	
Relapsing multiple sclerosis	Subcutaneous injection	2019			PHASE III	

Pipeline
continued

Advanced development Medical device project for which a positive proof of concept has been established, and clinical and non-clinical studies are being conducted to establish the device's safety, efficacy or performance. This is needed to address regulatory requirements for obtaining marketing authorization.

Submission Application for marketing approval has already been submitted to one or both of the following regulatory agencies: the US Food and Drug Administration (FDA), the European Medicines Agency (EMA). Novartis has not yet received marketing authorization from both regulatory agencies. The application contains comprehensive data and information gathered during human clinical trials and animal studies conducted through the various phases of drug development.

Major development projects

Project/product	Common name	Mechanism of action
Infectious diseases		
KAF156	–	Imidazolopiperazines derivative
KAE609	cipargamin	PfATP4 inhibitor
LAM320	clofazimine	Mycobacterial DNA binding
Ophthalmology		
RTH258	brolucizumab	Anti-vascular endothelial growth factor (VEGF) single-chain antibody fragment
Lucentis	ranibizumab	Anti-VEGF monoclonal antibody fragment
Clareon Monofocal IOL	–	N/A
CyPass Micro-Stent	–	N/A
A02238	–	N/A
A00717	–	N/A
A01660	–	N/A
AcrySof IQ PanOptix IOL	–	N/A
AcrySof IQ PanOptix Toric IOL	–	N/A
AcrySof IQ ReSTOR Toric 2.5 D IOL	–	N/A
Biosimilars		
GP1111	infliximab	TNF-α inhibitor
GP2017	adalimumab	TNF-α inhibitor
HX575	epoetin alfa	Erythropoiesis-stimulating agent
GP2013	rituximab	Anti-CD20 monoclonal antibody
GP2015	etanercept	TNF-α inhibitor
LA-EP2006	pegfilgrastim	Pegylated granulocyte colony-stimulating factor

[1] Filings that have received approval in either the US or EU but are awaiting approval in the other market
[2] Phase and planned filing dates refer to the lead indication in development.
[6] Resubmission to address FDA complete response letter

Potential indication/disease area	Route of administration	Planned filing dates[1,2]	PHASE I	PHASE II	PHASE III	SUBMISSION
Malaria	Oral	≥2021		PHASE II		
Malaria	Oral	≥2021		PHASE II		
Multi-drug resistant tuberculosis	Oral	2018			PHASE III	
Neovascular age-related macular degeneration [lead indication]; diabetic macular edema	Intravitreal injection	2018			PHASE III	
Retinopathy of prematurity	Intravitreal injection	2018			PHASE III	
Next-generation IOL	Cataract implant	EU 2017 US 2019	ADVANCED DEVELOPMENT			
Micro-invasive glaucoma surgical device for implant during cataract surgery	Glaucoma implant	EU 2017	ADVANCED DEVELOPMENT			
Mid-tier phacoemulsification device	Cataract equipment	US 2018 EU 2018	ADVANCED DEVELOPMENT			
Daily disposable line extension	Vision care	US 2018 EU 2018	ADVANCED DEVELOPMENT			
New daily disposable lens	Vision care	US 2018 EU 2018	ADVANCED DEVELOPMENT			
Trifocal IOL	Cataract implant	US 2019	ADVANCED DEVELOPMENT			
Trifocal IOL for astigmatism	Cataract implant	US 2019	ADVANCED DEVELOPMENT			
Multifocal IOL for astigmatism	Cataract implant	US				SUBMISSION
Inflammatory bowel disease; rheumatoid arthritis; plaque psoriasis (same as originator)	Intravenous	EU 2017			PHASE III	
Arthritides (rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis); plaque psoriasis and others (same as originator)	Subcutaneous	2017			PHASE III	
Anemia in chronic kidney disease; chemotherapy-induced anemia and others (same as originator)	Subcutaneous and intravenous	US 2017			PHASE III	
Non-Hodgkin's lymphoma; chronic lymphocytic leukemia; rheumatoid arthritis; granulomatosis with polyangiitis; microscopic polyangiitis (same as originator)	Intravenous	EU registration US 2017				SUBMISSION
Arthritides (rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis); plaque psoriasis and others (same as originator)	Subcutaneous	US approved EU registration				SUBMISSION
Chemotherapy-induced neutropenia and others (same as originator)	Subcutaneous	EU registration US 2018[6]				SUBMISSION

1

2

PHOTO ESSAY

Helping Syrian refugees manage chronic diseases

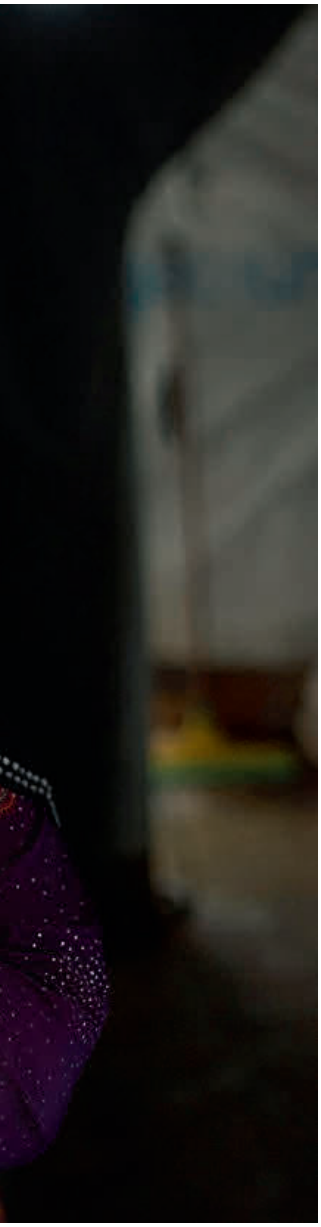
Among the many Syrians uprooted by armed conflict are thousands of people with chronic conditions – such as diabetes and heart disease – whose treatment was disrupted when they fled.

Many have settled in Lebanon, where chronic diseases already place a major burden on the healthcare system, accounting for an estimated 85% of deaths. Now health facilities have been further stretched by the influx of people fleeing Syria, who have swelled the population by a third.

To help tackle this problem, Novartis last year began working with the International Committee of the Red Cross (ICRC) to support improved access to medicines and medical care for refugees in Lebanon.

The company is supplying medications for high blood pressure and diabetes through Novartis Access, an innovative business approach that offers medicines for chronic diseases to governments and public-sector customers in lower-income countries at a cost of USD 1 per treatment per month.

The situation in Lebanon is just one example of the growing challenges posed by chronic illnesses as populations age. These conditions account for 38 million deaths worldwide every year – 75% of them in



1 Syrian refugees ponder an uncertain future: Zakiya, one of the daughters of Hamid, with her son Waleed, age 10, in their makeshift home.
2 ICRC health workers visit the home of a refugee named Ziad in southern Lebanon.
3 ICRC patient Elham (center) with some of her children and their families after fleeing from Syria
4 Mohammad peers into a building used as a mosque by Syrian refugees.

low- and middle-income countries. Chronic diseases require early detection and sustained treatment, so migrant populations are particularly at risk.

Take 58-year-old Hamid and his wife Hamida, who farmed near the Syrian city of Homs until they were driven out by fierce fighting in 2012.

They now live in Lebanon with two daughters and two grandsons, who rely on casual work to pay for food and lodging. Health inevitably suffers in this hand-to-mouth existence, and Hamid, who has lived with diabetes for 20 years, found himself unable to pay for drugs that were free in Syria.

After six weeks without insulin, he lost so much weight that he was forced to seek help, and the local ICRC-supported clinic provided a lifeline by supplying drugs and regular checkups. His wife also received treatment after she was diagnosed with diabetes.

They were among more than 270 000 people who sought treatment at ICRC-supported healthcare facilities in 2016. The organization aims to provide diagnosis, treatment and follow-up for Syrian and underserved Palestinian refugees as well as Lebanese patients affected by chronic illnesses, to prevent long-term complications such as stroke or kidney disease.

The most deadly chronic condition worldwide is heart disease. The ICRC provides vital care for refugees such as Ziad, who suffers from high blood pressure and fled with his wife and children in 2014 when the Damascus suburb where they lived was badly damaged.

He now struggles to make a living as a laborer, and believes the trauma caused by the devastation of his homeland has worsened problems. “Sometimes it hurts me like a disease, seeing the news on television about Syria,” he says.

Gaining access to care is critical for survival for some refugees. Elham, the widowed matriarch of a large extended family, has both heart disease and diabetes – as do her brother and their cousin, Mohammad, who is an imam.

Elham’s open heart surgery was funded by the Office of the United Nations High Commissioner for Refugees, while Mohammad has also undergone a series of operations. All three family members rely on continued treatment provided by the ICRC.

While aid is vital, clearly peace and stability are key to a long-term solution to the difficulties faced by many refugees.

Corporate responsibility

We focus our corporate responsibility work in two key areas: expanding access to healthcare and doing business responsibly. This combination of responsible business and making our medicines accessible is directly linked to our company mission, vision and strategy. We put access to healthcare at the heart of our business strategy, looking for new ways to deliver medicines to as many people as possible.

Expanding access

52 m
Patients reached through access programs

120 000
The number of Novartis Access treatments delivered to Kenya, Lebanon and Ethiopia since launch, each providing a one-month supply of medicine

2/4
Novartis leads two of the four most advanced malaria development programs underway worldwide: KAF156 and KAE609

Doing business responsibly

120
Pilots ongoing or completed to find new and improved ways to engage with healthcare professionals

9 800
Doctors and other participants globally received access to webcasts of industry meetings in 2016, part of our efforts to do business differently

10 000 tns
Net reduction in CO_2 emissions

Mountaha and her 4-year-old daughter Mona are among thousands of displaced people who have settled in Lebanon, where Novartis is working with the Red Cross to support treatment for chronic diseases among refugees.

Corporate responsibility strategy and governance

We use our expertise and skills in two key areas, which are the focus of our corporate responsibility (CR) efforts: expanding access to healthcare and doing business responsibly. This combination of responsible business and making medicines accessible is an important element supporting our company mission, vision and strategy.

To help us achieve our goal of finding new ways to deliver breakthrough treatments to as many people as possible, our access efforts include an array of approaches such as innovative business models, equitable commercial models, zero-profit initiatives, patient assistance programs and strategic philanthropy.

Moreover, to help us become a trusted leader in changing the practice of medicine, we are taking steps to ensure our standards align with society's increasingly high expectations for ethical behavior.

Corporate responsibility is embedded throughout our company. The Head of Corporate Responsibility reports directly to the CEO of Novartis, and our CR efforts are overseen by the Governance, Nomination and Corporate Responsibilities Committee of the Novartis Board of Directors. This commitment from senior management and the Board helps us make the strategic decisions necessary to successfully integrate CR into our business. The engagement and dedication of all our associates are essential to bring CR initiatives to life.

Taking action on what matters most

Our activities and how we carry them out have an impact beyond our business performance. In late 2016, we kicked off our second full CR materiality assessment to help us understand the CR issues that matter to key internal and external stakeholders, as well as stakeholders' needs and expectations. We began conducting interviews – aiming to reach approximately 400 individuals worldwide – including executives across our company; customers; academics; and representatives of patient organizations, nongovernmental organizations, health institutions, and other groups considered important to the industry and our business.

We will use the findings, which will be available in 2017, to guide our strategy, track issues of concern, inform and prioritize our CR programs, establish meaningful metrics against which to measure our CR performance, and further integrate CR into our standard business processes. This assessment follows the first CR materiality analysis from 2013, which was refreshed in 2015.

In late 2016, we kicked off our second full CR materiality assessment to help us further integrate CR topics that matter into our standard business processes

Corporate responsibility
continued

Novartis contributes to achieving the UN Sustainable Development Goals

The United Nations Sustainable Development Goals urge countries to "leave no one behind." The third development goal specifically focuses on ensuring healthy lives and promoting well-being for all people of all ages, while many others such as goal 1 (no poverty), goal 6 (clean water and sanitation), and goal 10 (reduced inequalities) are inextricably linked to health, either directly or indirectly.

As a leading healthcare company, ensuring good health and well-being (goal 3) is at the core of our business and is aligned with our mission to improve and extend people's lives. Through our business operations and ongoing activities, we make essential contributions to goals 8, 9, 13 and 17.

Ensuring good health and well-being is aligned with our mission.

3 GOOD HEALTH AND WELL-BEING

Our mission is to improve and extend people's lives. We pursue a combination of approaches to improve access to our medicines for underserved populations. We also work to improve disease diagnosis and management through disease awareness, training and education programs.

Through our business operations and ongoing activities, we make essential contributions to goals 8, 9 and 13.

8 DECENT WORK AND ECONOMIC GROWTH

Novartis employs 123 000 people worldwide. Our products are available in about 155 countries, and they reached nearly 1 billion people in 2016. We are committed to providing decent employment and promoting a diverse and inclusive working environment.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Innovation is at the core of what we do. We use science-based innovation to discover and develop breakthrough treatments, and we pioneer sustainable business models to deliver them to as many people as possible. Our capability-building efforts focus on patient care, research and development, and business skills, aiming to improve health outcomes and strengthen healthcare systems.

13 CLIMATE ACTION

Climate change threatens development and disproportionately burdens the poorest and most vulnerable, while posing clear health risks. We strive to reduce our carbon emissions and minimize our overall environmental footprint.

Partnerships are at the heart of everything we do.

17 PARTNERSHIPS FOR THE GOALS

Novartis seeks effective partnerships to deliver treatments and quality care to as many people as possible. We partner with governments and the public sector, nongovernmental organizations, local communities and health workers, and research and academic institutes.

Expanding access to healthcare

While significant progress has been made in tackling some of the world's greatest healthcare challenges, billions of people still lack adequate access to medicines. We are working on ways to reimagine access to healthcare through programs that help patients worldwide get the medicines they need, when they need them, at prices they can afford.

Pioneering innovative social business models

In late 2016, we marked the one-year anniversary of the launch of Novartis Access, our portfolio of medicines to fight key chronic diseases. This portfolio includes 15 on- and off-patent medicines addressing cardiovascular diseases, type 2 diabetes, breast cancer and respiratory illnesses. It is offered to governments and public-sector customers in low- and lower-middle-income countries at a price of USD 1 per treatment per month.

The first treatments were delivered to Kenya in February and distributed by our local partner, Mission for Essential Drugs and Supplies (MEDS). Kenya received a total of four shipments in 2016. In total, more than 120 000 Novartis Access treatments were delivered to Kenya, Lebanon and Ethiopia, each providing a one-month supply of medicine. In September, we signed a memorandum of understanding for the implementation of Novartis Access in Rwanda, and we expect the first product delivery in early 2017. We also signed a broad memorandum of understanding with the government of Vietnam, which also covers noncommunicable disease interventions such as Novartis Access.

30 Countries are targeted for the rollout of Novartis Access in the coming years

We plan to roll out Novartis Access in 30 countries in the coming years based on government and stakeholder demand. The Novartis Access team is currently in talks with governments and local stakeholders in more than 10 priority countries in sub-Saharan Africa, Southeast Asia, Central America, and Central and Eastern Europe.

Additionally, Novartis Access filed 370 submissions for marketing authorization with health authorities in 21 countries. As we are required to register each Novartis Access portfolio product in all relevant formulations and dosage forms, we have taken this step proactively to facilitate the swift rollout of the program.

LOCAL PARTNERSHIPS CRITICAL TO SUCCESS

Our experience thus far shows that most healthcare systems in lower-income countries are geared toward tackling infectious diseases and are ill-equipped to address the needs of patients with chronic illnesses. This cannot be solved by one organization alone, so we partner with organizations that can contribute their skills and capabilities. Our distribution partners include MEDS and the Kenya Red Cross. We are also working with Management Sciences for Health to assess the supply chains in public and faith-based healthcare facilities in Kenya and to identify risks that may be detrimental to product integrity. In addition, we are teaming up with the Christian Health Association of Kenya, the Kenya Conference of Catholic Bishops, and the Kenya Red Cross to build capacity among healthcare workers to diagnose and manage chronic diseases in local facilities across the country.

HELPING REFUGEES IN LEBANON

In March, the International Committee of the Red Cross and Novartis Access launched a pilot to improve access to treatment for Syrian refugees in Lebanon – as well as for underserved Lebanese and Palestinian patients – suffering from type 2 diabetes and high blood pressure. Together, these two diseases account for more than 50% of deaths in Lebanon.

EXPANDING THE HEALTHY FAMILY PROGRAMS

Healthy Family is an innovative business model that aims to reach more patients in rural areas in the developing world. In 2016, it continued its expansion to reach more than 7.7 million people through health education sessions in India, Kenya, Vietnam and Indonesia. Nearly 610 000 patients attended specific health camps. Healthy Family is profitable in India and on track to break even in Kenya in 2017.

Corporate responsibility
continued

To improve the quality and impact of the Healthy Family activities, we reassessed and adjusted, where relevant, various program parameters. Specifically, we adjusted the disease area focus, simplified the referral process, capped the number and size of health camps to increase the quality and length of the consultations, and, in some cases, initiated agreements with new partners. As a result, the total number of patients reached in 2016 was smaller than in previous years.

Equitable commercial models in lower-income countries

Our access strategy framework was approved by the Access to Medicine Committee in 2015. This defines a set of tools to develop equitable pricing strategies for lower-income countries, according to the purchasing power of patients and payors. These strategies are systematically applied to key innovative pharmaceutical products that address the disease priorities in countries. The goal is to maximize patient reach through sustainable commercial models, while minimizing the lag time between introduction in higher- and lower-income countries.

We are tracking the implementation of these efforts through a set of indicators that measure the number of patients with access to our products, as well as the price that patients actually pay for them. As affordability is also impacted by factors outside of our control – including markups, taxes, tariffs, etc. – our local teams use this data to engage with distribution partners in an effort to reduce markups on Novartis products before they reach patients.

Sandoz: generating new ideas to make access happen

Our generics division, Sandoz, combines its broad portfolio of more than 1 000 off-patent medicines, covering all major therapeutic areas, with CR programs to improve access, medical information and medical capacity building.

In September, Sandoz launched the Sandoz HACk, short for Healthcare Access Challenge. This competition aimed to generate novel solutions to key healthcare access challenges in local communities. Open to 18- to 35-year-olds from around the world, the Sandoz HACk received 150 submissions, from which six finalist entries were selected. After further refining ideas on the online OpenIDEO platform, three winners will be chosen in the first half of 2017. They will receive seed funding and support from mentors to help bring their ideas to life.

In November, Sandoz announced a new collaboration to increase access to medicines by donating up to USD 10 million of products annually to Americares – a health-focused relief and development organization that responds to people affected by poverty or disaster with life-changing health programs, medicine and medical supplies. The initial donation will include more than 25 Sandoz products to treat infections; cardiovascular, eye and skin conditions; and musculoskeletal pain.

In December, Sandoz signed a sub-licensing agreement with the Medicines Patent Pool to help produce much-needed hepatitis C treatments for developing countries. Specifically, Sandoz will manufacture daclatasvir, a new direct-acting antiviral that – when used in combination with other treatments – is proven to cure multiple genotypes of the hepatitis C virus.

Patient assistance programs

In 2016, our worldwide patient assistance programs helped more than 130 000 people access medicines they could not afford due to financial hardship, lack of insurance, or inadequate reimbursement. One of our key programs is Novartis Oncology Access, or NOA. NOA is designed to improve access in countries that have challenging healthcare environments or very limited healthcare reimbursement systems. Today, NOA offers assistance to emerging nations in Asia, the Middle East, Central and Eastern Europe, Africa and Latin America. In addition to *Glivec*, NOA programs include patient access to *Tasigna* and *Exjade*. NOA and the *Glivec* International Patient Assistance Program (GIPAP) combined reached more than 80 000 patients around the world in 2016.

Given changes in the healthcare environment since GIPAP was launched 14 years ago, starting in 2017, our longtime partner The Max Foundation will assume full responsibility for development and management of the program. Novartis Oncology will donate *Glivec* to The Max Foundation to supply patients currently eligible for GIPAP, and provide funding to The Max Foundation to support program operations.

Novartis access approaches: key performance indicators 2016

There is no one-size-fits-all solution for access to healthcare. We continue to pursue a combination of approaches – innovative business models that provide tailored and scalable solutions, equitable commercial models, high-quality generics, patient assistance programs, zero-profit models and drug donations, strategic philanthropy and emergency relief – to reach underserved patients.

Social business models

	Patients reached (thousands)		FTEs[1]		People reached (thousands)[2]	
	2016	2015	**2016**	2015	**2016**	2015
Novartis Access	8.4[3]	3.3[3]	14	10		
Healthy Family (in India, Kenya, Vietnam and Indonesia)	609.6[4]	981.2	495	519	7 756.4	7 621.4
Total	**618.0**	**984.5**	**509**	**529**	**7 756.4**	**7 621.4**

Patient assistance programs

	Patients reached (thousands)		Value USD (millions)[5]	
	2016	2015	**2016**	2015
Novartis Patient Assistance Foundation Inc. (US)	45.4	42.6	1 115.0[6]	707.0
Oncology/hematology LMIC patient assistance	83.3	80.6	1 579.1	1 523.5
Alcon US patient assistance	5.8[7]	7.8	9.7[7]	13.2
Total	**134.5**	**131.0**	**2 703.8**	**2 243.7**

Zero-profit model

	Patients reached (thousands)		Value USD (millions)[8]	
	2016	2015	**2016**	2015
Malaria/*Coartem*	49 757.9[9]	64 097.7	80.7	111.5
Total	**49 757.9**	**64 097.7**	**80.7**	**111.5**

Donations

	Patients reached (thousands)		Value USD (millions)[5]	
	2016	2015	**2016**	2015
Alcon medical missions[10]	484.0	393.8	73.0	43.0
Leprosy (WHO)	290.0	304.5	4.4	5.6
Fascioliasis/*Egaten*[11]	276.2[12]	13.7	<1	<1
Medicine donations (emergency relief)			1.8	1.1
Total	**1 050.2**	**712.0**	**79.2**	**49.7**

Health systems strengthening

	Value USD (millions)[13]		FTEs[1]		People reached (thousands)[2]	
	2016	2015	**2016**	2015	**2016**	2015
Novartis Foundation	14.8	12.0	14	10	8 908.6[14]	4 456.0
Novartis research capacity-building programs	3.5	5.5	6	6	1.0	1.0
Total	**18.3**	**17.5**	**20**	**16**	**8 909.6**	**4 457.0**

	Patients reached (thousands)		Value USD (millions)[5 8 13]		FTEs[1]		People reached (thousands)[2]	
	2016	2015	**2016**	2015	**2016**	2015	**2016**	2015
Grand total	**51 560.6**	**65 925.2**	**2 882.0**	**2 422.4**	**529**	**545**	**16 666.0**	**12 078.4**

[1] Full-time equivalent positions and contractors
[2] Via training and service delivery and through health awareness activities
[3] The patient number was calculated based on treatments delivered and the following elements: daily treatment doses, treatment duration, treatment adherence and potential treatment overlap (as it is common for chronic patients to take several drugs). The treatment adherence and treatment overlap factors are based on assumptions from developed markets and will be revisited when we gain additional insights from Novartis Access rollout countries.
[4] Several strategic measures were implemented to improve the quality and impact of the program (capping number and size of health camps, etc).
[5] Wholesale acquisition cost (WAC) plus logistics costs for some programs
[6] Integration of Alcon brands in the program as of August 2016 and a full-year impact of GSK oncology medicines
[7] Data reflects January to July 2016; as of August 2016, the program transitioned to the Novartis Patient Assistance Foundation Inc. (US).
[8] *Coartem* was provided without profit for public sector use and to donor-funded programs in the private sector. The value of these shipments is calculated based on the average ex-factory price of non-donor-funded *Coartem* to private-sector purchasers in developing countries, minus payments received from the public sector and donor-funded customers in the private sector.
[9] Increased availability of generic options on the market
[10] Retail value for surgical products
[11] Manufacturing, testing and FTE costs
[12] Some 2015 shipments shifted to 2016.
[13] Operating costs
[14] Programs at scale report the catchment of a population in the area where a program has been implemented. Includes expanded nationwide catchment area of the population in 25 districts of Ghana

Corporate responsibility
continued

Zero-profit models and product donations

The Novartis Malaria Initiative recently achieved another treatment milestone: Since 2001, the initiative has delivered, without profit, more than 800 million antimalarial treatments – including more than 300 million dispersible pediatric treatments – mostly to the public sector of malaria-endemic countries. In 2016, our malaria treatments delivered at zero profit reached approximately 50 million patients.

In 2016, Novartis celebrated a 30-year commitment to leprosy elimination. In total, since 2000, we have donated multidrug therapy to 6 million leprosy patients worldwide. The Novartis Foundation continues this legacy by consistently devising novel strategies to fully interrupt the transmission of the disease. At the 19th International Leprosy Congress in September, the foundation presented emerging evidence from the leprosy post-exposure prophylaxis (LPEP) program. LPEP evaluates the effect of providing preventative medicines to close contacts of newly diagnosed patients – such as family members or friends – to decrease the risk of transmission. Partway through the study, LPEP has already shown that its strategy of contact tracing and preventative therapy is feasible and efficient, meaning it could be integrated into routine practice in endemic countries in the future.

In 2016, Novartis celebrated a 30-year commitment to leprosy elimination. In total, since 2000, we have donated multidrug therapy to 6 million leprosy patients worldwide

Alcon: driving access to state-of-the-art surgical eye care

For years, Alcon has partnered with Orbis, which operates a Flying Eye Hospital that provides hands-on training to local eye care specialists and treats patients in some of the world's most underserved areas. Approximately 200 patients are treated during a typical Orbis program. In 2016, Orbis launched its third-generation Flying Eye Hospital, equipped with the latest technology. Alcon supported the aircraft with equipment, products, volunteers and financial assistance. The new Flying Eye Hospital completed its maiden program in Shenyang, China, in September. During the three-week visit, the plane's medical volunteers treated 124 patients and provided hands-on surgical training to 18 local doctors.

200 The number of patients treated during a typical Orbis Flying Eye Hospital program

Effective partnerships to strengthen healthcare systems

While increased availability of high-quality, affordable medicines is important, a holistic system approach is needed to improve quality of care. Strong health services and trained health workers are also critical. The Novartis Foundation is pioneering solutions beyond treatment by testing and validating innovative healthcare models that have a transformational impact on the health of the poorest populations.

In 2016, the Novartis Foundation, together with global nonprofit PATH, local partners and government agencies, launched an innovative blood pressure management program in Vietnam called Communities for Healthy Hearts. It is designed to improve the health of adults who have high blood pressure and are living in low-income households in four districts in Ho Chi Minh City, Vietnam's largest urban area. The program strengthens treatment and referral services, partners with social enterprises to improve blood pressure screening, and leverages technology to help patients manage their disease.

In a village near San Lorenzo, Guatemala, field worker Eduardo Canuz and nurse Evelin Alvarado Fuentes discuss the hazards of wood-burning stoves with Tomasa Carrete and her daughter Veronica Bulux.

Science-based innovation to address the needs of underserved populations

Bacteria, viruses and other micro-organisms continue to wreak havoc on human health, despite major medical advances. Infectious diseases remain the leading cause of death in children and adolescents, and one of the leading causes of death in adults. We are continuing to research potential therapies for these neglected diseases, which can be devastating, especially in developing countries.

In August, we reported on a new target for three neglected diseases: African sleeping sickness, leishmaniasis and Chagas disease. Working in lab models, our researchers at the Genomics Institute of the Novartis Research Foundation demonstrated that it may be possible to treat all three diseases with a single class of compound that blocks cellular machinery known as the proteasome.

Novartis leads two of the four most advanced malaria development programs underway worldwide. Malaria still kills approximately 430 000 people each year, most of them children under 5 years old. In September, the results of a proof-of-concept study for one compound, KAF156, were published, and further development is ongoing. The second compound, KAE609, continues to be evaluated for the role it could play in the battle against the disease. Read more about our antimalarial research and development (R&D) efforts on page 51.

In October, we announced that the Novartis Institute for Tropical Diseases (NITD) will move its operations and research programs from Singapore to Emeryville, California in the US, where it will be co-located with the infectious diseases research team of the Novartis Institutes for BioMedical Research (NIBR). This move will strengthen NITD for the future by enabling closer collaboration with the NIBR infectious diseases research team and the San Francisco Bay Area life sciences community. NITD will remain an institute within the global research network of NIBR and continue to focus on the discovery of new medicines to combat malaria and other tropical diseases. The transition is expected to take place over the next 15 months.

Adaptive R&D is the modification of an existing drug to improve therapeutic efficacy, safety, and access to medicine, and – most importantly – to generate a positive health outcome. Most often, this work is done with a specific focus on poor and vulnerable patient groups. Our Established Medicines franchise manages a product portfolio of more than 90 mature brands spanning 11 therapeutic areas. It also systematically evaluates its portfolio and executes relevant adaptive R&D projects. In addition, our Center of Excellence for Emerging Markets collaborates closely with the global program teams across the Innovative Medicines Division to ensure that adaptive R&D considerations, especially formulations for specific age groups or geographies, are firmly embedded in the development plans for our new products.

Corporate responsibility
continued

Doing business responsibly

We recognize that achieving our business goals requires that we operate with high integrity, transparency and environmental sustainability. We must meet society's increasing expectations in a way that builds and maintains trust.

Continuing to build a culture of integrity

It takes significant effort to truly and deeply embed a culture of integrity in a sustainable way across a large, complex and multinational organization. As a result, we do still uncover lapses. We take allegations of any inappropriate behavior very seriously, actively investigate them, and take appropriate disciplinary action. Associates can report suspected misconduct to the Business Practices Office (BPO) – an independent team that reports to the Group General Counsel.

In 2016, the BPO received a total of 3 595 complaints of alleged misconduct, of which 1 888 were deemed not to be related to misconduct and were delegated for review and action outside the BPO investigative process. The BPO initiated investigations of 1 707 reported cases related to misconduct; 893 were substantiated, including 401 that resulted in dismissals or resignations.

Following recent cases of misconduct, we have further increased our focus on ensuring that lessons learned are shared immediately and transparently throughout the global organization to identify other similar behaviors and enable intelligent risk mitigation. We continue to invest significant efforts to embed a culture of compliance throughout our organization.

Training and guiding associates

All Novartis Group company associates are required to complete integrity and compliance training. In 2016, more than 110 000 employees completed the Code of Conduct course.

Every year since 2012, global communications toolkits have been rolled out to support the launch and updating of policies and guidelines, and to reinforce ethical behavior among associates. These toolkits include a range of awareness-raising and educational materials such as posters, videos, letters to internal stakeholder groups, frequently asked questions and answers, training presentations and case materials.

Additionally, our CEO chaired a webcast on global integrity and compliance to reinforce our commitment to embed responsible business practices across our organization and make leaders accountable. We also developed integrity case studies – inspired by real-life scenarios – for managers to use in discussions with their teams.

Compliance has now become a regular agenda item of leadership meetings across the company. To ensure accountability of local country organizations, our management includes integrity and compliance questions as part of standard business reviews.

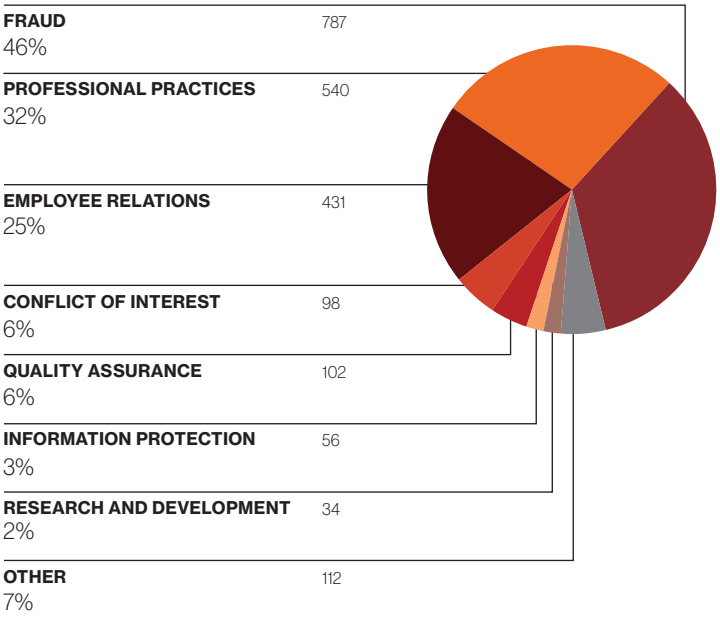
In addition, we continue to further embed our revised Values and Behaviors launched last year in all aspects of employees' lives at Novartis – from recruitment and development to promotions, performance assessments and bonus awards.

Strengthening the Integrity & Compliance function

In May, we introduced a new Chief Ethics and Compliance Officer who continues to report directly to the CEO. The new Chief Ethics and Compliance Officer is also Head of Litigation, reporting to the Group General Counsel of Novartis. By bringing the compliance and legal functions closer together, we can evaluate facts that are uncovered and intended for use in litigation cases to determine if additional compliance actions or policies are warranted. This helps us constantly improve our compliance activities.

Misconduct cases[1] per category

A total of 1 707 cases of misconduct were reported to the BPO, of which 893 were substantiated, including 401 that resulted in dismissals or resignations.



[1] One case can fall under several categories, so the total is greater than 100% and category figures total more than the stated number of cases. Investigation reports are received on an ongoing basis, which potentially leads to a reassessment of the allegation category and related figures.

We also continue to strengthen the Integrity & Compliance (I&C) function, which now has approximately 375 full-time-equivalent employees who are dedicated to integrity and compliance at the local, regional and global levels. Of these employees, 175 were added in the past three years. Additionally, we developed and launched an internal, web-based tool in January 2016 called the I&C Training Academy, which is designed to help I&C professionals further enhance their functional skills and competencies.

Furthermore, we took steps to strengthen integrity and compliance monitoring by hiring regional monitoring teams to perform in-country testing.

Changing how we interact with customers

Companies in the healthcare industry have an important responsibility to educate doctors, nurses and other clinicians about how medicines and devices work. Practices such as sponsoring doctors to attend conferences, inviting clinicians to speak about products, and providing promotional aids have long been used by pharmaceutical companies to deliver information to the medical community about medicines and services in their portfolio.

One of our goals in 2016 was to find better and more inclusive ways to reach a broader cross-section of this community. Moreover, social expectations are rapidly changing, and educational and promotional practices that have been widely used by the industry must be re-evaluated.

We have 120 pilots for finding new and improved ways of engaging with healthcare professionals that are ongoing or completed. This includes employing technology to supplement face-to-face meetings and bring the experience of international congresses to the local level. For the prominent American Society of Clinical Oncology meeting in June, we used our new virtual conference platform *Vivinda* TV to deliver meeting content on-demand to more than 5 000 virtual delegates in 103 countries – a reach five times greater than in the past. And at the European School for Advanced Studies in Ophthalmology, we used *Vivinda* TV to provide almost 1 800 virtual delegates in 75 countries with online access to meeting content. This significantly exceeded the 600 ophthalmologists who would normally attend the meeting in person. Additionally, Novartis partnered with the

Ethics and people key performance indicators [1]

	2016	2015
Full-time equivalent positions / headcount [2]	**118 393 / 122 985**	118 700 / 122 966
Turnover: % voluntary / % overall	**7.4 / 12.2**	7.3 / 13.5
Voluntary turnover of high [3] performers (%)	**5.8**	5.5
Internal hires / external hires (%)	**47.0 / 53.0**	44.8 / 55.2
Women in management: % of management [4] / % of Board of Directors	**42 / 25**	41 / 27
Associate nationalities / associate nationalities in management [4]	**142 / 109**	145 / 109
Annual training hours per employee	**27.8**	27.3
Lost-time injury and illness rate (per 200 000 hours worked) [5]	**0.08**	0.11
Total recordable case rate (per 200 000 hours worked) [5, 6]	**0.29**	0.40
Novartis associates trained and certified on Code of Conduct [7]	**110 774**	110 638
Misconduct cases reported / allegations substantiated [8]	**1 707 / 893**	1 300 / 1 010
Dismissals and resignations related to misconduct [9]	**401**	577
Regulatory inspections without major findings (%)	**98.1**	98.4
Suppliers posing an elevated risk under responsible procurement [10]	**441**	475
Suppliers with active follow-up [10, 11]	**147**	249
Suppliers audited [10]	**76**	100

[1] Continuing operations
[2] Headcount reflects the total number of associates in our payroll systems. Full-time equivalent adjusts headcount for associates working less than 100%. All data as of December 31
[3] We have refined the high-performer definition methodology to reflect the focus on Values and Behaviors, and have restated 2015 data.
[4] Management defined locally
[5] Data include Novartis associates and third-party personnel managed by Novartis associates.
[6] Includes all work-related injury and illness, whether leading to lost time or not
[7] Active Novartis associates with email addresses, trained via e-learning
[8] The number of misconduct cases reported may change as matters may be reassessed in the course of the case lifecycle. The number of substantiated allegations may change due to the fact that investigation reports with assessments are received on an ongoing basis, which potentially leads to a difference in numbers at a later stage. In 2016, the Business Practices Office (BPO) received a total of 3 595 complaints of alleged misconduct, of which 1 888 were deemed not to be related to misconduct and were delegated for review and action outside the BPO investigative process. The BPO initiated investigations of 1 707 reported cases related to misconduct; 893 were substantiated, including 401 that resulted in dismissals or resignations.
[9] The number of dismissals and resignations related to misconduct may change due to the fact that investigation reports are received and then reviewed for remedial actions on an ongoing basis, which potentially leads to a difference in numbers at a later stage.
[10] Includes new suppliers and new products, services or sites from existing suppliers; potential risks include labor or human rights, HSE and animal welfare
[11] Follow-up includes more information requested, audits or on-site assessments.

Corporate responsibility
continued

American Society of Hematology (ASH) to provide 3 000 healthcare professionals with virtual access to their annual congress via the ASH web portal.

Beginning 2017, our company will offer doctors support to attend international medical conferences based on their active participation in the event (i.e., only if they are speakers or presenters of Novartis data, chairs of Novartis-sponsored sessions or faculty for post-congress education). Novartis will also only sponsor speakers to represent the company in clearly defined instances, such as when a new product becomes available, a new indication is added to an existing product, or significant new clinical data is released.

We have 120 pilots for finding new and improved ways of engaging with healthcare professionals that are ongoing or completed

Increasing transparency around payments to customers

As of 2016, companies belonging to the European Federation of Pharmaceutical Industries and Associations (EFPIA), including Novartis, publicly disclose payments and other transfers of value to health professionals and healthcare organizations for prescription pharmaceuticals. Since June, we have made our disclosure reports available on our global website. We will extend this disclosure to include all product segments in EFPIA countries where we have activities – even parts of our business that are not covered by the EFPIA code – and publish them on our global website in 2017.

In addition to the EFPIA code, we comply with similar transparency codes and regulations in the US, Japan and Australia.

Combatting counterfeit medicines

Novartis is continuing to work to tackle the problem of counterfeit drugs.

We established both an Anti-Counterfeiting Steering Committee and an Anti-Counterfeiting Working Group. The steering committee, made up of senior managers from across the company, is tasked with driving the strategic direction of our anti-counterfeiting approach worldwide. The working group develops and delivers the specific operational activities needed to implement the strategy.

Driving environmental sustainability

In late 2015, Novartis launched its Vision 2030 on Environmental Sustainability, which is underpinned by a set of environmental sustainability targets in four areas: energy and climate, water and micropollutants, materials and waste, and environmental sustainability management. Throughout 2016, a cross-divisional team began to select major facility and infrastructure projects and measures necessary to achieve our 2020 goals, based on the savings as determined by our internal carbon price of USD 100/tCO_2e. We are identifying opportunities for contracting renewable wind and solar electricity as priority actions.

At the same time, we found ways to improve our environmental footprint in our day-to-day operations, contributing to a reduction in carbon emissions (Scope 1 and Scope 2) of 10 kilotons in 2016. For instance, at our facility in Grimsby in the UK, we implemented a new wastewater technology that uses microbubbles. This technology was first introduced at our plant in Ringaskiddy, Ireland, in 2015. There, it reduced electricity demand by 160 kilowatts per year and carbon emissions by 600 tons per year, without impacting the performance of the plant.

Ghanaian scientist Edmund Ekuadzi gathers plants used by traditional healers to analyze their medicinal effects.

We found ways to improve our environmental footprint in our day-to-day operations, contributing to a reduction in carbon emissions (Scope 1 and Scope 2) of 10 kilotons in 2016

Maintaining a responsible supply chain

We engage with an extensive network of suppliers worldwide, and their contributions are crucial to our success. Responsible procurement (RP) helps ensure our goods and services are ethically sourced by requiring the companies with which we do business to meet the standards of ethics, business integrity and environmental practice that we expect. Our RP practice is designed to provide a clear view of where potential issues exist or standards may be compromised, with speed and accuracy. It quickly filters out the approximately 95% of suppliers that present little or no ethical risk, enabling us to concentrate our efforts on the small number of suppliers where a significant risk exists or where we can influence change.

In 2016, we conducted a materiality assessment to ensure that our current processes meet the recent heightened external interest, additional scrutiny and new regulations. One of the outcomes was the establishment of a cross-functional steering committee. This committee has the accountability to expand our current RP program into a comprehensive third-party risk framework across Novartis.

In 2017, cross-functional workstreams formed under the steering committee will carry out an action plan to strengthen the policy, execution and monitoring aspects of the program to address additional third-party risks.

Expanding our corporate volunteering program

Novartis has a number of initiatives to engage our associates, helping us to attract and develop talented people, strengthen our company's culture, and support our ability to execute our strategy.

In 2015, we put in place a corporate volunteering platform through which Novartis associates can register a potential corporate responsibility project idea or sign up to become a corporate volunteer. In 2016, the program expanded significantly, launching in several markets, including low- and middle-income countries. The scope of projects in the platform is broad and includes partnerships with global charitable organizations, remote and on-the-ground capability building, one-time and recurring pro bono services, and local efforts to support smaller-scale foundations and institutions.

Environmental sustainability key performance indicators [1, 2]

	2016	2015
Energy use (million gigajoules), on site and purchased	**16.6**	17.2
Water discharge (million m^3)	**16.2**	17.2
Contact water use, excluding cooling water (million m^3)	**14.8**	15.5
Emissions		
Greenhouse gas (GHG) emissions, total Scope 1 and Scope 2 (1 000 t)	**1 352.7**	1 362.1
GHG emissions, Scope 1, combustion and processes on site (1 000 t)	**396.6**	396.8
GHG emissions, Scope 1, vehicles (1 000 t)	**134.7**	138.9
GHG emissions, Scope 2, purchased energy (1 000 t)	**821.4**	826.4
Halogenated volatile organic compounds (t)	**50.7**	66.4
Non-halogenated volatile organic compounds (t)	**480.8**	517.1
Operational waste		
Hazardous waste not recycled (1 000 t)	**60.2**	57.6
Non-hazardous waste not recycled (1 000 t)	**17.9**	20.6

[1] Continuing operations

[2] 2016 environmental sustainability data published in the Annual Report are actual data for the period from January through September, and best estimates for the period from October through December. They will be updated with actual data in the first quarter of 2017. Significant deviations will be reported on our website and restated in next year's Annual Report.

Independent Assurance Report on the Novartis 2016 corporate responsibility reporting

To the Board of Directors of Novartis AG, Basel

We have been engaged to perform assurance procedures to provide limited assurance on the following aspects of the 2016 corporate responsibility (CR) reporting of Novartis AG and its consolidated subsidiaries (Novartis Group) included in the Annual Report 2016.

Scope and subject matter

Our limited assurance engagement focused on the following data and information disclosed in the consolidated CR reporting of Novartis Group for the year ended December 31, 2016:

- The social key performance indicators on page 7, the "Novartis access approaches: key performance indicators 2016" on page 65, the "Misconduct cases per category" on page 68, the "Ethics and people key performance indicators" on page 69 and the "Environmental sustainability key performance indicators" on page 71 (CR indicators)
- Reporting processes and related controls in relation to data aggregation of CR indicators

Criteria

The management reporting processes with respect to the CR reporting and CR indicators were assessed against Novartis Group internal policies and procedures, as set forth in the following:

- Guideline on Corporate Responsibility Management at Novartis and the Code of Conduct
- Procedures by which the data for the CR indicators reporting are gathered, collected and aggregated internally

Inherent limitations

The accuracy and completeness of CR indicators are subject to inherent limitations given their nature and methods for determining, calculating and estimating such data. Our Assurance Report should therefore be read in connection with Novartis Group guidelines, definitions and procedures on CR reporting.

Novartis responsibilities

The Board of Directors of Novartis AG is responsible for both the subject matter and the criteria as well as for selection, preparation and presentation of the information in accordance with the criteria. This responsibility includes the design, implementation and maintenance of related internal control relevant to this reporting process that is free from material whether due to fraud and error.

Our responsibilities

Our responsibility is to form an independent opinion, based on our limited assurance procedures, on whether anything has come to our attention to indicate that the CR indicators are not stated, in all material respects, in accordance with the reporting criteria.

We planned and performed our procedures in accordance with the International Standard on Assurance Engagements (ISAE) 3000 (revised) "Assurance Engagements Other Than Audits or Reviews of Historical Financial Information." This standard requires that we plan and perform the assurance engagement to obtain limited assurance on the identified CR indicators.

A limited assurance engagement under ISAE 3000 (revised) is substantially less in scope than a reasonable assurance engagement in relation to both the risk assessment procedures, including an understanding of internal control, and the procedures performed in response to the assessed risks. Consequently, the nature, timing and extent of procedures for gathering sufficient appropriate evidence are deliberately limited relative to a reasonable assurance engagement and, therefore, less assurance is obtained with a limited assurance engagement than for a reasonable assurance engagement.

Our independence and quality control

We have complied with the independence and other ethical requirements of the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants, which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior.

Our firm applies International Standard on Quality Control 1 and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards, and applicable legal and regulatory requirements.

Summary of work performed

Our assurance procedures included the following:
- Reviewing the application of the Novartis Group internal CR reporting guidelines
- Interviewing associates responsible for internal reporting and data collection
- Performing tests on a sample basis of evidence supporting selected CR data concerning completeness, accuracy, adequacy and consistency
- Inspecting relevant documentation on a sample basis
- Reviewing and assessing the management reporting processes for CR reporting and consolidation, and their related controls

We have not carried out any work on data other than outlined in the scope and subject matter section as defined above. We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our assurance conclusions.

Limited assurance conclusion

Based on our work described in this report, nothing has come to our attention that causes us to believe that the data and information outlined in the scope and subject matter section (including the related controls) have not been prepared, in all material aspects, in accordance with Novartis Group internal policies and procedures.

PricewaterhouseCoopers AG

Bruno Rossi

Raphael Rutishauser

Basel, January 24, 2017


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PHOTO ESSAY

Coping with eye disease and fading vision late in life

Groups of people doing communal exercises to keep fit are an everyday sight in Japan, but for one woman they are a very public way to show she is fighting back against a debilitating eye disease.

Yuko Yoshikawa feared she could no longer help organize the popular sessions, known as radio exercises, when she began suffering from age-related macular degeneration (AMD), which causes progressive loss of vision in the elderly. The disease results in gradual blurring of the eye's central vision, making it harder to read and recognize faces, and often triggering depression and feelings of isolation.

She gained information and support from other patients, and is now working with them to spread the word through a group called AMD Tomonokai, which means "friends" in Japanese. Ms. Yoshikawa, now 65, was encouraged to maintain her involvement with the exercise classes, though she now wears dark glasses to protect her eyes against bright sunlight.

Through its newsletters, meetings and website, the group shares AMD patients' experiences and advises them on a range of practical matters, such as how to get the most out of medical consultations, find the best form of therapy, and manage the costs of healthcare. It also offers practical tips, like using a smartphone to read bus timetables by photographing the small print and enlarging it on the screen.

Above all, the group stresses the importance of social interaction and maintaining normal activities for as much as possible to counteract the psychological effects of the disease.

The challenges associated with AMD will likely grow as the world's population ages. In Japan, which has the oldest average population of any country in the world, an estimated 700 000 people suffer from the disease. Worldwide, about 170 million people are affected, and this number is expected to increase to nearly 200 million by 2020.

1 Despite eyesight problems, Yuko Yoshikawa (center foreground) throws herself into the communal fitness sessions that are a feature of Japanese life.
2 Hideo Takahashi, founder and head of the AMD support group, with his wife Chizuko at their vegetable plot in Saitama, near Tokyo, Japan
3 Ms. Yoshikawa visits a historic shrine near her Tokyo home.

There is no cure for AMD, though therapies such as *Lucentis* have been shown to improve symptoms in the more serious form of the disease, called wet AMD. And Novartis has ongoing work to develop alternative treatments.

Members of AMD Tomonokai find different ways to cope with the disease. Despite her deteriorating vision, Hiroko Ayabe, a 71-year-old retired teacher, continues to play an active role in family life by looking after her grandchildren every day until her daughter and son-in-law get home from work.

The group's founder and head, Hideo Takahashi, sets a good example by cycling to a small inner-city farm where he and his wife, Chizuko, tend the vegetables they grow – his eyes also protected by dark glasses.

Mr. Takahashi, now 68 years old, discovered he had AMD seven years ago and experienced the same uncertainty and isolation as many other patients. However, after a lifetime in the pharmaceutical industry, he was more familiar with the world of healthcare and determined to put his knowledge to good use.

The group he established now has around 100 members and provides an important source of advice, as well as support and encouragement for patients. And like the plants he tends on his vegetable plot, Mr. Takahashi is confident that now that it has taken root, it will flourish and grow over time.

For detail on **eye care** research → page 50

Corporate governance

Contents

Dear shareholder,

In 2016, we refreshed our Board with new members, focused on the new operating model of Novartis, and further strengthened our corporate governance.

The mandate of our Board

Our Board is accountable for stewardship, governance and oversight, and for setting the strategic direction to deliver sustainable value. We achieve this by setting a clear strategy for Novartis and through an effective governance.

Our Board is also responsible for appointing our CEO and the other Executive Committee members. We assert independent judgment and work closely with our Executive Committee to ensure our strategy is properly implemented, our ethical standards are applied, and our performance is optimized.

Board composition

To be effective and independent, our Board must have the right composition, structure and processes, and a clear understanding of its role and responsibilities. Our Board meets these requirements.

Our Board is comprised of 12 non-executive, independent members with diverse education, experience, nationalities and interpersonal skills. This diversity was further strengthened when Ton Buechner and Liz Doherty joined in February 2016, reinforcing our Board's expertise in finance and accounting, as well as in leadership and management. With this, we achieved a substantial Board refreshment. Two-thirds of our Board members have a tenure of less than six years, balancing the benefits of continuity and experience with refreshment, without applying a mandatory term limit.

In line with committee succession plans, Liz joined our Audit and Compliance Committee (ACC), and was designated as Financial Expert. Subject to their re-election at the Annual General Meeting of Shareholders (AGM) 2017, Liz will take over the chairmanship of the ACC from Srikant Datar; Srikant will remain an ACC member, designated as second Financial Expert; and he will take over the chairmanship of the Risk Committee from Andreas von Planta, who has already taken over the chairmanship of the Governance, Nomination and Corporate Responsibilities Committee (GNCRC) from Pierre Landolt.

All Board members are non-executive and independent, as defined by our own rules and those of the Swiss Code of Best Practice for Corporate Governance. We have established processes to ensure our Board functions effectively, promoting efficient and balanced decision-making, and enabling our Board to effectively fulfill its duties in the best interest of our shareholders, employees and other stakeholders.

We emphasize training, performance evaluation and ongoing improvement of our Board and its members, as well as succession planning. To get an outside view on where we could improve further, we initiate a performance and effectiveness evaluation by an independent expert on a regular basis, with the most recent external review being completed during 2014.

The focus of our Board in 2016

The key areas that our Board focused on in 2016 were structural, cultural and leadership changes, as well as the corporate responsibility programs, compliance and the compensation system.
We re-evaluate the strategic direction of Novartis each year and make necessary changes in line with our mandate to create sustainable value.

Last year, a key strategic topic for our Board was the continuing transformation of Novartis. This began in 2014 when we focused our company on our core businesses and created a more integrated organization to facilitate collaboration, drive efficiency, and support productivity gains. In 2016, in close cooperation with our Executive Committee, we implemented additional structural changes aimed at positioning our company for future growth. They included creating Global Drug Development and manufacturing organizations to further enhance efficiency and effectiveness. As a result of these actions, in just over three years, Novartis has transformed from a strongly divisionalized organization to a more integrated, streamlined company focused on key segments and able to take advantage of its global scale. For details on our strategy and structure, please see pages 14 – 19. We also strengthened our focus on the corporate culture of Novartis as defined by the Novartis Values and Behaviors.

The GNCRC also reviewed progress on Novartis Access, our portfolio of 15 on- and off-patent medicines offered to governments and public-sector customers in low- and lower-middle-income countries at a price of USD 1 per treatment per month, which completed its first year of implementation. The Novartis Malaria Initiative, the Healthy Family social business, and our corporate volunteering program were also reviewed. The GNCRC also reviewed Novartis' performance in key sustainability ratings and discussed the potential for introducing more robust reporting on the social impact of our activities. For further information on our corporate responsibility efforts, please see the Corporate Responsibility chapter, beginning on page 60, and our Corporate Responsibility Performance Report on the Novartis website: www.novartis.com/about-us/corporate-responsibility.

To meet the increasing expectations of patients and society in a way that makes us proud, we also took further steps in the compliance area. We enhanced our core compliance processes and strengthened our Integrity & Compliance function. Further, we evolved the way we work to increase access to evidence-based information about our products and services, with the aim of helping doctors deliver the best possible care for patients. We will continue to focus on further strengthening leaders' accountability at all levels of the organization for compliance.

And, finally, we continued to refine our compensation system in line with best practice principles. For further information, please see our Compensation Report, beginning on page 110.

Role of the Chairman

As independent, non-executive Chairman, I am responsible for the leadership of the Board, ensuring its effectiveness in all aspects of its role. I also make sure we effectively collaborate with our CEO and the Executive Committee.

I ensure that our Board and its committees work effectively, setting the agenda, style and tone of Board discussions. I promote constructive challenge and debate, as well as effective decision-making, while ensuring that our performance is regularly evaluated and that our members are provided with appropriate support, education and advice.

In addition, I support, mentor and challenge our CEO, without interfering in the operational management of Novartis.

I am supported in my tasks by our Vice Chairman, Enrico Vanni, who would lead the Board if I were incapacitated.

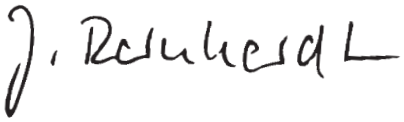
Strengthened governance framework

During the last two years, we took steps to further strengthen our corporate governance, implementing the rules of the Ordinance against Excessive Compensation in Stock Exchange Listed Companies. We introduced annual elections of the Chairman of the Board, of all Board members, and of Compensation Committee members. We also introduced yearly binding shareholder votes on the aggregate compensation of our Board and Executive Committee, as well as a yearly non-binding shareholder vote on the Compensation Report.

Last year we also addressed the question of auditor rotation. We concluded that, at this stage, continuing with the yearly assessment of PwC's objectivity, effectiveness and independence, and with the regular rotation of the audit partner in charge, is in the best interest of Novartis, its investors and other stakeholders.

Importance of shareholder engagement

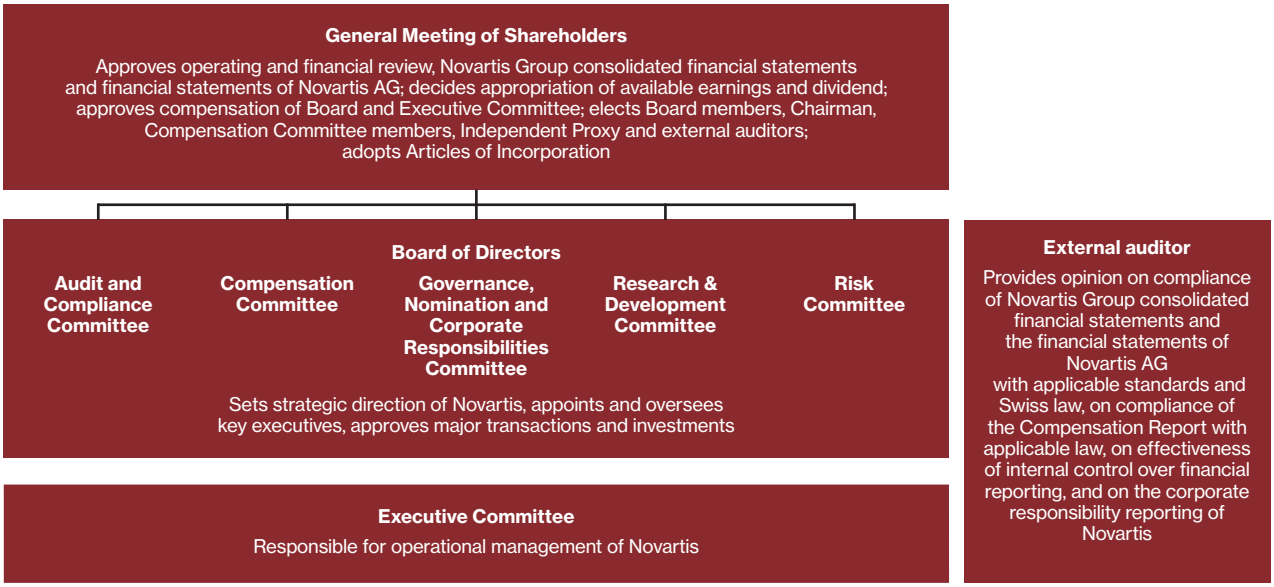
Engagement with our shareholders is critical to our company's long-term success. Our Board is committed to continuous shareholder engagement. We strive to exchange views with our shareholders in an atmosphere of trust and respect that promotes a collaborative dialogue, with views and positions expressed openly to enhance mutual understanding. As part of these efforts, based on a structured annual program, our governance specialists meet regularly with their peers from shareholder groups, and I personally meet with many of our shareholders, discussing strategy and governance. Our shareholder engagement meaningfully contributes to the continuing evolution of our governance framework.



Joerg Reinhardt
Chairman of the Board of Directors

Summary of our corporate governance approach

Governance bodies



Leadership structure

Independent, non-executive Chairman and separate CEO

Board governance

Structure

All Board members are non-executive and independent, as defined by our rules. The Board has assigned responsibilities to five committees:

- Audit and Compliance Committee
- Compensation Committee
- Governance, Nomination and Corporate Responsibilities Committee
- Research & Development Committee
- Risk Committee

Composition

Board members have diverse education, experience, nationalities and interpersonal skills. Their biographies (beginning on page 94) describe their specific qualifications.

Processes

The Board's processes significantly influence its effectiveness. The Board has implemented best practices for all such processes. Important elements include Board meeting agendas (to address all important topics), information submitted to the Board (to ensure the Board receives sufficient information from management to perform its supervisory duty and to make decisions that are reserved for it), and boardroom behavior (to promote an efficient and balanced decision-making process).

Board and Executive Committee compensation

Information on Board and Executive Committee compensation is outlined in our Compensation Report, beginning on page 110.

Our shares and our shareholders

Our shares

Share capital of Novartis AG

As of December 31, 2016, the share capital of Novartis AG is CHF 1 313 557 410 fully paid-in and divided into 2 627 114 820 registered shares, each with a nominal value of CHF 0.50 (Novartis share). Novartis AG has neither authorized nor conditional capital. There are no preferential voting shares; all Novartis shares have equal voting rights. No participation certificates, non-voting equity securities (Genussscheine), or profit-sharing certificates have been issued.

Novartis shares are listed on the SIX Swiss Exchange (ISIN CH0012005267, symbol: NOVN), and on the New York Stock Exchange (NYSE) in the form of American depositary receipts (ADRs) representing Novartis American depositary shares (ADSs) (ISIN US66987V1098, symbol: NVS).

The holder of an ADR has the rights enumerated in the deposit agreement (such as the right to give voting instructions and to receive dividends). The ADS depositary of Novartis AG – JPMorgan Chase Bank, New York – holding the Novartis shares underlying the ADRs is registered as a shareholder in the Novartis Share Register. An ADR is not a Novartis share and an ADR holder is not a Novartis AG shareholder. ADR holders exercise their voting rights by instructing the depositary to exercise their voting rights. Each ADR represents one Novartis share.

Changes in share capital

During the last three years, the following changes were made to the share capital of Novartis AG:

In 2014, the share capital of Novartis AG did not change. In 2015, Novartis AG reduced its share capital by CHF 14.6 million (from CHF 1 353 096 500 to CHF 1 338 496 500) by canceling 29.2 million Novartis shares repurchased on the second trading line during 2013 and 2014. In 2016, Novartis AG reduced its share capital by CHF 24.9 million (from CHF 1 338 496 500 to CHF 1 313 557 410) by canceling 49.9 million Novartis shares repurchased on the second trading line during 2015.

Capital changes

	Number of shares			
Year	As of Jan 1	Changes in shares	As of Dec 31	Changes in CHF
2014	2 706 193 000		2 706 193 000	
2015	2 706 193 000	– 29 200 000	2 676 993 000	– 14 600 000
2016	2 676 993 000	– 49 878 180	2 627 114 820	– 24 939 090

A table with additional information on changes in the Novartis AG share capital can be found in Note 8 to the financial statements of Novartis AG.

Convertible or exchangeable securities

Novartis AG has not issued convertible or exchangeable bonds, warrants, options or other securities granting rights to Novartis shares, other than options (and similar instruments such as stock appreciation rights) granted under or in connection with equity-based participation plans of Novartis associates. Novartis AG does not grant any new stock options under these plans.

Share repurchase programs

At the Annual General Meeting (AGM) in February 2008, shareholders approved the sixth share repurchase program authorizing the Board to repurchase Novartis shares up to a maximum of CHF 10 billion via a second trading line on the SIX Swiss Exchange. In 2008, a total of 6 million Novartis shares were repurchased at an average price of CHF 49.42 per Novartis share, and canceled in 2009. In April 2008, the share repurchases were suspended in favor of debt repayment. In December 2010, the Board announced the reactivation of the share repurchases. In 2011, 39 430 000 Novartis shares were repurchased at an average price of CHF 52.81 per Novartis share, and canceled in 2012. In 2012, no Novartis shares were repurchased. In 2013, 2 160 000 Novartis shares were repurchased at an average price of CHF 70.58 per Novartis share. In 2014, 27 040 000 Novartis shares were repurchased at an average price of CHF 81.18 per Novartis share. In 2015, 29 200 000 Novartis shares repurchased in 2013 and 2014 were canceled. In the same year, 49 878 180 Novartis shares were repurchased at an average price of CHF 93.24 per Novartis share, and canceled in 2016. With those repurchases, the sixth share repurchase program was completed.

At the AGM in February 2016, shareholders approved the seventh share repurchase program authorizing the Board to repurchase Novartis shares up to a maximum of CHF 10 billion. In 2016, a total of 10 270 000 Novartis shares were repurchased at an average price of CHF 74.67 per Novartis share.

Share developments

SHARE DEVELOPMENTS IN 2016

— Swiss-listed Novartis shares decreased 14.6% to CHF 74.10
— ADRs decreased 15.3% to USD 72.84

Novartis shares finished at CHF 74.10, a decrease of 14.6% from the 2015 year-end closing price of CHF 86.80. Novartis ADRs decreased in 2016 by 15.3% to USD 72.84 from USD 86.04. The Swiss Market Index (SMI), in comparison, decreased by 6.8% in 2016, whereas the world pharmaceutical index (MSCI) decreased by 12.0% during the year. Total shareholder return for Novartis shares in 2016 was -11.4% in CHF and -13.8% in USD. The disappointing Alcon performance, the slow uptake of *Entresto* and the patent expiration of *Gleevec* in US weighed on our share price in 2016. Over a longer-term period, Novartis AG has consistently delivered a solid performance, providing a 8.7% compounded annual total shareholder return between January 1, 1996 and December 31, 2016, exceeding the 8.4% compounded returns of its large pharmaceutical peers (see page 115; "benchmark companies"), or the returns of 8.3% of the MSCI.

The market capitalization of Novartis AG based on the number of Novartis shares outstanding (excluding Novartis treasury shares) amounted to USD 172 billion as of December 31, 2016, compared to USD 208 billion as of December 31, 2015.

CONTINUOUSLY RISING DIVIDEND SINCE 1996

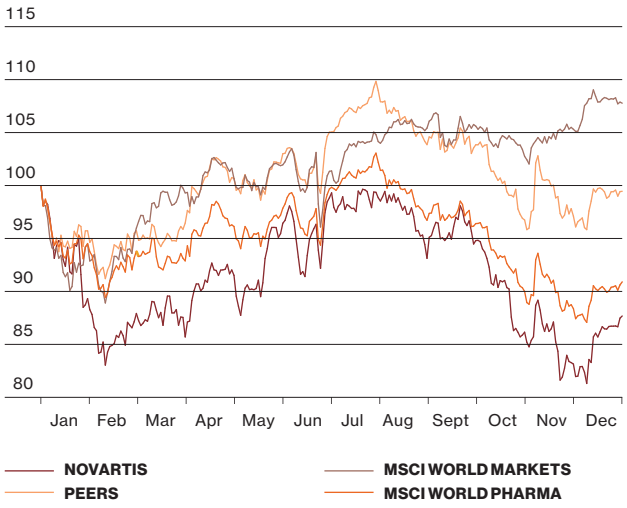
The Board proposes a 2% increase in the dividend payment for 2016 to CHF 2.75 per Novartis share (2015: CHF 2.70) for approval at the AGM on February 28, 2017. This represents the 20th consecutive increase in the dividend paid per share since the creation of Novartis AG in December 1996, which reflects the successful execution of the Group's strategy as well as the performance of the Executive Committee and all Novartis associates. If the 2016 dividend proposal is approved by shareholders, dividends to be paid out will total approximately USD 6.4 billion (2015: USD 6.5 billion). This will result in an expected payout ratio of 96% of net income from continuing operations (2015: 92% and 36% of net income attributable to shareholders of Novartis AG). Based on the 2016 year-end share price of CHF 74.10, the dividend yield will be 3.7% (2015: 3.1%). The dividend payment date has been set for March 6, 2017.

DIRECT SHARE PURCHASE PLAN

As of June 20, 2016, Novartis no longer provides a Direct Share Purchase Plan. All participants were informed about the termination through a letter, which also included details about available options and the modalities of the closure.

Novartis 2016 share price movement

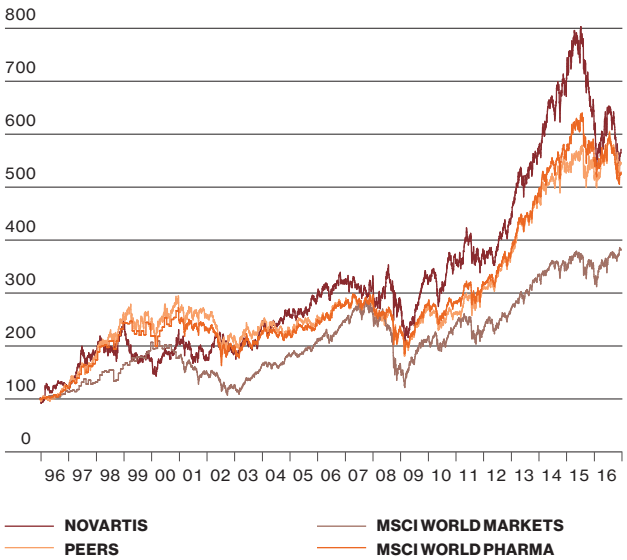
(based on USD amounts)



Source: Datastream; data are converted into US dollars and re-based to 100 at January 1, 2016. Currency fluctuations have an influence on the representation of the relative performance of Novartis vs. indices and peers.

Novartis 1996–2016 total shareholder return

(based on USD amounts)



Source: Datastream; data are converted into US dollars and re-based to 100 at January 1, 1996. Currency fluctuations have an influence on the representation of the relative performance of Novartis vs. indices and peers.

Key Novartis share data

	2016	2015	2014
Issued shares	**2 627 114 820**	**2 676 993 000**	**2 706 193 000**
Treasury shares [1]	253 055 807	303 098 183	307 566 743
Outstanding shares at December 31	**2 374 059 013**	**2 373 894 817**	**2 398 626 257**
Weighted average number of shares outstanding	**2 378 474 555**	**2 402 806 352**	**2 425 782 324**

[1] Approximately 135 million treasury shares (2015: 137 million; 2014: 153 million) are held in entities that restrict their availability for use.

Per-share information[1]

	2016	2015	2014
Basic earnings per share (USD) from continuing operations	2.82	2.92	4.39
Basic earnings per share (USD) from discontinued operations		4.48	– 0.18
Total basic earnings per share (USD)	2.82	7.40	4.21
Diluted earnings per share (USD) from continuing operations	2.80	2.88	4.31
Diluted earnings per share (USD) from discontinued operations		4.41	– 0.18
Total diluted earnings per share	2.80	7.29	4.13
Operating cash flow (USD) from continuing operations	4.82	5.03	5.73
Year-end equity for Novartis AG shareholders (USD)	31.52	32.46	29.50
Dividend (CHF) [2]	2.75	2.70	2.60

[1] Calculated on the weighted average number of shares outstanding, except year-end equity
[2] 2016: proposal to shareholders for approval at the Annual General Meeting on February 28, 2017

Key ratios – December 31

	2016	2015	2014
Price/earnings ratio [1]	25.7	11.9	22.2
Price/earnings ratio from continuing operations [1]	25.7	30.1	21.3
Enterprise value/EBITDA from continuing operations	13	16	15
Dividend yield (%) [1]	3.7	3.1	2.8

[1] Based on the Novartis share price at December 31 of each year

Key data on ADRs issued in the US

	2016	2015	2014
Year-end ADR price (USD)	72.84	86.04	92.66
High [1]	86.21	106.12	96.65
Low [1]	67.59	83.96	78.20
Number of ADRs outstanding [2]	315 349 314	299 578 398	307 623 364

[1] Based on the daily closing prices
[2] The depositary, JPMorgan Chase Bank, holds one Novartis AG share for every ADR issued.

Share price (CHF)

	2016	2015	2014
Year-end share price	74.10	86.80	92.35
High [1]	86.45	102.30	93.80
Low [1]	68.15	82.20	70.65
Year-end market capitalization (USD billions) [2]	**172.0**	**208.3**	**223.7**
Year-end market capitalization (CHF billions) [2]	**175.9**	**206.1**	**221.5**

[1] Based on the daily closing prices
[2] Market capitalization is calculated based on the number of shares outstanding (excluding treasury shares).

Our shareholders

Significant shareholders

According to the Novartis Share Register, as of December 31, 2016, the following registered shareholders (including nominees and the ADS depositary) held more than 2% of the total share capital of Novartis AG, with the right to vote all these Novartis shares based on an exemption granted by the Board (see page 84):[1]

- Shareholders: Novartis Foundation for Employee Participation, with its registered office in Basel, holding 2.6%; Emasan AG, with its registered office in Basel, holding 3.4%; and UBS Fund Management (Switzerland) AG, with its registered office in Basel, holding 2.1%
- Nominees: Chase Nominees Ltd., London, holding 8.5%; Nortrust Nominees, London, holding 3.9%; and The Bank of New York Mellon, New York, holding 4.4% through its nominees, The Bank of New York Mellon, Everett, holding 1.8%, and The Bank of New York Mellon, Brussels, holding 2.6%
- ADS depositary: JPMorgan Chase Bank, New York, holding 12.0%

According to a disclosure filed with Novartis AG, Norges Bank (Central Bank of Norway), Oslo, held 2.02% of the share capital of Novartis AG as of December 31, 2016.

According to disclosure notifications filed with Novartis AG and the SIX Swiss Exchange, each of the following shareholders held between 3% and 5% of the share capital of Novartis AG as of December 31, 2016:

- Capital Group Companies Inc., Los Angeles
- BlackRock Inc., New York

Disclosure notifications pertaining to shareholdings in Novartis AG that were filed with Novartis AG and the SIX Swiss Exchange are published on the latter's electronic publication platform, and can be accessed via: www.six-exchange-regulation.com/en/home/publications/significant-shareholders.html.

Cross shareholdings

Novartis AG has no cross shareholdings in excess of 5% of capital, or voting rights with any other company.

[1] Excluding 4.5% of the share capital held as treasury shares by Novartis AG and its entities that restrict their availability for use

Distribution of Novartis shares

The information in the following tables relates only to registered shareholders and does not include holders of unregistered shares. Also, the information provided in the tables below cannot be assumed to represent the entire Novartis AG investor base because nominees and JPMorgan Chase Bank, as ADS depositary, are registered as shareholders for a large number of beneficial owners.

As of December 31, 2016, Novartis AG had approximately 171 000 registered shareholders.

Number of shares held

As of December 31, 2016	Number of registered shareholders	% of registered share capital
1–100	25 153	0.06
101–1 000	103 217	1.66
1 001–10 000	38 138	4.03
10 001–100 000	3 427	3.40
100 001–1 000 000	481	5.47
1 000 001–5 000 000	71	5.53
5 000 001 or more [1]	35	50.12
Total registered shareholders/shares	170 522	70.27
Unregistered shares		29.73
Total		**100.00**

[1] Including significant registered shareholders as listed above

Registered shareholders by type

As of December 31, 2016	Shareholders in %	Shares in %
Individual shareholders	96.24	13.28
Legal entities [1]	3.70	35.11
Nominees, fiduciaries and ADS depositary	0.06	51.61
Total	**100.00**	**100.00**

[1] Excluding 4.5% of the share capital held as treasury shares by Novartis AG and its entities that restrict their availability for use

Registered shareholders by country

As of December 31, 2016	Shareholders in %	Shares in %
Belgium	0.14	4.08
France	2.37	0.49
Germany	5.27	2.00
Japan	0.16	0.73
Switzerland [1]	88.60	42.53
United Kingdom	0.47	23.43
United States	0.31	23.93
Other countries	2.68	2.81
Total	**100.00**	**100.00**

Registered shares held by nominees are shown in the country where the company/affiliate entered in the Novartis Share Register as shareholder has its registered seat.

[1] Excluding 4.5% of the share capital held as treasury shares by Novartis AG and its entities that restrict their availability for use

Shareholder rights

Shareholders have the right to receive dividends, to vote and to execute all other rights as granted under Swiss law and the Articles of Incorporation.

RIGHT TO VOTE

Each Novartis share registered with the right to vote entitles the holder to one vote at General Meetings of Shareholders (General Meetings). Novartis shares can only be voted if they are registered with voting rights in the Novartis Share Register by the third business day before the General Meeting (for shareholder registration and voting restrictions, see page 84).

ADR holders may vote by instructing JPMorgan Chase Bank, the ADS depositary, to exercise the voting rights attached to the registered Novartis shares underlying the ADRs. JPMorgan Chase Bank exercises the voting rights for registered Novartis shares underlying ADRs for which no voting instructions have been given by providing a discretionary proxy to an uninstructed independent designee. Such designee has to be a Novartis AG shareholder.

POWERS OF GENERAL MEETINGS OF SHAREHOLDERS

The following powers are vested exclusively in the General Meeting:

- Adoption and amendment of the Articles of Incorporation
- Election and removal of the Chairman of the Board, Board and Compensation Committee members, the Independent Proxy and external auditors
- Approval of the management report (if required) and of the consolidated financial statements
- Approval of the financial statements of Novartis AG, and decision on the appropriation of available earnings shown on the balance sheet, including dividends
- Approval of the maximum aggregate amounts of compensation of the Board (for the period from an AGM until the next AGM) and of the Executive Committee (for the financial year following the AGM)
- Grant of discharge to Board and Executive Committee members
- Decision of other matters that are reserved by law or by the Articles of Incorporation to the General Meeting of Shareholders

RESOLUTIONS AND ELECTIONS AT GENERAL MEETINGS

The General Meeting passes resolutions and elections with the absolute majority of the votes represented at the meeting. However, under the Articles of Incorporation (www.novartis.com/corporate-governance), the approval of two-thirds of the votes represented at the meeting is required for:

- An alteration of the purpose of Novartis AG
- The creation of shares with increased voting powers
- An implementation of restrictions on the transfer of registered shares, and the removal of such restrictions

— An authorized or conditional increase of the share capital
— An increase of the share capital out of equity, by contribution in kind, for the purpose of an acquisition of property or the grant of special rights
— A restriction or suspension of rights or options to subscribe
— A change of location of the registered office of Novartis AG
— The dissolution of Novartis AG

In addition, the law provides for a qualified majority for other resolutions, such as a merger or spin-off.

OTHER SHAREHOLDER RIGHTS

Shareholders representing at least 10% of the Novartis share capital may request that an extraordinary General Meeting be convened. Shareholders representing Novartis shares with an aggregate nominal value of at least CHF 1 million may request that an item be included in a General Meeting agenda. Such requests must be made in writing at least 45 days before the meeting, specify the agenda item to be included, and contain the proposal on which the shareholder requests a vote.

Shareholders can vote their Novartis shares by themselves or appoint another shareholder or the Independent Proxy to vote on their behalf. All shareholders (who are not yet registered on the online platform; see below) receive a General Meeting invitation letter with a proxy appointment form for the appointment of the Independent Proxy. On this form, shareholders can instruct the Independent Proxy to vote on alternative or additional motions related to the agenda items either (i) according to the motions of the Board for such alternative or additional motions, or (ii) against such alternative or additional motions. They can also abstain from voting.

Novartis AG offers shareholders the opportunity to use an online platform (the Sherpany Platform) to receive notices of future General Meetings exclusively by email and to electronically give their instructions to the Independent Proxy, grant powers of attorney to other shareholders, and order their admission cards online. The General Meeting registration form enables shareholders who are not yet registered on the Sherpany Platform to order detailed documents related to opening a Sherpany account. They may also do so by contacting the Novartis Share Registry. Shareholders can deactivate their online account at any time and again receive invitations in paper form.

Other rights associated with a registered Novartis share may only be exercised by the shareholder, its legal representative, another shareholder with the right to vote, the Independent Proxy, an usufructuary (a person who is not the owner of the share but who is entitled to exercise shareholder rights), or a nominee who is registered in the Novartis Share Register.

Shareholder registration

Only shareholders, usufructuaries or nominees registered in the Novartis Share Register with voting rights may exercise their voting rights. To be registered with voting rights, a shareholder must declare that he or she acquired the shares in his or her own name and for his or her own account. According to the Articles of Incorporation, the Board may register nominees with the right to vote. For restrictions on the registration of nominees, please see below.

The Articles of Incorporation provide that no shareholder shall be registered with the right to vote for more than 2% of the registered share capital. The Board may, upon request, grant an exemption from this restriction. Considerations include whether the shareholder supports the Novartis goal of creating sustainable value and has a long-term investment horizon. In 2016, the Board approved an exemption requested by UBS Fund Management (Switzerland) AG based on the fulfilment of the requirements as disclosed above. Further exemptions are in force for the registered significant shareholders listed on page 82 under Our Shareholders – Significant Shareholders, and for Norges Bank (Central Bank of Norway), Oslo, which as of December 31, 2016, was not registered in the share register but according to disclosure notification filed with Novartis AG, held 2.02% of the share capital of Novartis AG.

The same registration and voting restrictions indirectly apply to holders of ADRs.

Given that shareholder representation at General Meetings traditionally has been rather low in Switzerland, Novartis AG considers registration restrictions necessary to prevent a minority shareholder from dominating a General Meeting.

The Articles of Incorporation provide that no nominee shall be registered with the right to vote for more than 0.5% of the registered share capital. The Board may, upon request, grant an exemption from this restriction if the nominee discloses the names, addresses and number of shares of the individuals for whose account it holds 0.5% or more of the registered share capital. Exemptions are in force for the nominees listed on page 82 under Our Shareholders – Significant Shareholders, and for the nominee Citi Bank, London, which in 2015 requested an exemption, but as of December 31, 2016, was not registered in the Novartis Share Register.

The same restrictions indirectly apply to holders of ADRs.

Registration restrictions in the Articles of Incorporation may only be removed through a resolution of the General Meeting, with approval of at least two-thirds of the votes represented at the meeting.

Shareholders, ADR holders, or nominees who are linked to each other or who act in concert to circumvent registration restrictions are treated as one person or nominee for the purposes of the restrictions on registration.

No restrictions on trading of shares

No restrictions are imposed on the transferability of Novartis shares. The registration of shareholders in the Novartis Share Register or in the ADR register kept by JPMorgan Chase Bank does not affect the tradability of Novartis shares or ADRs. Registered Novartis shareholders or ADR holders may therefore purchase or sell their Novartis shares or ADRs at any time, including before a General Meeting, regardless of the record date. The record date serves only to determine the right to vote at a General Meeting.

Change-of-control provisions

NO OPTING UP, NO OPTING OUT

According to the Swiss Federal Act on Financial Infrastructures, anyone who – directly, indirectly or acting in concert with third parties – acquires equity securities exceeding 33 1/3% of the voting rights of a company (whether or not such rights are exercisable) is required to make an offer to acquire all listed equity securities of that company. A company may raise this threshold up to 49% of the voting rights ("opting up") or may, under certain circumstances, waive the threshold ("opting out"). Novartis AG has not adopted any such measures.

CHANGE-OF-CONTROL CLAUSES

In accordance with good corporate governance and the rules of the Ordinance against Excessive Compensation in Listed Companies, there are no change-of-control clauses and "golden parachute" agreements benefiting Board members, Executive Committee members, or other members of senior management. Furthermore, employment contracts with Executive Committee members do not contain notice periods or contract periods exceeding 12 months, or commissions for the acquisition or transfer of enterprises or severance payments.

General compensation provisions

NON-EXECUTIVE MEMBERS OF THE BOARD OF DIRECTORS

Compensation of non-executive members of the Board includes fixed compensation elements only. In particular, non-executive members of the Board shall receive no company contributions to any pension plan, no performance-related elements, and no financial instruments (e.g., options).

MEMBERS OF THE EXECUTIVE COMMITTEE

The members of the Executive Committee receive fixed and variable, performance-related compensation. Fixed compensation is comprised of the base salary and may include other elements and benefits such as contributions to pension plans. Variable compensation may be structured into short-term and long-term compensation elements. Short-term variable compensation elements shall be governed by performance metrics that take into account the performance of Novartis and/or parts thereof, and/or individual targets. Achievements are generally measured based on the one-year period to which the short-term compensation relates. The long-term compensation plans are based on performance metrics that take into account strategic objectives of Novartis (such as financial, innovation, shareholder return and/or other metrics). Achievements are generally measured based on a period of not less than three years.

ADDITIONAL AMOUNT

If the maximum aggregate amount of compensation already approved by the General Meeting is not sufficient to cover the compensation of newly appointed or promoted Executive Committee members, Novartis may pay out compensation, in a total amount up to 40% of the total maximum aggregate amount last approved for the Executive Committee per compensation period, to newly appointed or promoted Executive Committee members.

For detailed information on the compensation of the Board and the Executive Committee, see the Compensation Report, beginning on page 110.

Our Board of Directors

Composition of the Board of Directors and its committees (as per December 31, 2016)

Election and term of office

Board members, the Chairman, and Compensation Committee members are elected annually and individually by shareholders at the General Meeting. Board members whose term of office has expired are immediately eligible for re-election.

The average tenure of Board members is seven years, with two-thirds of Board members having a tenure of less than six years. A Board member must retire after reaching age 70. Under special circumstances, shareholders may grant an exemption from this rule and re-elect a Board member for additional terms of office. There is no mandatory term limit for Board members so as to not lose the value of the insight and knowledge of the company's operations and practices that long-serving Board members have developed.

Name	Nationality	Year of birth	First election at AGM	Last election at AGM	End of current term
Joerg Reinhardt, Ph.D.	D	1956	2013	2016	2017
Enrico Vanni, Ph.D.	CH	1951	2011	2016	2017
Nancy C. Andrews, M.D., Ph.D.	US	1958	2015	2016	2017
Dimitri Azar, M.D.	US	1959	2012	2016	2017
Ton Buechner	NLD	1965	2016	2016	2017
Srikant Datar, Ph.D.	US	1953	2003	2016	2017
Elizabeth Doherty	GB	1957	2016	2016	2017
Ann Fudge	US	1951	2008	2016	2017
Pierre Landolt, Ph.D.	CH	1947	1996	2016	2017
Andreas von Planta, Ph.D.	CH	1955	2006	2016	2017
Charles L. Sawyers, M.D.	US	1959	2013	2016	2017
William T. Winters	GB/US	1961	2013	2016	2017

Board profile

Board composition

The composition of the Board must align with our status as a listed company as well as our business portfolio, geographic reach and culture. The Board must be diverse in all aspects. Knowledge and experience in the following fields must be represented on the Board: leadership and management; healthcare, life sciences and medicine; research and development; engineering and technology; marketing; banking, finance and accounting; human resources; legal and public affairs; and risk management.

Individual Board member profile

Board members should have the following personal qualities:

- Interact with other Board members to build an effective and complementary Board
- Establish trusting relationships
- Apply independence of thought and judgment
- Be challenging but supportive in the boardroom
- Influence without creating conflict by applying a constructive, non-confrontational style
- Listen well and offer advice based on sound judgment
- Be able and willing to commit adequate time to Board and committee responsibilities
- Be open to personal feedback and seek to be responsive
- Do not have existing board memberships or hold other positions that could lead to a permanent conflict of interest
- Understand and respect the boundaries of the role, leaving the operational management of the company to the CEO and his Executive Committee

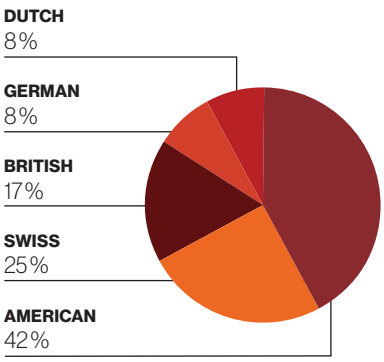
Board members' biographies (pages 94–97) highlight the specific qualifications that led the Board to conclude members are qualified to serve on the Board, which is diverse in terms of background, credentials, interests and skills.

Board diversity

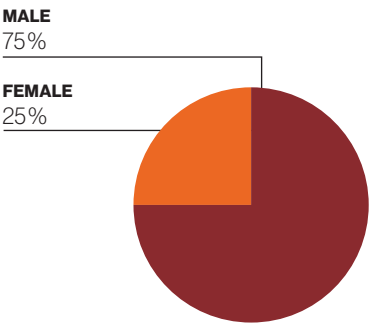
The diversity of a board of directors is critical to its effectiveness. When the Governance, Nomination and Corporate Responsibilities Committee (GNCRC) of Novartis identifies new Board member candidates to be proposed to shareholders for election, the maintenance and improvement of the Board's diversity is an important criterion. The Board's aspiration is to have a diverse Board in all aspects. This includes nationality, gender, background and experience, age, tenure, viewpoints, interests, and technical and interpersonal skills.

Diversity

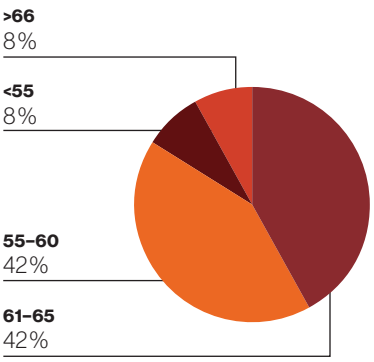
Nationality



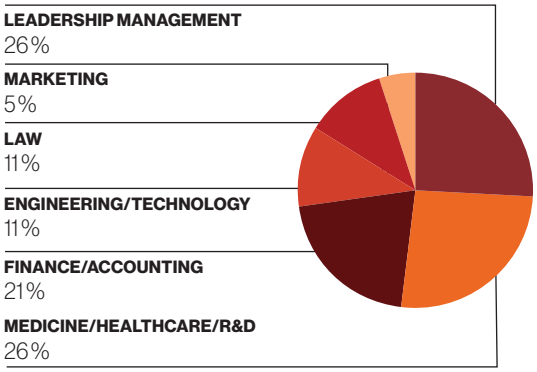
Gender



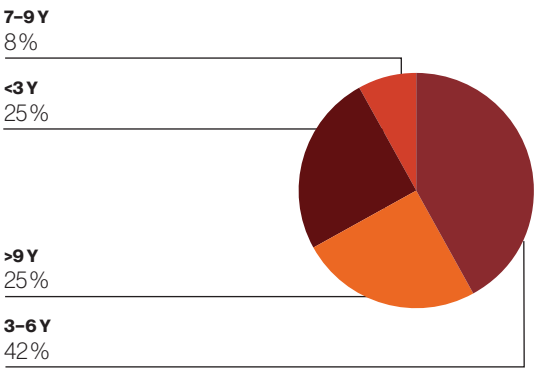
Age



Background/experience



Tenure



Role of the Board and its committees

The Board is responsible for the overall direction and supervision of management, and holds the ultimate decision-making authority for Novartis AG, with the exception of decisions reserved for shareholders.

The Board has delegated certain responsibilities to five committees, as set out below. Responsibilities described with the terms "overseeing" or "reviewing" are subject to final Board approval. The committees enable the Board to work in an efficient and effective manner, ensuring a thorough review and discussion of issues, while giving the Board more time for deliberation and decision-making. Moreover, committees ensure that only Board members who are independent oversee audit and compliance, governance and compensation – as only independent Board members are delegated in the respective committees.

Responsibilities	Members	Number of meetings held in 2016/approximate average duration (hrs) of each meeting/attendance	Documents/ Link
Board of Directors		**11/7:00**	
The primary responsibilities of the Board of Directors include: — Setting the strategic direction of the Group — Appointing, overseeing and dismissing key executives, and planning their succession — Approving major transactions and investments — Determining the organizational structure and governance of the Group — Determining and overseeing financial planning, accounting, reporting and controlling — Approving annual financial statements and corresponding financial results releases	**Joerg Reinhardt**[1]	**11**	Articles of Incorporation of Novartis AG Regulations of the Board of Directors, its Committees and the Executive Committee of Novartis AG (Board regulations) www.novartis.com/ corporate-governance
	Enrico Vanni	11	
	Nancy C. Andrews	11	
	Dimitri Azar	11	
	Ton Buechner[3]	7	
	Srikant Datar	11	
	Elizabeth Doherty[3]	8	
	Ann Fudge	11	
	Pierre Landolt	11	
	Andreas von Planta	11	
	Charles L. Sawyers	9	
	William T. Winters	10	
Audit and Compliance Committee		**7/3:00**	
The primary responsibilities of this committee include: — Supervising external auditors, and selecting and nominating external auditors for election by the meeting of shareholders — Overseeing internal auditors — Overseeing accounting policies, financial controls, and compliance with accounting and internal control standards — Approving quarterly financial statements and financial results releases — Overseeing internal control and compliance processes and procedures — Overseeing compliance with laws, and external and internal regulations The Audit and Compliance Committee has the authority to retain external consultants and other advisors.	**Srikant Datar**[1,2]	**7**	Charter of the Audit and Compliance Committee www.novartis.com/ corporate-governance
	Dimitri Azar	7	
	Elizabeth Doherty[2,3]	5	
	Andreas von Planta	7	
	Enrico Vanni	7	
Compensation Committee		**6/3:00**	
The primary responsibilities of this committee include: — Designing, reviewing and recommending to the Board compensation policies and programs — Advising the Board on the compensation of Board members and the CEO — Deciding on the compensation of Executive Committee members — Preparing the Compensation Report and submitting it to the Board for approval The Compensation Committee has the authority to retain external consultants and other advisors.	**Enrico Vanni**[1]	**6**	Charter of the Compensation Committee www.novartis.com/ corporate-governance
	Srikant Datar	6	
	Ann Fudge	6	
	William T. Winters	6	

[1] Chairman

[2] Audit Committee Financial Expert as defined by the US Securities and Exchange Commission

[3] As of AGM February 2016

Responsibilities	Members	Number of meetings held in 2016/approximate average duration (hrs) of each meeting/attendance	Documents/ Link
Governance, Nomination and Corporate Responsibilities Committee		**3/2:00**	
The primary responsibilities of this committee include: — Designing, reviewing and recommending to the Board corporate governance principles — Identifying candidates for election as Board members — Assessing existing Board members and recommending to the Board whether they should stand for re-election — Preparing and reviewing the succession plan for the CEO — Developing and reviewing an onboarding program for new Board members, and an ongoing education plan for existing Board members — Reviewing on a regular basis the Articles of Incorporation, with a view to reinforcing shareholder rights — Reviewing on a regular basis the composition and size of the Board and its committees — Reviewing annually the independence status of each Board member — Reviewing directorships and agreements of Board members for conflicts of interest, and dealing with conflicts of interest — Overseeing the company's strategy and governance on corporate responsibility The Governance, Nomination and Corporate Responsibilities Committee has the authority to retain external consultants and other advisors.	**Andreas von Planta**[1] **3** Ann Fudge 3 Pierre Landolt 3 Charles L. Sawyers 3 Enrico Vanni 3		Charter of the Governance, Nomination and Corporate Responsibilities Committee www.novartis.com/corporate-governance
Research & Development Committee		**4/8:00**	
The primary responsibilities of this committee include: — Monitoring research and development, and bringing recommendations to the Board — Assisting the Board with oversight and evaluation related to research and development — Informing the Board on a periodic basis about the research and development strategy, the effectiveness and competitiveness of the research and development function, emerging scientific trends and activities critical to the success of research and development, and the pipeline — Advising the Board on scientific, technological, and research and development matters — Providing counsel and know-how to management in the area of research and development — Reviewing such other matters in relation to the company's research and development as the committee may, in its own discretion, deem desirable in connection with its responsibilities The Research & Development Committee has the authority to retain external consultants and other advisors.	**Joerg Reinhardt**[1] **4** Nancy C. Andrews 4 Dimitri Azar 4 Charles L. Sawyers 4		Charter of the Research & Development Committee www.novartis.com/corporate-governance
Risk Committee		**6/2:00**	
The primary responsibilities of this committee include: — Ensuring that Novartis has implemented an appropriate and effective risk management system and process — Ensuring that all necessary steps are taken to foster a culture of risk-adjusted decision-making without constraining reasonable risk-taking and innovation — Approving guidelines and reviewing policies and processes — Reviewing with management, internal auditors and external auditors the identification, prioritization and management of risks; the accountabilities and roles of the functions involved in risk management; the risk portfolio; and the related actions implemented by management The Risk Committee has the authority to retain external consultants and other advisors.	**Andreas von Planta**[1] **6** Nancy C. Andrews 5 Srikant Datar 6 Ann Fudge 6		Charter of the Risk Committee www.novartis.com/corporate-governance

[1] Chairman

The Novartis corporate culture and role of the Board

The corporate culture of Novartis is becoming a key focus of the Board. The Board works to ensure that the Novartis strategy, operating model and compensation system are aligned with Novartis' Values and Behaviors, as endorsed by the Board and that the Novartis compensation system supports the desired corporate culture of Novartis. The Board will also review a regular evaluation of the corporate culture throughout Novartis.

Functioning of the Board

The Board takes decisions as a whole, supported by its five committees. Each committee has a written charter outlining its duties and responsibilities, and is led by a Board-elected Chairman.

The Board and its committees meet regularly throughout the year. The chairs set their meeting agendas. Any Board member may request a Board or committee meeting, and the inclusion of an agenda item. Before meetings, Board members receive materials to help them prepare the discussions and decision-making.

Chairman

Joerg Reinhardt has been the independent, non-executive Chairman since August 1, 2013. He has both industry and Novartis experience, and meets the company's independence criteria. As independent Chairman, he can lead the Board to represent the interests of all stakeholders, being accountable to them and creating sustainable value through effective governance, the right strategy, and delivery of the expected level of performance. The independent chairmanship also ensures an appropriate balance of power between the Board and the Executive Committee.

In this role, Mr. Reinhardt:

— Provides leadership to the Board
— Supports and mentors the CEO
— Supported by the GNCRC, ensures effective succession plans for the Board and the Executive Committee
— Ensures that the Board and its committees work effectively
— Sets the agenda, style and tone of Board discussions, promoting constructive dialogue and effective decision-making
— Supported by the GNCRC, ensures that all Board committees are properly established, composed and operated
— Ensures that the Board's performance is annually evaluated
— Ensures onboarding programs for new Board members, and continuing education and specialization for all Board members
— Ensures effective communication with the company's shareholders
— Promotes effective relationships and communication between Board and Executive Committee members

Vice Chairman

Enrico Vanni has been the independent, non-executive Vice Chairman since February 22, 2013.

In this role, Mr. Vanni:

— Leads the Board in case and as long as the Chairman is incapacitated
— Chairs the sessions of independent Board members, and leads independent Board members if and as long as the Chairman is not independent
— Leads the yearly session of the Board members evaluating the performance of the Chairman, during which the Chairman is not present

Board meetings

The Board has meetings with Executive Committee members, as well as private meetings without them.

In 2016, there were 11 Board meetings. Because all Board members are independent, no separate meetings of the independent Board members were held in 2016.

Key activities of our Board and committees in 2016

In 2016, the Board addressed in its meetings among others the following key standard topics: strategy; Group targets; mergers and acquisitions, business development and licensing review; financial and business reviews; major projects; investments and transactions; governance; and corporate culture. Topics addressed during private meetings included Board self-evaluation and the performance assessment of the Executive Committee members, as well as CEO and Executive Committee succession planning.

In addition, in 2016 our Board and its committees focused on a number of special topics, including:

Board of Directors:
Compliance; the Alcon turnaround; the creation of the new Innovative Medicines Division with two separate business units, Pharmaceuticals and Oncology; and the new operating model of Novartis

Audit and Compliance Committee:
Specific accounting and compliance questions, compensation disclosure; and the legal and regulatory environment concerning the rotation of external auditors

Compensation Committee:
Novartis peer groups; potential risks within the compensation systems for executives and other associates, including the sales force; clawback and malus; and shareholder feedback from the corporate governance roadshow

Governance, Nomination and Corporate Responsibilities Committee:
Shareholder feedback from our corporate governance roadshow; emerging corporate governance practices and whether to adopt them; succession planning for the Board, Board committees, and committee chairs; the search profile for and discussion of potential new Board members; and reviews of our corporate responsibility activities

Research & Development Committee:
The Novartis portfolio of research and development projects in oncology and dermatology; efforts to discover new drug discovery targets; high throughput screening for target and drug discovery; the long term strategy for NIBR after the appointment of new leadership; and incentives and compensation-related topics for the R&D organization

Risk Committee:
The Novartis Integrity & Compliance organization, key business risks in the manufacturing organization; foreign exchange risk management; IT security; and risks potentially arising out of the compensation system

Honorary Chairmen

Dr. Alex Krauer and Dr. Daniel Vasella have been appointed Honorary Chairmen in recognition of their significant achievements on behalf of Novartis. They are not provided with Board documents and do not attend Board meetings.

Independence of Board members

The independence of Board members is a key corporate governance issue. An independent Board member is one who is independent of management and has no business or relationship that could materially interfere with the exercise of objective, unfettered and independent judgment. Only with a majority of Board members being independent can the Board fulfill its obligation to represent the interests of shareholders, being accountable to them and creating sustainable value through the effective governance of Novartis. Accordingly, Novartis established independence criteria based on international best practice standards as outlined on the Novartis website: www.novartis.com/investors/governance-documents.shtml.

- The majority of Board members and any member of the Audit and Compliance Committee, the Compensation Committee, and the GNCRC must meet the company's independence criteria. These include, inter alia, (i) a Board member not having received direct compensation of more than USD 120 000 per year from Novartis, except for dividends or Board compensation, within the last three years; (ii) a Board member not having been an employee of Novartis within the last three years; (iii) a family member not having been an executive officer of Novartis within the last three years; (iv) a Board member or family member not being employed by the external auditor of Novartis; (v) a Board member or family member not being a board member, employee or 10% shareholder of an enterprise that has made payments to, or received payments from, Novartis in excess of the greater of USD 1 million or 2% of that enterprise's gross revenues. For members of the Audit and Compliance Committee and the Compensation Committee, even stricter rules apply.
- In addition, Board members are bound by the Novartis Conflict of Interest Policy, which prevents a Board member's potential personal interests from influencing the decision-making of the Board.
- The GNCRC annually submits to the Board a proposal concerning the determination of the independence of each Board member. For this assessment, the committee considers all relevant facts and circumstances of which it is aware – not only the explicit formal independence criteria. This includes an assessment of whether a Board member is truly independent, in character and judgment, from any member of senior management and from any of his/her current or former colleagues.
- In its meeting on December 15, 2016, the Board determined that all of its members are independent.

Relationship of non-executive Board members with Novartis

No Board member is or was a member of the management of Novartis AG or of any other Novartis Group company in the last three financial years up to December 31, 2016. There are no significant business relationships of any Board member with Novartis AG or with any other Novartis Group company.

Mandates outside the Novartis Group

No Board member may hold more than 10 additional mandates in other companies, of which no more than four shall be in other listed companies. Chairmanships of the boards of directors of other listed companies count as two mandates. Each of these mandates is subject to Board approval.

The following mandates are not subject to these limitations:

a) Mandates in companies that are controlled by Novartis AG
b) Mandates that a Board member holds at the request of Novartis AG or companies controlled by it. No Board member shall hold more than five such mandates.
c) Mandates in associations, charitable organizations, foundations, trusts and employee welfare foundations. No Board member may hold more than 10 such mandates.

"Mandates" means those in the supreme governing body of a legal entity that is required to be registered in the commercial register or a comparable foreign register. Mandates in different legal entities that are under joint control are deemed one mandate.

The Board may issue regulations that determine additional restrictions, taking into account the position of the respective member.

Loans and credits

No loans or credits shall be granted to members of the Board.

Board performance and effectiveness evaluation

Process

The Board conducts an annual review to evaluate its performance and that of individual committees and members. As part of this process, each Board member completes a questionnaire on the performance and effectiveness of the Board and the Chairman, and on his/her committees, which lays the groundwork for a qualitative review led by the Chairman. The Chairman has discussions with each Board member, and then with the entire Board. Also, the Board, without its Chairman, discusses the performance of the Chairman. Further, the committee evaluations are discussed by the respective committees, and the results are debriefed to the Board. Any suggestion for improvement is recorded and actions are agreed upon.

Periodically, this process is conducted by an independent consultant. In 2014, an independent performance and effectiveness evaluation of the Board and its committees, including an individual Board member assessment, was conducted by the independent expert company Russell Reynolds Associates. In 2015 and 2016, the performance evaluation was conducted internally.

Content and results

The performance review examines the performance and effectiveness, and strengths and weaknesses, of individual Board members and of the full Board and each Board committee.

This review covers topics including Board composition; purpose, scope and responsibilities; processes and governance of the Board and its committees; meetings and pre-reading material; team effectiveness; and leadership and culture.

The review also evaluates the ability and willingness of each Board member to commit adequate time and effort to his/her responsibilities as provided for in the charter of the GNCRC.

The results were discussed at the January 2017 meetings. It was concluded that the Board and its committees operate effectively.

Information and control systems of the Board vis-à-vis management

Information on management

The Board ensures that it receives sufficient information from the Executive Committee to perform its supervisory duty and to make decisions that are reserved for it. The Board obtains this information through several means:

— The CEO informs the Board regularly about current developments.
— Executive Committee meeting minutes are made available to the Board.
— Meetings or teleconferences are held as required between Board members and the CEO.
— The Board regularly meets with all Executive Committee members.
— The Board receives detailed, quarterly updates from each Division Head.
— By invitation, other members of management attend Board meetings to report on areas of the business for which they are responsible.
— Board members are entitled to request information from Executive Committee members or any other Novartis associate, and they may visit any Novartis site.

Board committees

Board committees regularly meet with management and, at times, outside consultants, to review the business, better understand applicable laws and policies affecting the Group, and support the Board and management in meeting the requirements and expectations of stakeholders and shareholders.

In particular, the Chief Financial Officer (CFO), the Group General Counsel, and representatives of the external auditors are invited to Audit and Compliance

Committee meetings. Additionally, the heads of Internal Audit, Financial Reporting & Accounting, Compliance and Quality, as well as the Head of the Global Business Practices Office, report on a regular basis to the Audit and Compliance Committee. This committee reviews financial reporting processes on behalf of the Board. For each quarterly and annual release of financial information, the Disclosure Review Committee is responsible for ensuring the accuracy and completeness of disclosures. The Disclosure Review Committee, which is a management committee, is chaired by the CFO and includes the CEO; the Group General Counsel; the heads of the divisions, Novartis Operations, and the Novartis Institutes for BioMedical Research (NIBR), as well as their finance heads; and the heads of the following corporate functions: Treasury, Tax, Financial Reporting & Accounting, Internal Audit and Investor Relations. The Audit and Compliance Committee reviews decisions made by the Disclosure Review Committee before the quarterly and annual releases are published.

The Risk Committee oversees the risk management system and processes, and also reviews the risk portfolio of the Group to ensure appropriate and professional risk management. For this purpose, the Group Risk Office and the risk owners of the divisions report on a regular basis to the Risk Committee. The Group General Counsel, the Head of Group Risk, the Head of Internal Audit, the Head of Ethics and Compliance, and other senior executives are invited to these meetings on a regular basis.

Novartis management information system

Novartis produces comprehensive, consolidated (unaudited) financial statements on a monthly basis for the total Group and its operating divisions. These are typically available within 10 days of the end of the month, and include the following:

- Consolidated income statement of the month, quarter-to-date and year-to-date in accordance with International Financial Reporting Standards (IFRS), as well as adjustments to arrive at core results, as defined by Novartis. The IFRS and core figures are compared to the prior-year period and targets in both USD and on a constant currency basis.
- Consolidated balance sheet as of the month-end in accordance with IFRS in USD
- Consolidated cash flow on a monthly, quarter-to-date and year-to-date basis in accordance with IFRS in USD
- Supplementary data on a monthly, quarterly and year-to-date basis such as free cash flow, gross and net debt, headcount, personnel costs, working capital, and earnings per share on a USD basis where applicable

Constant currencies, core results, free cash flow, net debt and related target figures are non-IFRS measures. An explanation of non-IFRS measures can be found on pages 171 – 175 of the operating and financial review 2016.

This information is made available to Board members on a monthly basis. An analysis of key deviations from the prior year or target is also provided.

Two times per year, the Board also receives an outlook of the full-year results in accordance with IFRS and “core” (as defined by Novartis) along with related commentary prior to the release of the results.

On an annual basis, in the fourth quarter of the year, the Board receives and approves the operating and financial targets for the following year.

In the middle of the year, the Board also reviews and approves the strategic plan for the next five years, which includes a projected consolidated income statement in USD prepared in accordance with IFRS and “core.”

The Board does not have direct access to the company’s financial and management reporting systems but can, at any time, request more detailed financial information on any aspect that is presented to it.

Internal audit

The Internal Audit function carries out operational and system audits in accordance with an audit plan approved by the Audit and Compliance Committee. This function helps organizational units accomplish objectives by providing an independent approach to the evaluation, improvement and effectiveness of their internal control framework. It prepares reports on the audits it has performed, and reports actual or suspected irregularities to the Audit and Compliance Committee and to the CEO. The Audit and Compliance Committee regularly reviews the internal audit scope, audit plans and results.

Risk management

The Group Risk Office is overseen by the Board’s independent Risk Committee. The Compensation Committee works closely with the Risk Committee to ensure that the compensation system does not lead to excessive risk-taking by management (for details, see our Compensation Report, beginning on page 110).

Organizational and process measures have been designed to identify and mitigate risks at an early stage. Organizationally, the responsibility for risk assessment and management is allocated to the divisions, organizational units, and functions, with specialized Corporate functions, such as Group Finance, Group Legal, Group Quality Assurance, Corporate Health, Safety and Environment, Business Continuity Management, Integrity and Compliance and the Business Practices Office, providing support and controlling the effectiveness of the risk management in these respective areas.

Board of Directors

Joerg Reinhardt, Ph.D.

Chairman of the Board of Directors
German, age 60

Joerg Reinhardt, Ph.D., has been Chairman of the Board of Directors since 2013. He is also Chairman of the Research & Development Committee and Chairman of the Board of Trustees of the Novartis Foundation.

Mr. Reinhardt previously was chairman of the board of management and the executive committee of Bayer HealthCare, Germany. Prior to that, he was Chief Operating Officer of Novartis from 2008 to 2010, and Head of the Vaccines and Diagnostics Division of Novartis from 2006 to 2008. He was also Chairman of the Board of the Genomics Institute of the Novartis Research Foundation in the United States from 2000 to 2010, a member of the supervisory board of MorphoSys AG in Germany from 2001 to 2004, and a member of the board of directors of Lonza Group AG in Switzerland from 2012 to 2013.

Mr. Reinhardt graduated with a doctorate in pharmaceutical sciences from Saarland University in Germany. He joined Sandoz Pharma Ltd. in 1982 and held various positions at Sandoz and later Novartis, including Head of Development.

Enrico Vanni, Ph.D.

Vice Chairman of the Board of Directors
Swiss, age 65

Enrico Vanni, Ph.D., has been a member of the Board of Directors since 2011 and qualifies as an independent Non-Executive Director. He is Vice Chairman of the Board of Directors and Chairman of the Compensation Committee. He is also a member of the Audit and Compliance Committee and the Governance, Nomination and Corporate Responsibilities Committee.

Since his retirement as director of McKinsey & Company in 2007, Mr. Vanni has been an independent consultant. He is a board member of several companies in industries from healthcare to private banking – including Advanced Oncotherapy PLC in the United Kingdom, and non-listed companies such as Lombard Odier SA, Banque Privée BCP (Suisse) SA, Eclosion2, and Denzler & Partners SA, all based in Switzerland.

Mr. Vanni holds an engineering degree in chemistry from the Federal Polytechnic School of Lausanne, Switzerland; a doctorate in chemistry from the University of Lausanne; and a Master of Business Administration from INSEAD in Fontainebleau, France. He began his career as a research engineer at the International Business Machines Corp. (IBM) in California, United States, and joined McKinsey in Zurich in 1980. He managed the Geneva office for McKinsey from 1988 to 2004, and consulted for companies in the pharmaceutical, consumer and finance sectors. He led McKinsey's European pharmaceutical practice and served as a member of the firm's partner review committee prior to his retirement in 2007. As an independent consultant, Mr. Vanni has continued to support leaders of pharmaceutical and biotechnology companies on core strategic challenges facing the healthcare industry.

Nancy C. Andrews, M.D., Ph.D.

Member of the Board of Directors
American, age 58

Nancy C. Andrews, M.D., Ph.D., has been a member of the Board of Directors since February 2015. She qualifies as an independent Non-Executive Director and is a member of the Research & Development Committee and the Risk Committee.

Dr. Andrews is dean of the Duke University School of Medicine and vice chancellor for academic affairs at Duke University in the United States. She is also a professor of pediatrics, pharmacology and cancer biology at Duke, and was elected as a fellow of the American Association for the Advancement of Science and to membership in the US National Academy of Sciences, the National Academy of Medicine, and the American Academy of Arts and Sciences. She is former president of the American Society for Clinical Investigation and serves on the council of the National Academy of Medicine, the board of directors of the American Academy of Arts and Sciences, and the Scientific Management Review Board of the US National Institutes of Health.

Dr. Andrews holds a doctorate in biology from the Massachusetts Institute of Technology, and a doctor of medicine from Harvard Medical School, both in the US. She completed her residency and fellowship trainings in pediatrics and hematology/oncology at Boston Children's Hospital and the Dana-Farber Cancer Institute, also in the US, and served as an attending physician at Boston Children's Hospital. Prior to joining Duke, Dr. Andrews was director of the Harvard/MIT M.D.-Ph.D. Program, and dean of basic sciences and graduate studies as well as professor of pediatrics at Harvard Medical School. From 1993 to 2006, she was a biomedical research investigator at the Howard Hughes Medical Institute in the US. Her research expertise is in iron homeostasis and mouse models of human diseases.

Dimitri Azar, M.D.

Member of the Board of Directors
American, age 57

Dimitri Azar, M.D., has been a member of the Board of Directors since 2012. He qualifies as an independent Non-Executive Director and is a member of the Audit and Compliance Committee and the Research & Development Committee.

Dr. Azar is dean of the College of Medicine and professor of ophthalmology, bioengineering and pharmacology at the University of Illinois at Chicago in the United States, where he formerly was head of the Department of Ophthalmology and Visual Sciences. He is a member of the American Ophthalmological Society, former president of the Chicago Ophthalmological Society, and president-elect of the Chicago Medical Society. Additionally, he is on the board of the Tear Film and Ocular Surface Society, the board of Verb Surgical, and the scientific advisory board of Verily.

Dr. Azar began his career at the American University of Beirut Medical Center in Lebanon, and completed his fellowship and residency training at the Massachusetts Eye and Ear Infirmary at Harvard Medical School in the US. His research on matrix metalloproteinases in corneal wound healing and angiogenesis has been funded by the US National Institutes of Health since 1993. Dr. Azar practiced at the Wilmer Eye Institute at the Johns Hopkins Hospital School of Medicine in the US, and then returned to the Massachusetts Eye and Ear Infirmary as director of cornea and external disease. He became professor of ophthalmology with tenure at Harvard Medical School in 2003. Dr. Azar holds an Executive Master of Business Administration from the University of Chicago Booth School of Business in the US.

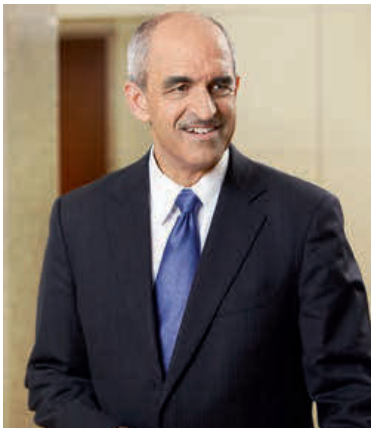
Ton Buechner

Member of the Board of Directors
Dutch, age 51

Ton Buechner has been a member of the Board of Directors since February 23, 2016. He qualifies as an independent Non-Executive Director.

Since 2012, Mr. Buechner has served as chairman and CEO of the executive board of Dutch multinational AkzoNobel. Prior to joining AkzoNobel, he spent almost two decades at the Sulzer Corporation in Switzerland, where he was appointed divisional president in 2001 and served as president and CEO from 2007 to 2011. Mr. Buechner's early career was spent in the oil and gas construction industry, and included roles at Allseas Engineering in the Netherlands and at Aker Kvaerner in Singapore. He is a member of the supervisory board of Voith GmbH.

Mr. Buechner is an engineer by training. He received his master's degree in civil engineering from Delft University of Technology in the Netherlands in 1988, specializing in offshore construction technology and coastal engineering. Mr. Buechner holds a Master of Business Administration from IMD business school in Lausanne, Switzerland.



Srikant Datar, Ph.D.

Member of the Board of Directors
American, age 63

Srikant Datar, Ph.D., has been a member of the Board of Directors since 2003 and qualifies as an independent Non-Executive Director. He is Chairman of the Audit and Compliance Committee, and a member of the Risk Committee and the Compensation Committee. The Board of Directors has appointed him as Audit Committee Financial Expert.

Mr. Datar is the Arthur Lowes Dickinson professor of business administration, faculty chair of the Harvard Innovation Lab, and senior associate dean for university affairs at Harvard Business School in the United States. He is also a member of the boards of directors of ICF International Inc., Stryker Corp. and T-Mobile US, all in the US.

Mr. Datar graduated in 1973 with distinction in mathematics and economics from the University of Bombay in India. He is a chartered accountant, and holds two master's degrees and a doctorate from Stanford University in the US. Mr. Datar has worked as an accountant and planner in industry, and as a professor at Carnegie Mellon University, Stanford University and Harvard University, all in the US. His research interests are in the areas of cost management, measurement of productivity, new product development, innovation, time-based competition, incentives and performance evaluation. He is the author of many scientific publications and has received several academic awards and honors. Mr. Datar has also advised and worked with numerous companies in research, development and training.

Board of Directors (continued)

Elizabeth (Liz) Doherty

Member of the Board of Directors
British, age 59

Elizabeth (Liz) Doherty has been a member of the Board of Directors since February 23, 2016. She qualifies as an independent Non-Executive Director and is a member of the Audit and Compliance Committee. The Board of Directors has appointed her as Audit Committee Financial Expert.

Ms. Doherty is a non-executive director and chairman of the audit committee of Dunelm Group PLC in the United Kingdom, and a member of the supervisory board and audit committee of Corbion NV in the Netherlands. She is a fellow of the Chartered Institute of Management Accountants, a non-executive board member of the UK Ministry of Justice, and a non-executive board member of Her Majesty's Courts and Tribunals Service in the UK. She previously served as a non-executive director and audit committee member at Delhaize Group in Belgium and Nokia Corp. in Finland, and as a non-executive director at SABMiller PLC in the UK.

Ms. Doherty received her bachelor's degree in liberal studies in science (physics) from the University of Manchester in the UK. She began her career as an auditor and has held senior finance and accounting roles at Unilever PLC and Tesco PLC. Additionally, she was chief financial officer of both Brambles Ltd. and Reckitt Benckiser Group PLC.

Ann Fudge

Member of the Board of Directors
American, age 65

Ann Fudge has been a member of the Board of Directors since 2008. She qualifies as an independent Non-Executive Director and is a member of the Risk Committee; the Compensation Committee; and the Governance, Nomination and Corporate Responsibilities Committee.

Ms. Fudge is vice chairman and senior independent director of Unilever NV, London and Rotterdam. She is also chair of the United States Program Advisory Panel of the Bill & Melinda Gates Foundation, a director of Northrop Grumman Corporation in the US, and a trustee of Boston-based WGBH public media.

Ms. Fudge received her bachelor's degree from Simmons College in the US and her Master of Business Administration from Harvard Business School, also in the US. She is former chairman and CEO of Young & Rubicam Brands, New York. Before that, she served as president of the Beverages, Desserts and Post Division of Kraft Foods Inc. in the US.

Pierre Landolt, Ph.D.

Member of the Board of Directors
Swiss, age 69

Pierre Landolt, Ph.D., has been a member of the Board of Directors since 1996. He qualifies as an independent Non-Executive Director and is a member of the Governance, Nomination and Corporate Responsibilities Committee.

Mr. Landolt is chairman of the Sandoz Family Foundation, overseeing its development in several investment fields. He is also chairman of the Swiss private bank Landolt & Cie SA. In Switzerland, he is chairman of Emasan AG and Vaucher Manufacture Fleurier SA, and vice chairman of Parmigiani Fleurier SA. Additionally, he is vice chairman of the Montreux Jazz Festival Foundation and a board member of Amazentis SA, Switzerland, and the Eneas Fund, Cayman Islands. In Brazil, Mr. Landolt is president of AxialPar Ltda. and Moco Agropecuaria Ltda., the Instituto Fazenda Tamanduá and the Instituto Estrela de Fomento ao Microcrédito.

Mr. Landolt graduated with a bachelor's degree in law from the University of Paris-Assas. From 1974 to 1976, he worked for Sandoz Brazil. In 1977, he acquired an agricultural estate in the semi-arid Northeast Region of Brazil, and within several years he converted it into a model farm in organic and biodynamic production. Since 1997, Mr. Landolt has been associate and chairman of AxialPar Ltda., Brazil, an investment company focused on sustainable development. In 2000, he co-founded Eco-Carbone SAS, a company active in the design and development of carbon sequestration processes. In 2007, he co-founded Amazentis SA, a startup company active in the convergence space of medication and nutrition. In 2011, Mr. Landolt received the title of Docteur des Sciences Économiques Honoris Causa from the University of Lausanne in Switzerland.

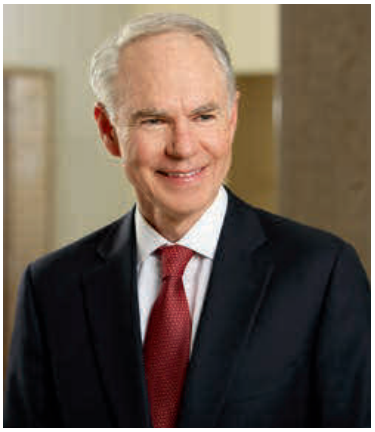
Andreas von Planta, Ph.D.

Member of the Board of Directors
Swiss, age 61

Andreas von Planta, Ph.D., has been a member of the Board of Directors since 2006. He qualifies as an independent Non-Executive Director and is Chairman of the Risk Committee and the Governance, Nomination and Corporate Responsibilities Committee. He is also a member of the Audit and Compliance Committee.

Mr. von Planta is a board member of Helvetia Holding AG in Switzerland, and also serves on the boards of various Swiss subsidiaries of foreign companies and other non-listed Swiss companies, including Burberry (Suisse) SA, Lenz & Staehelin AG, A.P. Moller Finance SA, HSBC Private Bank (Suisse) SA, Socotab Frana SA and Raymond Weil SA. Additionally, he is chairman of the regulatory board of the SIX Swiss Exchange AG.

Mr. von Planta holds a doctorate in law from the University of Basel in Switzerland, and a Master of Laws from Columbia Law School in the United States. He passed his bar examinations in Basel in 1982. Since 1983, he has lived in Geneva and worked for the law firm Lenz & Staehelin, where he became a partner in 1988. His areas of specialization include corporate law, corporate governance, corporate finance, company reorganizations, and mergers and acquisitions.



Charles L. Sawyers, M.D.

Member of the Board of Directors
American, age 57

Charles L. Sawyers, M.D., has been a member of the Board of Directors since 2013. He qualifies as an independent Non-Executive Director and is a member of the Research & Development Committee and the Governance, Nomination and Corporate Responsibilities Committee.

In the United States, Dr. Sawyers is chair of the Human Oncology and Pathogenesis Program at Memorial Sloan Kettering Cancer Center, professor of medicine and of cell and developmental biology at the Weill Cornell Graduate School of Medical Sciences, and an investigator at the Howard Hughes Medical Institute. He was appointed to US President Barack Obama's National Cancer Advisory Board, and is former president of the American Association for Cancer Research and of the American Society for Clinical Investigation. He is also a member of the US National Academy of Sciences, the Institute of Medicine, and the scientific advisory board of Agios Pharmaceuticals Inc. in the US.

Dr. Sawyers received his doctor of medicine from the Johns Hopkins University School of Medicine in the US, and worked at the Jonsson Comprehensive Cancer Center at the University of California, Los Angeles for nearly 18 years before joining Memorial Sloan Kettering in 2006. An internationally acclaimed cancer researcher, he co-developed the Novartis cancer drug *Gleevec/Glivec* and has received numerous honors and awards, including the Lasker-DeBakey Clinical Medical Research Award in 2009.

William T. Winters

Member of the Board of Directors
British/American, age 55

William T. Winters has been a member of the Board of Directors since 2013. He qualifies as an independent Non-Executive Director and is a member of the Compensation Committee.

Mr. Winters is CEO and a board member of Standard Chartered, based in London. He also serves on the board of Colgate University in the United States, and on the boards of the International Rescue Committee, the Young Vic theater and the Print Room theater in the United Kingdom.

Mr. Winters received his bachelor's degree from Colgate University and his Master of Business Administration from the Wharton School of the University of Pennsylvania in the US. He previously ran Renshaw Bay, an alternative asset management firm, and was co-CEO of JPMorgan's investment bank from 2003 to 2010. He joined JPMorgan in 1983 and has held management roles across several market areas and in corporate finance. Additionally, he was a commissioner on the UK Independent Commission on Banking in 2010 and 2011, and was awarded the title of Commander of the Order of the British Empire in 2013.

Honorary Chairmen

Alex Krauer, Ph.D.
Daniel Vasella, M.D.

Corporate Secretary

Charlotte Pamer-Wieser, Ph.D.

Our management

Composition of the Executive Committee

Executive Committee composition

The Executive Committee is headed by the CEO. Its members are appointed by the Board.

There are no contracts between Novartis and third parties whereby Novartis would delegate any business management tasks to such third parties.

Executive Committee role and functioning

The Board has delegated to the Executive Committee overall responsibility for and oversight of the operational management of Novartis. This includes:

- Developing policies and strategic plans for Board approval, and implementing those approved
- Submitting to the Board and its committees proposed changes in management positions of material significance, investments, financial measures, acquisitions and divestments, contracts of material significance, and targets – and implementing those approved
- Preparing and submitting quarterly and annual reports to the Board and its committees
- Informing the Board of all matters of fundamental significance to the businesses
- Recruiting, appointing and promoting senior management
- Ensuring the efficient operation of the Group and the achievement of optimal results
- Promoting an active internal and external communications policy
- Dealing with any other matters delegated by the Board

The Executive Committee is supported by a sub-committee: The Disclosure Committee (members are the CEO, CFO and Group General Counsel) determines whether an event constitutes information that is material to the Group, determines the appropriate disclosure and update of such information, and reviews media releases concerning such information.

CEO

In addition to other Board-assigned duties, the CEO leads the Executive Committee, building and maintaining an effective executive team. With the support of the Executive Committee, the CEO:

- Is responsible for the operational management of Novartis
- Develops strategy proposals to be recommended to the Board, and ensures that approved strategies are implemented
- Plans human resourcing to ensure that Novartis has the capabilities and means to achieve its plans, and that robust management succession and management development plans are in place and presented to the Board
- Develops an organizational structure, and establishes processes and systems to ensure the efficient organization of resources
- Ensures that financial results, business strategies and, when appropriate, targets and milestones are communicated to the investment community – and generally develops and promotes effective communication with shareholders and other stakeholders
- Ensures that the business performance is consistent with business principles, as well as with high legal and ethical standards, and that the culture of Novartis is consistent with the Novartis Values and Behaviors
- Leads the Innovative Medicines Division
- Develops processes and structures to ensure that capital investment proposals are reviewed thoroughly, that associated risks are identified, and that appropriate steps are taken to manage these risks
- Develops and maintains an effective framework of internal controls over risk in relation to all business activities of the company
- Ensures that the flow of information to the Board is accurate, timely and clear

Mandates outside the Novartis Group

No Executive Committee member may hold more than six additional mandates in other companies, of which no more than two additional mandates shall be in other listed companies. Each of these mandates is subject to Board approval. Executive Committee members are not allowed to hold chairmanships of the boards of directors of other listed companies.

The following mandates are not subject to these limitations:

a) Mandates in companies that are controlled by Novartis AG
b) Mandates that an Executive Committee member holds at the request of Novartis AG or companies controlled by it. No Executive Committee member shall hold more than five such mandates.
c) Mandates in associations, charitable organizations, foundations, trusts and employee welfare foundations. No Executive Committee member may hold more than 10 such mandates.

"Mandates" means those in the supreme governing body of a legal entity that is required to be registered in the commercial register or a comparable foreign register. Mandates in different legal entities that are under joint control are deemed one mandate.

The Board may issue regulations that determine additional restrictions, taking into account the position of the respective member.

Loans and credits

No loans or credits shall be granted to members of the Executive Committee.

Executive Committee

Joseph Jimenez

Chief Executive Officer of Novartis
American, age 57

Joseph Jimenez has been Chief Executive Officer (CEO) of Novartis since 2010.

Mr. Jimenez previously held the position of Division Head, Novartis Pharmaceuticals. He joined Novartis in 2007 as Division Head, Novartis Consumer Health. Before that, he served as president and CEO of the North American and European businesses for the H.J. Heinz Company. He also served on the board of directors of Colgate-Palmolive Co. from 2009 to 2015, and of AstraZeneca PLC from 2002 to 2007.

Mr. Jimenez is a member of the board of directors of General Motors Co. He graduated in 1982 with a bachelor's degree from Stanford University and in 1984 with a Master of Business Administration from the University of California, Berkeley, both in the United States.

Steven Baert

Head of Human Resources of Novartis
Belgian, age 42

Steven Baert has been Head of Human Resources (CHRO) of Novartis since 2014. He is a member of the Executive Committee of Novartis.

Mr. Baert joined Novartis in 2006 as Head of Human Resources Global Functions in Switzerland. He has held several other senior HR roles, including Head of Human Resources for Emerging Growth Markets, and Global Head, Human Resources, Oncology. Mr. Baert also served as Head of Human Resources, United States and Canada, for Novartis Pharmaceuticals Corporation. Prior to joining Novartis, he held HR positions at Bristol-Myers Squibb Co. and Unilever.

Mr. Baert represents Novartis on the board of the GSK Consumer Healthcare joint venture. He holds a Master of Business Administration from the Vlerick Business School in Belgium and a Master of Laws from the Katholieke Universiteit Leuven, also in Belgium. Additionally, he has a Bachelor of Laws from the Katholieke Universiteit Brussels.

F. Michael (Mike) Ball

CEO, Alcon
American, age 61

F. Michael (Mike) Ball was appointed CEO of Alcon on February 1, 2016. He is a member of the Executive Committee of Novartis.

Mr. Ball previously served as CEO of Hospira from 2011 to 2015. At Hospira, a world leader in injectable pharmaceuticals and infusion devices, he successfully turned the company around and grew it by focusing on product and quality improvements, and expanding its global footprint. Prior to Hospira, Mr. Ball held a number of senior leadership positions at Allergan, beginning in 1995. He served as president from 2006 to 2011 after having led the strategy and execution of global commercial activities for a wide range of businesses, including eye care pharmaceuticals, over-the-counter products and surgical devices. Before joining Allergan, Mr. Ball held roles of increasing responsibility in marketing and sales at Syntex Corporation and Eli Lilly. He began his career in the healthcare industry in 1981.

Mr. Ball holds a Bachelor of Science and a Master of Business Administration from Queen's University in Canada.

James (Jay) Bradner, M.D.

President of the Novartis Institutes for BioMedical Research (NIBR)
American, age 44

James (Jay) Bradner, M.D., joined Novartis on January 1, 2016 and became President of the Novartis Institutes for BioMedical Research (NIBR) on March 1, 2016. He is a member of the Executive Committee of Novartis.

Prior to joining Novartis, Dr. Bradner was on the faculty of Harvard Medical School in the Department of Medical Oncology at the Dana-Farber Cancer Institute in the United States. He was also associate director of the Center for the Science of Therapeutics at the Broad Institute of MIT and Harvard. Dr. Bradner is a co-founder of five biotechnology companies and has co-authored more than 150 scientific publications and 30 US patent applications.

Dr. Bradner is a graduate of Harvard University and the University of Chicago Medical School in the US. He completed his residency in medicine at Brigham and Women's Hospital and his fellowship in medical oncology and hematology at the Dana-Farber Cancer Institute. He has been honored with many awards and was elected into the American Society for Clinical Investigation in 2011 and the Alpha Omega Alpha Honor Medical Society in 2013.

Felix R. Ehrat, Ph.D.

Group General Counsel of Novartis
Swiss, age 59

Felix R. Ehrat, Ph.D., has been Group General Counsel of Novartis since 2011. He is a member of the Executive Committee of Novartis.

Mr. Ehrat is a leading practitioner of corporate, banking, and mergers and acquisitions law, as well as an expert in corporate governance and arbitration. He started his career as an associate at Bär & Karrer Ltd. in Zurich in 1987, became partner in 1992, and advanced to senior partner (2003 to 2011) and executive chairman of the board (2007 to 2011). Mr. Ehrat is chairman of Globalance Bank AG in Switzerland, and chairman of SwissHoldings (the federation of industrial and service groups in Switzerland). He is a board member of Geberit AG and Avenir Suisse (a think tank for economic and social issues), and previously served as chairman and board member of several listed and non-listed companies.

Mr. Ehrat was admitted to the Zurich bar in 1985 and received his doctorate in law from the University of Zurich in Switzerland in 1990. He received his Master of Laws from McGeorge School of Law in the United States in 1986. Some of his past memberships include the International Bar Association, where he was co-chair of the Corporate and M&A Law Committee from 2007 to 2008, and Association Internationale des Jeunes Avocats, where he was president from 1998 to 1999.

Richard Francis

CEO, Sandoz
British, age 48

Richard Francis has been CEO of Sandoz since 2014. He is a member of the Executive Committee of Novartis.

Mr. Francis joined Novartis from Biogen Idec, where he held global and country leadership positions during his 13-year career with the company. Most recently, he was senior vice president of the company's United States commercial organization. From 1998 to 2001, he was at Sanofi in the United Kingdom, and held various marketing roles across the company's urology, analgesics and cardiovascular products. He has also held sales and marketing positions at Lorex Synthélabo and Wyeth.

Mr. Francis received a Bachelor of Arts in economics from Manchester Metropolitan University in the UK.

Executive Committee (continued)

Paul Hudson

CEO, Novartis Pharmaceuticals
British, age 49

Paul Hudson has been CEO of Novartis Pharmaceuticals since July 1, 2016. He is a member of the Executive Committee of Novartis.

Mr. Hudson joined Novartis from AstraZeneca, where he most recently was president, AstraZeneca United States and executive vice president, North America. He also served as representative director and president of AstraZeneca K.K. in Japan; as president of AstraZeneca's business in Spain; and as vice president and primary care director, United Kingdom. Before AstraZeneca, Mr. Hudson held roles of increasing responsibility at Schering-Plough, including leading biologics global marketing. He began his career in sales and marketing roles at GlaxoSmithKline UK and Sanofi-Synthélabo UK.

Mr. Hudson holds a degree in economics from Manchester Metropolitan University in the UK and a diploma in marketing from the Chartered Institute of Marketing, also in the UK.

Harry Kirsch

Chief Financial Officer of Novartis
German, age 51

Harry Kirsch has been Chief Financial Officer (CFO) of Novartis since 2013. He is a member of the Executive Committee of Novartis.

Mr. Kirsch joined Novartis in 2003 and, prior to his current position, served as CFO of the company's Pharmaceuticals Division. Under his leadership, the division's core operating income margin increased, in constant currencies, every quarter of 2011 and 2012 despite patent expirations. At Novartis, he also served as CFO of Pharma Europe, and as Head of Business Planning & Analysis and Financial Operations for the Pharmaceuticals Division. Mr. Kirsch joined Novartis from Procter & Gamble (P&G) in the United States, where he was CFO of P&G's global pharmaceutical business. Prior to that, he held finance positions in various categories of P&G's consumer goods business, technical operations, and Global Business Services organization.

Mr. Kirsch represents Novartis on the board of the GSK Consumer Healthcare joint venture. He holds a diploma degree in industrial engineering and economics from the University of Karlsruhe in Germany.

Vasant (Vas) Narasimhan, M.D.

Global Head of Drug Development and Chief Medical Officer for Novartis
American, age 40

Vasant (Vas) Narasimhan, M.D., has been Global Head of Drug Development and Chief Medical Officer for Novartis since February 1, 2016. He is a member of the Executive Committee of Novartis.

Dr. Narasimhan joined Novartis in 2005 and has held numerous leadership positions in development and commercial functions. His most recent role was Global Head of Development for Novartis Pharmaceuticals, overseeing the entire general medicines pipeline. He previously served as Global Head of the Sandoz Biopharmaceuticals and Oncology Injectables business unit, overseeing the division's biosimilars pipeline, and as Global Head of Development for Novartis Vaccines. Dr. Narasimhan has also held commercial and strategic roles at Novartis, including North America Region Head for Novartis Vaccines, and United States Country President for Novartis Vaccines and Diagnostics. Before joining Novartis, he worked at McKinsey & Company.

Dr. Narasimhan received his medical degree from Harvard Medical School in the US and obtained a master's degree in public policy from Harvard's John F. Kennedy School of Government. He received his bachelor's degree in biological sciences from the University of Chicago, also in the US. He is an elected member of the US National Academy of Medicine.

Bruno Strigini

CEO, Novartis Oncology
French, age 55

Bruno Strigini has been CEO of Novartis Oncology since July 1, 2016. He is a member of the Executive Committee of Novartis.

Mr. Strigini joined Novartis in 2014 as President of Oncology. Prior to Novartis, he was president of MSD for Europe and Canada (Merck & Co. in the United States and Canada). He previously worked at Schering-Plough, UCB Celltech and SmithKline Beecham, and his roles included president of international operations, president of Japan and Asia-Pacific, head of global marketing and business development, and managing director positions.

Mr. Strigini holds a Master of Business Administration from IMD business school in Switzerland, a doctorate in pharmacy from the University of Montpellier in France, and a master's degree in microbiology from Heriot-Watt University in the United Kingdom. He is an elected member of the French National Academy of Pharmacy, and in 2014, he was awarded a doctor honoris causa from Universidad Internacional Menéndez Pelayo in Spain.

André Wyss

President of Novartis Operations and Country President for Switzerland
Swiss, age 49

André Wyss has been President of Novartis Operations since February 1, 2016, and is responsible for manufacturing, shared services and public affairs. He is also Country President for Switzerland and a member of the Executive Committee of Novartis.

Mr. Wyss joined Novartis in 1984 as a chemistry apprentice in manufacturing. Before being appointed President of Novartis Operations, he served as Head of Novartis Business Services, building and implementing a shared services organization across Novartis. Prior to that, he held several other leadership positions, including US Country Head and President of Novartis Pharmaceuticals Corporation; Head of the Pharmaceuticals Division for the AMAC region (Asia-Pacific, Middle East and African countries); Group Emerging Markets Head; and Country President and Head of Pharmaceuticals, Greece.

Mr. Wyss received a graduate degree in economics from the School of Economics and Business Administration (HWV) in Switzerland in 1995. He is a member of the board of economiesuisse.

Secretary

Bruno Heynen

Our independent external auditors

Duration of the mandate and terms of office of the auditors

Based on a recommendation by the Audit and Compliance Committee, the Board nominates an independent auditor for election at the AGM. PricewaterhouseCoopers (PwC) assumed its existing auditing mandate for Novartis in 1996. Bruno Rossi, auditor in charge, began serving in his role in 2013, and Stephen Johnson, global relationship partner, began serving in his role in 2014. PwC ensures that these partners are rotated at least every five years.

Information to the Board and the Audit and Compliance Committee

PwC is responsible for providing an opinion on whether the consolidated financial statements comply with IFRS and Swiss law, and whether the separate parent company financial statements of Novartis AG comply with Swiss law. Additionally, PwC is responsible for opining on the effectiveness of internal control over financial reporting, on the Compensation Report and on the corporate responsibility reporting of Novartis.

The Audit and Compliance Committee, acting on behalf of the Board, is responsible for overseeing the activities of PwC. In 2016, this committee held 7 meetings. PwC was invited to 6 of these meetings to attend during the discussion of agenda items that dealt with accounting, financial reporting or auditing matters and any other matters relevant to its audit.

On an annual basis, PwC provides the Audit and Compliance Committee with written disclosures required by the US Public Company Accounting Oversight Board, and the committee and PwC discuss PwC's independence from Novartis.

The Audit and Compliance Committee recommended to the Board to approve the audited consolidated financial statements and the separate parent company financial statements of Novartis AG for the year ended December 31, 2016. The Board proposed the acceptance of these financial statements for approval by the shareholders at the next AGM.

The Audit and Compliance Committee regularly evaluates the performance of PwC, and once a year determines whether PwC should be proposed to the shareholders for election. Also once a year, the auditor in charge and the global relationship partner report to the Board on PwC's activities during the current year and on the audit plan for the coming year. They also answer any questions or concerns that Board members have about the performance of PwC, or about the work it has conducted or is planning to conduct.

To assess the performance of PwC, the Audit and Compliance Committee holds private meetings with the CFO and the Head of Internal Audit and, if necessary, obtains an independent external assessment. Criteria applied for the performance assessment of PwC include an evaluation of its technical and operational competence; its independence and objectivity; the sufficiency of the resources it has employed; its focus on areas of significant risk to Novartis; its willingness to probe and challenge; its ability to provide effective, practical recommendations; and the openness and effectiveness of its communications and coordination with the Audit and Compliance Committee, the Internal Audit function, and management.

Approval of audit and non-audit services

The Audit and Compliance Committee approves a budget for audit services, whether recurring or non-recurring in nature, and for audit-related services not associated with internal control over financial reporting. PwC reports quarterly to the Audit and Compliance Committee regarding the extent of services provided in accordance with the applicable pre-approval, and the fees for services performed to date. The Audit and Compliance Committee individually approves all audit-related services associated with internal control over financial reporting, tax services and other services prior to the start of work.

Audit and additional fees

PwC charged the following fees for professional services rendered for the 12-month periods ended December 31, 2016 and December 31, 2015:

	2016 USD million	2015[1] USD million
Audit services	26.7	25.9
Audit-related services	2.9	1.1
Tax services	0.7	0.0
Other services	1.3	0.7
Total	**31.6**	**27.7**

[1] Amounts for 2015 have been reclassified in line with the new 2016 classification criteria to allow comparison with 2016 amounts.

Audit services include work performed to issue opinions on consolidated financial statements and parent company financial statements of Novartis AG, to issue opinions relating to the effectiveness of the Group's internal control over financial reporting, and to issue reports on local statutory financial statements. Also included are audit services that generally can only be provided by the statutory auditor, such as the audit of the Compensation Report, audits of non-recurring transactions, audits of the adoption of new accounting policies, audits of information systems and the related control environment, reviews of quarterly financial results, as well as procedures required to issue consents and comfort letters.

Audit-related services include other assurance services provided by the independent auditor but not restricted to those that can only be provided by the statutory auditor. They include services such as audits of pension and other employee benefit plans, contract audits of third-party arrangements, corporate responsibility assurance, and other audit-related services.

Tax services represent tax compliance, assistance with historical tax matters, and other tax-related services.

Other services include procedures related to corporate integrity agreements, training in the finance area, benchmarking studies, and license fees for use of accounting and other reporting guidance databases.

Our corporate governance framework

Laws and regulations

Novartis AG is subject to the laws of Switzerland, in particular Swiss company and securities laws, and to the securities laws of the US as applicable to foreign private issuers of securities.

In addition, Novartis AG is subject to the rules of the SIX Swiss Exchange, including the Directive on Information Relating to Corporate Governance.

Novartis AG is also subject to the rules of the NYSE as applicable to foreign private issuers of securities. The NYSE requires Novartis AG to describe any material ways in which its corporate governance differs from that of domestic US companies listed on the exchange. These differences are:

— Novartis AG shareholders do not receive written reports directly from Board committees.
— External auditors are appointed by shareholders at the AGM, as opposed to being appointed by the Audit and Compliance Committee.
— While shareholders cannot vote on all equity compensation plans, they are entitled to hold separate, yearly binding shareholder votes on Board and Executive Committee compensation.
— The Board has set up a separate Risk Committee that is responsible for business risk oversight, as opposed to delegating this responsibility to the Audit and Compliance Committee.
— The full Board is responsible for overseeing the performance evaluation of the Board and Executive Committee.
— The full Board is responsible for setting objectives relevant to the CEO's compensation and for evaluating his performance.

Swiss Code of Best Practice for Corporate Governance

Novartis applies the Swiss Code of Best Practice for Corporate Governance.

Novartis corporate governance standards

Novartis has incorporated the aforementioned corporate governance standards described above into the Articles of Incorporation and the Regulations of the Board of Directors, its Committees and the Executive Committee of Novartis AG (www.novartis.com/corporate-governance).

The GNCRC regularly reviews these standards and principles, taking into account best practices, and recommends improvements to the corporate governance framework for consideration by the full Board.

Additional corporate governance information can be found on the Novartis website: www.novartis.com/corporate-governance.

Printed copies of the Novartis Articles of Incorporation, regulations of the Board, and charters of Board committees can be obtained by writing to: Novartis AG, Attn: Corporate Secretary, Lichtstrasse 35, CH-4056 Basel, Switzerland.

Further information

Group structure of Novartis

Novartis AG and Group companies

Under Swiss company law, Novartis AG is organized as a corporation that has issued shares of common stock to investors. The registered office of Novartis AG is Lichtstrasse 35, CH-4056 Basel, Switzerland.

Business operations are conducted through Novartis Group companies. Novartis AG, a holding company, owns or controls directly or indirectly all entities worldwide belonging to the Novartis Group. Except as described below, the shares of these companies are not publicly traded. The principal Novartis subsidiaries and associated companies are listed in Note 32 to the Group's consolidated financial statements.

Divisions

The businesses of Novartis are divided on a worldwide basis into three operating divisions: Innovative Medicines, with the two business units Novartis Pharmaceuticals and Novartis Oncology; Sandoz (generics); and Alcon (eye care). These businesses are supported by a number of global organizations including NIBR, which focuses on discovering new drugs; the Global Drug Development organization, which oversees the clinical development of new medicines; and Novartis Operations, which includes Novartis Technical Operations (the global manufacturing organization) and Novartis Business Services (which consolidates support services across Novartis).

Majority holdings in publicly-traded Group companies

The Novartis Group owns 73.4% of Novartis India Ltd., with its registered office in Mumbai, India, and listed on the Bombay Stock Exchange (ISIN INE234A01025, symbol: HCBA). The total market value of the 26.6% free float of Novartis India Ltd. was USD 74.2 million at December 31, 2016, using the quoted market share price at year-end. Applying this share price to all the shares of the company, the market capitalization of the whole company was USD 279.0 million, and that of the shares owned by Novartis was USD 204.8 million.

Significant minority shareholding owned by the Novartis Group

The Novartis Group owns 33.3% of the bearer shares of Roche Holding AG, with its registered office in Basel, Switzerland, and listed on the SIX Swiss Exchange (ISIN CH0012032113, symbol: RO). The market value of the Group's interest in Roche Holding AG, as of December 31, 2016, was USD 12.4 billion. The total market value of Roche Holding AG was USD 197.1 billion. Novartis does not exercise control over Roche Holding AG, which is independently governed, managed and operated.

The Novartis Group owns a 36.5% share of a joint venture created by GlaxoSmithKline PLC (GSK) and Novartis, which combined the Novartis OTC and GSK Consumer Healthcare businesses. Novartis holds four of the 11 seats on the joint venture's board. Furthermore, Novartis has certain minority rights and exit rights, including a put option that is exercisable as of March 2, 2018.

Political contributions

Novartis makes political contributions to support the political dialogue on issues of relevance to the company.

Political contributions made by Novartis are not intended to give rise to any obligations of the party receiving it, or with the expectation of a direct or immediate return for Novartis. Such contributions are fully compliant with applicable laws, regulations and industry codes. Novartis only makes political contributions in countries where such contributions from corporations are considered to reflect good corporate citizenship. Moreover, Novartis only makes modest political contributions so as to not create any dependency from the political parties receiving these contributions.

In 2016 Novartis issued a guideline on Responsible Lobbying, describing the overarching principles of transparency in lobbying activities. For more information on responsible lobbying see the public policy and advocacy section of the Novartis website (https://www.novartis.com/about-us/corporate-responsibility/doing-business-responsibly/public-policy-advocacy).

In 2016, Novartis made political contributions totaling approximately USD 1.0 million, thereof approximately USD 620 000 in Switzerland, USD 250 000 in the US, USD 110 000 in Australia and USD 10 000 in the UK. In addition, in the US, a political action committee established by Novartis used funds received from Novartis employees (but not from the company) to make political contributions totaling approximately USD 240 000.

In Switzerland, Novartis supports political parties that have a political agenda and hold positions that support the strategic interests of Novartis, its shareholders and other stakeholders. Swiss political parties are completely privately financed, and the contributions of companies are a crucial part thereof. This private financing of parties is a deeply-rooted trait of the Swiss political culture, and contributing to that system is an important element of being a good corporate citizen.

Shareholder relations

The CEO, with the CFO and Investor Relations team, supported by the Chairman, are responsible for ensuring effective communication with shareholders to keep them informed of the company's strategy, prospects, business operations and governance. Through communication, the Board also learns about and addresses shareholders' expectations and concerns.

Novartis communicates with its shareholders through the AGM, meetings with groups of shareholders and individual shareholders, and written and electronic communications.

At the AGM, the Chairman, CEO and other Executive Committee members, as well as representatives of the external auditors, are present and can answer shareholders' questions. Other meetings with shareholders may be attended by the Chairman, CEO, CFO, Executive Committee members, and other members of senior management.

Topics discussed with shareholders may include strategy, business performance and corporate governance, while fully respecting all applicable laws and stock exchange rules.

Information for our stakeholders

Introduction

Novartis is committed to open and transparent communication with shareholders, financial analysts, customers, suppliers and other stakeholders. Novartis aims to disseminate material developments in its businesses in a broad and timely manner that complies with the rules of the SIX Swiss Exchange and the NYSE.

Communications

Novartis publishes this Annual Report to provide information on the Group's results and operations. In addition, Novartis prepares an annual report on Form 20-F that is filed with the US Securities and Exchange Commission (SEC). Novartis discloses quarterly financial results in accordance with IFRS, and issues press releases from time to time regarding business developments.

Novartis furnishes press releases relating to financial results and material events to the SEC via Form 6-K. An archive containing recent Annual Reports, annual reports on Form 20-F, quarterly results releases, and all related materials – including presentations and conference call webcasts – is on the Novartis website at www.novartis.com/investors.

Novartis also publishes a consolidated Corporate Responsibility Performance Report, available on the Novartis website at www.novartis.com/about-us/corporate-responsibility, which details progress and demonstrates the company's commitment to be a leader in corporate responsibility. This report reflects the best-in-class reporting standard, the Global Reporting Initiative's G4 guidelines, and fulfills the company's reporting requirement as a signatory of the UN Global Compact.

Information contained in reports and releases issued by Novartis is only correct and accurate at the time of release. Novartis does not update past releases to reflect subsequent events, and advises against relying on them for current information.

Investor Relations program

An Investor Relations team manages the Group's interactions with the international financial community. Several events are held each year to provide institutional investors and analysts with various opportunities to learn more about Novartis.

Investor Relations is based at the Group's headquarters in Basel. Part of the team is located in the US to coordinate interaction with US investors. Information is available on the Novartis website: www.novartis.com/investors. Investors are also welcome to subscribe to a free email service on this site.

Website information

Topic	Information
Share capital	Articles of Incorporation of Novartis AG www.novartis.com/corporate-governance Novartis key share data www.novartis.com/key-share-data
Shareholder rights	Articles of Incorporation of Novartis AG www.novartis.com/corporate-governance Investor Relations information www.novartis.com/investors
Board regulations	Board regulations www.novartis.com/corporate-governance
Executive Committee	Executive Committee www.novartis.com/executive-committee
Novartis code for senior financial officers	Novartis Code of Ethical Conduct for CEO and Senior Financial Officers www.novartis.com/corporate-governance
Additional information	Novartis Investor Relations www.novartis.com/investors

1 Edmund Ekuadzi supervises an exam in pharmacognosy, the study of medicines derived from plants.
2 Mr. Ekuadzi at Kwame Nkrumah University of Science and Technology, where he teaches and does research
3 Discussing the search for medicinal plants with his colleagues
4 Back in the laboratory, Mr. Ekuadzi checks the equipment used to analyze plant samples.
5 Visiting the rainforest with Clifford Osafo Asare, an herbalist

PHOTO ESSAY

A researcher seeks the roots of plants' healing power

Deep in a forest in the West African country of Ghana, two men are searching for plants that they hope could ultimately provide a cure for some of the world's deadliest diseases.

One of these men is an expert on traditional healing, drawing on centuries of inherited knowledge about the medicinal qualities of certain roots and leaves. The other, Edmund Ekuadzi, is a university researcher who has dedicated his life to uncovering the science behind this ancient wisdom.

Mr. Ekuadzi, who grew up in the Ghanaian capital Accra, is an expert in the field of pharmacognosy, or the study of medicines derived from plants and other natural sources. Plants have yielded countless medicines over the years. Examples include willows, which were the original source of aspirin; poppies, which provided the painkiller morphine; and cinchona trees, which have long been used to make the anti-malarial drug quinine.

For Mr. Ekuadzi, the first challenge is to win the trust of traditional herbalists – who sometimes regard science as a threat to their livelihoods – and persuade them to identify the plants they use to treat a range of ailments. He then analyzes samples in his laboratory at Kwame Nkrumah University of Science and Technology in Kumasi, Ghana.

For example, he conducted the first scientific investigation of a shrub in the buckthorn family known as saa-wawa, widely used in West Africa as a cure-all for everything from cuts and burns to snake bites and jaundice. The study isolated a number of compounds that are responsible for the plant's antibacterial and anti-inflammatory properties.

This research provides a benchmark to assess the quality of herbal medicines that are extracted from the plants. "These medicines are important for the people of Ghana, where we are struggling to provide healthcare for all," he says.

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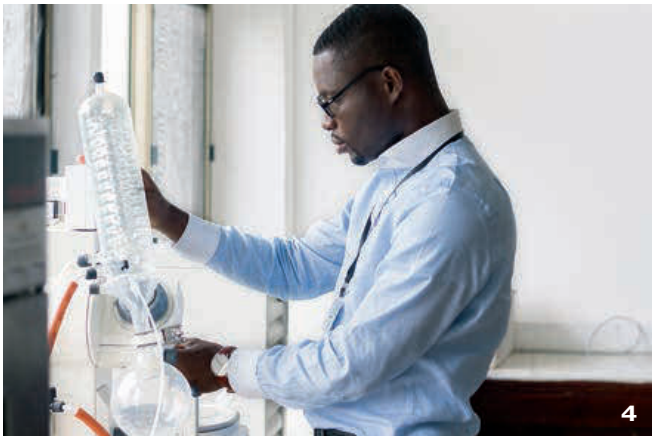

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But there is also the tantalizing prospect that one day he may discover a compound that is new to science and capable of transforming the practice of medicine.

Such a breakthrough occurred in the 1970s, when researchers studied a plant that for thousands of years had been known to Chinese herbalists for its antimalarial properties. Artemisinin now forms the basis of combination therapies such as *Coartem* from Novartis, which are the first-line treatment for malaria worldwide.

Mr. Ekuadzi received support from Novartis when he completed an internship in 2012 through the company's Next Generation Scientist Program. It is designed to develop the scientific and medical capabilities of postgraduate students and physicians from emerging countries, providing skills that will benefit them and their communities when they return home.

Mr. Ekuadzi, now 31, is one of more than 100 scientists from 21 countries who have taken part in the program, which helped him refine his use of techniques such as mass spectrometry. This enables him to analyze a plant's molecular structure and isolate the compounds that have therapeutic effects.

He now applies these skills at the university in Ghana where he teaches pharmacognosy and works as assistant laboratory manager, while continuing to analyze the native plants that have been used to treat people in Ghana for generations and that may one day benefit patients much farther afield.

Compensation Report

Contents

Dear shareholder,

As Chairman of the Compensation Committee of the Board of Directors, I am pleased to share with you the 2016 Compensation Report of Novartis AG.

Our strategy at Novartis is to use science-based innovation to deliver better outcomes for patients in growing areas of healthcare. Our executive compensation system is aligned with our success in implementing that strategy, as well as with the interests of our shareholders.

We introduced our new compensation system in 2014 with a combination of performance-related incentives, including a short-term Annual Incentive and two new Long-Term Incentive plans with three-year performance-periods. For the first time in 2016, the three-year performance-period for the two Long-Term Incentive plans has concluded.

In the interests of shareholders and proxy advisors, while remaining compliant with the Ordinance against Excessive Compensation in Listed Companies, the Compensation Committee has worked to further enhance, on a voluntary basis, our compensation disclosures. Additional information has been provided on the process for setting compensation targets for the Executive Committee, and the payout outcomes affecting realized compensation of the CEO. We believe this is a meaningful way to illustrate the alignment of the Compensation Committee's decisions on CEO pay for performance with our shareholders' interests.

Engagement with shareholders

The Compensation Committee would like to acknowledge the strong shareholder support at the 2016 Annual General Meeting (AGM) for all compensation-related resolutions, and express appreciation for the opportunity to meet many of our shareholders during 2016 to discuss various compensation topics.

Based on their feedback, in 2016 the Compensation Committee continued to evaluate the effectiveness of our compensation programs and concluded that they are well aligned with our strategic objectives and business priorities. However, with the evolution of the healthcare industry both in Europe and the US, as well as the emergence of large US biotechnology companies, the Compensation Committee has introduced a revised global healthcare peer group for performance-periods starting in 2017. This revised peer group will be used as the primary benchmark for determining the compensation opportunities of the CEO and other key executives, and for evaluating relative Total Shareholder Return (TSR) performance and ranking under the LTRPP. Further detail is provided on page 136.

In 2016, to strengthen integrity and compliance across the company and in line with the expectations of our shareholders, the Compensation Committee held a joint meeting with the Risk Committee focused on doing

business responsibly. The Committees endorsed new policies, systems and governance, including sales force compensation, to support the highest ethical conduct at all levels of the organization. While it will take time for the organization to truly embed our Values and Behaviors, the Board believes that these changes support our culture of delivering high performance with integrity and long-term sustainable value to shareholders.

2016 company performance

Novartis delivered in most of its key priority areas despite a challenging year. The company achieved solid financials absorbing US *Gleevec* loss of exclusivity. Operationally, in constant currencies, the company was slightly below its sales target, met its free cash flow target, and was below its net income target. Innovative Medicines delivered strong performance, Sandoz's was solid, outperformed peers and gained market share, while Alcon negatively impacted consolidated results.

Novartis achieved several breakthrough innovations and drove the growth products including the successful launch of *Cosentyx* and the steady growth of *Entresto* following positive treatment guidelines in the US and Europe. Significant changes to the company structure were implemented effective from July 1, 2016 to improve effectiveness by increasing the scale of the key functions, while at the same time lowering costs. Important progress has also been made in embedding a culture of integrity. Compliance failures mainly related to legacy issues.

2016 CEO realized compensation

The Compensation Committee focused on the CEO's performance compared to his financial and strategic objectives, our Values and Behaviors, and the overall performance of Novartis. The Compensation Committee used its judgment and support from an independent external compensation advisor to make decisions about individual compensation elements, variable compensation payouts (which can vary between 0%–200% of the target) and total compensation. Compensation Committee members also considered a variety of qualitative factors, including the business environment in which 2016 results were achieved.

- The CEO was awarded a 2016 Annual Incentive of CHF 2 835 010, representing 90% of target, based on a combination of our company's performance and his own performance. Half of the Annual Incentive is delivered in cash, and the remainder in restricted share units with a three-year vesting period.
- The three-year performance-period for the two new Long-Term Incentive plans introduced in 2014 was completed in 2016. For the first – our Long-Term Performance Plan (LTPP) – following the assessment of performance against the three-year Novartis Cash Value Added (NCVA) and Group innovation targets, the Compensation Committee approved a payout of 112% of target for the CEO. For the second – our Long-Term Relative Performance Plan (LTRPP) – following the assessment of the Novartis three-year TSR against the Novartis global healthcare peer group, the Compensation Committee noted that Novartis ranked 10th out of 13 companies. Considering our TSR was flat in USD, and was up +15% in CHF, over the three-year performance-period 2014–2016, the Compensation Committee approved a payout of 20% of target.

In light of the above, 2016 CEO realized total compensation was CHF 10 556 685 including his fixed compensation, his 2016 Annual Incentive, and the vesting of his LTPP and LTRPP awards for the performance-period 2014–2016. The total LTPP and LTRPP payout was CHF 5 392 347 including CHF 528 346 of dividend equivalents accrued over the three-year performance-period.

2017 AGM

We will continue to exchange views with our shareholders in an atmosphere of trust and respect that promotes a collaborative dialogue. Shareholder engagement is critical to our long-term success, and the Compensation Committee is committed to continue meeting with our shareholders. In line with our Articles of Incorporation, shareholders will be asked to approve the total maximum amount of Board compensation from the 2017 AGM to the 2018 AGM, the Executive Committee compensation for financial year 2018, and to endorse this Compensation Report in an advisory vote.

On behalf of Novartis and the Compensation Committee, I would like to thank you for your continued support and feedback, which I consider extremely valuable in driving improvements in our compensation systems and practices. I invite you to send your comments to me at the following email address: investor.relations@novartis.com.

Respectfully,

Enrico Vanni, Ph.D.
Chairman of the Compensation Committee

Compensation at a glance

Executive Committee compensation

Executive Committee compensation system (pages 116–120)

	Fixed compensation and benefits		Variable compensation			
	Annual base compensation	**Pension and other benefits**	**Annual Incentive**	**Long-Term Performance Plan (LTPP)**	**Long-Term Relative Performance Plan (LTRPP)**	
Purpose	Reflects associates' responsibilities, job characteristics, experience and skill sets	Establishes a level of security for associates and their dependents tailored to local market practices and regulations	Rewards performance against key short-term targets, and Values and Behaviors	Rewards long-term shareholder value creation and long-term innovation	Rewards relative total shareholder return	
Performance period	n/a	n/a	1 year	3 years	3 years	
Performance measures	n/a	n/a	Based on a payout matrix made up of: — Individual Balanced Scorecard, including financial targets and individual objectives — Assessed Values and Behaviors	Based on: — 75% Novartis Cash Value Added — 25% divisional long-term innovation milestones	Based on Novartis' relative total shareholder return vs. our peer group of global healthcare companies[1]	
Delivery (at the end of the performance period for variable compensation)	Cash	Country-specific	50% cash 50% deferred equity[2] (3-year holding of restricted shares/ restricted share units)	Equity (includes dividend equivalents)	Equity (includes dividend equivalents)	**Total variable compensation**
CEO variable opportunity[3]	n/a	n/a	Target: 150%	Target: 200%	Target: 125%[4]	Target: 475%
Other Executive Committee members' variable opportunity[3]	n/a	n/a	Target: 90–120%	Target: 140–190%	Target: 30–80%	Target: 260%–390%

[1] For the performance period 2016-2018, the companies in our global healthcare peer group consist of Abbott, AbbVie, Amgen, AstraZeneca, Bristol-Myers Squibb, Eli Lilly & Co., GlaxoSmithKline, Johnson & Johnson, Merck & Co., Pfizer, Roche and Sanofi.
[2] Executive Committee members may elect to receive more of their Annual Incentive in equity instead of cash.
[3] The shown information represents the variable compensation opportunity as a percentage of annual base compensation. The payout range for each element is 0–200% of target.
[4] Effective from the performance-period 2016-18 (previously 100%).

2016 CEO realized compensation (pages 124–126)

The following table provides a summary of the 2016 CEO realized compensation in relation to the performance periods ended December 31, 2016. We believe reporting realized compensation provides a meaningful way to transparently illustrate the alignment between the Compensation Committee's decisions on CEO pay for performance and shareholders' interests. In addition, this complements the disclosures required by the Ordinance against Excessive Compensation in Listed Companies (pages 129–135).
The CEO realized compensation includes the payouts, based on actual performance assessed, from the two Long-Term Incentive plans newly introduced in 2014 following the conclusion of their first three-year performance-period 2014–2016.

	2016 fixed compensation and benefits		Variable compensation			
	Annual base compensation	**Pension and other benefits**	**2016 Annual Incentive**	**Long-Term Performance Plan (LTPP) 2014–2016[1]**	**Long-Term Relative Performance Plan (LTRPP) 2014–2016[1]**	**Total realized compensation**
Joseph Jimenez (CEO)	2 093 417	235 911[2]	2 835 010	4 950 334	442 013	10 556 685

[1] The shown amounts represent the underlying share value of the total number of shares vested (including dividend equivalents) to the CEO for the LTPP and LTRPP performance-period 2014-2016.
[2] Includes an amount of CHF 4 336 for mandatory employer contributions for the CEO paid by Novartis to Swiss governmental social security systems. This amount is out of total employer contributions of CHF 1 144 673, and provides a right to the maximum future insured government pension benefit.

2017 Executive Committee compensation system (page 136)

The Executive Committee compensation system will remain unchanged in 2017 with the exception of a revised global healthcare peer group and corresponding LTRPP payout matrix.

Board compensation

2016 Board compensation system (page 137)

Delivery: 50% cash/50% equity (up to 100% equity at the option of each Board member)

(CHF)	Annual fee
Chairman of the Board	3 800 000
Board membership	300 000
Vice Chairman	50 000
Chairman of the Audit and Compliance Committee	120 000
Chairman of the following committees: — Compensation Committee — Governance, Nomination and Corporate Responsibilities Committee — Research & Development Committee — Risk Committee	60 000
Membership of the Audit and Compliance Committee	60 000
Membership of the following committees: — Compensation Committee — Governance, Nomination and Corporate Responsibilities Committee — Research & Development Committee — Risk Committee	30 000

2016 Board compensation (pages 138–140)

Amounts earned for financial year 2016

(CHF)	Cash	Equity	Other benefits[1]	**Total**
Chairman Dr. Joerg Reinhardt[2]	1 900 000	1 900 000	4 336	3 804 336
Other Board members active on December 31, 2016	1 625 000	2 540 000	12 147	4 177 147
Other Board members who stepped down at the 2016 AGM	27 500	27 500	579	55 579
Total	**3 552 500**	**4 467 500**	**17 062**	**8 037 062**[3]

[1] Includes an amount of CHF 17 062 for mandatory employer contributions for all Board members paid by Novartis to Swiss governmental social security systems. This amount is out of total employer contributions of CHF 387 308, and provides a right to the maximum future insured government pension benefit for the Board member.
[2] The Chairman of the Board also received payment for the loss of other entitlements at his previous employer totaling EUR 2 665 051, staggered in three installments from 2014 to 2016. In January 2016, the Chairman of the Board received the third and final installment. No additional committee fees for chairing the Research & Development Committee were delivered to the Chairman of the Board.
[3] Please see page 139 for a reconciliation between the amount reported in this table and the amount approved by shareholders at the 2016 AGM to be used to compensate Board members for the period from the 2016 AGM to the 2017 AGM. The amount paid is within the maximum amount approved by shareholders.

2017 Board compensation system

The Board compensation system will remain unchanged in 2017.

Compensation governance

Governance and risk management (pages 141–142)

Decision on	Decision making authority
Compensation of Chairman and other Board members	Board of Directors
Compensation of CEO	Board of Directors
Compensation of other Executive Committee members	Compensation Committee

Executive Committee compensation risk management principles

- Rigorous performance management process
- Balanced mix of short-term and long-term variable compensation elements
- Matrix approach to performance evaluation under the Annual Incentive, including an individual Balanced Scorecard and assessed Values and Behaviors
- Performance-based Long-Term Incentives only, with three-year overlapping cycles
- All variable compensation is capped at 200% of target
- Contractual notice period of 12 months
- Post-contractual non-compete limited to a maximum of 12 months (annual base compensation and Annual Incentive of the prior year only)
- No severance payments or change-of-control clauses
- Clawback principles apply to all elements of variable compensation
- Share ownership requirements; no hedging or pledging of Novartis share ownership position

Executive Committee compensation philosophy and principles

Novartis compensation philosophy

Our compensation philosophy aims to ensure that the Executive Committee is rewarded according to its success in implementing the company strategy and to its contribution to company performance. The Executive Committee compensation system is designed in line with the following key elements:

Pay for performance	Variable compensation is tied directly to the achievement of strategic company targets.
Shareholder alignment	A significant part of our incentives are equity-based. Also, the LTRPP rewards on the basis of relative total shareholder return.
Balanced rewards to create sustainable value	Mix of targets are based on financial metrics, innovation, individual objectives, Values and Behaviors, and performance vs. competitors.
Business ethics	The Values and Behaviors are an integral part of our compensation system.
Competitive compensation	Compensation competitive to relevant benchmarks ensures we are able to attract and retain the most talented global Executive Committee members.

Alignment with company strategy

The Novartis strategy is to use science-based innovation to deliver better patient outcomes. We aim to lead in growing areas of healthcare focusing on innovative pharmaceuticals and oncology medicines, generics and biosimilars, and eye care. To align the compensation system with this strategy, and to ensure that Novartis is a high-performing organization over the long term, the Board of Directors determines specific, measurable and time-bound performance metrics for both the short-term Annual Incentive and the Long-Term Incentive plans. The targets include financial metrics such as sales, profit and cash flow, as well as non-financial metrics in areas such as quality, talent, integrity and reputation, which are reinforced by our Values and Behaviors. The CEO and the other Executive Committee members are compensated according to the extent to which the targets are achieved.

Executive Committee compensation benchmarking

To attract and retain key talent, it is important for us to offer competitive compensation opportunities.

The Compensation Committee reviews the competitiveness of the compensation of the CEO and Executive Committee members on a regular basis. For this purpose, the Compensation Committee uses benchmark data from publicly available sources, as well as reputable market data providers where appropriate. All data is reviewed and evaluated by the Compensation Committee's independent advisor, who also provides independent research and advice regarding the compensation of the CEO and the other Executive Committee members.

While benchmarking information regarding executive pay is considered by the Compensation Committee, any decisions on compensation are ultimately based on the specific business needs of Novartis and on the executive's experience, skill sets and performance.

Executives meeting their objectives are generally awarded target compensation in line with the market median benchmark for comparable roles within a peer group of global competitors in the healthcare industry. Our peer group is made up of companies that are similar in size to Novartis and that also have similar business models and needs for talent and skills. In the event of under- or over-performance by an executive, the actual compensation may be lower or higher than the benchmark median.

The Compensation Committee considers the global healthcare peer group the most relevant benchmark given the fierce competition within the pharmaceutical and biotechnology industries for top executive talent with deep expertise and competences. The composition of the peer group accurately reflects the competitive landscape of Novartis. Although Novartis is headquartered in Switzerland, more than a third of sales come from the US market and the US will remain a significant recruitment talent pool for the company (e.g., all current Executive Committee members have extensive experience with the US). In addition to providing a benchmark for compensation, the global healthcare peer group is used to evaluate relative total shareholder return (TSR) performance and ranking under the Long-Term Relative Performance Plan (LTRPP), as a reference point for pay and performance alignment as well as for compensation plan design and practices.

Global healthcare peer group for 2016[1]

Abbott	AbbVie	Amgen
AstraZeneca	Bristol-Myers Squibb	Eli Lilly & Co.
GlaxoSmithKline	Johnson & Johnson	Merck & Co.
Pfizer	Roche	Sanofi

[1] This global healthcare peer group is used as the basis for the TSR comparator group featured in the LTRPP for the performance periods 2014-2016, 2015-2017 and 2016-2018.

The Compensation Committee reviews the companies in our global healthcare peer group annually and considers adjustments over time in line with the evolution of the competitive environment in the healthcare industry.

Following the latest review, the Compensation Committee approved changes to the global healthcare peer group for 2017 onwards, which are reflected on page 136.

The Compensation Committee also uses a cross-industry peer group of European-headquartered multi national companies as an additional reference point to assess regional pay practices and trends. These companies were selected on the basis of comparability in size, scale, global scope of operations, and economic influences to Novartis. This European cross-industry peer group is comprised of five global companies focusing exclusively on healthcare – AstraZeneca, GlaxoSmithKline, Novo Nordisk, Roche and Sanofi – and 10 companies selected from the STOXX® All Europe 100 Index representing all sectors (excluding financial services, energy and utilities, apparel, media, and real estate investment trusts): Anheuser-Busch, Bayer, BMW, Daimler, Danone, Heineken, L'Oréal, Merck KgaA, Nestlé and Unilever.

Novartis comparison to peer group median

Against the global healthcare peer group, Novartis is among the largest in key dimensions including market capitalization, sales and operating income. The table below compares our market capitalization, sales and operating income to the median market capitalization, sales and operating income for our global healthcare peer group.

(USD billions)	Novartis	Median of global healthcare peer group for 2016[3]
Market capitalization[1]	172.0	103.0
Net sales[2]	48.5	30.8
Operating income[2]	8.3	7.0

[1] Market capitalization at December 31, 2016 is calculated based on the number of shares outstanding (excluding treasury shares).
[2] Continuing operations
[3] Data source: Bloomberg database; most recently disclosed (as of January 18, 2017) trailing 12-month net sales and operating income.

2016 Executive Committee compensation system

The 2016 Executive Committee compensation system consists of the following components:

Fixed compensation and benefits		Variable compensation		
Annual base compensation	Pension and other benefits	Annual Incentive	Long-Term Performance Plan (LTPP)	Long-Term Relative Performance Plan (LTRPP)

Fixed compensation and benefits

Annual base compensation

The level of annual base compensation reflects each associate's key responsibilities, job characteristics, experience and skill sets. It is paid in cash, typically monthly.

Annual base compensation is reviewed regularly, and any increase reflects merit based on performance, as well as market movements.

Pension and other benefits

The primary purpose of pension and insurance plans is to establish a level of security for associates and their dependents with respect to age, health, disability and death. The level and scope of pension and insurance benefits provided are country-specific, influenced by local market practices and regulations.

Company policy is to change from defined benefit pension plans to defined contribution pension plans. All major pension plans have now been aligned with this policy as far as reasonably practicable. Please also see Note 25 to the Group's audited consolidated financial statements (page 226).

Novartis may provide other benefits in a specific country – such as a company car, and tax and financial planning services – according to local market practices and regulations. Executive Committee members who have been transferred on an international assignment also receive benefits (such as tax equalization) in line with the company's international assignment policies.

Variable compensation

Annual Incentive

For the Annual Incentive of the CEO and other Executive Committee members, a target incentive is defined as a percentage of annual base compensation at the beginning of each performance year. The target incentive is 150% of annual base compensation for the CEO, and ranges from 90% to 120% for the other Executive Committee members. It is delivered half in cash and half in equity deferred for three years.

The formula for the target Annual Incentive is outlined below.

Annual Incentive formula

Annual base compensation	x	Target incentive %	=	**Target Annual Incentive value**

PERFORMANCE MEASURES

The Annual Incentive payout is based on a matrix made up of two elements: a balanced scorecard and our Values and Behaviors, which are described in more detail below.

BALANCED SCORECARD

The first element used to determine the payout of the Annual Incentive is a balanced scorecard within which Group, divisional or unit targets are weighted 60%, and individual objectives are weighted 40%. For more details on the target-setting and performance management process, please refer to pages 121–122.

GROUP, DIVISIONAL AND UNIT TARGETS

Within the Group, divisional and unit targets, each measure is weighted individually. The CEO and corporate function heads share the same Group financial targets (further described below). In place of the Group targets, division and business unit heads have targets that include divisional or business unit sales, operating income, free cash flow as a percentage of sales, and market share of peers. Organizational unit heads have financial and non-financial targets specific to their organization. The Board of Directors sets the Group, divisional and unit targets at the start of each performance year in constant currencies, where applicable, and evaluates achievement against these targets at the end of that year.

INDIVIDUAL OBJECTIVES

Individual objectives differ for each Executive Committee member depending on their responsibilities, and may include additional financial and non-financial targets. Examples of additional financial targets are implementation of growth, productivity and development initiatives. Non-financial targets may include leadership as well as people and talent management, workforce diversity, quality, social initiatives such as access to medicines, and ethical business practices.

By way of illustration, the balanced scorecard measures used for the CEO in 2016 are set out in the table below.

2016 balanced scorecard measures used for the CEO

Performance measures	Weight	Breakdown of performance measures
Group financial targets	60%	Group net sales Corporate net result Group net income Group free cash flow as % of sales
CEO individual objectives	40%	Additional financial targets (e.g., EPS) Innovation and growth Cross-divisional synergies High-performing organization
Overall total	**100%**	

OUR VALUES AND BEHAVIORS

The second element used to determine the payout of the Annual Incentive ensures that the performance of all Novartis associates, including Executive Committee members, is achieved in line with our Values and Behaviors. Associates are held accountable to demonstrate innovation, quality, collaboration, performance, courage and integrity. All Novartis associates are expected to live up to these on a daily basis, and to align and energize other associates to do the same. Detailed descriptors are used to assess performance against our Values and Behaviors.

PERFORMANCE EVALUATION AND PAYOUT DETERMINATION

Following a thorough review of the two elements that compose the Annual Incentive – performance against the balanced scorecard objectives and an assessment against our Values and Behaviors – a rating from 1 to 3 is assigned to each.

The following payout matrix shows how the Annual Incentive performance factor is derived using a combination of performance against the balanced scorecard and demonstration of our Values and Behaviors. The Board of Directors for the CEO, and the Compensation Committee for the other Executive Committee members, determine the final payout factor, taking into account the ranges shown. Payouts are capped at 200% of target.

2016 Annual Incentive payout matrix

			% Payout		
Performance vs. Balanced Scorecard	Exceeding expectations	3	60–90%	130–160%	170–200%
	Meeting expectations	2	0–70%	90–120%	130–160%
	Partially meeting expectations	1	0%	0–70%	60–90%
			1 Partially meeting expectations	**2** Meeting expectations	**3** Exceeding expectations
			Values and Behaviors assessment		

The payout matrix for the Annual Incentive equally recognizes performance against the objectives in the balanced scorecard and demonstration of our Values and Behaviors.

FORM AND DELIVERY OF THE AWARD

The Annual Incentive is paid 50% in cash in the first quarter of the year following the performance-period, and 50% in Novartis restricted shares or restricted share units (RSUs) that are deferred and vest after three years. Each restricted share is entitled to voting rights and payment of dividends during the vesting period. Each RSU is equivalent in value to one Novartis share but does not carry any dividend, dividend equivalent or voting rights. Following the vesting period, settlement of RSUs is made in unrestricted Novartis shares or American Depositary Receipts (ADRs).

If a participant leaves Novartis due to voluntary resignation or misconduct, unvested restricted shares and RSUs are forfeited. The Board of Directors and the Compensation Committee retain accountability for ensuring that the plan rules are applied correctly, and for determining whether a different treatment should apply in exceptional circumstances. This is necessary to ensure that the treatment of any award in the event of cessation of employment is appropriate.

Executives may choose to receive all or part of the cash portion of their Annual Incentive in Novartis shares or ADRs (US only) that will not be subject to forfeiture conditions. In the US, awards may also be delivered in cash under the US-deferred compensation plan.

Long-Term Incentive plans

Novartis operates two Long-Term Incentive plans (the Long-Term Performance Plan and the Long-Term Relative Performance Plan) for the Executive Committee members, which are granted under the same plan rules, differing only with respect to the performance conditions applied.

GRANT OF LONG-TERM INCENTIVE PLANS

At the beginning of every performance-period, Executive Committee members are granted a target number of performance share units (PSUs) under each of the Long-Term Incentive plans according to the following formula:

STEP 1	Annual base compensation	x	Target incentive %	=	**Grant value**
STEP 2	Grant value	/	Share price	=	**Target number of PSUs**

VESTING OF LONG-TERM INCENTIVE PLANS

At the end of the three-year performance-period, the Compensation Committee adjusts the number of PSUs realized based on actual performance.

Long-Term Incentive plans payout formula

Target number of PSUs	x	Performance factor	=	**Realized PSUs** + dividend equivalents

The performance factor can range from 0% to 200% of target. Each realized PSU is converted into one Novartis share at the vesting date. PSUs do not carry voting rights, but do accrue dividend equivalents that are reinvested in additional PSUs and delivered at vesting to the extent that performance conditions have been met. In the US, awards may also be delivered in cash under the US-deferred compensation plan.

If a participant leaves Novartis due to voluntary resignation or termination by the company for misconduct, none of the awards vest. When a member is terminated by the company for reasons other than performance or conduct, the award vests on a pro-rata basis for time spent with the company during the performance-period. In such a case, the award will vest on the regular vesting date (no acceleration), will be subject to performance should an evaluation be possible, and will also be subject to other conditions such as observing the conditions of a non-compete agreement. Executives leaving Novartis due to approved retirement, including approved early retirement, death or disability, will receive full vesting of their award on the normal vesting date (acceleration will only apply in the case of death). The award will be subject to performance, should an evaluation be possible, and will also be subject to other conditions such as observing the conditions of a non-compete agreement. Further details can be found in Note 26 to the Group's audited consolidated financial statements (page 229).

The Board of Directors and the Compensation Committee retain accountability for ensuring that the plan rules are applied correctly, and for determining whether different treatment should apply in exceptional circumstances. This is necessary to ensure that the treatment of any award in the event of cessation of employment is appropriate.

LONG-TERM PERFORMANCE PLAN (LTPP)

This is the first of the two Long-Term Incentive plans.

OVERVIEW

The LTPP, as described below, was granted for the first time to the CEO and other Executive Committee members in 2014, and the first payout under this plan for performance-period 2014–2016 is disclosed on page 127. The LTPP target incentive is 200% of annual base compensation for the CEO, and ranges from 140% to 190% for the other Executive Committee members.

PERFORMANCE MEASURES

Awards under the LTPP are based on three-year performance objectives and split as follows:

	75% financial	25% innovation
Measure	Novartis Cash Value Added	Up to 10 key innovation milestones
CEO, corporate function and certain organizational unit heads	100% Group	Weighted average of divisional/unit performance
Commercial division and unit heads, and head of research unit		100% divisional/unit performance

FINANCIAL MEASURE (NOVARTIS CASH VALUE ADDED): 75% OF LTPP

The Novartis Cash Value Added (NCVA) is a metric that incentivizes sales growth and margin improvement as well as asset efficiency. A summary of the calculation is below.

Calculation formula for NCVA

in constant currencies

Operating income

+ Amortization, impairments and adjusting for gains/losses from non-operating financial assets

– Taxes

– Capital charge (based on WACC[1]) on gross operational assets

= NCVA[2]

[1] WACC = weighted average cost of capital
[2] NCVA = (cash flow return on investment % – WACC[1]) x gross operational assets

The NCVA targets are determined considering expected growth rates in sales, operating income, and return from invested capital (under foreseen economic circumstances).

At the end of the performance-period, the NCVA performance factor is calculated using results in constant currencies. The NCVA performance factor is based on a 1:3 payout curve, where a 1% deviation in realization versus target leads to a 3% change in payout (for example, a realization of 105% leads to a payout factor of 115%). Accordingly, if performance over the three-year vesting period falls below 67% of target, no payout is made for this portion of the LTPP. If performance over the three-year vesting period is above 133% of target, payout for this portion of the LTPP is capped at 200% of target.

The calculated performance realization is adjusted for unplanned major events during the performance-period (e.g., significant merger and acquisition transactions).

INNOVATION MEASURE: 25% OF LTPP

Innovation is a key element of the Novartis strategy. Divisional and unit innovation targets are set at the beginning of the performance-period, comprised of up to 10 target milestones that represent the most important research and development project milestones for each division and unit. These milestones are chosen because of the expected future impact to Novartis in terms of potential revenue, or due to their qualitative potential impact to science, medicine, and the treatment or care of patients.

A payout matrix has been established for this metric that allows a 0–150% payout for the achievement of target milestones. A 150–200% payout may be awarded for extraordinary additional achievement. The CEO and corporate function heads receive the weighted average of divisional and unit innovation payouts.

The Research & Development Committee assists the Board of Directors and the Compensation Committee in setting the innovation targets and reviewing achievements at the end of the performance-period.

LONG-TERM RELATIVE PERFORMANCE PLAN (LTRPP)
This is the second of the two Long-Term Incentive plans.

OVERVIEW
The LTRPP was granted for the first time to the CEO and other Executive Committee members in 2014, and the first payout under this plan for performance-period 2014–2016 is disclosed on page 128. As of 2016, the target incentive is 125% of annual base compensation for the CEO (a 25 percentage-point increase from 2015), and ranges from 30% to 80% for the other Executive Committee members.

PERFORMANCE MEASURE
The LTRPP is based on the achievement of long-term relative TSR versus the global healthcare peer group over rolling three-year performance-periods. TSR is calculated in USD as share price growth plus dividends over the three-year performance-period. The calculation is based on Bloomberg standard published TSR data, which is publicly available.

The peer group for the 2016–2018 performance-period is the same as for benchmarking the compensation of the CEO and other Executive Committee members and is comprised of: Abbott, AbbVie, Amgen, AstraZeneca, Bristol-Myers Squibb, Eli Lilly & Co., GlaxoSmithKline, Johnson & Johnson, Merck & Co., Pfizer, Roche and Sanofi.

At the end of the performance-period, all companies are ranked in order of highest to lowest TSR, and the position in the peer group determines the payout range as follows:

LTRPP payout matrix

Position in peer group	Payout range
Positions 1–3	160–200%
Positions 4–6	100–140%
Positions 7–10	20–80%
Positions 11–13	0%

The Compensation Committee uses its discretion to determine the payout factor within the ranges shown, and takes into consideration factors such as absolute TSR, overall economic conditions, currency fluctuations and other unforeseeable situations. The Compensation Committee believes that the LTRPP payout matrix is aligned with the company's pay-for-performance principle, including a very significant reduction in the actual payout relative to target payout if the company's TSR is below the median of the peer group. The LTRPP payout matrix is aligned with practices at the companies in our global healthcare peer group.

Target disclosure
To allow shareholders to assess the link between company performance and compensation, Novartis is committed to disclosing in the Compensation Report the targets of our compensation programs at the end of each performance-period – including judgment used in assessing actual performance versus targets. In line with this principle, the targets and achievements of the CEO for the 2016 Annual Incentive, the LTPP and the LTRPP for the performance-period 2014–2016 can be found on pages 124–126.

This approach is proposed to our shareholders given that disclosing our short- and long-term targets under our compensation programs before the end of the relevant performance-period would give substantial insight into the company's confidential, forward-looking strategies, and could therefore place the company and its shareholders at a competitive disadvantage.

Executive Committee performance management process

To foster a high-performance culture, the company applies a uniform performance management process worldwide based on quantitative and qualitative criteria, including our Values and Behaviors. Novartis associates, including the CEO and other Executive Committee members, are subject to a formal three-step process.

CEO objective setting

This section describes the objective-setting process to determine the stretch targets of our Annual Incentive plan and the LTPP. No objective setting is required for the LTRPP.

INDIVIDUAL TARGETS OF THE CEO ANNUAL INCENTIVE

The CEO discusses his individual objectives for the coming year directly with the Chairman of the Board of Directors prior to the start of the performance-period. The Chairman reviews the CEO's individual objectives before they are discussed and approved by the Board of Directors. The agreed individual objectives are also part of the CEO's balanced scorecard and laid out as Novartis priorities for the coming year.

GROUP FINANCIAL TARGETS OF THE CEO ANNUAL INCENTIVE AND LTPP

The Board of Directors and the Compensation Committee use a rigorous process to establish Group financial targets for the Annual Incentive and the LTPP. The objective-setting process for Group financial targets begins with bottom-up input from our commercial and organizational divisions and units by country and brands. The bottom-up input process takes into account both internal and external market and regulatory factors, such as new product launches, patent expiries, pricing pressures, changes in the healthcare environment, investments in capital expenditure, and resource allocation decisions. The Group financial targets support our ambition to be a leader in the healthcare industry without encouraging unnecessary or excessive risk taking, while being fully in line with Group compliance, conduct and accounting standards.

The financial targets are reviewed and challenged at the country, regional and Group levels as well as by the Executive Committee before they are proposed in December – prior to the start of the performance-period – to the Board of Directors.

The Board of Directors reviews and assesses the proposed financial targets in detail to ensure that they are set at levels that are sufficiently and appropriately challenging. This review takes into account a variety of relevant information including internal business plans, external market consensus, strategic choices to be made by the company, and industry expectations for the companies of our global healthcare peer group. Following this thorough review by the Board of Directors, the final objectives are approved early in the year and incorporated into the CEO Annual Incentive balanced scorecard and the LTPP.

INNOVATION TARGETS OF LTPP

Each year, the divisions and units evaluate their long-term strategic plans to develop recommendations for innovation targets that are focused on challenging milestones of critical importance to the long-term success of the business, and that should be the best- or first-in-class development projects that can significantly advance treatment outcomes for patients worldwide. These targets are presented by the Global Head of Drug Development and Chief Medical Officer for Novartis as well as the President of the Novartis Institutes for BioMedical Research (NIBR) at a joint meeting of the Research & Development Committee and the Compensation Committee. Both Committees review, discuss and challenge the targets before they are finalized and approved by the Board of Directors. The innovation targets of the LTPP are largely aligned with the major development projects outlined in the pipeline schedule of the Annual Report (see page 52).

CEO performance evaluation

The Board of Directors periodically assesses Group business performance, as well as the CEO's progress against his objectives and incentive plan targets. At the mid-year performance review, the performance of the CEO is reviewed by the Chairman of the Board of Directors.

For the year-end review, the CEO prepares and presents to the Chairman of the Board of Directors, and later to the full Board of Directors, the actual results against the previously agreed-upon objectives, taking into account the financial results as well as an assessment against our Values and Behaviors. At the year-end review, the Board of Directors discusses the performance of the CEO without him being present. The Board of Directors evaluates the degree to which the set objectives have been achieved and – to the extent possible – compares these results with peer industry companies, taking into account general economic and financial criteria as well as industry developments. The Board of Directors later shares its assessment with the CEO.

CEO compensation determination

As part of the review of CEO compensation, the Compensation Committee considers a competitive analysis of CEO target compensation prepared by its independent advisor and, based on competitive factors as well as individual and company performance, determines any recommendations for changes to target compensation for the coming year.

At its January meeting, following a recommendation from the Compensation Committee, the Board of Directors approves the CEO's variable compensation for the prior performance-periods and the target compensation for the coming year. This meeting takes place without the CEO being present. The Board of Directors later shares its decisions with the CEO.

Performance management process for the other Executive Committee members (excluding the CEO)

The other Executive Committee members propose the financial and non-financial targets for their division or unit for review, challenge and approval by the CEO and, subsequently (as previously described), by the Board of Directors and Compensation Committee. In addition, each Executive Committee member agrees on individual objectives with the CEO, who also reviews each member's performance at mid-year and year-end.

Following the year-end evaluation, the CEO meets with the Chairman of the Board of Directors, who reviews the performance of each Executive Committee member. Subsequently, the CEO presents and discusses at the Board of Directors meeting the recommended performance rating for each Executive Committee member.

Shortly after year-end, the CEO proposes a payout for the Annual Incentive for each Executive Committee member based on the performance ratings and corresponding to the payout matrix. The Compensation Committee discusses each member's performance with the CEO and approves the Annual Incentive payouts for the prior year as well as any changes to target compensation for the coming year. The Compensation Committee informs the Board of Directors of its final decisions, and the CEO later shares these decisions with each Executive Committee member.

Assessment of Values and Behaviors at Novartis

Values and Behaviors have been an integral part of the company's compensation system since its foundation. In 2015, to reinforce the culture of the company, Novartis rolled out six new Values and Behaviors – which are innovation, quality, collaboration, performance, courage and integrity.

What we value	Observed behaviors
Innovation	
Experiment and deliver solutions	— Experiment and encourage others to do so — Take smart risks that benefit patients and customers — Deliver new solutions with speed and simplicity
Quality	
Take pride in doing ordinary things extra-ordinarily well	— Look for better ways to do things — Do not compromise on quality and safety; strive for excellence — Always work on your strengths and weaknesses
Collaboration	
Champion high-performing teams with diversity and inclusion	— Champion working together in high-performing teams — Know yourself and your impact on others — Welcome diversity and inclusion of styles, ideas and perspectives
Performance	
Prioritize and make things happen with urgency	— Show passion to achieve goals; go the extra mile — Put team results before your own success; acknowledge the contributions of others — Prioritize, make decisions, and make things happen with urgency
Courage	
Speak up, and give and receive feedback	— Speak up and challenge the norm — Acknowledge when things do not work; learn — Give and accept constructive feedback
Integrity	
Advocate and apply high ethical standards every day	— Operate with high ethical standards — Be humble and caring, and show trust, respect and empathy to others — Live by the Code of Conduct even when facing resistance or difficulties

These values are embedded in all aspects of employees' lives at Novartis, including recruitment, development and promotions; performance assessments through 360-degree evaluations and organizational employee surveys; and Annual Incentive awards; to measure individual and organizational performance against our values. As part of the Annual Incentive award process, training programs and toolkits were established to evaluate behavior related to the six new values. They are one of the elements used to assess associates' performance.

In 2015 and again in 2016, we further improved the framework for measuring individual performance against our values, ensuring that fair, objective assessments can be made in a uniform way across all levels of the organization. The assessment is part of a rigorous management process review in which observed Values and Behaviors are evaluated based on globally-defined principles. The assessment initially takes place during a discussion between associates and line managers, followed by a calibration and validation at multiple levels of the organization to allow for a fair, consistent, objective and transparent evaluation. During the calibration sessions, line managers share the proposed ratings of their direct reports with management peers to ensure all apply a common framework, and they seek input and feedback on observed behaviors.

The Values and Behaviors assessments for the CEO and other Executive Committee members are made and calibrated by the Board of Directors.

2016 CEO compensation

This section provides information on the CEO target compensation followed by the 2016 CEO realized compensation on a voluntary basis.

1. 2016 CEO target compensation

Following a competitive analysis of the CEO's compensation and an evaluation of the CEO's performance in 2015, the Compensation Committee approved an increase in the CEO's target compensation effective for 2016. The target compensation is the amount that the CEO is eligible to receive if there is 100% achievement of all short-term and long-term targets for the respective performance-periods, excluding any dividend equivalents and share price movement.

Among other things, the Compensation Committee considered that the CEO's target compensation had not been increased in three years and that his compensation was falling further below the median level of our global healthcare peer group. In recognition of this, the Compensation Committee approved:

— An increase in annual base compensation from CHF 2 060 500 to CHF 2 100 000 with effect from March 1, 2016
— A 25 percentage-point increase in CEO LTRPP target from 100% to 125% of annual base compensation as from the 2016–2018 performance-period to increase the competitiveness of the CEO's target total compensation versus peers through the incentive vehicle most aligned to shareholders' interests

In 2016, at target value, the CEO's compensation included Annual Incentive at 150%, LTPP at 200% and LTRPP at 125% of annual base compensation. The payout range for all of these plans can vary between 0%–200% of the target. Therefore the total target compensation for the CEO is CHF 12 075 000 and can range from a minimum of CHF 2 100 000 to a maximum of CHF 22 050 000 (excluding pension and other benefits, any share price movements and any accrued dividend equivalents), based on the extent to which financial and strategic objectives for payout of short-term Annual Incentive and Long-Term Incentive plans are achieved. As a result, the 2016 CEO's compensation at target was comprised of 19% fixed compensation (i.e. annual base compensation, pension and other benefits), 26% Annual Incentive, and 55% Long-Term Incentives.

2. 2016 CEO realized compensation

This section provides a detailed summary and breakdown by component of the total realized compensation of the CEO in relation to the performance-periods ended December 31, 2016. This includes, for the first time, reporting of CEO realized total compensation in a single table.

To give context to the 2016 CEO realized compensation, within this section, we include details of the CEO's achievements against his balanced scorecard targets along with the achievements under the LTPP (NCVA and Group Innovation) and LTRPP for the performance-period 2014–2016.

Reporting compensation at realized value in this way provides enhanced transparency to shareholders of the CEO's compensation. We also consider that this approach is an important method of demonstrating the alignment between the Compensation Committee's decisions on CEO pay for performance and shareholders' interests.

2016 CEO realized total compensation breakdown

The Compensation Committee believes it is critical to assess performance against a mix of targets (both short-term and long-term) for compensation-related purposes to reflect the full operational performance of the organization and to ensure that results are delivered with high integrity and long-term financial sustainability. The Compensation Committee uses its judgment when determining final compensation outcomes and any discretionary adjustments, positive or negative.

The CEO's 2016 realized total compensation was CHF 10 556 685. This amount is comprised of 2016 annual base compensation, pension and other benefits, Annual Incentive and, for the 2014–2016 performance-period, the vesting of his LTPP and LTRPP awards including accrued dividend equivalents.

A detailed breakdown by component of the 2016 CEO realized compensation is set out below.

ANNUAL BASE COMPENSATION

The CEO annual base compensation paid in 2016 was CHF 2 093 417 (representing a 1.6% increase from 2015).

PENSION AND OTHER BENEFITS

The CEO received pension benefits of CHF 160 283 and other benefits of CHF 75 628 during 2016.

ANNUAL INCENTIVE

Given the 2016 CEO balanced scorecard and assessed Values and Behaviors, the Annual Incentive award was CHF 2 835 010.

Following the performance evaluation of the CEO by the Board of Directors, the Compensation Committee thoroughly reviewed the assessment against the previously agreed objectives as set out in the 2016 CEO balanced scorecard (see following page).

In reaching its recommendation to the Board of Directors on the CEO's 2016 Annual Incentive payout factor of 90% (which was subsequently approved by the Board of Directors), the Compensation Committee recognized that overall he met expectations, was successful in achieving significant milestones in innovation, and that Novartis met its free cash flow target while it was slightly below its sales target in a year of absorbing *Gleevec* US LOE. Group net income was below target mainly due to Alcon performance.

Among the major achievements in 2016 were *Cosentyx* reaching blockbuster status, *Gilenya* delivering double digit growth, Sandoz biopharmaceuticals reaching USD 1 billion of sales, and *Entresto* receiving positive treatment guidelines in the US and Europe.

2016 CEO BALANCED SCORECARD

The Annual Incentive performance is measured in constant currencies to reflect the operational performance that can be influenced.

	Performance metrics for continuing operations (weight)	Target[1]	Achievement vs. target (in constant currencies)
Group financial targets (60%)	Group net sales (30%)	USD 49 540 m	Slightly below
	Corporate net result[2] (20%)	USD –1 675 m	Slightly above
	Group net income (30%)	USD 7 203 m	Below
	Group free cash flow as % of sales (20%)	18.8%	At target
	Achievement of Group financial targets		**Slightly below**
Individual objectives (40%)	**Additional financial targets for continuing operations** In constant currencies, core operating income and EPS were below target. Core EPS was slightly below. Divisional share of peers (Innovative Medicines and Sandoz) were ahead of target while Alcon was behind.		Below
	Innovation and growth The company continued to strengthen its pipeline, with the NIBR unit producing 13 new Proof of Concepts (above target). In total, Novartis secured 14 approvals in Innovative Medicines, as well as 15 major submissions. Progress was made with the biosimilars pipeline at Sandoz, with the FDA approval of Etanercept and filing of Rituximab with the EMA. LEE011 (ribociclib) achieved FDA breakthrough therapy designation. Growth Products contributed USD 17.1 billion or 35% of net sales, up 20% (USD) over the prior year. *Cosentyx* was ahead of target, and reached blockbuster status. *Entresto* continued to grow steadily following positive treatment guidelines in the US and Europe.		Exceeded
	Cross-divisional synergies In January 2016, Novartis announced plans to further focus its divisions to better leverage our development and marketing capabilities. Novartis Business Services (NBS) continued to leverage the global scale of Novartis to streamline and consolidate operations. Novartis Technical Operations completed the organizational integration including a more efficient utilization of functional capabilities and resources. Novartis completed the creation of its new Global Drug Development (GDD) organization to further streamline drug development. A total of 38 000 associates realigned to new business organizations with effect from July 1, 2016 with minimal business disruption. All these actions will increase the productivity of the company and provide a solid foundation for the future growth and profitability of Novartis.		At target
	High-performing organization (e.g., quality, talent) Novartis continues to proactively drive compliance, reliable product quality and sustainable efficiency as part of the quality strategy. Compliance issues which were uncovered and remediated mainly related to legacy failures. A total of 206 global health authority inspections were completed in 2016, 26 of which were conducted by the FDA. All but 4 out of 206 inspections were deemed good or acceptable. Corrective and preventative actions to address all observations have been defined and are being implemented. In 2016, Novartis combined several innovative Access programs into a single portfolio under unified leadership. The Group was successful in filing approximately three quarters of its Novartis Top Leader roles (the company's 360 most senior executives) internally. Women in management increased to 42% and Novartis continues to be recognized in the market for its efforts in diversity and inclusion. Our Values and Behaviors continued to progress in employee pulse surveys and have been embedded in all aspects of associates' lives at Novartis and significant progress has been made in embedding a culture of integrity in a sustainable way.		At target
	Achievement of individual objectives		**At target**

[1] The target was set using July 2015 forward currency exchange rates.
[2] Includes corporate cost, income from associated companies, net financial income and income taxes.

As a result of the CEO's achievements as described above, a payout factor of 90% was approved for the CEO and the value of his 2016 Annual Incentive award was determined as follows:

	Annual base compensation[1] CHF thousands	x	Target incentive % of annual base compensation	x	Performance factor % of target	=	**Final award CHF thousands**
2016 Annual Incentive	2 100	x	150%	x	90%	=	**2 835**[2]

[1] As per plan rules, the Annual Incentive is calculated based on the annual base compensation effective March 1, 2016
[2] 50% of the Annual Incentive is paid in cash and the other 50% as 19 867 RSUs, which have a three-year vesting period.

OUTCOME OF THE LTPP PERFORMANCE-PERIOD 2014–2016

The LTPP payout for the CEO for performance-period 2014–2016 is CHF 4 950 334, including CHF 485 037 of dividend equivalents. The LTPP payout factor for the CEO was 112% based on the outcome of the performance objectives below.

Measure	Weight	Targets and achievements
Novartis Cash Value Added (NCVA)	75%	Over the three-year performance period, 2014 to 2016, Novartis performed 4.4% ahead of the USD 10.1 billion NCVA target in constant currencies. This was mainly due to over achievements in the beginning of the performance-period driven by stronger than anticipated performance of *Gleevec* and the successful launch of *Cosentyx*. NCVA was negatively impacted by Alcon underperformance at the end of the cycle. Overall this corresponded to a payout of 113% following the application of the 1:3 payout curve. In arriving at the NCVA performance score, the Compensation Committee excluded, as a major item, the favorable impact from lower cost of capital.
Group Innovation	25%	Novartis delivered strong innovation performance over the period 2014–2016 despite usual attrition rates inherent to pharmaceutical drug development. The majority of innovation targets were achieved by our divisions and units many of which will have a significant positive impact for both the company and patient outcomes. The company successfully achieved major innovation milestones, including *Entresto* (approved in the US and the EU), *Cosentyx* (approved for AS and PsA in EU and in the US) and submissions of biosimilar etanercept and pegfilgrastim. *Zarxio* (filgrastim) was the first biosimilar approved in the US under the BPCIA pathway. Based on the evaluation performed by the R&D Committee, the Board of Directors approved, in line with a recommendation from the Compensation Committee, a payout factor for group innovation of 107% applicable to the CEO. This corresponds to the weighted average of divisional and unit innovation payouts.

OUTCOME OF THE LTRPP PERFORMANCE-PERIOD 2014–2016

The LTRPP payout for the CEO for performance-period 2014–2016 is CHF 442 013, including CHF 43 309 of dividend equivalents. The LTRPP payout factor applicable to the CEO was 20% based on Novartis TSR rank position, in USD, being 10th in the comparator group of 13 healthcare companies (Novartis and 12 other companies).

In USD our TSR was flat for the three-year period 2014–2016 while in CHF TSR was up +15%. In reaching its decision on the payout factor, the Compensation Committee exercised its discretion within the boundaries of the LTRPP payout matrix (see page 120) and decided that the minimum of the payout range should apply.

2016 CEO realized total compensation table

The following table is newly introduced to aid shareholders' understanding of 2016 realized total compensation of the CEO. It reports, the aggregate fixed and variable compensation in the year, including the LTPP and the LTRPP payouts for performance-period 2014–2016 following their respective completed performance assessments.

Equity relating to the 2016 Annual Incentive is disclosed using the underlying value of Novartis shares on the date of grant, while the realized value for the LTPP and LTRPP payouts (including dividend equivalents) is calculated using the share price on the date of vest. In both cases the applicable date is January 17, 2017 and the share price was CHF 71.35 per Novartis share.

		2016 base compensation	2016 pension benefits	2016 Annual Incentive		Realized LTPP 2014–2016 period	Realized LTRPP 2014–2016 period	Other 2016 compensation	Total realized compensation
	Currency	Cash (amount)	Amount[1]	Cash (amount)	Equity (value at grant date)[2]	Shares (value at vesting date)[3]	Shares (value at vesting date)[3]	Amount[4]	Amount[5]
Joseph Jimenez (CEO)	CHF	2 093 417	160 283	1 417 500	1 417 510	4 950 334	442 013	75 628	10 556 685

[1] Includes service costs of pension and post-retirement healthcare benefits accumulated in 2016, in accordance with IAS19. It also includes an amount of CHF 4 336 for mandatory employer contributions for the CEO paid by Novartis to Swiss governmental social security systems. This amount is out of total employer contributions of CHF 1 144 673, and provides a right to the maximum future insured government pension benefit.

[2] The portion of the Annual Incentive delivered in RSUs is rounded up to the nearest share.

[3] For the performance-period 2014-2016, the accrued dividend equivalent amounts were CHF 485 037 and CHF 43 309 respectively for the LTPP and the LTRPP.

[4] Includes any other perquisites and benefits in kind.

[5] All amounts are before deduction of the employee's social security contribution and income tax due by the CEO.

2015 CEO realized compensation

It should be noted that a direct year over year comparison to the 2016 realized compensation is not possible given the changes made in 2014 to our Long-Term Incentive plans from the Old LTPP (OLTPP) to the LTPP and LTRPP, and the fact that OLTPP awards did not accrue dividend equivalents.

However, using the 2016 methodology for reporting realized compensation, the CEO's 2015 realized total compensation is calculated as CHF 10 911 330 (with no dividend equivalents accrued, per the OLTPP rules), including CHF 5 496 351 OLTPP payout for the performance-period 2013–2015.

CEO and other Executive Committee members' 2014–2016 Long-Term Incentive plans vesting

Overview

In this section, the tables reconcile the target values at grant date with the total value of shares delivered to the CEO and other Executive Committee members (including dividend equivalents) following the vesting of the first performance-period 2014–2016 for the LTPP and the LTRPP respectively. Details of the LTPP and the LTRPP can be found on pages 118–120.

We recognize the importance to our shareholders of being able to easily reconcile the payout of our Long-Term Incentive plans against the original amounts granted. It allows an assessment of pay for performance decisions by the Compensation Committee.

The Long-Term Incentive plans' payout outcomes for the other Executive Compensation members is determined using an approach closely aligned to the methodology used for the CEO described on page 126. For the LTPP, the NCVA measure applies to the other Executive Committee members as it does for the CEO. However, the innovation measure is specific to the performance of the respective division or unit. To determine the LTRPP payout, the same principles apply as for the CEO.

Payout schedule for the LTPP performance-period 2014–2016[1]

	PSUs at grant			Shares delivered at vesting				
	PSUs (target number)	PSUs (target value at grant date) (CHF)[2]	Payout factor for LTPP (% of target)	Performance shares delivered at vesting (number)	Performance shares delivered at vesting (value at vesting date) (CHF)[3]	Dividend equivalent shares delivered at vesting (number)[4]	Dividend equivalent shares delivered at vesting (value at vesting date) (CHF)	Total shares delivered at vesting (value at vesting date) (CHF)
Joseph Jimenez (CEO)	55 878	4 121 003	112%	62 583	4 465 297	6 798	485 037	4 950 334
Other 7 members of the Executive Committee who were active members on December 31, 2016[5]	75 962	5 602 506	107%–114%	84 539	6 030 352	9 080	647 739	6 678 091
Subtotal	**131 840**	**9 723 509**		**147 122**	**10 495 649**	**15 878**	**1 132 776**	**11 628 425**
Other 3 members of the Executive Committee members who stepped down during 2016	72 699	5 366 905	106%–115%	81 651	5 799 375	9 150	649 864	6 449 239
Total	**204 539**	**15 090 414**		**228 773**	**16 295 024**	**25 028**	**1 782 640**	**18 077 664**

[1] For those who joined the Executive Committee in the course of the performance-period 2014-2016, the information disclosed reflects the pro-rata LTPP 2014-2016 payout attributable to the period they were a member of the Executive Committee. Includes 3 039 target PSUs granted to Vasant Narasimhan under the OLTPP for the performance-period 2014-2016. The payout factor for the OLTPP 2014-2016 is 113% of target.

[2] The shown amounts represent the underlying share value of the target number of PSUs granted to each Executive Committee member for the performance-period 2014-2016 based on the closing share price on the grant date (January 22, 2014) of CHF 73.75 per Novartis share and USD 80.79 per ADR.

[3] The shown amounts represent the underlying share value of the target number of PSUs vested for the performance-period 2014-2016 based on the closing share price on the vesting date (January 17, 2017) of CHF 71.35 per Novartis share and USD 71.99 per ADR.

[4] Dividend equivalent shares are calculated on the dividend each member of the Executive Committee would have received based on the actual number of shares delivered at the end of the performance-period 2014-2016. At vesting, the dividend equivalents are credited in shares or ADRs.

[5] Excludes F. Michael Ball, James Bradner and Paul Hudson, who joined the Executive Committee in 2016 and have not participated in the LTPP for the performance-period 2014-2016

For the CEO and other Executive Committee members, including those who stepped down during the year, the combined impact of the performance factor and share price movements over the performance-period to determine the value of performance shares delivered at vesting, compared to the target value at grant date, was CHF 1.2 million excluding dividend equivalents. Of that amount, the impact of the share price movement over the performance-period was CHF –583 548.

Payout schedule for the LTRPP performance-period 2014–2016[1]

	PSUs at grant			Shares delivered at vesting				
	PSUs (target number)	PSUs (target value at grant date) (CHF)[2]	Payout factor for LTRPP (% of target)	Performance shares delivered at vesting (number)	Performance shares delivered at vesting (value at vesting date) (CHF)[3]	Dividend equivalent shares delivered at vesting (number)[4]	Dividend equivalent shares delivered at vesting (value at vesting date) (CHF)	Total shares delivered at vesting (value at vesting date) (CHF)
Joseph Jimenez (CEO)	27 939	2 060 501	20%	5 588	398 704	607	43 309	442 013
Other 6 members of the Executive Committee who were active members on December 31, 2016[5]	20 043	1 478 226	20%	4 008	285 926	435	31 033	316 959
Subtotal	**47 982**	**3 538 727**		**9 596**	**684 630**	**1 042**	**74 342**	**758 972**
Other 3 members of the Executive Committee members who stepped down during 2016	30 042	2 218 214	20%	6 008	426 414	677	48 048	474 462
Total	**78 024**	**5 756 941**		**15 604**	**1 111 044**	**1 719**	**122 390**	**1 233 434**

[1] For those who joined the Executive Committee in the course of the performance-period 2014-2016, the information disclosed reflects the pro-rata LTRPP 2014-2016 payout attributable to the period they were a member of the Executive Committee.

[2] The shown amounts represent the underlying share value of the target number of PSUs granted to each Executive Committee member for the performance-period 2014-2016 based on the closing share price on the grant date (January 22, 2014) of CHF 73.75 per Novartis share and USD 80.79 per ADR.

[3] The shown amounts represent the underlying share value of the target number of PSUs vested for the performance-period 2014-2016 based on the closing share price on the vesting date (January 17, 2017) of CHF 71.35 per Novartis share and USD 71.99 per ADR.

[4] Dividend equivalent shares are calculated on the dividend each member of the Executive Committee would have received based on the actual number of shares delivered at the end of the performance-period 2014-2016. At vesting, the dividend equivalents are credited in shares or ADRs.

[5] Excludes F. Michael Ball, James Bradner, Paul Hudson and Vasant Narasimhan, who joined the Executive Committee in 2016 and have not participated in the LTRPP for the performance-period 2014-2016

For the CEO and other Executive Committee members, including those who stepped down during the year, the combined impact of the performance factor and share price movements over the performance-period to determine the value of performance shares delivered at vesting, compared to the target value at grant date, was CHF –4.6 million excluding dividend equivalents. Of that amount, the impact of the share price movement over the performance-period was CHF –40 285.

CEO and other Executive Committee members' compensation at grant value

In accordance with the Ordinance against Excessive Compensation in Listed Companies in Switzerland we continue to disclose, in this section, total compensation at grant value for the CEO and other Executive Committee members.

In 2016, Novartis implemented organizational changes to pursue its growth and innovation strategy with the following appointments to the Executive Committee:

— Effective February 1, 2016, F. Michael Ball was appointed CEO of Alcon following the departure of Jeff George. In line with the company's priorities for 2016, Mr. Ball received a one-off performance-based Long-Term Incentive award linked to Alcon-specific growth targets over a three-year period to further incentivize him to return the division to growth, accelerate innovation and sales, strengthen customer relationships, and improve basic operations.
— Also effective February 1, 2016, Dr. Vasant Narasimhan was appointed Global Head of Drug Development and Chief Medical Officer to lead our drive to improve resource allocation and standards in drug development across divisions and business units.
— On March 1, 2016, as previously announced in the 2015 Compensation Report, Dr. James Bradner became President of NIBR when Dr. Mark Fishman retired. Prior to joining Novartis, Dr. Bradner was on the faculty of Harvard Medical School in the Department of Medical Oncology at the Dana-Farber Cancer Institute in the US. Dr. Bradner also advised and served on the boards of several scientific companies he founded, and served on the supervisory board of another company. As previously disclosed, in reaching the terms of the offer for Dr. Bradner, the Board of Directors recognized the need to make up compensation that he forfeited by joining Novartis.
— On July 1, 2016, Novartis created two separate business units, Novartis Pharmaceuticals and Novartis Oncology, which together form the Innovative Medicines Division. As part of this reorganization, Bruno Strigini was appointed CEO of Novartis Oncology, and Paul Hudson was appointed CEO of Novartis Pharmaceuticals. Prior to joining Novartis, Mr. Hudson served as an executive at another company. In reaching the terms of the offer for Mr. Hudson, the Board of Directors recognized the need to make up compensation that he forfeited by joining Novartis. With these changes, David Epstein, former Division Head of Novartis Pharmaceuticals, stepped down from the Executive Committee on June 30, 2016. In accordance with the terms of his retirement agreement as well as his employment contract, Mr. Epstein will leave the company in July 2017 after the expiry of his contractual 12-month notice period.

The tables below disclose for the CEO and the other Executive Compensation members the fixed compensation (e.g., base compensation and pension benefits), variable compensation (e.g., the cash portion of the 2016 Annual Incentive and the granted share based compensation of the 2016 Annual Incentive, and the LTPP and LTRPP for the performance-period 2016–2018), plus other compensation. Other 2016 compensation includes the full amount of compensation for lost entitlements from former employers either paid in cash or granted in equity in the year.

PSUs awarded under the Long-Term Incentive plans are reported at target value on the respective grant dates (i.e. assuming the PSUs will vest at 100% achievement and excluding any dividend equivalents that may be accrued during the performance-period). The actual payout outcomes for the PSUs will be assessed after the relevant performance-periods complete, with a payout range of 0–200% of the target value.

CEO and other Executive Committee members' compensation at grant value for financial year 2016

		Fixed compensation and pension benefits		Variable compensation					
		Actual compensation paid or granted for 2016				Long-Term Incentive 2016 grants at target			
		2016 base compensation	2016 pension benefits	2016 Annual Incentive		LTPP 2016–2018 period	LTRPP 2016–2018 period	Other 2016 compensation	Total compensation
	Currency	Cash (amount)	Amount[1]	Cash (amount)	Equity (value at grant date)[2]	PSUs (target value at grant date)[3]	PSUs (target value at grant date)[3]	Amount[4]	Amount[5]
Executive Committee members active on December 31, 2016[6]									
Joseph Jimenez (CEO)	CHF	2 093 417	160 283	1 417 500	1 417 510	4 200 031	2 625 079	75 628	11 989 448
Steven Baert	CHF	721 667	147 442	554 730	554 746	1 050 048	350 042	139 159	3 517 834
F. Michael Ball (from February 1, 2016)[7]	USD	1 012 308	60 574	553 574	553 603	1 742 284	762 269	4 040 748	8 725 360
James Bradner (from March 1, 2016)[8]	USD	888 462	58 859	579 393	579 448	1 687 473	794 195	1 155 169	5 742 999
Felix R. Ehrat	CHF	915 833	148 122	202 400	809 680	1 564 033	552 002	14 852	4 206 922
Richard Francis	CHF	786 667	188 738	520 000	520 070	1 280 062	480 033	1 116 054	4 891 624
Paul Hudson (from July 1, 2016)[9]	CHF	475 000	108 818	288 945	288 968	0	0	3 090 313	4 252 044
Harry Kirsch	CHF	1 025 000	141 510	736 450	736 475	1 751 009	824 018	51 361	5 265 823
Vasant Narasimhan (from February 1, 2016)	CHF	764 993	157 348	537 531	537 551	1 093 245	364 468	102 868	3 558 004
Bruno Strigini (from July 1, 2016)	CHF	445 000	109 057	211 863	211 910	1 074 442	268 670	45 696	2 366 638
André Wyss	CHF	830 834	146 289	0	1 275 025	1 360 001	425 040	95 595	4 132 784
Subtotal[10]	**CHF**	**9 931 091**	**1 425 275**	**5 585 643**	**7 468 241**	**16 751 942**	**7 422 814**	**9 850 656**	**58 435 662**
Executive Committee members who stepped down during 2016[11]									
David Epstein (until June 30, 2016)[12]	USD	699 767	290 385	428 400	428 412	1 285 264	642 632	4 529 809	8 304 669
Mark C. Fishman (until February 29, 2016)[13]	USD	175 154	107 706	195 000	0	0	0	126 454	604 314
Jeff George (until January 31, 2016)[14]	USD	80 000	18 558	44 000	43 986	0	0	2 996 905	3 183 449
Subtotal[10]	**CHF**	**940 809**	**410 492**	**657 537**	**465 417**	**1 266 270**	**633 135**	**7 540 067**	**11 913 726**
Total[10]	**CHF**	**10 871 900**	**1 835 767**	**6 243 180**	**7 933 658**	**18 018 212**	**8 055 949**	**17 390 723**	**70 349 389**

See page 131 for 2015 compensation figures

[1] Includes service costs of pension and post-retirement healthcare benefits accumulated in 2016, in accordance with IAS19. It also includes an amount of CHF 75 216 for mandatory employer contributions for all Executive Committee members paid by Novartis to governmental social security systems. This amount is out of total employer contributions of CHF 3 263 989, and provides a right to the maximum future insured government pension benefit for the Executive Committee member.

[2] The portion of the Annual Incentive delivered in equity is rounded up to the nearest share based on the closing share price on the grant date (January 17, 2017) of CHF 71.35 per Novartis share and USD 71.99 per ADR.

[3] The shown amounts represent the underlying share value of the target number of PSUs granted to Executive Committee members for the performance-period 2016-2018 based on the closing share price on the grant date (January 20, 2016) of CHF 79.70 per Novartis share and USD 80.49 per ADR. For F. Michael Ball, who joined Novartis on February 1, 2016, the target PSUs were granted on February 1, 2016, at the closing share price of the same date (USD 77.27 per ADR).

[4] Includes any other perquisites, benefits in kind, and international assignment benefits as per the global mobility policy (e.g., housing, international health insurance, children's school fees, tax equalization). Tax equalization benefits included for David Epstein, Richard Francis and Jeff George are USD 478 904, CHF 862 101 and USD 961 519, respectively.

[5] All amounts are before deduction of the social security contribution and income tax due by the Executive Committee member.

[6] For those members who joined the Executive Committee in 2016, the information under the columns "Base compensation," "Pension benefits" and "Annual Incentive" includes their pro-rata compensation from the date they joined the Executive Committee to December 31, 2016. The information under "LTPP" and "LTRPP" reflects their pro-rata compensation at target for the period to December 31, 2018.

[7] F. Michael Ball received 50 000 target PSUs, mainly subject to the achievement of Alcon's sales and core operating income growth targets, as well as successful launches of new products and solving critical supply issues. The total target value at grant date was USD 3.9 million. The 50 000 target PSUs are subject to performance conditions assessed annually in three tranches of 16 667, 16 667 and 16 666 for the calendar years 2016, 2017 and 2018, respectively. The PSUs vest on February 1, 2019, provided the relevant performance conditions are met and he remains employed with Novartis on that date. Subject to the extent to which the performance conditions are fulfilled, between 0% and 200% of the target PSUs may vest. The full value of the target PSUs is included under the column "Other 2016 compensation."

[8] James Bradner received 3 607 RSUs for lost entitlements in connection with his former supervisory board mandate, with a total value at grant date of USD 309 300. The vesting of the RSUs will be staggered based on the original vesting period of the lost entitlements, in January 2018 and January 2020, provided that he remains employed with Novartis on the respective vesting dates. In addition, Dr. Bradner received as compensation for lost entitlements at one of his former scientific companies a cash payment of USD 844 250. Both awards, made in 2016, are included in full under the column "Other 2016 compensation" and were previously disclosed in the 2015 Annual Report.

[9] Paul Hudson received a cash payment of CHF 191 300 in July 2016. In addition, he received 2 992 RSUs and 31 510 target PSUs, with total target value at grant date of CHF 2.8 million. These amounts are for lost entitlements at his former employer. The vesting of the RSUs will be staggered based on the original vesting period of the lost entitlements, between March 2017 and March 2019. The vesting of the target PSUs will be subject to the achievement of performance conditions under the Novartis LTPP, and staggered based on the original vesting period of the lost entitlements, between March 2017 and December 2023. Both awards will vest provided he remains employed with Novartis on the respective vesting dates. The full value of the cash payment and the awards is included under the column "Other 2016 compensation."

[10] Amounts in USD for Mr. Ball, Dr. Bradner, Mr. Epstein, Mark C. Fishman and Mr. George were converted at a rate of CHF 1.00 = USD 1.015, which is the same average exchange rate used in the Group's 2016 consolidated financial statements.

[11] For those members who left the Executive Committee in 2016, the information under the columns "Base compensation," "Pension benefits," "Annual Incentive," "LTPP" and "LTRPP" reflects the pro-rata compensation during 2016 for the period they were an Executive Committee member. The information under the column "Other 2016 compensation" includes, inter alia, their pro-rata compensation from the date they stepped down from the Executive Committee to December 31, 2016.

[12] Mr. Epstein stepped down from the Executive Committee on June 30, 2016. In accordance with the contractual notice period of his employment agreement, he will leave the company in July 2017. Until the end of the notice period, he will receive further contractual compensation that includes the base salary, pension and other benefits, and the vesting of his incentive awards under the approved early retirement conditions of the Novartis plan rules.

[13] Dr. Fishman stepped down from the Executive Committee on February 29, 2016 and retired from Novartis. Until the retirement date, he received further contractual compensation that included base salary, pension and other benefits, and the vesting of his incentive awards in accordance with the terms of the Novartis plan rules. As of March 1, 2016, Dr. Fishman provided certain consulting services to Novartis for which he is compensated for a period of up to two years until February 28, 2018. The fees for these services are capped at USD 250 000 p.a. and are in line with those for other scientists who provide consultancy services to the NIBR organization. In 2016, no payments were made in relation to such services.

[14] Mr. George stepped down from the Executive Committee on January 31, 2016. In accordance with the contractual notice period of his employment agreement, he will leave the company in January 2017. Until the end of the notice period, he will receive further contractual compensation that includes the base salary, pension and other benefits, and the vesting of his incentive awards in accordance with the terms of the Novartis plan rules. Mr. George was not granted LTPP and LTRPP awards for the performance-period 2016-2018. In accordance with the applicable plan rules, the LTPP and LTRPP awards for the performance-period 2015-2017 will be eligible to vest on the normal vesting date pro-rata based on the number of months of Novartis employment during the performance-period. The vesting of these awards is subject to performance conditions assessed at the end of the period.

CEO and other Executive Committee members' compensation at grant value for financial year 2015[1] (comparative information)

		Fixed compensation and pension benefits		Variable compensation					
		Actual compensation paid or granted for 2015				Long-Term Incentive 2015 grants at target			
		2015 base compensation	2015 pension benefits	2015 Annual Incentive		LTPP 2015–2017 period	LTRPP 2015–2017 period	Other 2015 compensation	Total compensation
	Currency	Cash (amount)	Amount[2]	Cash (amount)	Equity (value at grant date)[3]	PSUs (target value at grant date)[4]	PSUs (target value at grant date)[4]	Amount[5]	Amount[6]
Executive Committee members active on December 31, 2015									
Joseph Jimenez (CEO)	CHF	2 060 500	175 289	1 545 375	1 545 383	4 121 054	2 060 527	88 432	11 596 560
Steven Baert	CHF	653 333	158 099	543 900	543 953	960 048	256 030	94 716	3 210 079
Felix R. Ehrat	CHF	892 500	153 054	648 875	648 917	1 521 517	447 565	12 669	4 325 097
David Epstein	USD	1 400 000	362 819	1 428 000	1 428 054	2 520 001	1 260 050	569 737	8 968 661
Mark C. Fishman[7]	USD	990 000	248 910	861 300	861 323	1 881 089	891 021	129 825	5 863 468
Richard Francis	CHF	716 667	193 635	599 400	599 424	1 080 054	360 018	954 170	4 503 368
Jeff George	USD	956 539	200 946	158 400	158 404	1 536 056	576 009	1 260 286	4 846 640
Harry Kirsch	CHF	950 000	160 431	757 625	757 628	1 480 074	647 575	51 476	4 804 809
André Wyss	CHF	735 000	127 237	0	1 176 053	1 102 513	294 083	83 688	3 518 574
Subtotal[8]	**CHF**	**9 225 826**	**1 749 163**	**6 448 733**	**7 624 994**	**15 974 055**	**6 687 990**	**3 169 620**	**50 880 381**
Executive Committee members who stepped down during 2015									
Brian McNamara (until March 1, 2015)[9]	USD	131 154	69 008	115 100	0	58 361	11 751	40 670	426 044
Andrin Oswald (until March 1, 2015)[9]	CHF	138 333	27 634	136 500	0	64 580	13 899	283 236	664 182
Subtotal[8]	**CHF**	**264 443**	**93 988**	**247 173**	**0**	**120 696**	**25 198**	**322 342**	**1 073 840**
Total[8]	**CHF**	**9 490 269**	**1 843 151**	**6 695 906**	**7 624 994**	**16 094 751**	**6 713 188**	**3 491 962**	**51 954 221**

As published in the 2015 Compensation Report, with the exception of the tabular format

[1] Does not include reimbursement for travel and other necessary business expenses incurred by Executive Committee members in the performance of their services, as these amounts are not considered compensation

[2] Includes service costs of pension and post-retirement healthcare benefits accumulated in 2015, in accordance with IAS19. It also includes an amount of CHF 58 757 for mandatory employer contributions paid by Novartis to governmental social security systems. This amount is out of total employer contributions of CHF 3 457 097, and provides a right to the maximum future insured government pension benefit for the Executive Committee member.

[3] The portion of the Annual Incentive delivered in shares is rounded up to the nearest share based on the closing share price on the grant date (January 20, 2016). The closing share price on this date was CHF 79.70 per Novartis share and USD 80.49 per ADR.

[4] The shown amounts in these columns represent the underlying share value of the target number of PSUs granted to each Executive Committee member for the performance cycle 2015-2017 based on the closing share price on the grant date (January 21, 2015). The closing share price on this date was CHF 84.75 per Novartis share and USD 98.75 per ADR.

[5] Includes any other perquisites, benefits in kind and international assignment benefits as per global mobility policy (e.g., housing, international health insurance, children's school fees, tax equalization). Tax equalization benefits included for David Epstein, Richard Francis, Jeff George and Andrin Oswald are USD 305 867, CHF 739 086, USD 1 153 361 and CHF 249 728, respectively.

[6] All amounts are before deduction of social security contribution and income tax due by the Executive Committee member.

[7] Mark C. Fishman, President of NIBR and Executive Committee member, will step down from the Executive Committee on February 29, 2016 and retire from Novartis. He will receive further contractual compensation that includes the base salary, pension and other benefits (pro-rata until February 29, 2016) and the vesting of his incentive awards in accordance with the terms of the Novartis plan rules. As of March 1, 2016, Dr. Fishman will provide certain consulting services to Novartis for which he will be compensated for a period of up to two years until February 28, 2018. The fees for these services are capped at USD 250 000 p.a. and are in line with those paid to other scientists who provide consultancy services to the NIBR organization.

[8] Amounts in USD for Mr. Epstein, Dr. Fishman, Mr. George and Mr. McNamara were converted at a rate of CHF 1.00 = USD 1.040, which is the same average exchange rate used in the Group's 2015 consolidated financial statements.

[9] Brian McNamara (Division Head of Novartis OTC) and Andrin Oswald (Division Head of Novartis Vaccines) transitioned to the GlaxoSmithKline (GSK) group on March 2, 2015 following the completion of the Novartis OTC and Vaccines transactions with GSK. The information disclosed under columns "LTPP" and "LTRPP" in the table above reflects their pro-rata compensation at target. Following their transition to GSK, and in accordance with the applicable plan rules, the LTPP and LTRPP awards for the performance-period 2015-2017 (as well as for those granted for the performance-period 2014-2016) will be eligible to vest on the normal vesting date and on a pro-rata basis based on the number of months worked with Novartis during the performance-period. The vesting of these awards is subject to performance conditions assessed at the end of the performance-period.

Number of equity instruments awarded at grant value to the CEO and other Executive Committee members for financial year 2016[1]

The table below provides the number of equity instruments awarded to the CEO and other Executive Committee members for financial year 2016, and the awards for 2015 are on the next page for comparison purposes.

	Variable compensation			
	2016 Annual Incentive	LTPP 2016–2018 period	LTRPP 2016–2018 period	Other
	Equity (number)[2]	PSUs (target number)[3]	PSUs (target number)[3]	Equity/PSUs (number)
Executive Committee members active on December 31, 2016				
Joseph Jimenez (CEO)	19 867	52 698	32 937	0
Steven Baert	7 775	13 175	4 392	0
F. Michael Ball (from February 1, 2016)	7 690	22 548	9 865	50 000
James Bradner (from March 1, 2016)	8 049	20 965	9 867	3 607
Felix R. Ehrat	11 348	19 624	6 926	0
Richard Francis	7 289	16 061	6 023	0
Paul Hudson (from July 1, 2016)[4]	4 050	0	0	34 502
Harry Kirsch	10 322	21 970	10 339	0
Vasant Narasimhan (from February 1, 2016)	7 534	13 717	4 573	0
Bruno Strigini (from July 1, 2016)	2 970	13 549	3 388	0
André Wyss	17 870	17 064	5 333	0
Subtotal	**104 764**	**211 371**	**93 643**	**88 109**
Executive Committee members who stepped down during 2016				
David Epstein (until June 30, 2016)	5 951	15 968	7 984	29 902
Mark C. Fishman (until February 29, 2016)[4]	0	0	0	0
Jeff George (until January 31, 2016)[4]	611	0	0	6 724
Subtotal	**6 562**	**15 968**	**7 984**	36 626
Total	**111 326**	**227 339**	**101 627**	**124 735**

See next page for 2015 compensation figures

[1] The values of the awards are reported in the table "CEO and other Executive Committee member's compensation at grant value for financial year 2016" on page 130.

[2] Vested shares, restricted shares and/or RSUs granted under the Annual Incentive for performance-period 2016

[3] Target number of PSUs granted under the LTPP and LTRPP as applicable for the performance-period 2016-2018

[4] Paul Hudson, Mark C. Fishman and Jeff George were not granted LTPP and LTRPP awards for the performance-period 2016-2018.

Number of equity instruments awarded at grant value to the CEO and other Executive Committee members for financial year 2015[1] (comparative information)

	Variable compensation		
	2015 Annual Incentive	LTPP 2015–2017 period	LTRPP 2015–2017 period
	Equity (number)[2]	PSUs (target number)[3]	PSUs (target number)[3]
Executive Committee members active on December 31, 2015			
Joseph Jimenez (CEO)	19 390	48 626	24 313
Steven Baert	6 825	11 328	3 021
Felix R. Ehrat	8 142	17 953	5 281
David Epstein	17 742	25 519	12 760
Mark C. Fishman	10 701	19 049	9 023
Richard Francis	7 521	12 744	4 248
Jeff George	1 968	15 555	5 833
Harry Kirsch	9 506	17 464	7 641
André Wyss	14 756	13 009	3 470
Subtotal	**96 551**	**181 247**	**75 590**
Executive Committee members who stepped down during 2015			
Brian McNamara (until March 1, 2015)[4]	0	591	119
Andrin Oswald (until March 1, 2015)[4]	0	762	164
Subtotal	0	1 353	283
Total	**96 551**	**182 600**	**75 873**

As published in the 2015 Compensation Report, with the exception of the tabular format

[1] The values of the awards included in this table are reported in the table "CEO and other Executive Committee members' compensation at grant value for financial year 2015."

[2] Vested shares, restricted shares and/or RSUs granted under the Annual Incentive for performance-period 2015

[3] Target number of PSUs granted under the LTPP and LTRPP as applicable for the performance-period 2015-2017

[4] Target number of PSUs granted under the LTPP and LTRPP is reported on a pro-rata basis. See footnote 9 of the table "CEO and other Executive Committee members' compensation at grant value for financial year 2015."

CEO and other Executive Committee members' base compensation and variable compensation mix for financial year 2016[1]

	Base compensation	Variable compensation[2]
Joseph Jimenez (CEO)	17.8%	82.2%
Steven Baert	22.3%	77.7%
F. Michael Ball	21.9%	78.1%
James Bradner	19.6%	80.4%
Felix R. Ehrat	22.6%	77.4%
Richard Francis	21.9%	78.1%
Paul Hudson	45.1%	54.9%
Harry Kirsch	20.2%	79.8%
Vasant Narasimhan	23.2%	76.8%
Bruno Strigini	20.1%	79.9%
André Wyss	21.4%	78.6%
Total	**21.1%**	**78.9%**

[1] Excludes pension and other benefits. Also excludes David Epstein, Mark C. Fishman and Jeff George, who stepped down from the Executive Committee during 2016

[2] See the table "CEO and other Executive Committee members' compensation at grant value for financial year 2016" on page 130 with regard to the disclosure principles of variable compensation.

Additional information

This part provides additional disclosures, including information about the shareholdings of the CEO and the other Executive Committee members, collectively referred to in this section as Executive Committee members.

Share ownership requirements for Executive Committee members

Executive Committee members are required to own at least a minimum multiple of their annual base compensation in Novartis shares, RSUs or share options within five years of hire or promotion, as set out in the table below.

In the event of a substantial rise or drop in the share price, the Board of Directors may, at its discretion, amend that time period accordingly.

Function	Ownership level
CEO	5 x base compensation
Other Executive Committee members	3 x base compensation

The determination of equity amounts against the share ownership requirements is defined to include vested and unvested Novartis shares or ADRs, as well as RSUs acquired under our compensation plans. However, unvested matching shares granted under the Leveraged Share Savings Plan (LSSP), the Employee Share Ownership Plan (ESOP), and any unvested PSUs are excluded. The determination also includes other shares as well as vested options of Novartis shares or ADRs that are owned directly or indirectly by "persons closely linked" to an Executive Committee member. The Compensation Committee reviews compliance with the share ownership guideline on an annual basis.

As at December 31, 2016, all members who have served at least five years on the Executive Committee have met or exceeded their personal Novartis share ownership requirements.

Shares, ADRs, equity rights and share options owned by Executive Committee members

The following table shows the total number of shares, ADRs, and other equity rights owned by Executive Committee members and "persons closely linked" to them as at December 31, 2016.

As at December 31, 2016, no members of the Executive Committee together with "persons closely linked" to them owned 1% or more of the outstanding shares (or ADRs) of Novartis. As at the same date, no members of the Executive Committee held any share options to purchase Novartis shares, with the exception of André Wyss who held 373 000.

Shares, ADRs and other equity rights owned by Executive Committee members[1]

	Vested shares and ADRs	Unvested shares and other equity rights[2]	**Total at December 31, 2016**
Joseph Jimenez (CEO)	347 278	273 930	621 208
Steven Baert	11 111	50 827	61 938
F. Michael Ball	0	49 081	49 081
James Bradner	0	14 479	14 479
Felix R. Ehrat	137 290	122 196	259 486
Richard Francis	22 424	49 550	71 974
Paul Hudson	0	24 027	24 027
Harry Kirsch	47 437	108 686	156 123
Vas Narasimhan	7 271	79 703	86 974
Bruno Strigini	4 310	92 383	96 693
André Wyss	61 475	92 875	154 350
Total[3]	**638 596**	**957 737**	**1 596 333**

[1] Includes holdings of "persons closely linked" to Executive Committee members (see definition on page 135)

[2] Includes restricted shares, RSUs and target number of PSUs. Matching shares under the ESOP and LSSP, and target number of PSUs are disclosed pro-rata to December 31, unless the award qualified for full vesting under the relevant plan rules. Awards under all other incentive plans are disclosed in full.

[3] David Epstein, Mark C. Fishman and Jeff George stepped down from the Executive Committee in 2016. At the time they stepped down from the Executive Committee, Mr. Epstein owned 116 027 vested shares, and 250 225 unvested shares and other equity rights; Dr. Fishman owned 117 792 vested shares, and 83 311 unvested shares and other equity rights; and Mr. George owned 144 368 vested shares, 141 396 vested share options, and 74 189 unvested shares and other equity rights.

Other payments to Executive Committee members

During 2016, no other payments or waivers of claims other than those set out in the tables (including their footnotes) contained in this Compensation Report were made to Executive Committee members or to "persons closely linked" to them.

Payments to former Executive Committee members

Under the former Executive Committee members' contracts and in line with the company's Long-Term Incentive plan rules, payments were made to five former members of the Executive Committee totaling CHF 5 243 670. The payments related to the vesting of Long-Term Incentives for the 2014–2016 performance-period based on actual performance outcomes plus any dividend equivalents. In addition, in line with the company's policies, a total amount of CHF 87 780 was paid by the company for tax, financial services and tax equalization provided to two former Executive Committee members. With the exception of the above amounts, during 2016, no other payments (or waivers of claims) were made to former Executive Committee members or to "persons closely linked" to them.

Loans to Executive Committee members

No loans were granted to current or former Executive Committee members or to "persons closely linked" to them in 2016. In addition, no such loans were outstanding as of December 31, 2016.

Persons closely linked

"Persons closely linked" are (i) their spouse, (ii) their children below age 18, (iii) any legal entities that they own or otherwise control, and (iv) any legal or natural person who is acting as their fiduciary.

Note 27 to the Group's audited consolidated financial statements

The total expense for the year for the compensation awarded to Executive Committee and Board members using International Financial Reporting Standards (IFRS) measurement rules is presented in the Financial Report in Note 27 on page 233 to the Group's audited consolidated financial statements.

Award and delivery of equity to Novartis associates

During 2016, 13.1 million unvested restricted shares (or ADRs), RSUs and target PSUs were granted, and 10.4 million Novartis vested shares (or ADRs) were delivered to Novartis associates under various equity-based participation plans. Current unvested equity instruments (restricted shares, RSUs and target PSUs) – as well as outstanding equity options held by associates – represent 2.2% of issued shares. Novartis delivers treasury shares to associates to fulfill these obligations, and aims to offset the dilutive impact from its equity-based participation plans.

2017 Executive Committee compensation system

The Compensation Committee has evaluated the Executive Committee compensation system and has decided that it will remain largely unchanged in 2017, with the exception of the revised LTRPP payout matrix to reflect the new global healthcare peer group effective from performance-periods starting in 2017, as described below. The Compensation Committee believes that the compensation system is operating as intended, supports the company's strategy, and is aligned with market and best practices.

Global healthcare peer group for 2017

With effect from performance-periods starting in 2017, our global healthcare peer group will consist of 15 global pharmaceutical and biotechnology companies, factoring the following changes:

— Removed Abbott Laboratories, as this company's core business is primarily in medical devices and nutrition
— Added Celgene, Biogen, Gilead and Novo Nordisk, reflecting the evolution of the healthcare industry and the emergence of large and global biotechnology companies with which we directly compete for executive talent

Global healthcare peer group for 2017		
AbbVie	Amgen	AstraZeneca
Biogen	Bristol-Myers Squibb	Celgene
Eli Lilly & Co.	Gilead Sciences	GlaxoSmithKline
Johnson & Johnson	Merck & Co.	Novo Nordisk
Pfizer	Roche	Sanofi

In accordance with the above global healthcare peer group, a new LTRPP payout matrix for performance-periods 2017–2019 has been developed, which can be found below.

LTRPP payout matrix for performance-period 2017–2019

Position in peer group	Payout range
Positions 1–4	160–200%
Positions 5–8	100–150%
Positions 9–12	20–80%
Positions 13–16	0%

2016 Board compensation system

Board compensation philosophy and benchmarking

The Board of Directors sets compensation for its members at a level that allows for the attraction and retention of high-caliber individuals with global experience, including a mix of Swiss and international members. Board members do not receive variable compensation, underscoring their focus on corporate strategy, supervision and governance.

The Board of Directors sets the level of compensation for its Chairman and the other members to be in line with relevant benchmark companies, which include other large Swiss-headquartered multinational companies: ABB, Credit Suisse, LafargeHolcim, Nestlé, Roche, Syngenta and UBS. This peer group has been chosen for Board compensation due to the comparability of Swiss legal requirements, including broad personal and individual liabilities under Swiss law (and new criminal liability under the Swiss rules regarding compensation of Board and Executive Committee members related to the Ordinance against Excessive Compensation in Listed Companies), and under US law (due to the company's secondary listing on the New York Stock Exchange).

The Board of Directors reviews the compensation of its members, including the Chairman, each year based on a proposal by the Compensation Committee and on advice from its independent advisor, including relevant benchmarking information.

Compensation of the Chairman of the Board of Directors

As Chairman, Dr. Joerg Reinhardt receives total annual compensation valued at CHF 3.8 million. The total compensation is comprised equally of cash and shares, as follows:

— Cash compensation: CHF 1.9 million per year
— Share compensation: annual value equal to CHF 1.9 million of unrestricted Novartis shares

Dr. Reinhardt also received compensation for lost entitlements at his former employer, with a total value of EUR 2.6 million, as reported in previous Compensation Reports. Payments were staggered based on the vesting period at his former employer during the period 2014–2016, provided that he remained in office as Chairman at the respective due dates. On January 31, 2016, he received the final installment of EUR 1 045 800 in cash.

For 2016, the Chairman voluntarily waived the increase in compensation to which he is contractually entitled, which is an amount not lower than the average annual compensation increase awarded to associates based in Switzerland (1% for 2016). For the year 2017, the Chairman will also voluntarily waive this increase.

Compensation of the other Board members

The annual fee rates for Board membership and additional functions are included in the table below. These were approved by the Board of Directors with effect from the 2014 AGM, and align our aggregate Board compensation with the current levels of other large Swiss companies.

2016 Board member annual fee rates

	Annual fee (CHF)
Chairman of the Board	3 800 000
Board membership	300 000
Vice Chairman	50 000
Chairman of the Audit and Compliance Committee	120 000
Chairman of the following committees: — Compensation Committee — Governance, Nomination and Corporate Responsibilities Committee — Research & Development Committee — Risk Committee	60 000
Membership of the Audit and Compliance Committee	60 000
Membership of the following committees: — Compensation Committee — Governance, Nomination and Corporate Responsibilities Committee — Research & Development Committee — Risk Committee	30 000

In addition, the following policies apply regarding Board compensation:

— 50% of compensation is delivered in cash, paid on a quarterly basis in arrears. Board members may choose to receive more of their compensation in shares instead of cash.
— At least 50% of compensation is delivered in shares in two installments: one six months after the AGM and one 12 months after the AGM.
— Board members bear the full cost of their employee social security contributions, if any, and do not receive share options or pension benefits.

The Board compensation system will remain unchanged in 2017.

2016 Board compensation

Board member compensation tables

The following tables disclose the 2016 Board member compensation and prior-year comparative information. Board compensation is reported as the amount earned in the financial year.

Board member compensation earned for financial year 2016

	Board membership	Vice Chairman	Audit and Compliance Committee	Compensation Committee	Governance, Nomination and Corporate Responsibilities Committee	Research & Development Committee	Risk Committee	Shares (number)[1]	Cash (CHF) (A)	Shares (CHF) (B)	Other (CHF) (C)[2]	Total (CHF) (A)+(B)+(C)[3]
Board members active on December 31, 2016												
Joerg Reinhardt[4]	Chair					Chair		25 020	1 900 000	1 900 000	4 336	3 804 336
Enrico Vanni	•	•	•	Chair	•[5]	•[6]		3 291	250 000	250 000	4 336	504 336
Nancy Andrews	•					•	•[5]	2 265	177 500	177 500	–	355 000
Dimitri Azar	•		•			•		2 567	195 000	195 000	–	390 000
Ton Buechner (from February 24, 2016)	•							1 864	–	250 000	–	250 000
Srikant Datar	•		Chair	•			•	3 159	240 000	240 000	–	480 000
Elizabeth Doherty (from February 24, 2016)	•		•					1 118	150 000	150 000	–	300 000
Ann Fudge	•			•	•		•	2 567	195 000	195 000	–	390 000
Pierre Landolt[7]	•				•[8]			4 553	–	335 000	3 475	338 475
Andreas von Planta	•		•		Chair[5]		Chair	3 055	237 500	237 500	4 336	479 336
Charles L. Sawyers	•				•	•		2 369	180 000	180 000	–	360 000
William T. Winters	•			•				4 344	–	330 000	–	330 000
Subtotal								**56 172**	**3 525 000**	**4 440 000**	**16 483**	**7 981 483**
Board members who stepped down at the 2016 AGM												
Verena A. Briner (until February 23, 2016)	•						•	1 147	27 500	27 500	579	55 579
Subtotal								**1 147**	**27 500**	**27 500**	**579**	**55 579**
Total								**57 319**	**3 552 500**	**4 467 500**	**17 062**	**8 037 062**

See next page for 2015 compensation figures

[1] The shown amounts represent the gross number of shares delivered to each Board member in 2016 for the respective Board member's service period. The number of shares reported in this column represent: (i) the second and final equity installment delivered in February 2016 for the services from the 2015 AGM to the 2016 AGM, and (ii) the first of two equity installments delivered in August 2016 for the services from the 2016 AGM to the 2017 AGM. The second and final equity installment for the services from the 2016 AGM to the 2017 AGM will take place in February 2017.

[2] Includes an amount of CHF 17 062 for mandatory employer contributions for all Board members paid by Novartis to Swiss governmental social security systems. This amount is out of total employer contributions of CHF 387 308, and provides a right to the maximum future insured government pension benefit for the Board member.

[3] All amounts are before deduction of the social security contribution and income tax due by the Board member.

[4] Does not include EUR 1 045 800 paid to Joerg Reinhardt on January 31, 2016 for lost entitlements at his former employer. This amount is the third and final of three installments totaling EUR 2 665 051, which compensates him for lost entitlements at his former employer. The lost entitlements of EUR 2 665 051 were included in full on page 124 of the 2014 Compensation Report. No additional committee fees for chairing the Research & Development Committee were delivered to Dr. Reinhardt.

[5] From February 24, 2016

[6] Until February 23, 2016

[7] According to Pierre Landolt, the Sandoz Family Foundation is the economic beneficiary of the compensation.

[8] Until February 23, 2016, Chair of the Governance, Nomination and Corporate Responsibilities Committee

Board member compensation earned for financial year 2015[1] (comparative information)

	Board membership	Vice Chairman	Audit and Compliance Committee	Compensation Committee	Governance, Nomination and Corporate Responsibilities Committee	Research & Development Committee	Risk Committee	Shares (number)[2]	Cash (CHF) (A)	Shares (CHF) (B)	Other (CHF) (C)[3]	Total (CHF) (A)+(B)+(C)[4]
Board members active on December 31, 2015												
Joerg Reinhardt[5]	Chair					Chair		19 397	1 900 000	1 900 000	29 197	3 829 197
Enrico Vanni	•	•	•	Chair		•		2 552	250 000	250 000	4 357	504 357
Nancy Andrews (from February 27, 2015)	•					•		812	137 500	137 500	–	275 000
Dimitri Azar	•		•			•		2 712	172 250	217 750	–	390 000
Verena A. Briner	•						•	1 684	165 000	165 000	4 357	334 357
Srikant Datar	•		Chair	•			•	2 450	240 000	240 000	–	480 000
Ann Fudge	•			•	•		•	1 990	195 000	195 000	–	390 000
Pierre Landolt[6]	•				Chair			3 674	–	360 000	3 492	363 492
Andreas von Planta	•		•		•		Chair	2 296	225 000	225 000	4 357	454 357
Charles L. Sawyers	•				•[7]	•		1 757	177 500	177 500	–	355 000
William T. Winters	•			•[7]				3 210	–	325 000	–	325 000
Subtotal								**42 534**	**3 462 250**	**4 192 750**	**45 760**	**7 700 760**
Board members who stepped down at the 2015 AGM												
Ulrich Lehner (until February 26, 2015)	•	•	•	•	•			1 242	39 167	39 167	582	78 916
Subtotal								**1 242**	**39 167**	**39 167**	**582**	**78 916**
Total								**43 776**	**3 501 417**	**4 231 917**	**46 342**	**7 779 676**

As published in the 2015 Compensation Report, with the exception of the tabular format

[1] Does not include reimbursement for travel and other necessary business expenses incurred by Board members in the performance of their services, as these are not considered compensation

[2] The shown amounts represent the gross number of shares delivered to each Board member in 2015 for the respective Board member's service period. The number of shares reported in this column represent: (i) the second and final equity installment delivered in February 2015 for the services from the 2014 AGM to the 2015 AGM, and (ii) the first of two equity installments delivered in August 2015 for the services from the 2015 AGM to the 2016 AGM. The second and final equity installment for the services from the 2015 AGM to the 2016 AGM will take place in February 2016.

[3] Includes an amount of CHF 21 502 for mandatory employer contributions paid by Novartis to Swiss governmental social security systems. This amount is out of total employer contributions of CHF 429 806, and provides a right to the maximum future insured government pension benefit for the Board member.

[4] All amounts are before the deduction of the social security contribution and income tax due by the Board member.

[5] Does not include EUR 871 251 paid to Joerg Reinhardt on January 31, 2015 for lost entitlements at his former employer. This amount is the second of three installments totaling EUR 2 665 051, which compensates him for lost entitlements at his previous employer that were due to him on joining Novartis. The third and last installment of EUR 1 045 800 will be delivered on January 31, 2016, provided that he remains in office as our Chairman at the due dates. The lost entitlements of EUR 2 665 051 were included in full in the 2013 Board compensation table on page 124 of the 2014 Compensation Report based on our disclosure policy to report compensation for lost entitlements in full in the year the member of the Board or Executive Committee joined Novartis.

[6] According to Pierre Landolt, the Sandoz Family Foundation is the economic beneficiary of the compensation.

[7] From February 27, 2015

Reconciliation between the reported Board compensation and the amount approved by shareholders at the AGM

(CHF)	Compensation earned for the respective financial year (A)[1]	Compensation earned for the period from January 1 to the AGM (2 months) of the financial year (B)	Compensation to be earned for the period from January 1 to the AGM (2 months) in the year following the financial year (C)	Total compensation earned from AGM to AGM (A)-(B)+(C)	Amount approved by shareholders at the respective AGM	Amount within the amount approved by shareholders at the respective AGM
	2016	**January 1, 2016 to 2016 AGM**	**January 1, 2017 to 2017 AGM[2]**	**2016 AGM to 2017 AGM**	**2016 AGM**	**2016 AGM**
Joerg Reinhardt	3 804 336	633 334	633 334	3 804 336	3 805 000	Yes
Other Board members	4 232 726	653 334	713 334	4 292 726	4 355 000	Yes
Total	**8 037 062**	**1 286 668**	**1 346 668**	**8 097 062**	**8 160 000**	**Yes**

	2015	January 1, 2015 to 2015 AGM	January 1, 2016 to 2016 AGM	2015 AGM to 2016 AGM	2015 AGM	2015 AGM
Joerg Reinhardt	3 829 197	658 174	633 334	3 804 357	3 805 000	Yes
Other Board members	3 950 479	667 250	653 334	3 936 563	3 940 000	Yes
Total	**7 779 676**	**1 325 424**	**1 286 668**	**7 740 920**	**7 745 000**	**Yes**

[1] See previous page for 2016 Board member compensation.

[2] To be confirmed and reported in the 2017 Compensation Report

Loans to Board members

No loans were granted to current or former members of the Board of Directors or to "persons closely linked" to them during 2016. In addition, no such loans were outstanding as of December 31, 2016.

Other payments to Board members

During 2016, no payments (or waivers of claims) other than those set out in the Board member compensation table (including its footnotes) on page 138 were made to current members of the Board of Directors or to "persons closely linked" to them.

Payments to former Board members

During 2016, no payments (or waivers of claims) were made to former Board members or to "persons closely linked" to them, except for the following amounts:

- Dr. William R. Brody and Dr. Rolf M. Zinkernagel, who stepped down from the Board of Directors at the 2014 AGM, received delegated Board membership fees for their work on the Boards of the Novartis Institute for Tropical Diseases (Dr. Zinkernagel) and the Genomics Institute of the Novartis Research Foundation (Dr. Brody and Dr. Zinkernagel). During 2016, an amount of CHF 25 000 and CHF 50 000 was paid to Dr. Brody and Dr. Zinkernagel, respectively, for their work on these Boards. No further payments related to these Board memberships will be made to Dr. Brody and Dr. Zinkernagel, as their respective mandates have ended.
- The payments reported in Note 27 to the Group's audited consolidated financial statements (page 233)

Share ownership requirements for Board members

The Chairman is required to own a minimum of 30 000 Novartis shares, and other members of the Board of Directors are required to own at least 4 000 Novartis shares within three years after joining the Board of Directors, to ensure their interests are aligned with shareholders'. Board members are prohibited from hedging or pledging their ownership positions in Novartis shares that are part of their guideline share ownership requirement, and are required to hold these shares for 12 months after retiring from the Board of Directors. As at December 31, 2016, all members of the Board of Directors who have served at least three years on the Board, as well as former members who stepped down from the Board at the 2016 AGM, have complied with the share ownership requirements.

Shares, ADRs and share options owned by Board members

The total number of vested Novartis shares and ADRs owned by members of the Board of Directors and "persons closely linked" to them as of December 31, 2016 is shown in the table below.

As of December 31, 2016, no members of the Board of Directors together with "persons closely linked" to them owned 1% or more of the outstanding shares (or ADRs) of Novartis. As of the same date, no members of the Board of Directors held any share options to purchase Novartis shares.

Shares and ADRs owned by Board members[1]

	Number of shares[2]
	At December 31, 2016
Joerg Reinhardt	497 762
Enrico Vanni	17 853
Nancy Andrews	2 308
Dimitri Azar	11 217
Ton Buechner	1 398
Srikant Datar	34 998
Elizabeth Doherty	839
Ann Fudge	17 530
Pierre Landolt[3]	58 061
Andreas von Planta	127 740
Charles L. Sawyers	6 029
William T. Winters	9 257
Total[4]	**784 992**

[1] Includes holdings of "persons closely linked" to Board members (see definition on page 135)

[2] Each share provides entitlement to one vote.

[3] According to Pierre Landolt, the Sandoz Family Foundation is the economic beneficiary of the shares.

[4] Verena A. Briner stepped down from the Board of Directors on February 23, 2016. On February 23, 2016, Dr. Briner owned 7 507 shares.

Compensation governance

Legal framework

The Swiss Code of Obligations and the Corporate Governance Guidelines of the SIX Swiss Exchange require listed companies to disclose certain information about the compensation of Board and Executive Committee members, their equity participation in the Group, and loans made to them. This Annual Report fulfills that requirement. In addition, the Annual Report is in line with the principles of the Swiss Code of Best Practice for Corporate Governance of the Swiss Business Federation (economiesuisse).

Compensation decision-making authorities

Authority for decisions related to compensation is governed by the Articles of Incorporation, Board regulations and the Compensation Committee Charter, which are all published on the company website: www.novartis.com/corporate-governance.

The Compensation Committee serves as the supervisory and governing body for compensation policies and plans within Novartis, and has overall responsibility for determining, reviewing and proposing compensation policies and plans for approval by the Board of Directors in line with the Compensation Committee Charter. A summary of discussions and conclusions of each committee meeting is delivered to the full Board of Directors. A summary of the compensation decision-making authorities is set out below.

Compensation authorization levels within the parameters set by the shareholders' meeting

Decision on	Decision making authority
Compensation of Chairman and other Board members	Board of Directors
Compensation of CEO	Board of Directors
Compensation of other Executive Committee members	Compensation Committee

Committee member independence

The Compensation Committee is composed exclusively of members of the Board of Directors who meet the independence criteria set forth in the Board regulations. From the 2016 AGM, the Compensation Committee had the following four members: Ann Fudge, Srikant Datar, Enrico Vanni and William Winters. Mr. Vanni has served as member since 2011 and as Chair since 2012.

Role of the Compensation Committee's independent advisor

The Compensation Committee retained Frederic W. Cook & Co. Inc. as its independent external compensation advisor for 2016. The advisor was hired directly by the Compensation Committee in 2011, and the Compensation Committee has been fully satisfied with the performance and independence of the advisor since its engagement. Frederic W. Cook & Co. Inc. is independent of management and does not perform any other consulting work for Novartis. In determining whether or not to renew the engagement with the advisor, the Compensation Committee evaluates, at least annually, the quality of the consulting service, the independence of the advisor, and the benefits of rotating advisors.

Compensation Committee meetings held in 2016

In 2016, the Compensation Committee held six formal meetings, and two additional joint meetings with the Research & Development Committee to review and endorse for approval by the Board of Directors the innovation targets and achievements of our LTPP. It also held one additional joint meeting with the Risk Committee to review risk within the compensation systems for executives and other associates, including the sales force. The Compensation Committee conducted a performance self-evaluation and a review of its charter in 2016, as it does every year.

Compensation governance and risk management

The Compensation Committee, with support from its independent advisor, reviews market trends in compensation and changes in corporate governance rules. Together with the Risk Committee, it also reviews the Novartis compensation systems to ensure that they do not encourage inappropriate or excessive risk taking, and instead encourage behaviors that support sustainable value creation.

A summary of the risk management principles is outlined below.

Risk management principles

- **Rigorous performance management process, with approval of targets and evaluation of performance for the CEO by the Board of Directors**
- **Balanced mix of short-term and long-term variable compensation elements**
- **Balanced scorecard approach to performance evaluation under the Annual Incentive, including Values and Behaviors**
- **Clawback principles**
- **Performance-vesting Long-Term Incentives only, with three-year overlapping cycles**
- **Variable compensation is capped at 200% of target**
- **Contractual notice period of 12 months**
- **Post-contractual non-compete limited to a maximum of 12 months (annual base compensation and Annual Incentive of the prior year only)**
- **No severance payments or change-of-control clauses**
- **Share ownership requirements; no hedging or pledging of Novartis share ownership position by Board and Executive Committee members**

Executive Committee employment contracts provide for a notice period of up to 12 months and contain no change-of-control clauses or severance provisions (e.g., agreements concerning special notice periods, longer-term contracts, "golden parachutes," waiver of lock-up periods for equities and bonds, shorter vesting periods, and additional contributions to occupational pension schemes).

Malus and clawback

Any incentive compensation paid to Executive Committee members is subject to malus and clawback rules. This means that the Board of Directors for the CEO, or the Compensation Committee for the other Executive Committee members, may decide – subject to applicable law – to not pay any unpaid or unvested incentive compensation (malus), or to seek to recover incentive compensation that has been paid in the past (clawback), where the payout has been proven to conflict with internal management standards, including company and accounting policies, or violate laws. This principle applies to both the short-term Annual Incentive and the Long-Term Incentive plans. In 2016, the Compensation Committee did not exercise malus or clawback for current or former Executive Committee members.

Report of the statutory auditor on the Compensation Report of Novartis AG

To the General Meeting of Novartis AG, Basel

We have audited the 2016 CEO target compensation on page 123, the 2016 CEO realized compensation on page 124, the outcome of the LTRPP performance-period 2014–2016, 2016 CEO realized total compensation table and 2015 CEO realized compensation on page 126, the CEO and other Executive Committee members' 2014–2016 Long Term Incentive plans vesting on pages 127–128, the CEO and other Executive Committee members' compensation at grant value on pages 129–135 and the 2016 Board Compensation on pages 138–140 of the accompanying Compensation Report of Novartis AG for the year ended December 31, 2016.

Board of Directors' responsibility
The Board of Directors is responsible for the preparation and overall fair presentation of the Compensation Report in accordance with Swiss law and the Ordinance against Excessive Compensation in Listed Companies (Ordinance). The Board of Directors is also responsible for designing the compensation system and defining individual compensation packages.

Auditor's responsibility
Our responsibility is to express an opinion on the accompanying Compensation Report. We conducted our audit in accordance with Swiss Auditing Standards. These standards require that we comply with ethical requirements, and plan and perform the audit to obtain reasonable assurance about whether the Compensation Report complies with Swiss law and articles 14–16 of the Ordinance.

An audit involves performing procedures to obtain audit evidence on the disclosures made in the Compensation Report with regard to compensation, loans and credits in accordance with articles 14–16 of the Ordinance. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatements in the Compensation Report, whether due to fraud or error. This audit also includes evaluating the reasonableness of the methods applied to value components of compensation, as well as assessing the overall presentation of the Compensation Report. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Opinion
In our opinion, the Compensation Report of Novartis AG for the year ended December 31, 2016 complies with Swiss law and articles 14–16 of the Ordinance.

PricewaterhouseCoopers AG

Bruno Rossi
Audit expert
Auditor in charge

Stephen Johnson
Global relationship partner

Basel, January 24, 2017

1 His work as a stadium groundskeeper in Brisbane, Australia, exposed Malcolm Caddies to heavy doses of sunlight.
2 Mr. Caddies spends the morning with his family.
3 Mr. Caddies is an evangelist for Australia's SunSmart campaign, which promotes using sunscreen, wearing a hat, and staying under cover when the sun is strongest.
4 Australia still has high rates of skin cancer, but the SunSmart campaign may be having an impact.

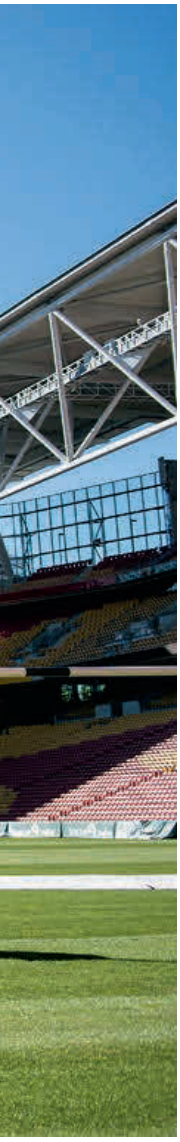

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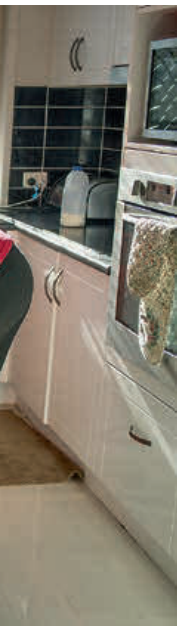
PHOTO ESSAY

A groundskeeper tackles cancer in several ways

Malcolm Caddies' medical odyssey began like so many others' around the world: with the discovery of a lump. It was under his left arm, and it was sizeable – about three centimeters. He hurried to the doctor in his hometown of Brisbane, Australia. She did some tests and came back with grim news. He had melanoma, a cancer of skin pigment. "She told me to get my affairs in order," Mr. Caddies recalls, "that I was probably going to die."



Australia and New Zealand have the highest rates of skin cancer in the world. And for 47-year-old Mr. Caddies, the head groundskeeper at Brisbane's SunCorp Stadium, it has always been an occupational hazard. He works in Brisbane's abundant sunshine, with its exceptionally high rates of ultraviolet (UV) light, and has long understood the risks, wearing sunscreen and a hat, avoiding the midday sun, and routinely going to doctors for skin checks. "You're always having things cut out," he says.

But his big malignant tumor signaled something much more dire. Mr. Caddies' oldest son, then 17, searched "metastatic melanoma" on Google, and came away shaken. Meanwhile, Mr. Caddies and his wife shielded their two younger boys from the news.

Yet when Mr. Caddies went to the Melanoma Center in Brisbane, the first thing the doctor told him was to "forget everything" he'd been told about the disease. While the tumor was large, it was not a death sentence. Indeed, tests showed that the cancer had not spread far. Doctors removed the tumor and two lymph nodes, and found that only one of them was affected. That was a promising sign.

When doctors later inspected Mr. Caddies' history, they found another report of melanoma six years earlier. The fact that Mr. Caddies' case was a recurrence qualified him to participate in a clinical trial. Since completing the treatment, he has had hospital checks every month as well as CT scans every three months. So far, he has no further symptoms. He says he now monitors the UV index as he tries to avoid unnecessary exposure. When he does venture out into the sun, he wears a wide-brim hat and the strongest sunscreen.

His mission now is to spread the word about melanoma and to encourage fellow citizens, colleagues, and especially his children to lower their risk. The goal, part of a national drive in Australia, is to be "sunsmart." That means adopting a "no hat, no play" philosophy, applying plenty of sunscreen, and staying inside or in the shade, when possible, during the high-UV hours around noon.

While melanoma rates in Australia remain stubbornly high with 13 300 new cases diagnosed every year, there's a ray of good news: Rates for Australians under 40 appear to be dropping. That indicates that sunsmart lessons from Mr. Caddies and thousands of other survivors may be sinking in.

For detail on **cancer** research → page 42

Financial Report

Contents

FINANCIAL REPORT

Operating and financial review 2016

This operating and financial review should be read together with the Group's consolidated financial statements in this Annual Report, which have been prepared in accordance with International Financial Reporting Standards (IFRS) as published by the International Accounting Standards Board, and with the sections on performance and innovation on pages 22 to 57 of this Annual Report.

On January 27, 2016, Novartis announced plans to further focus our divisions, integrating businesses that share therapeutic areas to better leverage our development and marketing capabilities. These plans included the transfer of the Ophthalmic Pharmaceuticals franchise from the Alcon Division to the Innovative Medicines Division (formerly named the Pharmaceuticals Division), and the transfer of selected mature products from the Innovative Medicines Division to the Sandoz Division. Operationally, these transfers were completed as of April 1, 2016. The centralization of manufacturing and the integration of some drug development functions, also announced on January 27, 2016, were operationally completed as of July 1, 2016.

In compliance with IFRS, Novartis updated its current and prior years segment financials to reflect these transfers, to aid comparability of year-on-year results. As a result, all comparisons of divisional results from 2016 to 2015 reflect the new divisional structure.

In 2015, Novartis completed a series of portfolio transformation transactions, including the acquisition of oncology assets from GlaxoSmithKline plc (GSK) and a 36.5% interest in GSK Consumer Healthcare Holdings Ltd., and the divestment of its Vaccines and Animal Health businesses. To reflect these transactions, Novartis reported the Group's financial results for all years presented as "continuing operations" and "discontinued operations."

Unless otherwise noted, the comments in this operating and financial review refer to continuing operations, which include the businesses of the Innovative Medicines, Sandoz and Alcon Divisions; Corporate activities; and, starting March 2, 2015, the results from the new oncology assets acquired from GSK and the 36.5% interest in the GSK Consumer Healthcare joint venture (the latter reported as investment in associated companies). We also provide information on discontinued operations and total Group performance. For further details on continuing and discontinued operations see pages 152 and 154 and Note 30 to the Group consolidated financial statements.

Risk overview

Our financial results are affected to varying degrees by external factors. Loss of market exclusivity and the introduction of branded and generic competitors could significantly erode sales of our innovative products. Our ability to grow depends on the success of our research and development efforts to replenish our pipeline, as well as on the commercial acceptance of our products in market. Increased pricing pressure could impact our ability to generate returns and invest for the future.

We have a significant global compliance program in place, but any failure to comply with local laws could lead to substantial liabilities. There are strict regulatory requirements surrounding our manufacturing processes, which introduce a greater chance for disruptions and liabilities. With products sold in approximately 155 countries, our ability to hedge against foreign exchange fluctuations could have a significant effect on our reported results. We also depend on critical information technology systems to support our business processes.

For more detail on these trends and how they could impact our results, see details starting on page 167.

Results of operations

In evaluating the Group's performance, we consider not only the IFRS results, but also certain non-IFRS measures, including core results and constant currency results. These measures assist us in evaluating our ongoing performance from year to year and we believe this additional information is useful to investors in understanding the performance of our business.

The Group's core results – including core operating income, core net income and core earnings per share – exclude fully the amortization and impairment charges of intangible assets, excluding software, and certain acquisition related items. The following items that exceed a threshold of USD 25 million are also excluded: integration and divestment related income and expenses, divestment gains and losses, restructuring charges/releases, legal related items, impairments of property, plant and equipment and financial assets, as well as income and expense items that management deems exceptional and that are or are expected to accumulate within the year to be over a USD 25 million threshold. A reconciliation between IFRS results and core results is shown on pages 173-175.

We present information about our net sales and other key figures relating to operating and net income in constant currencies (cc). We calculate constant currency net sales and operating income by applying the prior-year average exchange rates to current financial data expressed in local currencies in order to estimate an elimination of the impact of foreign exchange rate movements.

The core results, constant currencies and other non-IFRS measures are explained in more detail starting on page 171 and are not intended to be substitutes for the equivalent measures of financial performance prepared in accordance with IFRS. These measures may differ from similarly titled non-IFRS measures of other companies.

Group overview

Novartis delivered solid financial performance in 2016, driven by our continued success with growth products including *Cosentyx* and *Gilenya*, which helped offset the effects of generic competition of approximately USD 2.4 billion, mainly driven by the loss of patent protection in the US for the pioneering leukemia drug, *Gleevec*. As a result, our net sales to third parties from continuing operations of USD 48.5 billion (–2%, 0% cc) were broadly in line with the prior year. Currencies negatively impacted the results driven by the strengthening of the US dollar on average versus the British pound and major emerging market currencies, which was partially offset by the strengthening of the Japanese yen.

Operating income was USD 8.3 billion (–8%, –3% cc), a decrease from USD 9.0 billion in 2015 mainly due to the loss of exclusivity on *Gleevec*, as investments related to new product launches and the Alcon growth plan were partially offset by resource allocation and productivity programs. Operating income margin was 17.0% of net sales.

Net income from continuing operations was USD 6.7 billion (–5%, +1% cc) with the increase of 1% in constant currencies compared to the decline in operating income due to higher income from associated companies, mainly from the investment in GSK Consumer Healthcare Holdings Ltd. The current year includes USD 0.3 billion (2015: USD 0.4 billion) exceptional charges related to Venezuela. For more information see page 159.

Basic earnings per share from continuing operations increased 2% in constant currencies (–3%, +2% cc) to USD 2.82, up more than net income in constant currencies due to a reduction in the average number of shares outstanding.

Free cash flow from continuing operations increased 2% to USD 9.5 billion, mainly driven by lower net investments in property, plant and equipment.

For the total Group, net income amounted to USD 6.7 billion in 2016 compared to USD 17.8 billion in 2015. The prior year benefitted from the USD 10.8 billion net income from discontinued operations, which included USD 12.7 billion of exceptional pre-tax divestment gains and the operational results of the divested businesses until the respective dates of completion of the transactions. For more information on discontinued operations please see pages 152 and 154 and Note 30 to the Novartis Group consolidated financial statements.

Basic earnings per share decreased to USD 2.82 from USD 7.40 in the prior year.

Free cash flow for the total Group amounted to USD 9.5 billion in 2016 compared to USD 9.0 billion in 2015. The prior year included a negative free cash flow of approximately USD 0.3 billion from discontinued operations.

Key figures

(USD millions unless indicated otherwise)	**Year ended Dec 31, 2016**	Year ended Dec 31, 2015	Change in USD %	Change in constant currencies %
Net sales to third parties from continuing operations	**48 518**	**49 414**	**– 2**	**0**
Sales to discontinued operations		26	nm	nm
Net sales from continuing operations	**48 518**	**49 440**	**– 2**	**0**
Other revenues	918	947	– 3	– 3
Cost of goods sold	– 17 520	– 17 404	– 1	– 2
Gross profit from continuing operations	**31 916**	**32 983**	**– 3**	**– 1**
Marketing & Sales	– 11 998	– 11 772	– 2	– 4
Research & Development	– 9 039	– 8 935	– 1	– 2
General & Administration	– 2 194	– 2 475	11	8
Other income	1 927	2 049	– 6	– 5
Other expense	– 2 344	– 2 873	18	17
Operating income from continuing operations	**8 268**	**8 977**	**– 8**	**– 3**
Return on net sales (%)	17.0	18.2		
Income from associated companies	703	266	164	164
Interest expense	– 707	– 655	– 8	– 10
Other financial income and expense	– 447	– 454	2	58
Income before taxes from continuing operations	**7 817**	**8 134**	**– 4**	**2**
Taxes	– 1 119	– 1 106	– 1	– 13
Net income from continuing operations	**6 698**	**7 028**	**– 5**	**1**
Net income from discontinued operations		10 766	nm	nm
Net income	**6 698**	**17 794**	**– 62**	**– 59**
Attributable to:				
Shareholders of Novartis AG	*6 712*	*17 783*	*– 62*	*– 59*
Non-controlling interests	*– 14*	*11*	*nm*	*nm*
Basic earnings per share (USD) from continuing operations	**2.82**	**2.92**	**– 3**	**2**
Basic earnings per share (USD) from discontinued operations		4.48	nm	nm
Total basic earnings per share (USD)	**2.82**	**7.40**	**– 62**	**– 59**
Free cash flow from continuing operations	**9 455**	**9 259**	**2**	
Free cash flow	**9 455**	**9 029**	**5**	

nm = not meaningful

Net sales by segment

The following table provides an overview of net sales to third parties by segment:

(USD millions)	**Year ended Dec 31, 2016**	Year ended Dec 31, 2015	Change in USD %	Change in constant currencies %
Innovative Medicines[1, 2]	32 562	33 345	– 2	0
Sandoz[2]	10 144	10 070	1	2
Alcon[2]	5 812	5 999	– 3	– 2
Net sales to third parties from continuing operations	**48 518**	**49 414**	**– 2**	**0**

[1] Formerly named the Pharmaceuticals Division
[2] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016

Additional comments on the changes in the net sales by division can be found starting on page 22.

Operating income from continuing operations

The following table provides an overview of operating income by segment:

(USD millions)	Year ended Dec 31, 2016	% of net sales	Year ended Dec 31, 2015	% of net sales	Change in USD %	Change in constant currencies %
Innovative Medicines[1, 2]	**7 426**	**22.8**	**7 815**	**23.4**	**– 5**	**0**
Sandoz[2]	**1 445**	**14.2**	**1 300**	**12.9**	**11**	**14**
Alcon[2]	**– 132**	**– 2.3**	**281**	**4.7**	**nm**	**nm**
Corporate	– 471		– 419		– 12	– 25
Operating income from continuing operations	**8 268**	**17.0**	**8 977**	**18.2**	**– 8**	**– 3**

nm = not meaningful
[1] Formerly named the Pharmaceuticals Division
[2] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016

Operating income was USD 8.3 billion (–8%, –3% cc), a decrease from USD 9.0 billion in 2015 mainly due to the loss of exclusivity on *Gleevec*, as investments related to new product launches and the Alcon growth plan were partially offset by resource allocation and productivity programs. The negative currency impact of 5% was due to the strong USD on average versus the British pound and major emerging market currencies, partially offset by the strengthening of the Japanese yen. Operating income margin in constant currencies decreased 0.7 percentage points; currency had a negative impact of 0.5 percentage points resulting in a decrease of 1.2 percentage points to 17.0% of net sales.

Additional comments on the changes in operating income by division can be found starting on page 22.

Corporate income and expense, which includes the cost of Group management and central services, amounted to a net expense of USD 471 million (–12%, –25% cc) in 2016 compared to a net expense of USD 419 million in the prior year. The increase was mainly due to lower royalty and other income as well as costs related to the execution of the initiatives announced on January 27, 2016, to further focus the divisions, centralize manufacturing and integrate drug development functions. These factors more than offset the reduction in General & Administration expenses in 2016.

Core operating income key figures[1]

(USD millions unless indicated otherwise)	Year ended Dec 31, 2016	Year ended Dec 31, 2015	Change in USD %	Change in constant currencies %
Core gross profit from continuing operations	**35 806**	**36 900**	**– 3**	**– 1**
Marketing & Sales	– 11 991	– 11 729	– 2	– 4
Research & Development	– 8 402	– 8 738	4	3
General & Administration	– 2 120	– 2 389	11	8
Other income	753	823	– 9	– 7
Other expense	– 1 059	– 1 077	2	– 1
Core operating income from continuing operations	**12 987**	**13 790**	**– 6**	**– 2**
As % of net sales	26.8	27.9		

[1] An explanation of non-IFRS measures and reconciliation tables can be found starting on page 171.

The adjustments made to operating income to arrive at core operating income from continuing operations amounted to USD 4.7 billion (2015: USD 4.8 billion) broadly in line with the prior year.

Excluding these items, core operating income from continuing operations decreased 6% (–2% cc) to USD 13.0 billion. Core operating income margin in constant currencies decreased 0.7 percentage points mainly due to the loss of exclusivity on *Gleevec*, as investments related to new product launches and the Alcon growth plan were partially offset by resource allocation and productivity programs. Currency had a negative impact of 0.4 percentage points, resulting in a margin of 26.8% of net sales, compared to 27.9% in 2015. Additional comments on the changes in the core operating income by division can be found starting on page 22.

The following table provides an overview of core operating income by segment:

(USD millions)	Year ended Dec 31, 2016	% of net sales	Year ended Dec 31, 2015	% of net sales	Change in USD %	Change in constant currencies %
Innovative Medicines[1, 2]	**10 354**	**31.8**	**10 862**	**32.6**	**– 5**	**– 1**
Sandoz[2]	**2 071**	**20.4**	**2 045**	**20.3**	**1**	**4**
Alcon[2]	**850**	**14.6**	**1 235**	**20.6**	**– 31**	**– 27**
Corporate	– 288		– 352		18	4
Core operating income from continuing operations	**12 987**	**26.8**	**13 790**	**27.9**	**– 6**	**– 2**

[1] Formerly named the Pharmaceuticals Division
[2] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016

Research and development of Innovative Medicines Division

The following table provides an overview of the reported and core research and development expense of the Innovative Medicines Division:

(USD millions unless indicated otherwise)	Year ended Dec 31, 2016	Year ended Dec 31, 2015[1]	Change in USD %	Change in constant currencies %
Research and Exploratory Development	– 2 645	– 2 739	3	2
Confirmatory Development	– 5 064	– 4 946	– 2	– 4
Total Innovative Medicines Division Research and Development expense	**– 7 709**	**– 7 685**	**0**	**– 2**
As % of Innovative Medicines net sales to third parties	23.7	23.0		
Core Research and Exploratory Development[2]	– 2 543	– 2 663	5	3
Core Confirmatory Development[2]	– 4 569	– 4 839	6	4
Total Core Innovative Medicines Division Research and Development expense	**– 7 112**	**– 7 502**	**5**	**4**
As % of Innovative Medicines net sales to third parties	21.8	22.5		

[1] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016
[2] Core excludes impairments, amortization and certain other items.

Innovative Medicines Division Research and Exploratory Development expense amounted to USD 2.6 billion in 2016, a decrease of 3% (+2% cc) compared to 2015 as a result of continued productivity efforts. Confirmatory Development expense increased by 2% (–4% cc) to USD 5.1 billion compared to USD 4.9 billion in 2015, mainly driven by the impairment of intangible assets.

Core Research and Exploratory Development expense in the Innovative Medicines Division as percent of sales decreased by 0.8 percentage points in constant currencies as a result of continued productivity efforts and synergies from acquired Oncology assets. This decrease was partially offset by negative currency movements of 0.1 percentage points, resulting in a net decrease of 0.7 percentage points to 21.8% of net sales.

Non-operating income and expense

The following table provides an overview of non-operating income and expense:

(USD millions unless indicated otherwise)	Year ended Dec 31, 2016	Year ended Dec 31, 2015	Change in USD %	Change in constant currencies %
Operating income from continuing operations	**8 268**	**8 977**	**– 8**	**– 3**
Income from associated companies	703	266	164	164
Interest expense	– 707	– 655	– 8	– 10
Other financial income and expense	– 447	– 454	2	58
Income before taxes from continuing operations	**7 817**	**8 134**	**– 4**	**2**
Taxes	– 1 119	– 1 106	– 1	– 13
Net income from continuing operations	**6 698**	**7 028**	**– 5**	**1**
Net income from discontinued operations		10 766	nm	nm
Net income	**6 698**	**17 794**	**– 62**	**– 59**
Basic EPS (USD) from continuing operations	**2.82**	**2.92**	**– 3**	**2**
Basic EPS (USD) from discontinued operations		4.48	nm	nm
Total basic EPS (USD)	**2.82**	**7.40**	**– 62**	**– 59**

nm = not meaningful

Income from associated companies increased to USD 703 million, compared to USD 266 million in the prior year.

The increase was mainly due to income recognized from our investment in GSK Consumer Healthcare Holdings Ltd. of USD 234 million compared to a loss of USD 79 million recognized in the prior year, in which the income from operations was more than offset by integration charges and an additional expense from the final purchase price allocation for the investment in GSK. The 2016 income contribution from GSK Consumer Healthcare Holdings Ltd. includes a negative adjustment recorded in the second quarter upon the issuance of 2015 actual results.

In addition, in 2016, we recognized an income of USD 464 million from our investment in Roche, which reflected our estimated share of income for 2016 of USD 532 million partly offset by the adjustment for 2015 actual results. The higher contribution from Roche in 2016 was mainly due to a smaller adjustment recognized upon publication of 2015 actual results by Roche compared to the adjustment recorded in the prior year upon publication of the 2014 actual results.

Interest expense from continuing operations increased to USD 707 million from USD 655 million in the prior year due to higher outstanding debt.

Other financial income and expense amounted to an expense of USD 447 million compared to USD 454 million in the prior-year, mainly on account of an exceptional charge of USD 305 million (2015: USD 410 million) related to Venezuela due to foreign exchange losses on intragroup payables as well as higher currency losses recognized in 2016.

The tax rate from continuing operations increased to 14.3% from 13.6% in the prior year, mainly as a result of a change in profit mix to jurisdictions with higher tax rates.

Net income from continuing operations was USD 6.7 billion (–5%, +1% cc) with the increase of 1% in constant currencies compared to the decline in operating income due to higher income from associated companies, mainly from the investment in GSK Consumer Healthcare Holdings Ltd. The current year includes USD 0.3 billion (2015: USD 0.4 billion) exceptional charges related to Venezuela. For more information see page 159.

Basic earnings per share from continuing operations was USD 2.82 per share (–3%, +2% cc), up more than net income due to a reduction in the average number of shares outstanding.

Core non-operating income and expense

The following table provides an overview of core non-operating income and expense:

(USD millions unless indicated otherwise)	Year ended Dec 31, 2016	Year ended Dec 31, 2015	Change in USD %	Change in constant currencies %
Core operating income from continuing operations	**12 987**	**13 790**	**– 6**	**– 2**
Income from associated companies	1 134	981	16	16
Interest expense	– 707	– 655	– 8	– 10
Other financial income and expense	– 99	– 24	nm	nm
Core income before taxes from continuing operations	**13 315**	**14 092**	**– 6**	**– 2**
Taxes	– 2 001	– 2 051	2	– 2
Core net income from continuing operations	**11 314**	**12 041**	**– 6**	**– 3**
Core net loss from discontinued operations		– 256	nm	nm
Core net income	**11 314**	**11 785**	**– 4**	**– 1**
Core basic EPS (USD) from continuing operations	**4.75**	**5.01**	**– 5**	**– 2**
Core basic EPS (USD) from discontinued operations		– 0.11	nm	nm
Core basic EPS (USD)	**4.75**	**4.90**	**– 3**	**0**

nm = not meaningful

Core income from associated companies increased to USD 1.1 billion from USD 981 million in the prior-year period. The increase was due to a higher contribution from GSK Consumer Healthcare Holdings Ltd., which accounted for USD 369 million in 2016 compared to USD 213 million in prior-year period.

Core other financial income and expense, which excludes the exceptional charges of USD 0.3 billion (2015: USD 0.4 billion) related to Venezuela amounted to a net expense of USD 99 million, compared to USD 24 million in 2015.

The core tax rate from continuing operations (core tax as a percentage of core pre-tax income) increased to 15.0% from 14.6% in the prior year. This increase is mainly a result of a change in core profit mix to jurisdictions with higher tax rates.

Core net income from continuing operations was USD 11.3 billion (–6%, –3% cc) and decreased 3% in constant currencies, broadly in line with core operating income.

Core basic EPS from continuing operations was USD 4.75 (–5%, –2% cc), down less than core net income due to a reduction in the number of shares outstanding.

Discontinued operations

(USD millions unless indicated otherwise)	Year ended Dec 31, 2015
Net sales to third parties from discontinued operations	**601**
Operating income from discontinued operations	**12 477**
Net income from discontinued operations	**10 766**
Attributable to:	
Shareholders of Novartis AG	*10 758*
Non-controlling interests	*8*
Basic earnings per share (USD) from discontinued operations	**4.48**
Free cash flow from discontinued operations	**– 230**

As all transactions of the portfolio transformation were completed during 2015, there are no results from discontinued operations reported in the 2016 consolidated income statement. In 2015, results for discontinued operations include the operational results from the Vaccines influenza business, prior to its divestment to CSL Limited on July 31, 2015, as well as results from the Vaccines non-influenza business and OTC until March 2, 2015. Operational results from the Animal Health business, which was divested on January 1, 2015 include only the divestment gain.

Discontinued operations in 2015 also include the exceptional pre-tax gains of USD 12.7 billion from the divestment of Animal Health (USD 4.6 billion), and the transactions with GSK (USD 2.8 billion for the Vaccines non-influenza business and USD 5.9 billion arising from

the contribution of Novartis OTC into the GSK Consumer Healthcare joint venture). In addition, the GSK transactions resulted in USD 0.6 billion of additional transaction-related costs that were expensed.

Net income from discontinued operations in the prior year amounted to USD 10.8 billion. For more information on discontinued operations please see pages 152 and 154, and Note 30 to the Novartis Group consolidated financial statements.

Total Group

For the total Group, net income amounted to USD 6.7 billion compared to USD 17.8 billion in 2015. The decrease was mainly due to the exceptional divestment gains included in the net income from the discontinued operations of the prior year.

Basic earnings per share decreased to USD 2.82 from USD 7.40.

Factors affecting comparability of year-on-year results of operations

The comparability of the year-on-year results of our operations for the total Group can be significantly affected by acquisitions and divestments. The transactions of significance during 2016 and 2015 are mentioned below.

Significant transactions in 2016

ALCON – ACQUISITION OF TRANSCEND MEDICAL, INC.

On February 17, 2016, Alcon entered into an agreement to acquire Transcend Medical, Inc. (Transcend), a privately-held, US-based company focused on developing minimally-invasive surgical devices to treat glaucoma. The transaction closed on March 23, 2016, and the fair value of the total purchase consideration was USD 332 million. Results of operations since the date of acquisition were not material.

INNOVATIVE MEDICINES – ACQUISITION OF SELEXYS PHARMACEUTICALS CORPORATION

On November 18, 2016, Novartis acquired Selexys Pharmaceuticals Corporation (Selexys), a privately-held, US-based company specializing in development of therapeutics in certain hematologic and inflammatory disorders, following receipt of results of the SUSTAIN study. The fair value of the total purchase consideration for acquiring the 81% stake Novartis did not already own amounted to USD 268 million. Results of operations since the date of acquisition were not material.

Significant transactions in 2015

Portfolio transformation transactions

In 2015, Novartis completed a series of portfolio transformation transactions as follows:

TRANSACTION WITH ELI LILLY AND COMPANY

On January 1, 2015, Novartis closed its transaction with Eli Lilly and Company, USA (Lilly) announced in April 2014, to divest its Animal Health business for USD 5.4 billion in cash. This resulted in a pre-tax gain of USD 4.6 billion, which is recorded in operating income from discontinued operations.

TRANSACTIONS WITH GLAXOSMITHKLINE PLC

On March 2, 2015, Novartis closed its transactions with GlaxoSmithKline plc, Great Britain (GSK) announced in April 2014, with the following consequences:

INNOVATIVE MEDICINES – ACQUISITION OF GSK ONCOLOGY PRODUCTS

Novartis acquired GSK's oncology products and certain related assets for an aggregate cash consideration of USD 16.0 billion. In 2015, from the date of acquisition the business generated net sales of USD 1.8 billion. Management estimates that sales for the entire year 2015 would have amounted to USD 2.1 billion had the oncology products been acquired at the beginning of the 2015 reporting period. The 2015 net results from operations on a reported basis since the acquisition date were not material, mainly due to amortization of intangible assets.

VACCINES – DIVESTMENT

Novartis divested its Vaccines business (excluding its Vaccines influenza business) to GSK for up to USD 7.1 billion plus royalties. The USD 7.1 billion consists of USD 5.25 billion paid at closing and up to USD 1.8 billion in future milestone payments. The fair value of the contingent future milestones and royalties as at the acquisition date is USD 1.0 billion, resulting in a fair value of consideration received of USD 6.25 billion. Included in this amount is a USD 450 million milestone payment received in late March 2015. The sale of this business resulted in a pre-tax gain of USD 2.8 billion, which is recorded in operating income from discontinued operations.

CONSUMER HEALTH – COMBINATION OF NOVARTIS OTC WITH GSK CONSUMER HEALTHCARE

Novartis and GSK agreed to create a combined consumer healthcare business through the combination of Novartis OTC and GSK Consumer Healthcare businesses. On March 2, 2015, a new entity, GlaxoSmithKline Consumer Healthcare Holdings Ltd. (GSK Consumer Healthcare) was formed via the contribution of business from both Novartis and GSK. Novartis has a 36.5% interest in the newly created entity. Based on estimates of fair value exchanged, an investment in associated company of USD 7.6 billion was recorded. The resulting pre-tax gain, net of transaction related costs, of USD 5.9 billion is recorded in operating income from discontinued

operations. The investment is accounted for using the equity method of accounting using estimated results for the last quarter of the year.

ADDITIONAL GSK RELATED COSTS

The GSK transaction resulted in USD 0.6 billion of additional transaction-related costs that were expensed, thereof USD 0.3 billion paid in 2015.

TRANSACTION WITH CSL

On October 26, 2014, Novartis entered into an agreement with CSL to sell its Vaccines influenza business to CSL for USD 275 million. The transaction with CSL was completed on July 31, 2015, resulting in a partial reversal of the impairment recorded in 2014 in the amount of USD 0.1 billion, which is included in operating income from discontinued operations.

Other significant transactions in 2015

INNOVATIVE MEDICINES – ACQUISITION OF SPINIFEX PHARMACEUTICALS, INC.

On June 29, 2015, the Innovative Medicines Division acquired Spinifex Pharmaceuticals, Inc. (Spinifex), a US and Australia based, privately held development stage company, focused on developing a peripheral approach to treat neuropathic pain. The transaction closed on July 24, 2015, and the fair value of the total purchase consideration was USD 312 million. The 2015 results of operations since the date of acquisition were not material.

INNOVATIVE MEDICINES – ACQUISITION OF ADMUNE THERAPEUTICS LLC

On October 16, 2015, the Innovative Medicines Division acquired Admune Therapeutics LLC (Admune), a US-based, privately held company, broadening the Novartis pipeline of cancer immunotherapies. The fair value of the total purchase consideration amounted to USD 258 million. The 2015 results of operations since the date of acquisition were not material.

For further details on significant transactions in 2016 and 2015, see Note 2 to the Group consolidated financial statements.

Classification as continuing operations and discontinued operations

Following the April 22, 2014 announcement of the portfolio transformation transactions with Lilly and GSK, as described above, Novartis reported the Group's financial statements for the current and prior years as "continuing operations" and "discontinued operations".

Continuing operations comprise the businesses of the Innovative Medicines, Sandoz and Alcon Divisions as well as the continuing Corporate activities. Continuing operations also include the results from oncology assets acquired from GSK and the estimated results from the 36.5% interest in GSK Consumer Healthcare Holdings Ltd. for the period from March 2, 2015 (the latter reported as part of income from associated companies).

Discontinued operations included in 2015 the operational results from the Vaccines influenza business, prior to its divestment to CSL Limited on July 31, 2015, as well as results from the Vaccines non-influenza business and OTC business until March 2, 2015. Operational results from the Animal Health business, which was divested on January 1, 2015, include only the divestment gain.

Discontinued operations in 2015 also included the exceptional pre-tax gain of USD 12.7 billion from the divestment of Animal Health (USD 4.6 billion) and from the transactions with GSK (USD 2.8 billion from the Vaccines non-influenza business and USD 5.9 billion arising from the contribution of Novartis OTC into GSK Consumer Healthcare Holdings Ltd.). In addition the GSK transactions resulted in USD 0.6 billion of additional transaction-related costs, which were expensed and reported in Corporate discontinued operations.

Excluded from discontinued operations are certain intellectual property rights and related other revenues of the Vaccines Division, which are retained by Novartis and are now reported under Corporate activities.

As required by IFRS, results of the discontinued operations excluded any further depreciation and amortization related to discontinued operations from the date of the portfolio transformation announcement of April 22, 2014.

Free cash flow

Novartis defines free cash flow as cash flow from operating activities and cash flow associated with the purchase or sale of property, plant and equipment, intangible, other non-current and financial assets, excluding marketable securities. Cash flows in connection with the acquisition or divestment of subsidiaries, associated companies and non-controlling interests in subsidiaries are not taken into account to determine free cash flow. The free cash flow measure, which is a non-IFRS measure, is discussed more on page 172. The following is a summary of the free cash flow:

(USD millions)	**2016**	2015	Change
Operating income from continuing operations	**8 268**	**8 977**	**– 709**
Reversal of non-cash items			
Depreciation, amortization and impairments	6 175	5 575	600
Change in provisions and other non-current liabilities	956	1 642	– 686
Other	– 264	– 96	– 168
Operating income adjusted for non-cash items	**15 135**	**16 098**	**– 963**
Interest and other financial receipts	942	1 180	– 238
Interest and other financial payments	– 878	– 669	– 209
Taxes paid	– 2 111	– 2 454	343
Payments out of provisions and other net cash movements in non-current liabilities	– 1 536	– 1 207	– 329
Change in inventory and trade receivables less trade payables	– 1 051	– 617	– 434
Change in other net current assets and other operating cash flow items	974	– 246	1 220
Cash flows from operating activities from continuing operations	**11 475**	**12 085**	**– 610**
Purchase of property, plant & equipment	– 1 862	– 2 367	505
Proceeds from sales of property, plant & equipment	161	237	– 76
Purchase of intangible assets	– 1 017	– 1 138	121
Proceeds from sales of intangible assets	847	621	226
Purchase of financial assets	– 247	– 264	17
Proceeds from sales of financial assets	247	166	81
Purchase of other non-current assets	– 149	– 82	– 67
Proceeds from sales of other non-current assets		1	– 1
Free cash flow from continuing operations	**9 455**	**9 259**	**196**
Free cash flow from discontinued operations		– 230	230
Free cash flow	**9 455**	**9 029**	**426**

In 2016, free cash flow from continuing operations amounted to USD 9.5 billion (+2 % USD) compared to USD 9.3 billion in 2015. The increase of USD 0.2 billion was mainly driven by lower net investments in property, plant and equipment.

Free cash flow for the total Group amounted to USD 9.5 billion in 2016 compared to USD 9.0 billion in 2015. The prior year included a negative free cash flow of approximately USD 0.3 billion from discontinued operations.

Liquidity, cash flow and capital resources

The following table summarizes the Group's cash flow:

(USD millions)	2016	2015	Change
Cash flows from operating activities from continuing operations	11 475	12 085	– 610
Cash flows used in investing activities from continuing operations	– 2 693	– 19 666	16 973
Cash flows used in/from operating and investing activities from discontinued operations	– 748	8 694	– 9 442
Cash flows used in financing activities	– 5 314	– 9 176	3 862
Effect of exchange rate changes on cash and cash equivalents	– 387	– 286	– 101
Net change in cash and cash equivalents	**2 333**	**– 8 349**	**10 682**
Change in marketable securities, commodities, time deposits and derivative financial instruments	– 3	– 66	63
Change in current and non-current financial debts and derivative financial instruments	– 1 871	– 1 520	– 351
Change in net debt	**459**	**– 9 935**	**10 394**
Net debt at January 1	– 16 484	– 6 549	– 9 935
Net debt at December 31	**– 16 025**	**– 16 484**	**459**

Cash flows from operating activities from continuing operations amounted to USD 11.5 billion, compared to USD 12.1 billion in 2015. The decrease of USD 0.6 billion was driven by lower operating income adjusted for non-cash items, lower hedging results and higher payments out of provisions, partially offset by dividends received from GSK Consumer Healthcare Holdings Ltd., lower cash outflows for taxes paid and net current assets and other operating cash flow items.

Cash flows used in investing activities from continuing operations amounted to USD 2.7 billion in 2016. This amount includes cash outflows of USD 1.9 billion for the purchase of property, plant and equipment, USD 1.4 billion for intangible, financial and other non-current assets, and USD 0.8 billion for acquisitions and divestments of businesses, net (including the Transcend Medical, Inc. and Selexys Pharmaceuticals Corporation acquisitions). This was offset by cash inflows of USD 1.3 billion of proceeds from the sale of non-current assets and USD 0.1 billion net proceeds from sales of marketable securities and commodities. In 2015, cash flows used in investing activities from continuing operations amounted to USD 19.7 billion, primarily due to the acquisition of the GSK oncology assets for USD 16.0 billion.

Cash flows used in investing activities from discontinued operations amounted to USD 0.7 billion in 2016 due to portfolio transformation transactions payments, including capital gains taxes. In 2015, the cash flows from investing activities from discontinued operations of USD 8.9 billion were mainly driven by net proceeds from the portfolio transformation divestments.

The cash flows used in financing activities amounted to USD 5.3 billion, compared to USD 9.2 billion in 2015. The 2016 amount includes cash outflows of USD 6.5 billion for the dividend payment and USD 0.9 billion for treasury share transactions, net. The net inflow from current and non-current financial debts of USD 2.1 billion was due to the increase in short-term borrowings of USD 1.8 billion and the issuance of two euro denominated bonds for total proceeds of USD 1.9 billion, partially offset by the repayment at maturity of a euro denominated bond of USD 1.7 billion.

The 2015 amount included mainly a cash outflow of USD 6.6 billion for the dividend payment and USD 4.5 billion for treasury share transactions, net, partially offset by a net inflow from financial debts of USD 2.0 billion.

Group net debt

Group net debt consists of:

(USD millions)	2016	2015	Change
Current financial debts and derivative financial instruments	– 5 905	– 5 604	– 301
Non-current financial debts	– 17 897	– 16 327	– 1 570
Total financial debt	**– 23 802**	**– 21 931**	**– 1 871**
Less liquidity			
Cash and cash equivalents	7 007	4 674	2 333
Marketable securities, commodities, time deposits and derivative financial instruments	770	773	– 3
Total liquidity	**7 777**	**5 447**	**2 330**
Net debt at December 31	**– 16 025**	**– 16 484**	**459**

Total non-current and current financial debt, including derivatives, amounted to USD 23.8 billion at December 31, 2016, compared to USD 21.9 billion at December 31, 2015.

Non-current financial debt increased by USD 1.6 billion to USD 17.9 billion at December 31, 2016, mainly due to the issuance of two euro denominated bonds for a total amount of USD 2.0 billion.

Current financial debt increased by USD 0.3 billion to USD 5.9 billion at December 31, 2016, from USD 5.6 billion at December 31, 2015, mainly due to higher short-term borrowings partially offset by a repayment at maturity of a euro denominated bond of USD 1.7 billion. Overall current financial debt consists of the current portion of non-current debt of USD 0.2 billion and other short-term borrowings (including derivatives and commercial

paper) of USD 5.7 billion. Group net debt decreased to USD 16.0 billion at the end of 2016 from USD 16.5 billion at the end of 2015.

Novartis has two US commercial paper programs under which it can issue up to USD 9.0 billion in the aggregate of unsecured commercial paper notes. Novartis also has a Japanese commercial paper program under which it can issue up to JPY 150 billion (approximately USD 1.3 billion) of unsecured commercial paper notes. Commercial paper notes totaling USD 3.2 billion under these three programs were outstanding as per December 31, 2016. Novartis further has a committed credit facility of USD 6.0 billion, entered into on September 23, 2015. This credit facility is provided by a syndicate of banks and is intended to be used as a backstop for the US commercial paper programs. It matures in September 2020 and was undrawn as per December 31, 2016.

The long-term credit rating for the company continues to be double-A (Moody's Aa3; Standard & Poor's AA–; Fitch AA).

We are not aware of significant demands to change our level of liquidity needed to support our normal business activities. We make use of various borrowing facilities provided by several financial institutions. We also successfully issued various bonds in previous years (including 2015 and 2016) and raised funds through our commercial paper programs. In addition, reverse repurchasing agreements are contracted and Novartis has entered into credit support agreements with various banks for derivative transactions.

An overview of our current financial debt and related interest rates is set forth below:

	December 31 USD millions	Average interest rate at year end %	Average balance during the year USD millions	Average interest rate during the year %	Maximum balance during the year USD millions
2016					
Interest-bearing accounts of associates payable on demand	1 601	0.50	1 694	0.50	1 763
Bank and other financial debt	836	8.56	1 066	6.71	1 369
Commercial paper	3 174	0.68	4 788	0.45	6 989
Current portion of non-current financial debt	178	na	881	na	1 719
Fair value of derivative financial instruments	116	na	93	na	192
Total current financial debt	**5 905**		**8 522**		**12 032**
2015					
Interest-bearing accounts of associates payable on demand	1 645	0.62	1 720	0.59	1 803
Bank and other financial debt	1 185	5.98	1 280	5.54	2 785
Commercial paper	1 085	0.62	3 545	0.19	5 686
Current portion of non-current financial debt	1 659	na	1 916	na	3 044
Fair value of derivative financial instruments	30	na	79	na	188
Total current financial debt	**5 604**		**8 540**		**13 506**

na = not applicable or available

Interest bearing accounts of associates payable on demand relate to employee deposits in CHF from the compensation of associates employed by Swiss entities (December 31, 2016 interest rate: 0.5%). Other bank and financial debt refer to usual lending and overdraft facilities.

The maturity schedule of our net debt can be found in Note 29 to the consolidated financial statements on page 242.

The following table provides a breakdown of liquidity and financial debt by currency:

Liquidity and financial debt by currency

(as of December 31)

	Liquidity in % 2016[1]	Liquidity in % 2015[1]	**Financial debt in % 2016[2]**	Financial debt in % 2015[2]
USD	77	50	66	64
EUR	9	16	13	14
CHF	5	13	13	14
JPY		1	5	5
Other	9	20	3	3
	100	100	100	100

[1] Liquidity includes cash and cash equivalents, marketable securities, commodities and time deposits.
[2] Financial debt includes non-current and current financial debt.

Contractual obligations

The following table summarizes the Group's contractual obligations and other commercial commitments, as well as the effect these obligations and commitments are expected to have on the Group's liquidity and cash flow in future periods:

	Payments due by period				
(USD millions)	Total	Less than 1 year	2–3 years	4–5 years	After 5 years
Non-current financial debt, including current portion	**18 075**	178	3 513	1 628	12 756
Operating leases	**2 897**	262	324	186	2 125
Unfunded pensions and other post-employment benefit plans	**2 242**	117	244	256	1 625
Research & Development					
Potential milestone commitments	**4 175**	385	854	2 283	653
Purchase commitments					
Property, plant & equipment	**223**	200	23		
Total contractual cash obligations	**27 612**	**1 142**	**4 958**	**4 353**	**17 159**

The Group intends to fund the R&D and purchase commitments with internally generated resources.

On December 16, 2016 Novartis entered into an agreement to acquire Ziarco Goup Limited, a privately held company focused on the development of novel treatments in dermatology. The transaction closed on January 20, 2017. The total consideration of USD 420 million consists of an initial cash payment of USD 325 million before purchase price adjustments and preliminary present value of contingent consideration of USD 95 million.

On December 20, 2016 Novartis entered into a definitive agreement for the acquisition of Encore Vision, Inc, a privately held company focused on the development of a novel treatment in presbyopia. The transaction closed on January 20, 2017. The total consideration of USD 465 million consists of an initial cash payment of USD 375 million before purchase price adjustments and preliminary present value of contingent consideration of USD 90 million.

For further details on the above two transactions see Note 2 to the Group consolidated financial statements.

Effects of currency fluctuations

We transact our business in many currencies other than the US dollar, our reporting currency.

The following provides an overview of net sales and operating expenses for our continuing operations based on IFRS values for 2016 and 2015 for currencies most important to the Group:

	2016		2015	
Currency	Net sales %	Operating expenses %	Net sales %	Operating expenses %
US dollar (USD)	38	43	40	42
Euro (EUR)	26	23	24	23
Swiss franc (CHF)	2	15	2	13
Japanese yen (JPY)	7	5	6	4
Chinese yuan (CNY)	4	3	4	3
British pound (GBP)	3	2	3	3
Canadian dollar (CAD)	3	1	3	1
Brazilian real (BRL)	2	1	2	2
Australian dollar (AUD)	2	1	2	1
Russian ruble (RUB)	1	1	1	1
Other currencies	12	5	13	7

Operating expenses in the above table include cost of goods sold, Marketing & Sales, Research & Development, General & Administration, Other income and Other expense.

We prepare our consolidated financial statements in US dollars. As a result, fluctuations in the exchange rates between the US dollar and other currencies can have a significant effect on both the Group's results of operations as well as on the reported value of our assets, liabilities and cash flows. This in turn may significantly affect reported earnings (both positively and negatively) and the comparability of period-to-period results of operations.

For purposes of our consolidated balance sheets, we translate assets and liabilities denominated in other currencies into US dollars at the prevailing market exchange rates as of the relevant balance sheet date. For purposes of the Group's consolidated income and cash flow statements, revenue, expense and cash flow items in local currencies are translated into US dollars at average exchange rates prevailing during the relevant period. As a result, even if the amounts or values of these items remain unchanged in the respective local currency, changes in exchange rates have an impact on the amounts or values of these items in our consolidated financial statements.

Because our expenditures in Swiss francs are significantly higher than our revenues in Swiss francs, volatility in the value of the Swiss franc can have a significant impact on the reported value of our earnings, assets and liabilities, and the timing and extent of such volatility can be difficult to predict. In addition, there is a risk that certain countries could take steps that could significantly impact the value of their currencies.

There is also a risk that certain countries could devalue their currency. If this occurs, then it could impact the effective prices we would be able to charge for our products and also have an adverse impact on both our consolidated

income statement and balance sheet. The Group is exposed to a potential adverse devaluation risk on its intercompany funding and total investment in certain subsidiaries operating in countries with exchange controls.

The most significant country in this respect is Venezuela, where the Group has incurred significant foreign exchange losses in 2016 and 2015.

Subsidiaries whose functional currencies have experienced a cumulative inflation rate of more than 100% over the past three years apply the rules of IAS 29 "Financial Reporting in Hyperinflationary Economies." Gains and losses incurred upon adjusting the carrying amounts of non-monetary assets and liabilities for inflation are recognized in the income statement. The subsidiaries in Venezuela restate non-monetary items in the balance sheet in line with the requirements of IAS 29.

The Group's subsidiaries in Venezuela are experiencing a significant reduction in approvals for remittance of US dollars outside the country at the exchange rate available for imports of specific goods and services of national priority, including medicines and medical supplies. As a result, in November 2016, the Group changed the exchange rate applied to translate the financial statements of its Venezuelan subsidiaries from VEF 11 per USD to the floating rate of DICOM (Sistema de Divisa Complementaria) which was VEF 658 per USD as of November 1, 2016. A corresponding USD 0.3 billion revaluation loss on the outstanding intercompany balances was recognized in the fourth quarter of 2016. Due to reserves against the intercompany balances, the net outstanding intercompany payable balance of Venezuela subsidiaries was reduced to an insignificant amount as at December 31, 2016.

The Group has an equivalent of approximately USD 2 million of cash in Venezuela in local currency (VEF), which is subject to loss of purchase power due to high inflation in the country.

The Group manages its global currency exposure by engaging in hedging transactions where management deems appropriate, after taking into account the natural hedging afforded by our global business activity. For 2016, we entered into various contracts that change in value with movements in foreign exchange rates to preserve the value of assets, commitments and expected transactions. We use forward contracts and foreign currency options to hedge. For more information on how these transactions affect our consolidated financial statements and on how foreign exchange rate exposure is managed, see Notes 1, 5, 16 and 29 to the Group's consolidated financial statements.

The following table sets forth the foreign exchange rates of the US dollar against key currencies used for foreign currency translation when preparing the Group's consolidated financial statements:

	Average for year			Year-end		
USD per unit	**2016**	2015	Change in %	**2016**	2015	Change in %
AUD	0.744	0.753	– 1	0.722	0.731	– 1
BRL	0.288	0.305	– 6	0.307	0.253	21
CAD	0.755	0.784	– 4	0.741	0.721	3
CHF	1.015	1.040	– 2	0.978	1.011	– 3
CNY	0.151	0.159	– 5	0.144	0.154	– 6
EUR	1.107	1.110	0	1.051	1.093	– 4
GBP	1.355	1.529	– 11	1.227	1.483	– 17
JPY (100)	0.922	0.826	12	0.854	0.831	3
RUB (100)	1.498	1.649	– 9	1.648	1.362	21

The following table provides a summary of the currency impact on key Group figures due to their conversion into USD, the Group's reporting currency, of the financial data from entities reporting in non-US dollars. Constant currency (cc) calculations apply the exchange rates of the prior year to the current year financial data for entities reporting in non-US dollars.

Currency impact on key figures

	Change in constant currencies % 2016	Change in USD % 2016	Percentage point currency impact 2016	Change in constant currencies % 2015	Change in USD % 2015	Percentage point currency impact 2015
Net sales from continuing operations	0	– 2	– 2	5	– 5	– 10
Operating income from continuing operations	– 3	– 8	– 5	– 2	– 19	– 17
Net income from continuing operations	1	– 5	– 6	– 18	– 34	– 16
Core operating income from continuing operations	– 2	– 6	– 4	10	– 5	– 15
Core net income from continuing operations	– 3	– 6	– 3	9	– 5	– 14

For additional information on the effects of currency fluctuations, see Note 29 to the Group's consolidated financial statements.

Condensed consolidated balance sheets

(USD millions)	**Dec 31, 2016**	Dec 31, 2015	Change
Assets			
Property, plant & equipment	15 641	15 982	– 341
Goodwill	30 980	31 174	– 194
Intangible assets other than goodwill	31 340	34 217	– 2 877
Financial and other non-current assets	27 232	27 338	– 106
Total non-current assets	**105 193**	**108 711**	**– 3 518**
Inventories	6 255	6 226	29
Trade receivables	8 202	8 180	22
Other current assets	2 697	2 992	– 295
Cash, marketable securities, commodities, time deposits and derivative financial instruments	7 777	5 447	2 330
Total current assets	**24 931**	**22 845**	**2 086**
Total assets	**130 124**	**131 556**	**– 1 432**
Equity and liabilities			
Total equity	**74 891**	**77 122**	**– 2 231**
Financial debts	17 897	16 327	1 570
Other non-current liabilities	15 127	14 399	728
Total non-current liabilities	**33 024**	**30 726**	**2 298**
Trade payables	4 873	5 668	– 795
Financial debts and derivatives	5 905	5 604	301
Other current liabilities	11 431	12 436	– 1 005
Total current liabilities	**22 209**	**23 708**	**– 1 499**
Total liabilities	**55 233**	**54 434**	**799**
Total equity and liabilities	**130 124**	**131 556**	**– 1 432**

Total non-current assets of USD 105.2 billion at December 31, 2016 decreased by USD 3.5 billion compared to December 31, 2015.

Intangible assets other than goodwill decreased by USD 2.9 billion, mainly due to amortization and impairment charges totaling USD 4.5 billion, and unfavorable currency translation adjustments of USD 0.5 billion, partially offset by the impact of business combinations and additions totaling USD 2.1 billion. Property, plant and equipment decreased by 0.3 billion, mainly due to depreciation of USD 1.5 billion and unfavorable currency translation adjustments of USD 0.5 billion, partially offset by additions of USD 1.8 billion.

Goodwill decreased by USD 0.2 billion to USD 31.0 billion, mainly on account of currency translation adjustments.

Financial and other non-current assets decreased by USD 0.1 billion to USD 27.2 billion. This includes: investments in associated companies, which decreased by USD 1.0 billion to USD 14.3 billion, mainly on account of currency translation adjustments; deferred tax assets, which increased by USD 1.1 billion to USD 10.0 billion, mainly on intangible assets, inventories and pension obligations, and financial assets and other non-current assets which decreased by USD 0.2 billion to USD 2.9 billion.

Total current assets increased by USD 2.1 billion to USD 24.9 billion at December 31, 2016, mainly due to an increase in cash and cash equivalents, marketable securities, commodities and derivatives of USD 2.3 billion, partially offset by a decrease in other current assets of USD 0.3 billon. Inventories and trade receivables were broadly in line with the prior year.

Based on our current incurred loss provisioning approach, we consider that our doubtful debt provisions are adequate. However, we intend to continue to monitor the level of trade receivables in Greece, Italy, Portugal, Spain, Brazil, Russia and Saudi Arabia. Should there be a substantial deterioration in our economic exposure with respect to those countries, we may increase our level of provisions by moving to an expected loss provisioning approach or may change the terms of trade on which we operate.

The majority of the outstanding trade receivables from these closely monitored countries are due directly from local governments or from government-funded entities except for Russia, which are due from private entities. The gross trade receivables from these countries at December 31, 2016 amount to USD 1.5 billion (2015: USD 1.6 billion), of which USD 82 million are past due for more than one year (2015: USD 80 million) and for which provisions of USD 62 million have been recorded (2015: USD 56 million). At December 31, 2016, amounts past due for more than one year are not significant in any of these countries.

The following table provides an overview of our aging analysis of our trade receivables as of December 31, 2016 and 2015:

(USD millions)	2016	2015
Not overdue	7 386	7 318
Past due for not more than one month	262	265
Past due for more than one month but less than three months	223	255
Past due for more than three months but less than six months	185	193
Past due for more than six months but less than one year	145	156
Past due for more than one year	163	135
Provisions for doubtful trade receivables	– 162	– 142
Total trade receivables, net	**8 202**	**8 180**

There is also a risk that certain countries could devalue their currency. Currency exposures are described in more detail in paragraph "Effects of currency fluctuation" on page 158.

Trade payables and other current liabilities decreased by USD 1.8 billion to USD 16.3 billion, compared to USD 18.1 billion at December 31, 2015, due to a decrease in other current liabilities of USD 1.0 billion and a decrease in trade payables of USD 0.8 billion.

Current income tax liabilities decreased by USD 0.1 billion to USD 1.6 billion. While there is some uncertainty about the final taxes to be assessed in our major countries, we believe that our estimated amounts for current income tax liabilities, including any amounts related to any uncertain tax positions, are appropriate based on currently known facts and circumstances.

In our key countries, Switzerland and the US, assessments have been agreed by the tax authorities up to 2014 in Switzerland and in the US up to 2012, with the exception of one open US position related to the 2007 and one for the 2010 tax filings.

Other non-current liabilities amounted to USD 15.1 billion at December 31, 2016, compared to USD 14.4 billion at December 31, 2015. The increase of USD 0.7 billion was primarily due to an increase in the pension liability of USD 0.5 billion, mainly resulting from a decrease in the actuarial discount rates used to calculate the present value of the benefit obligation and an increase in deferred tax liability of USD 0.3 billion.

Other non-current liabilities include deferred tax liabilities of USD 6.7 billion, provisions and other non-current liabilities of USD 8.5 billion.

Novartis believes that its total provisions are adequate based upon currently available information. However, given the inherent difficulties in estimating liabilities in this area, Novartis may incur additional costs beyond the amounts provided. Management believes that such additional amounts, if any, would not be material to the Group's financial condition but could be material to the results of operations or cash flows in a given period.

The Group's equity decreased by USD 2.2 billion to USD 74.9 billion at December 31, 2016, compared to USD 77.1 billion at December 31, 2015. The decrease was mainly on account of unfavorable currency translation differences of USD 2.4 billion and net actuarial losses from defined benefit plans of USD 0.5 billion, partially offset by the Novartis share of other comprehensive income recognized by associated companies of USD 0.7 billion . The USD 6.5 billion dividend payment was offset by the net income of USD 6.7 billion.

The Group's liquidity amounted to USD 7.8 billion at December 31, 2016 compared to USD 5.4 billion at December 31, 2015, and net debt decreased to USD 16.0 billion at December 31, 2016 compared to USD 16.5 billion at December 31, 2015. The debt/equity ratio increased to 0.32:1 at December 31, 2016 compared to 0.28:1 at December 31, 2015.

Summary of equity movements attributable to Novartis AG shareholders

	Number of outstanding shares (in millions)			Issued share capital and reserves attributable to Novartis AG shareholders		
	2016	2015	Change	**2016 USD millions**	2015 USD millions	Change USD millions
Balance at beginning of year	**2 373.9**	**2 398.6**	**– 24.7**	**77 046**	**70 766**	**6 280**
Shares acquired to be held in Group Treasury		– 9.6	9.6		– 897	897
Shares acquired to be canceled	– 10.3	– 49.9	39.6	– 784	– 4 805	4 021
Other share purchases	– 2.6	– 4.1	1.5	– 208	– 417	209
Exercise of options and employee transactions	4.1	27.0	– 22.9	214	1 592	– 1 378
Equity-based compensation	9.0	11.9	– 2.9	664	815	– 151
Decrease of treasury share repurchase obligation under a share buyback trading plan					658	– 658
Dividends				– 6 475	– 6 643	168
Net income of the year attributable to shareholders of Novartis AG				6 712	17 783	– 11 071
Impact of change in ownership of consolidated entities				– 7		– 7
Other comprehensive income attributable to shareholders of Novartis AG				– 2 330	– 1 806	– 524
Balance at end of year	**2 374.1**	2 373.9	**0.2**	**74 832**	**77 046**	**– 2 214**

During 2016, 13.1 million treasury shares were delivered as a result of options being exercised and physical share deliveries related to equity-based participation plans (2015: 38.9 million shares). Novartis repurchased 10.3 million shares on the SIX Swiss Exchange second trading line under the CHF 10 billion share buyback approved at the Annual General Meeting (AGM) in 2016, to offset the dilutive impact from equity-based participation plans (2015: 49.9 million shares under the USD 5 billion share buyback announced in November 2013, which was completed in November 2015). In addition, 2.6 million shares were acquired from employees, which were previously granted to them under the respective programs (2015: 4.1 million). No shares were repurchased on the SIX Swiss Exchange first trading line in 2016 (2015: 9.6 million). With these transactions, the total number of shares outstanding was increased by 0.2 million shares in 2016 (2015: reduction of 24.7 million shares).

Critical accounting policies and estimates

Our significant accounting policies are set out in Note 1 to the Group's consolidated financial statements, which are prepared in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB).

Given the uncertainties inherent in our business activities, we must make certain estimates and assumptions that require difficult, subjective and complex judgments. Because of uncertainties inherent in such judgments, actual outcomes and results may differ from our assumptions and estimates, which could materially affect the Group's consolidated financial statements. Application of the following accounting policies requires certain assumptions and estimates that have the potential for the most significant impact on our consolidated financial statements.

Deductions from revenues

As is typical in the pharmaceutical industry, our gross sales are subject to various deductions which are primarily composed of rebates and discounts to retail customers, government agencies, wholesalers, health insurance companies and managed healthcare organizations. These deductions represent estimates of the related obligations, requiring the use of judgement when estimating the effect of these sales deductions on gross sales for a reporting period. These adjustments are deducted from gross sales to arrive at net sales.

The following summarizes the nature of some of these deductions and how the deduction is estimated. After recording these, net sales represent our best estimate of the cash that we expect to ultimately collect. The US market has the most complex arrangements related to revenue deductions.

United States specific healthcare plans and program rebates

The United States Medicaid Drug Rebate Program is administered by State governments using State and Federal funds to provide assistance to certain vulnerable and needy individuals and families. Calculating the rebates to be paid related to this program involves interpreting relevant regulations, which are subject to challenge or change in interpretative guidance by government authorities. Provisions for estimating Medicaid rebates are calculated using a combination of historical experience, product and population growth, product pricing and the mix of contracts and specific terms in the individual State agreements.

The United States Federal Medicare Program, which funds healthcare benefits to individuals age 65 or older and certain disabilities, provides prescription drug benefits under Part D section of the program. This benefit is provided and administrated through private prescription drug plans. Provisions for estimating Medicare Part D rebates are calculated based on the terms of individual plan agreements, product sales and population growth, product pricing and the mix of contracts.

We offer rebates to key managed healthcare and private plans in an effort to sustain and increase sales of our products. These programs provide a rebate after the plans have demonstrated they have met all terms and conditions set forth in their contract with us. These rebates are estimated based on the terms of individual agreements, historical experience, product pricing, and projected product growth rates.

These provisions are adjusted based on established processes and experiences from filing data with individual states and plans. There is often a time lag of several months between us recording the revenue deductions and our final accounting for them.

Non-United States specific healthcare plans and program rebates

In certain countries other than the US, we provide rebates to governments and other entities. These rebates are often mandated by laws or government regulations.

In several countries, especially in Europe and Australia, we enter into innovative pay-for-performance arrangements with certain healthcare providers. Under these agreements, we may be required to make refunds to the healthcare providers or to provide additional medicines free of charge if anticipated treatment outcomes do not meet predefined targets. Potential refunds and the delivery of additional medicines at no cost are estimated and recorded as a deduction of revenue at the time the related revenues are recorded. Estimates are based on historical experience and clinical data. In cases where historical experience and clinical data are not sufficient for a reliable estimation of the outcome, revenue recognition would be deferred until such history would be available. In addition, we offer global patient assistance programs.

There is often a time lag of several months between us recording the revenue deductions and our final accounting for them.

Non-healthcare plans and program rebates, returns and other deductions

We offer rebates to purchasing organizations and other direct and indirect customers to sustain and increase market share for our products. Since rebates are contractually agreed upon, the related provisions are estimated based on the terms of the individual agreements, historical experience, and projected product growth rates.

Charge-backs occur where our subsidiaries have arrangements with indirect customers to sell products at prices that are lower than the price charged to wholesalers. A charge-back represents the difference between the invoice price to the wholesaler and the indirect customer's contract price. We account for vendor charge-backs by reducing revenue for the estimate of charge-backs attributable to a sale transaction. Provisions for estimated charge-backs are calculated using a combination of factors such as historical experience, product growth rates, payments, product pricing, level of inventory in the distribution channel, the terms of individual agreements and our estimate of the claims processing time lag.

When we sell a product providing a customer the right to return it, we record a provision for estimated sales returns based on our sales return policy and historical return rates. Other factors considered include actual product recalls, expected marketplace changes, the remaining shelf life of the product, and the expected entry of generic products. In 2016, sales returns amounted to approximately 1% of gross product sales. If sufficient experience is not available, sales are only recorded based on evidence of product consumption or when the right of return has expired.

We enter into distribution service agreements with major wholesalers, which provide a financial disincentive for the wholesalers to purchase product quantities in excess of current customer demand. Where possible, we adjust shipping patterns for our products to maintain wholesalers' inventory levels consistent with underlying patient demand.

We offer cash discounts to customers to encourage prompt payment. Cash discounts are estimated and accrued at the time of invoicing and are deducted from revenue.

Following a decrease in the price of a product, we generally grant customers a "shelf stock adjustment" for their existing inventory for the relevant product. Provisions for shelf stock adjustments, which are primarily relevant within the Sandoz Division, are determined at the time of the price decline or at the point of sale, if the impact of a price decline on the products sold can be reasonably estimated based on the customer's inventory levels of the relevant product.

Other sales discounts, such as consumer coupons and co-pay discount cards, are offered in some markets. The estimated amounts of these discounts are recorded at the time of sale, or when the coupons are issued, and are estimated utilizing historical experience and the specific terms for each program. If a discount for a probable future transaction is offered as part of a sales transaction then an appropriate portion of revenue is deferred to cover this estimated obligation.

We adjust provisions for revenue deductions periodically to reflect actual experience. To evaluate the adequacy of provision balances, we use internal and external estimates of the inventory in transit, the level of inventory in the distribution and retail channels actual claims data received and the time lag for processing rebate claims. External data sources include reports from wholesalers and third-party market data purchased by Novartis.

The following table shows the worldwide extent of our revenue deductions provisions and related payment experiences for the Innovative Medicines, Sandoz and Alcon Divisions:

Provisions for deductions from revenue

				Income statement charge			
(USD millions)	Revenue deductions provisions at January 1	Effect of currency translation and business combinations	Payments/ utilizations	Adjustments of prior years	Current year	Change in provisions offset against gross trade receivables	Revenue deductions provisions at December 31
2016							
US-specific healthcare plans and program rebates	1 165		– 3 203	7	3 492		1 461
Non-US-specific healthcare plans and program rebates	1 024	– 31	– 1 844	– 26	1 883	14	1 020
Non-healthcare plans and program-related rebates, returns and other deductions	1 601	– 19	– 11 142	– 117	11 383	– 4	1 702
Total continuing operations 2016	**3 790**	**– 50**	**– 16 189**	**– 136**	**16 758**	**10**	**4 183**
2015							
US-specific healthcare plans and program rebates	1 097		– 2 823	– 90	2 981		1 165
Non-US-specific healthcare plans and program rebates	1 015	– 109	– 1 716	– 3	1 846	– 9	1 024
Non-healthcare plans and program-related rebates, returns and other deductions	1 421	– 69	– 10 679	– 124	10 993	59	1 601
Total continuing operations 2015	**3 533**	**– 178**	**– 15 218**	**– 217**	**15 820**	**50**	**3 790**

The table below shows the gross to net sales reconciliation for our Innovative Medicines Division:

Gross to net sales reconciliation

	Income statement charge			
	Charged through revenue deduction provisions USD millions	Charged directly without being recorded in revenue deduction provisions USD millions	Total USD millions	In % of gross sales
2016				
Innovative Medicines gross sales subject to deductions			**42 630**	**100.0**
US-specific healthcare plans and program rebates	– 3 051		– 3 051	– 7.2
Non-US-specific healthcare plans and program rebates	– 1 352	– 885	– 2 237	– 5.2
Non-healthcare plans and program-related rebates, returns and other deductions	– 2 736	– 2 044	– 4 780	– 11.2
Total Innovative Medicines gross to net sales adjustments	**– 7 139**	**– 2 929**	**– 10 068**	**– 23.6**
Innovative Medicines net sales 2016			**32 562**	**76.4**
2015[1]				
Innovative Medicines gross sales subject to deductions			**42 460**	**100.0**
US-specific healthcare plans and program rebates	– 2 533		– 2 533	– 6.0
Non-US-specific healthcare plans and program rebates	– 1 238	– 762	– 2 000	– 4.7
Non-healthcare plans and program-related rebates, returns and other deductions	– 2 831	– 1 751	– 4 582	– 10.8
Total Innovative Medicines gross to net sales adjustments	**– 6 602**	**– 2 513**	**– 9 115**	**– 21.5**
Innovative Medicines net sales 2015			**33 345**	**78.5**

[1] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016.

Surgical equipment revenue

Surgical equipment is often sold together with other products and services under a single contract. The total consideration is allocated to the separate elements based on their relative fair values. Revenue is recognized once the recognition criteria have been met for each element of the contract.

For surgical equipment, in addition to cash and instalment sales, revenue is recognized under finance and operating lease arrangements. Arrangements in which Novartis transfers substantially all the risks and rewards incidental to ownership to the customer are treated as finance lease arrangements. Revenue from finance lease arrangements is recognized at amounts equal to the fair values of the equipment, which approximate the present values of the minimum lease payments under the arrangements. As interest rates embedded in lease arrangements are approximately market rates, revenue under finance lease arrangements is comparable to revenue for outright sales. Finance income for arrangements in excess of twelve months is deferred and subsequently recognized based on a pattern that approximates the use of the effective interest method and recorded in "Other income". Operating lease revenue for equipment rentals is recognized on a straight-line basis over the lease term.

Impairment of goodwill, intangible assets and property, plant and equipment

We review long-lived intangible assets and property, plant and equipment for impairment whenever events or changes in circumstance indicate that the asset's balance sheet carrying amount may not be recoverable. Goodwill, the Alcon brand-name and other currently not amortized intangible assets are reviewed for impairment at least annually.

An asset is generally considered impaired when its balance sheet carrying amount exceeds its estimated recoverable amount, which is defined as the higher of its fair value less costs of disposal and its value in use. Usually, Novartis adopts the fair value less costs of disposal method for its impairment evaluation. In most cases no directly observable market inputs are available to measure the fair value less costs of disposal. Therefore, an estimate of fair value less costs of disposal is derived indirectly and is based on net present value techniques utilizing post-tax cash flows and discount rates. In the limited cases where the value in use method is applied, net present value techniques are utilized using pre-tax cash flows and discount rates.

Fair value reflects estimates of assumptions that market participants would be expected to use when pricing the asset and for this purpose management considers the range of economic conditions that are expected to

exist over the remaining useful life of the asset. The estimates used in calculating net present values are highly sensitive, and depend on assumptions specific to the nature of the Group's activities with regard to:
— amount and timing of projected future cash flows;
— future tax rates;
— behavior of competitors (launch of competing products, marketing initiatives, etc.); and
— appropriate discount rate.

Due to the above factors and those further described in Note 1, actual cash flows and values could vary significantly from forecasted future cash flows and related values derived using discounting techniques.

The recoverable amount of the grouping of cash generating units to which goodwill and indefinite life intangible assets are allocated is based on fair value less costs of disposal. The valuations are derived from applying discounted future cash flows based on key assumptions, including the terminal growth rate and discount rate. For additional information see Note 11 starting on page 207.

In 2016, intangible asset impairment charges for continuing operations of USD 591 million were recognized, of which USD 522 million were recorded in the Innovative Medicines Division and USD 65 million in the Sandoz Division and USD 4 million in the Alcon Division.

In 2015, intangible asset impairment charges of continuing operations amounted to USD 206 million (USD 178 million in the Innovative Medicines Division and USD 27 million in the Sandoz Division and USD 1 million in the Alcon Division).

In 2016, there was no reversal of prior year impairment charges (2015: USD 40 million).

Goodwill and other intangible assets represent a significant part of our consolidated balance sheet, primarily due to acquisitions. Although no significant additional impairments are currently anticipated, impairment evaluation could lead to material impairment charges in the future. For more information, see Note 11 to the Group's consolidated financial statements.

Additionally, net impairment charges for property, plant and equipment from continuing operations during 2016 amounted to USD 102 million (2015: USD 80 million).

Trade receivables

Trade receivables are initially recognized at their invoiced amounts including any related sales taxes less adjustments for estimated revenue deductions such as rebates, charge backs and cash discounts.

Provisions for doubtful trade receivables are established once there is an indication that it is likely that a loss will be incurred. These provisions represent the difference between the trade receivable's carrying amount in the consolidated balance sheet and the estimated net collectible amount. Significant financial difficulties of a customer, such as probability of bankruptcy, financial reorganization, default or delinquency in payments are considered indicators that recovery of the trade receivable is doubtful. Trade receivable balances include sales to drug wholesalers, retailers, private health systems, government agencies, managed care providers, pharmacy benefit managers and government-supported healthcare systems. Novartis continues to monitor sovereign debt issues and economic conditions in Greece, Italy, Portugal, Spain and other countries, and evaluates trade receivables in these countries for potential collection risks. Substantially all of the trade receivables overdue from such countries are due directly from local governments or from government-funded entities. Deteriorating credit and economic conditions and other factors in these countries have resulted in, and may continue to result in an increase in the average length of time that it takes to collect these trade receivables and may require Novartis to re-evaluate the collectability of these trade receivables in future periods.

Contingent consideration

In a business combination or divestment of a business, it is necessary to recognize contingent future payments to previous or from new owners representing contractually defined potential amounts as a liability or asset. Usually for Novartis these are linked to milestone or royalty payments related to certain assets and are recognized as a financial liability or asset at their fair value which is then re-measured at each subsequent reporting date. These estimations typically depend on factors such as technical milestones or market performance and are adjusted for the probability of their likelihood of payment and if material, appropriately discounted to reflect the impact of time. Changes in the fair value of contingent consideration liabilities are recognized in the consolidated income statement in "Cost of goods sold" for currently marketed products and in "Research & Development" for In-Process Research and Development (IPR&D). Changes in contingent consideration assets are recognized in ""Other revenue", Other income" or "Other expense", depending on its nature. The effect of unwinding the discount over time is recognized in "Interest expense" in the consolidated income statement. Novartis does not recognize contingent consideration associated with asset purchases outside of a business combination that are conditional upon future events which are within its control until such time as there is an unconditional obligation. If the contingent consideration is outside the control of Novartis, a liability is recognized once it becomes probable that the contingent consideration will become due. In both cases, if appropriate, a corresponding asset is recorded.

Impairment of associated companies accounted for at equity

Novartis considers investments in associated companies for impairment evaluation whenever indicators are noted for example when there is a quoted share price indicating a fair value less than the per-share balance sheet carrying value for the investment.

"Marketable securities" are financial assets recorded in Corporate and consisting principally of quoted equity and quoted debt securities as well as fund investments which are principally traded in liquid markets. Marketable securities that are held for long-term strategic purposes and typically recorded in the Divisions are classified as non-current financial assets. They include equity securities and fund investments.

Retirement and other post-employment benefit plans

We sponsor pension and other post-employment benefit plans in various forms that cover a significant portion of our current and former associates. For post-employment plans with defined benefit obligations, we are required to make significant assumptions and estimates about future events in calculating the expense and the present value of the liability related to these plans. These include assumptions about the interest rates we apply to estimate future defined benefit obligations and net periodic pension expense as well as rates of future pension increases. In addition, our actuarial consultants provide our management with historical statistical information such as withdrawal and mortality rates in connection with these estimates.

Assumptions and estimates used by the Group may differ materially from the actual results we experience due to changing market and economic conditions, higher or lower withdrawal rates, and longer or shorter life spans of participants among other factors. For example, in 2016, a decrease in the interest rate we apply in determining the present value of the defined benefit obligations of one quarter of one percent would have increased our year-end defined benefit pension obligation for plans in Switzerland, US, UK, Germany and Japan, which represent 95% of the Group total defined benefit pension obligation, by approximately USD 0.8 billion. Similarly, if the 2016 interest rate had been one quarter of one percentage point lower than actually assumed, net periodic pension cost for pension plans in these countries, which represent about 92% of the Group's total net periodic pension cost for pension plans, would have increased by approximately USD 27 million. Depending on events, such differences could have a material effect on our total equity. For more information on obligations under retirement and other post-employment benefit plans and underlying actuarial assumptions, see Note 25 to the Group's consolidated financial statements.

Provisions and Contingencies

A number of Group companies are involved in various government investigations and legal proceedings (intellectual property, sales and marketing practices, product liability, commercial, employment and wrongful discharge, environmental claims, etc.) arising out of the normal conduct of their businesses. For more information, see Note 20 and Note 28 in the Group's consolidated financial statements.

We record provisions for legal proceedings when it is probable that a liability has been incurred and the amount can be reliably estimated. These provisions are adjusted periodically as assessments change or additional information becomes available. For significant product liability cases the provision is actuarially determined based on factors such as past experience, amount and number of claims reported, and estimates of claims incurred but not yet reported.

Provisions are recorded for environmental remediation costs when expenditure on remedial work is probable and the cost can be reliably estimated. Remediation costs are provided for under "Non-current liabilities" in the Group's consolidated balance sheet.

Provisions relating to estimated future expenditure for liabilities do not usually reflect any insurance or other claims or recoveries, since these are only recognized as assets when the amount is reasonably estimable and collection is virtually certain.

Research & Development

Internal Research & Development costs are fully charged to the consolidated income statement in the period in which they are incurred. We consider that regulatory and other uncertainties inherent in the development of new products preclude the capitalization of internal development expenses as an intangible asset usually until marketing approval from the regulatory authority is obtained in a relevant major market, such as for the US, the EU, Switzerland or Japan.

Healthcare contributions

In many countries our subsidiaries are required to make contributions to the countries' healthcare costs as part of programs other than the ones mentioned above under deductions from revenues. The amounts to be paid depend on various criteria such as the subsidiary's market share or sales volume compared to certain targets. Considerable judgment is required in estimating these contributions as not all data is available when the estimates need to be made.

The largest of these healthcare contributions relates to the US Healthcare Reform fee, which was introduced in 2011. This fee is an annual levy to be paid by US pharmaceutical companies, including various Novartis subsidiaries, based on each company's qualifying sales as a percentage of the prior year's government-funded program sales. This pharmaceutical fee levy is recognized in "Other expense".

On July 25, 2014, the US Department of the Treasury and the US Internal Revenue Service issued final guidance on this pharmaceutical fee levy which stipulated that instead of a liability being estimated and recognized immediately with the first qualifying sale in the following fee year, as had been industry practice, the levy is owed in the year in which the sales occur.

As a result of this final guidance, in 2014, "Other expense" includes the recurring non-tax deductible annual expense of approximately USD 200 million for the 2014 pharmaceutical fee levy, as well as the non-tax deductible expense of USD 204 million for the 2013 pharmaceutical fee levy. USD 204 million of this charge has been considered as an additional exceptional charge in 2014 since it results from the change in timing of recognition of the pharmaceutical fee levy as required by the final guidance.

In addition, effective 2013, the US government also implemented a medical device sales tax which is levied on the Alcon Division's US sales of products which are considered surgical devices under the law. This medical device tax is initially included in the cost of inventory as, for Alcon, the tax is usually levied on intercompany sales. It is expensed as cost of goods sold when the inventory is sold to third parties.

Taxes

We prepare and file our tax returns based on an interpretation of tax laws and regulations, and record estimates based on these judgments and interpretations. Our tax returns are subject to examination by the competent taxing authorities, which may result in an assessment being made requiring payments of additional tax, interest or penalties. Since Novartis uses its intellectual property globally to deliver goods and services, the transfer prices within the Group as well as arrangements between subsidiaries to finance research & development and other activities may be challenged by the national tax authorities in any of the jurisdictions in which Novartis operates. Therefore, inherent uncertainties exist in our estimates of our tax positions, but we believe that our estimated amounts for current and deferred tax assets or liabilities, including any amounts related to any uncertain tax positions, are appropriate based on currently known facts and circumstances.

New accounting pronouncements

See Note 1 to the Group's consolidated financial statements.

Internal control over financial reporting

The Group's management has assessed the effectiveness of internal control over financial reporting. The Group's independent statutory auditor also issued an opinion on the effectiveness of internal control over financial reporting. Both the Group's management and its external auditors concluded that the Group maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016.

Factors affecting results of operations

We believe that our strategy, which is anchored in our company's tradition of leadership in innovation, positions us well to take advantage of trends shaping the future of the industry. These trends range from advances in science and technology that are opening new frontiers for research and development (R&D), to the growing and graying of populations that are boosting demand for chronic disease treatments (see page 15).

At the same time, these trends contribute to certain risks and uncertainties in our operations. Some of them are inherent to the industry, and others are specific to Novartis. Anticipating and managing these risks can influence our ability to deliver strong financial performance and meet the needs of patients, healthcare providers, payors, regulators and shareholders.

Approach to risk management

The Risk Committee of the Board ensures the Group has implemented an appropriate and effective risk management system and process. It reviews with management and internal audit the identification, prioritization and management of the risks, the accountabilities and roles of the functions involved with risk management, the risk portfolio and the related actions implemented by management. The Risk Committee informs the Board of Directors on a periodic basis.

The Group Risk Office coordinates and aligns the risk management processes, and reports to the Risk Committee on a regular basis on risk assessment and risk management. Organizational and process measures have been designed to identify and mitigate risks at an early stage. Organizationally, the responsibility for risk assessment and management is allocated to the divisions, organizational units, and functions, with specialized Corporate functions, such as Group Finance, Group Legal, Group Quality Assurance, Corporate Health, Safety and Environment, Business Continuity Management, Integrity and Compliance and the Business Practices Office, providing support and controlling the effectiveness of the risk management in these respective areas.

Financial risk management is described in more detail in Note 29 to the Group consolidated financial statements.

Risk factors

Loss of exclusivity for patented products

Pharmaceutical companies routinely face generic competition when their products lose patent or other intellectual property protection, and Novartis is no exception. Major products of our Innovative Medicines and Alcon Divisions, as well as certain products of our Sandoz Division, are protected by patent or other intellectual prop-

erty rights – allowing us to exclusively market those products. The loss of exclusivity has had, and will continue to have, an adverse effect on our results. In 2016, the impact of generic competition on our net sales amounted to USD 2.4 billion.

Some of our best-selling products have started to, or are expected to, face considerable competition due to the expiration of patent or other intellectual property protection. For example, we faced generic competition for *Gleevec/Glivec* in the US, Japan and certain EU countries for most of 2016. In the remaining EU countries, certain of our *Glivec* intellectual property rights expired in December 2016, and generic competition there has begun. Looking forward, certain intellectual property protecting *Afinitor* and *Gilenya* will expire in 2018, 2019 and 2020. In addition, some of the patents protecting these products are being challenged in the US, raising the possibility of an earlier entry of generic competition.

To counter the impact of patent expirations, we continuously invest in R&D to rejuvenate our portfolio. For example, in 2016, we invested 18.6% of total net sales in R&D. One measure of the output of our efforts is the performance of our growth products – products launched in a key market (EU, US, Japan) in 2011 or later, or products with exclusivity in key markets until at least 2020 (except Sandoz, which includes only products launched in the last 24 months). These products accounted for 35% of total net sales in 2016, up 20% (USD) from the previous year.

Ability to deliver new products

Our ability to maintain and grow our business – and to replace revenue and income lost to generic and other competition – depends in part on the success of our R&D activities in identifying and developing new treatments that address unmet medical needs, are accepted by patients and physicians, and are reimbursed by payors.

Developing new healthcare products and bringing them to market is a costly, lengthy and uncertain process. R&D for a new product in our Innovative Medicines Division can take 15 years or more, from discovery to commercial launch. With time limits on intellectual property protections, the longer it takes to develop a product, the less time we may have to recoup our costs. During each stage of development, there is a significant risk that we will encounter obstacles. They may cause a delay or add substantial expense, limit the potential for commercial success, or force us to abandon a product in which we have invested substantial amounts of time and money.

In addition, as healthcare costs continue to rise, governments and payors around the world are increasingly focused on health outcomes, rewarding new products that represent truly breakthrough innovation versus those that offer an incremental benefit over other products in the same therapeutic class. This has led to requests for more clinical trial data, for the inclusion of more patients in clinical trials, and for more detailed analyses of the trials. As a result, the already lengthy and expensive process of obtaining regulatory approvals and reimbursement for pharmaceutical products has become even more challenging.

Our Sandoz Division faces similar challenges, particularly in the development of biosimilars. While Sandoz was a pioneer in introducing biosimilars to the European market in 2006, and was the first company to win approval for a biosimilar under the new regulatory pathway in the US in 2015, many countries still lack fully developed regulatory frameworks for the development and approval of biosimilars. Further delays in establishing regulatory frameworks, or any other difficulties that may arise in the development or marketing of biosimilars, could put at risk the significant investments that Sandoz has made, and will continue to make, in this area.

Our Alcon Division faces medical device development and approval processes that are often similarly difficult. As part of its growth plan, Alcon is taking steps to accelerate innovation. It has started to see the results of its efforts, with the approval and launch in 2016 of two new intraocular lenses, *PanOptix* and *UltraSert*, as well as a multifocal version of *Dailies Total1*. But there is no certainty that Alcon will continue to be successful in these efforts, and if it is not, there could be a material adverse effect on the success of the Alcon Division, and on the Group as a whole.

In spite of our significant investments, there can be no guarantee that our R&D activities will produce commercially viable new products that will enable us to grow our business and replace revenue and income lost to competition.

Commercial success of key growth products

Our ability to grow depends not only on our pipeline delivery, but also on our commercial success, particularly with respect to our growth products, which we consider to be an indicator of our ability to renew our portfolio. The commercial success of these products could be impacted at any time by a number of factors, including new competitors, changes in doctors' prescribing habits, pricing pressure, manufacturing issues, or loss of intellectual property protection. In addition, our revenue could be significantly impacted by the timing and rate of commercial acceptance of key new products.

All of our businesses face intense competition from new products and scientific advances from competitors. Physicians, patients and payors may choose competitor products instead of ours if they perceive them to be better in terms of efficacy, safety, cost or convenience. In our Oncology business, for example, *Afinitor* saw sales decline in 2016 due to new treatment options in advanced breast cancer and renal cell carcinoma in the US. Sales increases for *Afinitor* in other indications, such as neuroendocrine tumors of gastrointestinal or lung origin, were unable to compensate.

Our Alcon Division also faced significant competitive pressure in 2016. Alcon is implementing a growth plan to counteract this pressure, including steps such as accelerating innovation and increasing investments in new product launches. While we are starting to see signs of progress, such as contact lens market share gains in certain European countries where we started investing in direct-to-consumer advertising, there is no certainty that our actions and investments will be sufficient to offset competition and return the division to growth. Should

our efforts fail to accomplish their goals, or fail to do so in a timely manner, it could have a material adverse impact on our business, financial condition, or results of operations beyond the near term, as well.

Pricing and reimbursement
Around the world, governments and payors continue to struggle with rising healthcare costs as aging populations contribute to increased prevalence of chronic diseases. There have also been examples, particularly in the US, of significant controversies about prices for pharmaceuticals that some members of the public have considered excessive. These factors have intensified the pressures we face regarding the prices we charge for our drugs, and on our ability to establish satisfactory rates of reimbursement for our products by governments, insurers and other payors.

We expect scrutiny to continue in 2017 and following years as governments and insurers around the world strive to reduce healthcare costs through steps such as restricting access to higher priced new medicines, increasing coinsurance or copays owed by patients for medicines, increasing the use of generics, and imposing price cuts. In this environment, we believe it is more important than ever to demonstrate the value that true innovation brings to the healthcare system.

To manage these pressures, we are investing in real-world data and analytics to provide additional evidence of the health benefits of our products, exploring new technologies and patient management services, and partnering with payors to develop and scale outcomes-based commercial models. For example, we are working with customers on flexible pricing approaches where we are fully compensated only if a drug succeeds in meeting certain performance targets.

Business practices
In recent years, there has been a trend of increasing government investigations and litigation against companies operating in our industry, including in the US and other countries. We are obligated to comply with the laws of all countries in which we operate, as well as any new requirements that may be imposed upon us. But beyond legal requirements, we strive to meet evolving public expectations for ethical behavior. We have a significant global compliance program in place, and devote substantial time and resources to ensure that our business is conducted in a legal and publicly acceptable manner. Despite our efforts, any failure to comply with the law could lead to substantial liabilities that may not be covered by insurance and could affect our business and reputation.

Governments and regulatory authorities worldwide are also increasingly challenging practices previously considered to be legal and compliant. For example, sponsoring doctors to attend medical conferences has long been used by pharmaceutical companies to help raise awareness of the latest advances in medicine. One of our goals in 2016 was to find better and more inclusive ways to reach a broader cross-section of this community. We have therefore started to employ technology to supplement face-to-face meetings and bring the experience of international congresses to the local level.

Responding to these challenges and new regulations is costly. Investigations and litigation may affect our reputation, create a risk of potential exclusion from government reimbursement programs in the US and other countries, potentially large damage payments and agreements intended to regulate company behavior. This is why we continued to strengthen the Integrity & Compliance (I&C) function in 2016. The function now has 375 employees, 175 of whom were added in the last three years.

We also introduced a new Chief Ethics and Compliance Officer, reporting directly to the CEO, in 2016. The new Chief Ethics and Compliance Officer is also Head of Litigation, reporting to the Group General Counsel of Novartis. By bringing the I&C and Legal functions closer together, we can evaluate facts that are at issue in lawsuits to determine if additional compliance actions or policies are warranted. We expect this will help us constantly improve our compliance activities.

Supply continuity
The production of pharmaceutical products and medical devices can be highly complex, and any manufacturing issue compromising supply or quality could have serious consequences for the health of patients. For this reason, there are strict regulatory requirements surrounding our manufacturing processes, which introduce a greater chance for disruptions and liabilities. For example, government authorities monitor our manufacturing facilities, and if they fail to meet requirements, there is a risk that they could be shut down. Disturbances in our supply chain could lead to product shortages, lost revenue and litigation.

Beyond regulatory requirements, many of our products involve technically sophisticated manufacturing processes or require specialized raw materials. For example, biologic products – produced from living plant or animal micro-organisms – comprise a significant portion of our product portfolio. For biologic products, slight deviations in the production process could lead to production failures or recalls. Our portfolio also includes a number of sterile products, such as oncology treatments, which are technically complex to manufacture and require strict environmental controls. There is a greater chance of production failures and supply interruptions for such products.

Given the complexity of our manufacturing processes, we have worked for several years to adopt a single high-quality standard across the company. We believe these efforts are having an impact. The results of inspections by regulatory agencies in 2016 were consistent with the year before. Out of a total of 206 inspections, all but four (98%) were without major findings. Novartis took a further step in 2016 in our ongoing commitment to improvement, realigning our quality organization into a single, enterprise-wide group under one leader.

Foreign exchange fluctuations
Changes in exchange rates between the US dollar, our reporting currency, and other currencies can have a significant effect on our reported sales, costs and earnings, as well as on the reported value of our assets, liabilities and cash flows.

For example, because our expenditures in Swiss francs are significantly higher than our revenue in Swiss francs, volatility in the value of the Swiss franc can have a significant impact on our reported results, and the timing and extent of such volatility can be difficult to predict.

There is also a risk that certain countries could take steps that could significantly impact the value of their currencies, such as withdrawing from trade agreements or common currencies. In addition, countries may experience periods of high inflation. This could lead them to devalue their currencies or set exchange controls, as Venezuela has done. Ongoing conditions in Venezuela and other such countries could lead to further devaluations, which could result in significant additional financial losses to the Group in the future.

To mitigate the risk posed by foreign exchange fluctuations, we engage in hedging transactions where management deems appropriate, after taking into account the natural hedging afforded by our global business activity.

Intangible assets and goodwill

We carry a significant amount of goodwill and other intangible assets on our consolidated balance sheet, primarily due to acquisitions. As a result, we may incur significant impairment charges if the fair value of intangible assets and groupings of cash generating units containing goodwill would be less than their carrying value on the Group's consolidated balance sheet at any point in time.

We regularly review our long-lived intangible and tangible assets for impairment. In 2016, for example, we recorded intangible asset impairment charges of USD 591 million. Impairment testing may lead to additional impairment charges in the future. Any significant impairment charges could have a material adverse effect on our results of operations and financial condition.

Tax

Our worldwide operations are taxed under laws in the jurisdictions in which we operate. However, the integrated nature of our worldwide operations can produce conflicting claims from revenue authorities as to the determination of profits to be taxed in individual countries. The majority of the jurisdictions in which we operate have double tax treaties with other foreign jurisdictions, which provide a framework for mitigating the incidence of double taxation on our revenues and capital gains.

But in recent years, tax authorities around the world have become more rigid in exercising any discretion they may have. As part of this, the Organization for Economic Co-operation and Development (OECD) has proposed a number of tax law changes under its Base Erosion and Profit Shifting (BEPS) Action Plans to address issues of transparency, coherence and substance.

At the same time, the European Commission is finalizing the Anti Tax Avoidance Directive and continues to expand the application of the fiscal state aid policy and the respective investigation on tax ruling practices. These tax reform initiatives on the OECD and European levels also need local country implementation, including in our home country of Switzerland, which may result in significant changes to established tax principles and could lead to an increased risk of international tax disputes.

Although we have taken steps to be in compliance with the evolving OECD and European tax initiatives, and will continue to do so, significant uncertainties remain as to the outcome of the Swiss and other countries' tax reform efforts. Such efforts, including with respect to tax base or rate, transfer pricing, intercompany dividends, cross border transactions, controlled corporations, and limitations on tax relief allowed on the interest on intercompany debt, could require us to adapt our tax structure, increase our effective tax rate and adversely affect our financial results.

IT security, data integrity & data privacy

Our business is heavily dependent on critical, complex and interdependent information technology (IT) systems, including Internet-based systems, to support business processes.

The size and complexity of our IT systems, and – in some instances – their age, make them potentially vulnerable to external and internal security breaches, breakdowns, malicious intrusions, malware, misplaced and lost data, programming and human errors, and other similar events. Although we have devoted and continue to devote significant resources and management attention to the protection of our data and information technology, like many companies, we have experienced such events and expect to continue to experience them in the future. We believe that the data security breaches we have experienced to date have not resulted in significant disruptions to our operations, and will not have a significant adverse effect on our current or future results of operations. However, we may not be able to prevent breakdowns or breaches in our systems that could have a material adverse effect on our business, financial condition, results of operation, or reputation.

In addition, our use of information technologies, including the Internet, social media, mobile technologies, and technology-based medical devices – as well as other routine business operations – sometimes involves gathering personal information (including sensitive personal information) regarding our patients, vendors, customers, employees, collaborators and others. Breaches of our systems or other failures to protect such information could expose the personal information of third parties to unauthorized persons. Such information breaches could result in significant potential liability and reputational harm.

Non-IFRS measures as defined by Novartis

Novartis uses certain non-IFRS metrics when measuring performance, especially when measuring current year results against prior periods, including core results, constant currencies, free cash flow and net debt.

Despite the use of these measures by management in setting goals and measuring the Group's performance, these are non-IFRS measures that have no standardized meaning prescribed by IFRS. As a result, such measures have limits in their usefulness to investors.

Because of their non-standardized definitions, the non-IFRS measures (unlike IFRS measures) may not be comparable to the calculation of similar measures of other companies. These non-IFRS measures are presented solely to permit investors to more fully understand how the Group's management assesses underlying performance. These non-IFRS measures are not, and should not be viewed as, a substitute for IFRS measures.

As an internal measure of Group performance, these non-IFRS measures have limitations, and the Group's performance management process is not solely restricted to these metrics.

Core results

The Group's core results – including core operating income, core net income and core earnings per share – exclude fully the amortization and impairment charges of intangible assets, excluding software, and certain acquisition related items. The following items that exceed a threshold of USD 25 million are also excluded: integration and divestment related income and expenses, divestment gains and losses, restructuring charges/releases, legal related items, impairments of property, plant and equipment and financial assets, as well as income and expense items that management deems exceptional and that are or are expected to accumulate within the year to be over a USD 25 million threshold.

Novartis believes that investor understanding of the Group's performance is enhanced by disclosing core measures of performance because, as they exclude items that can vary significantly from year to year, the core measures enable better comparison of business performance across years. For this same reason, Novartis uses these core measures in addition to IFRS and other measures as important factors in assessing the Group's performance.

The following are examples of how these core measures are utilized:

— In addition to monthly reports containing financial information prepared under IFRS, senior management receives a monthly analysis incorporating these core measures.
— Annual budgets are prepared for both IFRS and core measures.

A limitation of the core measures is that they provide a view of the Group's operations without including all events during a period, such as the effects of an acquisition, divestments, or amortization/impairment of purchased intangible assets and restructurings.

Constant currencies

Changes in the relative values of non-US currencies to the US dollar can affect the Group's financial results and financial position. To provide additional information that may be useful to investors, including changes in sales volume, we present information about our net sales and various values relating to operating and net income that are adjusted for such foreign currency effects.

Constant currency calculations have the goal of eliminating two exchange rate effects so that an estimate can be made of underlying changes in the consolidated income statement excluding the impact of fluctuations in exchange rates:

— The impact of translating the income statements of consolidated entities from their non-USD functional currencies to USD
— The impact of exchange rate movements on the major transactions of consolidated entities performed in currencies other than their functional currency.

We calculate constant currency measures by translating the current year's foreign currency values for sales and other income statement items into USD, using the average exchange rates from the prior year and comparing them to the prior year values in USD.

We use these constant currency measures in evaluating the Group's performance, as they may assist us in evaluating our ongoing performance from year to year. However, in performing our evaluation, we also consider equivalent measures of performance that are not affected by changes in the relative value of currencies.

Growth rate calculation

For ease of understanding, Novartis uses a sign convention for its growth rates such that a reduction in operating expenses or losses compared to the prior year is shown as a positive growth.

Free cash flow

Novartis defines free cash flow as cash flow from operating activities and cash flow associated with the purchase or sale of property, plant and equipment, and intangible, other non-current and financial assets, excluding marketable securities. Cash flows in connection with the acquisition or divestment of subsidiaries, associated companies and non-controlling interests in subsidiaries are not taken into account to determine free cash flow.

Free cash flow is presented as additional information because Novartis considers it to be a useful indicator of the Group's ability to operate without reliance on additional borrowing or use of existing cash. Free cash flow is a measure of the net cash generated that is available for debt repayment, investment in strategic opportunities and for returning to shareholders. Free cash flow is not intended to be a substitute measure for cash flow from operating activities as determined under IFRS.

Net debt

Novartis defines net debt as current and non-current financial debt less cash and cash equivalents, current investments and derivative financial instruments. Net debt is presented as additional information because management believes it is a useful supplemental indicator of the Group's ability to pay dividends, to meet financial commitments and to invest in new strategic opportunities, including strengthening its balance sheet.

Novartis Cash Value Added

The Novartis Cash Value Added (NCVA) is a metric that is based on what the company assesses to be its cash flow return less a capital charge on gross operating assets. NCVA is used as the primary internal financial measure for determining payouts under the new Long-Term Performance Plan (LTPP) introduced in 2014. More information on NCVA is presented as part of the Compensation Report on page 119.

Additional information

EBITDA

Novartis defines earnings before interest, tax, depreciation and amortization (EBITDA) as operating income from continuing operations excluding depreciation of property, plant and equipment (including any related impairment charges) and amortization of intangible assets (including any related impairment charges).

(USD millions)	**2016**	2015	Change
Operating income from continuing operations	**8 268**	**8 977**	**– 709**
Depreciation of property, plant & equipment	1 489	1 470	19
Amortization of intangible assets	3 861	3 755	106
Impairments of property, plant & equipment, and intangible assets	693	246	447
EBITDA from continuing operations	**14 311**	**14 448**	**– 137**

Enterprise value

Enterprise value represents the total amount that shareholders and debt holders have invested in Novartis, less the Group's liquidity.

(USD millions unless indicated otherwise)	**Dec 31, 2016**	Dec 31, 2015	Change
Market capitalization	172 048	208 321	– 36 273
Non-controlling interests	59	76	– 17
Financial debts and derivatives	23 802	21 931	1 871
Liquidity	– 7 777	– 5 447	– 2 330
Enterprise value	**188 132**	**224 881**	**– 36 749**
Enterprise value/EBITDA	**13**	**16**	

2016 and 2015 reconciliation from IFRS results to core results

(USD millions unless indicated otherwise)	Innovative Medicines[1] 2016	Innovative Medicines[1] 2015[2] restated	Sandoz 2016	Sandoz 2015[2] restated	Alcon 2016	Alcon 2015[2] restated	Corporate 2016	Corporate 2015	Total Group 2016	Total Group 2015
IFRS operating income from continuing operations	**7 426**	7 815	**1 445**	1 300	**– 132**	281	**– 471**	– 419	**8 268**	8 977
Amortization of intangible assets	**2 440**	2 367	**460**	447	**901**	895			**3 801**	3 709
Impairments										
Intangible assets	522	138	65	27	4	1			591	166
Property, plant & equipment related to the Group-wide rationalization of manufacturing sites	1	6	– 7	83					– 6	89
Other property, plant & equipment	76	– 45	8	14		1		21	84	– 9
Financial assets	18	32					99	91	117	123
Total impairment charges	**617**	131	**66**	124	**4**	2	**99**	112	**786**	369
Acquisition or divestment related items										
- Income	– 68	– 22		– 1			– 229	– 260	– 297	– 283
- Expense	41	214		1			223	250	264	465
Total acquisition or divestment related items, net	**– 27**	192		0			**– 6**	– 10	**– 33**	182
Other items										
Divestment gains	– 608	– 626	– 6				– 48	– 54	– 662	– 680
Restructuring items										
- Income	– 41	– 30	– 23		– 4	– 4	– 5	– 5	– 73	– 39
- Expense	418	422	123	121	33	29	65	57	639	629
Legal-related items										
- Income	– 99								– 99	
- Expense	205	578		40		4		– 30	205	592
Additional income	– 61	– 119		– 2	– 13	– 5	– 22	– 68	– 96	– 194
Additional expense	84	132	6	15	61	33	100	65	251	245
Total other items	**– 102**	357	**100**	174	**77**	57	**90**	– 35	**165**	553
Total adjustments	**2 928**	3 047	**626**	745	**982**	954	**183**	67	**4 719**	4 813
Core operating income from continuing operations	**10 354**	10 862	**2 071**	2 045	**850**	1 235	**– 288**	– 352	**12 987**	13 790
As % of net sales	**31.8**	32.6	**20.4**	20.3	**14.6**	20.6			**26.8**	27.9
Income from associated companies			6	2			697	264	703	266
Core adjustments to income from associated companies, net of tax							431	715	431	715
Interest expense									– 707	– 655
Other financial income and expense[3]									– 99	– 24
Taxes (adjusted for above items)									– 2 001	– 2 051
Core net income from continuing operations									**11 314**	12 041
Core net loss from discontinued operations[4]										– 256
Core net income									**11 314**	11 785
Core net income attributable to shareholders									11 307	11 774
Core basic EPS from continuing operations (USD)[5]									**4.75**	5.01
Core basic EPS from discontinued operations (USD)[5]										– 0.11
Total core basic EPS (USD)[5]									**4.75**	4.90

[1] Formerly named the Pharmaceuticals Division
[2] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016.
[3] Adjusted for charges of USD 0.3 billion related mainly to Venezuela subsidiaries (2015: USD 0.4 billion)
[4] For details on 2015 discontinued operations reconciliation from IFRS to core net income, please refer to page 175.
[5] Earnings per share (EPS) is calculated on the amount of net income attributable to shareholders of Novartis AG.

2016 and 2015 reconciliation from Group IFRS results to Group core results

2016 (USD millions unless indicated otherwise)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment related items, including restructuring and integration charges[3]	Other items[4]	Core results
Gross profit from continuing operations	**31 916**	**3 758**	**96**		**36**	**35 806**
Operating income from continuing operations	**8 268**	**3 801**	**786**	**– 33**	**165**	**12 987**
Income before taxes from continuing operations	**7 817**	**4 097**	**786**	**– 33**	**648**	**13 315**
Taxes from continuing operations[5]	– 1 119					– 2 001
Net income from continuing operations	**6 698**					**11 314**
Net income	**6 698**					**11 314**
Basic EPS from continuing operations (USD)[6]	**2.82**					**4.75**
Total basic EPS (USD)[6]	**2.82**					**4.75**
The following are adjustments to arrive at core gross profit from continuing operations						
Other revenues	918				– 50	868
Cost of goods sold	– 17 520	3 758	96		86	– 13 580
The following are adjustments to arrive at core operating income from continuing operations						
Marketing & Sales	– 11 998				7	– 11 991
Research & Development	– 9 039	43	495		99	– 8 402
General & Administration	– 2 194				74	– 2 120
Other income	1 927		– 10	– 297	– 867	753
Other expense	– 2 344		205	264	816	– 1 059
The following are adjustments to arrive at core income before taxes from continuing operations						
Income from associated companies	703	296			135	1 134
Other financial income and expense	– 447				348	– 99

[1] Amortization of intangible assets: Cost of goods sold includes recurring amortization of acquired rights to in-market products and other production-related intangible assets; Research & Development includes the recurring amortization of acquired rights for technology platforms; Income from associated companies includes USD 296 million for the Novartis share of the estimated Roche core items.

[2] Impairments: Cost of goods sold and Research & Development include impairment charges related to intangible assets; Other income includes impairment reversals of property, plant and equipment; Other expense includes impairment charges related to property, plant and equipment, and financial assets.

[3] Acquisition or divestment related items, including restructuring and integration charges: Other income and Other expense include transitional service-fee income and expenses, and other items related to the portfolio transformation; Other income also includes a gain from the revaluation of a previously held financial investment in a newly acquired company.

[4] Other items: Other revenues include an early release of deferred income associated with a collaboration agreement; Cost of goods sold, Other income and Other expense include net restructuring and other charges related to the Group-wide rationalization of manufacturing sites; Research & Development, Marketing & Sales, Other income and Other expense include other restructuring income and charges; Cost of goods sold and Research & Development include adjustments of contingent considerations; General & Administration, Other income and Other expense include items related to setup costs for Novartis Business Services; Other income and Other expense also include legal settlements and changes in provisions; Other income also includes gains from product divestments, other income related to the portfolio transformation and a gain related to the sale of real estate; Other expense also includes a charge as a result of a pension plan amendment, a charge for an indirect tax settlement and other costs; Income from associated companies includes USD 135 million for the Novartis share of the estimated GSK Consumer Healthcare Holdings Ltd. core items; Other financial income and expense relates mainly to devaluation losses in Venezuela.

[5] Taxes on the adjustments between IFRS and core results take into account, for each individual item included in the adjustment, the tax rate that will finally be applicable to the item based on the jurisdiction where the adjustment will finally have a tax impact. Generally, this results in amortization and impairment of intangible assets and acquisition-related restructuring and integration items having a full tax impact. There is usually a tax impact on other items, although this is not always the case for items arising from legal settlements in certain jurisdictions. Adjustments related to income from associated companies are recorded net of any related tax effect. Due to these factors and the differing effective tax rates in the various jurisdictions, the tax on the total adjustments for continuing operations of USD 5.5 billion to arrive at the core results before tax amounts to USD 882 million. The average tax rate on the adjustments for continuing operations is 16.0% since the estimated full-year tax charge has been applied to the pre-tax income of the period.

[6] Earnings per share (EPS) is calculated on the amount of net income attributable to shareholders of Novartis AG.

2015 (USD millions unless indicated otherwise)	IFRS results	Amortization of intangible assets[1]	Impairments[2]	Acquisition or divestment related items, including restructuring and integration charges[3]	Other items[4]	Core results
Gross profit from continuing operations	**32 983**	**3 666**	**126**		**125**	**36 900**
Operating income from continuing operations	**8 977**	**3 709**	**369**	**182**	**553**	**13 790**
Income before taxes from continuing operations	**8 134**	**4 132**	**369**	**182**	**1 275**	**14 092**
Taxes from continuing operations[5]	– 1 106					– 2 051
Net income from continuing operations	**7 028**					**12 041**
Income before taxes from discontinued operations[6]	12 479		– 83	– 12 627	8	– 223
Taxes from discontinued operations	– 1 713					– 33
Net income/loss from discontinued operations	**10 766**					**– 256**
Net income	**17 794**					**11 785**
Basic EPS from continuing operations (USD)[7]	**2.92**					**5.01**
Basic EPS from discontinued operations (USD)[7]	4.48					– 0.11
Total basic EPS (USD)[7]	**7.40**					**4.90**
The following are adjustments to arrive at core gross profit from continuing operations						
Other revenues	947				– 28	919
Cost of goods sold	– 17 404	3 666	126		153	– 13 459
The following are adjustments to arrive at core operating income from continuing operations						
Marketing & Sales	– 11 772				43	– 11 729
Research & Development	– 8 935	43	40		114	– 8 738
General & Administration	– 2 475				86	– 2 389
Other income	2 049		– 56	– 283	– 887	823
Other expense	– 2 873		259	465	1 072	– 1 077
The following are adjustments to arrive at core income before taxes from continuing operations						
Income from associated companies	266	423			292	981
Other financial income and expense	– 454				430	– 24

[1] Amortization of intangible assets: Cost of goods sold includes recurring amortization of acquired rights to in-market products and other production-related intangible assets; Research & Development includes the recurring amortization of acquired rights for technology platforms; Income from associated companies includes USD 423 million for the Novartis share of the estimated Roche core items.

[2] Impairments: Cost of goods sold, Research & Development and Other expense consist principally of net impairment charges or reversals related to intangible assets, property, plant and equipment, and financial assets; Other income includes a reversal of an impairment related to property, plant and equipment.

[3] Acquisition or divestment related items, including restructuring and integration charges: Other income and Other expense include items related to the portfolio transformation.

[4] Other items: Other revenues and Other income include additional gains from product divestments; Cost of goods sold and Other expense include charges for the Group-wide rationalization of manufacturing sites; Cost of goods sold also includes an inventory write-off; Marketing & Sales, Research & Development and Other expense include other restructuring charges; Research & Development also includes expenses related to product acquisitions; General & Administration includes charges for transforming IT and finance processes and expenses related to setup costs for Novartis Business Services; Other income also includes a gain of USD 110 million from a Swiss pension plan amendment and items related to portfolio transformation; Other expense also includes legal settlement provisions; Income from associated companies includes USD 292 million for the Novartis share of the estimated OTC joint venture core items; Other financial income and expense relates mainly to devaluation losses in Venezuela.

[5] Taxes on the adjustments between IFRS and core results take into account, for each individual item included in the adjustment, the tax rate that will finally be applicable to the item based on the jurisdiction where the adjustment will finally have a tax impact. Generally, this results in amortization and impairment of intangible assets and acquisition-related restructuring and integration items having a full tax impact. There is usually a tax impact on other items, although this is not always the case for items arising from legal settlements in certain jurisdictions. Adjustments related to income from associated companies are recorded net of any related tax effect. Due to these factors and the differing effective tax rates in the various jurisdictions, the tax on the total adjustments for continuing operations of USD 6.0 billion to arrive at the core results before tax amounts to USD 945 million. The average tax rate on the adjustments for continuing operations is 15.9%.

[6] Core adjustments on net income before tax of discontinued operations include gains from the divestment of Animal Health (USD 4.6 billion) and from the transactions with GSK (USD 2.8 billion for the non-influenza Vaccines business and USD 5.9 billion resulting from the contribution of the former Novartis OTC Division into the GSK Consumer Healthcare joint venture in exchange for 36.5% interest in this newly created entity), as well as additional transaction-related expenses of USD 0.6 billion and other portfolio transformation-related costs.

[7] Earnings per share (EPS) is calculated on the amount of net income attributable to shareholders of Novartis AG.

Summary of quarterly and Group financial data

Summary of quarterly financial data for 2016 and 2015

(USD millions unless indicated otherwise)	Q1	Q2	Q3	Q4	2016	Q1	Q2	Q3	Q4	2015
Net sales to third parties from continuing operations	**11 600**	**12 470**	**12 126**	**12 322**	**48 518**	**11 935**	**12 694**	**12 265**	**12 520**	**49 414**
Sales to discontinued operations						26				26
Net sales from continuing operations	**11 600**	**12 470**	**12 126**	**12 322**	**48 518**	**11 961**	**12 694**	**12 265**	**12 520**	**49 440**
Other revenues	210	209	215	284	918	241	202	220	284	947
Cost of goods sold	– 4 212	– 4 451	– 4 368	– 4 489	– 17 520	– 3 980	– 4 487	– 4 388	– 4 549	– 17 404
Gross profit	**7 598**	**8 228**	**7 973**	**8 117**	**31 916**	**8 222**	**8 409**	**8 097**	**8 255**	**32 983**
Marketing & Sales	– 2 741	– 3 067	– 2 944	– 3 246	– 11 998	– 2 691	– 3 016	– 2 890	– 3 175	– 11 772
Research & Development	– 2 041	– 2 190	– 2 224	– 2 584	– 9 039	– 2 067	– 2 206	– 2 190	– 2 472	– 8 935
General & Administration	– 564	– 582	– 456	– 592	– 2 194	– 591	– 601	– 573	– 710	– 2 475
Other income	777	239	530	381	1 927	414	357	682	596	2 049
Other expense	– 578	– 535	– 610	– 621	– 2 344	– 502	– 662	– 892	– 817	– 2 873
Operating income from continuing operations	**2 451**	**2 093**	**2 269**	**1 455**	**8 268**	**2 785**	**2 281**	**2 234**	**1 677**	**8 977**
Income from associated companies	127	203	217	156	703	15	121	120	10	266
Interest expense	– 185	– 180	– 174	– 168	– 707	– 179	– 164	– 154	– 158	– 655
Other financial income and expense	– 41	– 3	– 38	– 365	– 447	57	– 82	– 31	– 398	– 454
Income before taxes from continuing operations	**2 352**	**2 113**	**2 274**	**1 078**	**7 817**	**2 678**	**2 156**	**2 169**	**1 131**	**8 134**
Taxes	– 341	– 307	– 329	– 142	– 1 119	– 372	– 300	– 357	– 77	– 1 106
Net income from continuing operations	**2 011**	**1 806**	**1 945**	**936**	**6 698**	**2 306**	**1 856**	**1 812**	**1 054**	**7 028**
Net income/loss from discontinued operations						10 699	– 18	83	2	10 766
Net income	**2 011**	**1 806**	**1 945**	**936**	**6 698**	**13 005**	**1 838**	**1 895**	**1 056**	**17 794**
Attributable to:										
Shareholders of Novartis AG	*2 011*	*1 804*	*1 940*	*957*	*6 712*	*13 005*	*1 836*	*1 888*	*1 054*	*17 783*
Non-controlling interests		2	5	– 21	– 14	–	2	7	2	11
Basic earnings per share (USD) from continuing operations	*0.85*	*0.76*	*0.81*	*0.40*	*2.82*	*0.96*	*0.77*	*0.75*	*0.44*	*2.92*
Basic earnings per share (USD) from discontinued operations						*4.44*	*– 0.01*	*0.04*	*0.00*	*4.48*
Total basic earnings per share (USD)	*0.85*	*0.76*	*0.81*	*0.40*	*2.82*	*5.40*	*0.76*	*0.79*	*0.44*	*7.40*
Net sales to third parties by segment										
Innovative Medicines[1, 2]	**7 729**	**8 387**	**8 173**	**8 273**	**32 562**	**7 960**	**8 633**	**8 254**	**8 498**	**33 345**
Sandoz[2]	**2 445**	**2 577**	**2 517**	**2 605**	**10 144**	**2 444**	**2 530**	**2 542**	**2 554**	**10 070**
Alcon[2]	**1 426**	**1 506**	**1 436**	**1 444**	**5 812**	**1 531**	**1 531**	**1 469**	**1 468**	**5 999**
Net sales to third parties from continuing operations	**11 600**	**12 470**	**12 126**	**12 322**	**48 518**	**11 935**	**12 694**	**12 265**	**12 520**	**49 414**
Operating income by segment										
Innovative Medicines[1, 2]	**2 180**	**1 866**	**2 020**	**1 360**	**7 426**	**2 450**	**1 994**	**1 872**	**1 499**	**7 815**
Sandoz[2]	**346**	**380**	**354**	**365**	**1 445**	**340**	**281**	**388**	**291**	**1 300**
Alcon[2]	**31**	**7**	**– 50**	**– 120**	**– 132**	**141**	**54**	**57**	**29**	**281**
Corporate	– 106	– 160	– 55	– 150	– 471	– 146	– 48	– 83	– 142	– 419
Operating income from continuing operations	**2 451**	**2 093**	**2 269**	**1 455**	**8 268**	**2 785**	**2 281**	**2 234**	**1 677**	**8 977**
Core operating income from continuing operations	**3 261**	**3 332**	**3 381**	**3 013**	**12 987**	**3 651**	**3 593**	**3 489**	**3 057**	**13 790**
Core net income from continuing operations	**2 788**	**2 930**	**2 938**	**2 658**	**11 314**	**3 199**	**3 074**	**3 061**	**2 707**	**12 041**
Core basic earnings per share (USD) from continuing operations	*1.17*	*1.23*	*1.23*	*1.12*	*4.75*	*1.33*	*1.27*	*1.27*	*1.14*	*5.01*

[1] Formerly named the Pharmaceuticals Division

[2] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016

Summary of Group financial data 2012–2016

(USD millions unless indicated otherwise)		2016	2015	2014	2013	2012
Net sales to third parties from continuing operations		**48 518**	**49 414**	**52 180**	**51 869**	**51 080**
Change relative to preceding year	%	– 1.8	– 5.3	0.6	1.5	– 1.7
Innovative Medicines net sales[1, 2]		32 562	33 345	34 828	34 953	34 466
Change relative to preceding year	%	– 2.3	– 4.3	– 0.4	1.4	– 0.5
Sandoz net sales[2]		10 144	10 070	10 736	10 528	10 408
Change relative to preceding year	%	0.7	– 6.2	2.0	1.2	– 7.8
Alcon net sales[2]		5 812	5 999	6 616	6 388	6 206
Change relative to preceding year	%	– 3.1	– 9.3	3.6	2.9	3.3
Operating income from continuing operations		**8 268**	**8 977**	**11 089**	**10 983**	**11 507**
Change relative to preceding year	%	– 7.9	– 19.0	1.0	– 4.6	11.8
As % of net sales	%	17.0	18.2	21.3	21.2	22.5
As % of average equity	%	10.9	12.1	15.3	15.3	17.0
As % of average net operating assets	%	9.0	10.5	13.8	13.4	14.2
Net income from continuing operations		**6 698**	**7 028**	**10 727**	**9 309**	**9 530**
Change relative to preceding year	%	– 4.7	– 34.5	15.2	– 2.3	9.7
As % of net sales	%	13.8	14.2	20.6	17.9	18.7
As % of average equity	%	8.8	9.5	14.8	13.0	14.1
Net income/loss from discontinued operations			10 766	– 447	– 17	– 147
Net income		**6 698**	**17 794**	**10 280**	**9 292**	**9 383**
As % of average equity	%	8.8	24.1	14.1	12.9	13.9
Dividends of Novartis AG[3]		**6 445**	**6 475**	**6 643**	**6 810**	**6 100**
As % of net income from continuing operations[4]	%	96	92	62	74	65
As % of net income[4]	%	96	36	65	74	66
Cash flows from operating activities from continuing operations		**11 475**	**12 085**	**13 898**	**12 617**	**13 810**
Change relative to preceding year	%	– 5.0	– 13.0	10.2	– 8.6	1.4
As % of net sales	%	23.7	24.5	26.6	24.3	27.0
Cash flows from operating activities		**11 475**	**11 879**	**13 897**	**13 174**	**14 194**
Free cash flow from continuing operations		**9 455**	**9 259**	**10 934**	**9 521**	**11 251**
Change relative to preceding year	%	2.1	– 15.3	14.8	– 15.4	– 6.3
As % of net sales	%	19.5	18.7	21.0	18.4	22.0
Free cash flow		**9 455**	**9 029**	**10 762**	**9 945**	**11 383**
Purchase of property, plant & equipment[5]		**1 862**	**2 367**	**2 624**	**2 903**	**2 458**
Change relative to preceding year	%	– 21.3	– 9.8	– 9.6	18.1	28.5
As % of net sales	%	3.8	4.8	5.0	5.6	4.8
Depreciation of property, plant & equipment[5]		**1 489**	**1 470**	**1 586**	**1 554**	**1 517**
As % of net sales	%	3.1	3.0	3.0	3.0	3.0
Core Research & Development[5]		**8 402**	**8 738**	**8 723**	**8 885**	**8 396**
As % of net sales	%	17.3	17.7	16.7	17.1	16.4
Core Innovative Medicines Division Research & Development[1, 2]		**7 112**	**7 502**	**7 432**	**7 611**	**7 156**
As % of Innovative Medicines Division net sales	%	21.8	22.5	21.3	21.8	20.8
Total assets		**130 124**	**131 556**	**125 387**	**126 254**	**124 191**
Liquidity		7 777	5 447	13 862	9 222	8 119
Equity		74 891	77 122	70 844	74 472	69 263
Debt/equity ratio		0.32:1	0.28:1	0.29:1	0.24:1	0.28:1
Current ratio		1.12:1	0.96:1	1.39:1	1.16:1	1.16:1
Net operating assets		**90 916**	**93 606**	**77 393**	**83 268**	**80 870**
Change relative to preceding year	%	– 2.9	20.9	– 7.1	3.0	– 0.3
As % of net sales	%	187.4	189.4	148.3	160.5	158.3
Personnel costs[5, 6]		**13 681**	**13 540**	**14 569**	**13 760**	**13 127**
As % of net sales	%	28.2	27.4	27.9	26.5	25.7
Full-time equivalent associates at year-end[5, 6]		**118 393**	**118 700**	**117 809**	**119 362**	**112 461**
Net sales per full-time equivalent associate (average)[3]	USD	409 274	417 861	440 020	447 488	460 867

[1] Formerly named the Pharmaceuticals Division
[2] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016
[3] 2016 dividend proposal for shareholder approval at the Annual General Meeting on February 28, 2017.
In all years, this figure reflects only amounts paid to third-party shareholders of Novartis AG.
[4] Based on net income attributable to the shareholders of Novartis AG
[5] Continuing operations
[6] Own employees
nm = not meaningful

Novartis Group consolidated financial statements

Consolidated income statements

(For the years ended December 31, 2016, 2015 and 2014)

(USD millions unless indicated otherwise)	Note	**2016**	2015	2014
Net sales to third parties from continuing operations	3	**48 518**	**49 414**	**52 180**
Sales to discontinued segments			26	239
Net sales from continuing operations	3	**48 518**	**49 440**	**52 419**
Other revenues		918	947	1 215
Cost of goods sold		– 17 520	– 17 404	– 17 345
Gross profit from continuing operations		**31 916**	**32 983**	**36 289**
Marketing & Sales		– 11 998	– 11 772	– 12 377
Research & Development		– 9 039	– 8 935	– 9 086
General & Administration		– 2 194	– 2 475	– 2 616
Other income		1 927	2 049	1 391
Other expense		– 2 344	– 2 873	– 2 512
Operating income from continuing operations	3	**8 268**	**8 977**	**11 089**
Income from associated companies	4	703	266	1 918
Interest expense	5	– 707	– 655	– 704
Other financial income and expense	5	– 447	– 454	– 31
Income before taxes from continuing operations		**7 817**	**8 134**	**12 272**
Taxes	6	– 1 119	– 1 106	– 1 545
Net income from continuing operations		**6 698**	**7 028**	**10 727**
Net income/loss from discontinued operations	30		10 766	– 447
Net income		**6 698**	**17 794**	**10 280**
Attributable to:				
Shareholders of Novartis AG		*6 712*	*17 783*	*10 210*
Non-controlling interests		*– 14*	*11*	*70*
Basic earnings per share (USD) from continuing operations		2.82	2.92	4.39
Basic earnings per share (USD) from discontinued operations			4.48	– 0.18
Total basic earnings per share (USD)	**7**	**2.82**	**7.40**	**4.21**
Diluted earnings per share (USD) from continuing operations		2.80	2.88	4.31
Diluted earnings per share (USD) from discontinued operations			4.41	– 0.18
Total diluted earnings per share (USD)	**7**	**2.80**	**7.29**	**4.13**

The accompanying Notes form an integral part of the consolidated financial statements.

Consolidated statements of comprehensive income

(For the years ended December 31, 2016, 2015 and 2014)

(USD millions)	Note	2016	2015	2014
Net income		**6 698**	**17 794**	**10 280**
Other comprehensive income to be eventually recycled into the consolidated income statement:				
Fair value adjustments on marketable securities, net of taxes	8.1	– 113	28	89
Fair value adjustments on deferred cash flow hedges, net of taxes	8.1	15	20	21
Total fair value adjustments on financial instruments, net of taxes	8.1	– 98	48	110
Novartis share of other comprehensive income recognized by associated companies, net of taxes		671	– 48	– 5
Currency translation effects	8.2	– 2 391	– 1 662	– 2 220
Total of items to eventually recycle		– 1 818	– 1 662	– 2 115
Other comprehensive income never to be recycled into the consolidated income statement:				
Actuarial losses from defined benefit plans, net of taxes	8.3	– 515	– 147	– 822
Total comprehensive income		**4 365**	**15 985**	**7 343**
Attributable to:				
Shareholders of Novartis AG		*4 382*	*15 977*	*7 274*
Continuing operations		*4 382*	*5 238*	*7 820*
Discontinued operations			*10 739*	*– 546*
Non-controlling interests		*– 17*	*8*	*69*

The accompanying Notes form an integral part of the consolidated financial statements.

Consolidated statements of changes in equity

(For the years ended December 31, 2016, 2015 and 2014)

(USD millions)	Note	Share capital	Treasury shares	Retained earnings	Total value adjustments	Issued share capital and reserves attributable to Novartis shareholders	Non-controlling interests	Total equity
Total equity at January 1, 2014		**1 001**	**– 89**	**73 065**	**366**	**74 343**	**129**	**74 472**
Net income				10 210		10 210	70	10 280
Other comprehensive income	8			– 5	– 2 931	– 2 936	– 1	– 2 937
Total comprehensive income				**10 205**	**– 2 931**	**7 274**	**69**	**7 343**
Dividends	9.1			– 6 810		– 6 810		– 6 810
Purchase of treasury shares	9.2		– 43	– 6 883		– 6 926		– 6 926
Exercise of options and employee transactions	9.4		23	2 377		2 400		2 400
Equity-based compensation	9.5		6	1 137		1 143		1 143
Increase of treasury share repurchase obligation under a share buyback trading plan	9.7			– 658		– 658		– 658
Changes in non-controlling interests	9.8						– 120	– 120
Total of other equity movements			**– 14**	**– 10 837**		**– 10 851**	**– 120**	**– 10 971**
Total equity at December 31, 2014		**1 001**	**– 103**	**72 433**	**– 2 565**	**70 766**	**78**	**70 844**
Net income				17 783		17 783	11	17 794
Other comprehensive income	8			– 48	– 1 758	– 1 806	– 3	– 1 809
Total comprehensive income				**17 735**	**– 1 758**	**15 977**	**8**	**15 985**
Dividends	9.1			– 6 643		– 6 643		– 6 643
Purchase of treasury shares	9.2		– 33	– 6 086		– 6 119		– 6 119
Reduction of share capital	9.3	– 10	15	– 5				
Exercise of options and employee transactions	9.4		14	1 578		1 592		1 592
Equity-based compensation	9.5		6	809		815		815
Decrease of treasury share repurchase obligation under a share buyback trading plan	9.7			658		658		658
Changes in non-controlling interests	9.8						– 10	– 10
Fair value adjustments related to divestments	8			– 100	100			
Total of other equity movements		**– 10**	**2**	**– 9 789**	**100**	**– 9 697**	**– 10**	**– 9 707**
Total equity at December 31, 2015		**991**	**– 101**	**80 379**	**– 4 223**	**77 046**	**76**	**77 122**
Net income				6 712		6 712	– 14	6 698
Other comprehensive income	8			671	– 3 001	– 2 330	– 3	– 2 333
Total comprehensive income				**7 383**	**– 3 001**	**4 382**	**– 17**	**4 365**
Dividends	9.1			– 6 475		– 6 475		– 6 475
Purchase of treasury shares	9.2		– 7	– 985		– 992		– 992
Reduction of share capital	9.3	– 19	25	– 6				
Exercise of options and employee transactions	9.4		2	212		214		214
Equity-based compensation	9.5		5	659		664		664
Impact of change in ownership of consolidated entities	9.6			– 7		– 7		– 7
Fair value adjustments related to divestments	8			– 12	12			
Total of other equity movements		**– 19**	**25**	**– 6 614**	**12**	**– 6 596**		**– 6 596**
Total equity at December 31, 2016		**972**	**– 76**	**81 148**	**– 7 212**	**74 832**	**59**	**74 891**

The accompanying Notes form an integral part of the consolidated financial statements.

Consolidated balance sheets

(At December 31, 2016 and 2015)

(USD millions)	Note	2016	2015
Assets			
Non-current assets			
Property, plant & equipment	10	15 641	15 982
Goodwill	11	30 980	31 174
Intangible assets other than goodwill	11	31 340	34 217
Investments in associated companies	4	14 304	15 314
Deferred tax assets	12	10 034	8 957
Financial assets	13	2 196	2 466
Other non-current assets	13	698	601
Total non-current assets		**105 193**	**108 711**
Current assets			
Inventories	14	6 255	6 226
Trade receivables	15	8 202	8 180
Marketable securities, commodities, time deposits and derivative financial instruments	16	770	773
Cash and cash equivalents	16	7 007	4 674
Other current assets	17	2 697	2 992
Total current assets		**24 931**	**22 845**
Total assets		**130 124**	**131 556**
Equity and liabilities			
Equity			
Share capital	18	972	991
Treasury shares	18	– 76	– 101
Reserves		73 936	76 156
Issued share capital and reserves attributable to Novartis AG shareholders		**74 832**	**77 046**
Non-controlling interests		59	76
Total equity		**74 891**	**77 122**
Liabilities			
Non-current liabilities			
Financial debts	19	17 897	16 327
Deferred tax liabilities	12	6 657	6 355
Provisions and other non-current liabilities	20	8 470	8 044
Total non-current liabilities		**33 024**	**30 726**
Current liabilities			
Trade payables		4 873	5 668
Financial debts and derivative financial instruments	21	5 905	5 604
Current income tax liabilities		1 603	1 717
Provisions and other current liabilities	22	9 828	10 719
Total current liabilities		**22 209**	**23 708**
Total liabilities		**55 233**	**54 434**
Total equity and liabilities		**130 124**	**131 556**

The accompanying Notes form an integral part of the consolidated financial statements.

Consolidated cash flow statements

(For the years ended December 31, 2016, 2015 and 2014)

(USD millions)	Note	**2016**	2015	2014
Net income from continuing operations		**6 698**	**7 028**	**10 727**
Reversal of non-cash items	23.1	8 437	9 070	6 725
Dividends received from associated companies and others		899	432	479
Interest received		43	34	35
Interest paid		– 723	– 646	– 668
Other financial receipts			714	553
Other financial payments		– 155	– 23	– 24
Taxes paid [1]		– 2 111	– 2 454	– 2 179
Cash flows before working capital and provision changes from continuing operations		**13 088**	**14 155**	**15 648**
Payments out of provisions and other net cash movements in non-current liabilities		– 1 536	– 1 207	– 1 125
Change in net current assets and other operating cash flow items	23.2	– 77	– 863	– 625
Cash flows from operating activities from continuing operations		**11 475**	**12 085**	**13 898**
Cash flows used in operating activities from discontinued operations [1]			– 188	– 1
Total cash flows from operating activities		**11 475**	**11 897**	**13 897**
Purchase of property, plant & equipment		– 1 862	– 2 367	– 2 624
Proceeds from sales of property, plant & equipment		161	237	60
Purchase of intangible assets		– 1 017	– 1 138	– 780
Proceeds from sales of intangible assets		847	621	246
Purchase of financial assets		– 247	– 264	– 239
Proceeds from sales of financial assets		247	166	431
Purchase of other non-current assets		– 149	– 82	– 60
Proceeds from sales of other non-current assets			1	2
Divestments of interests in associated companies				1 370
Acquisitions and divestments of businesses, net	23.3	– 765	– 16 507	– 331
Purchase of marketable securities and commodities		– 530	– 595	– 169
Proceeds from sales of marketable securities and commodities		622	262	2 086
Cash flows used in investing activities from continuing operations		**– 2 693**	**– 19 666**	**– 8**
Cash flows used in/from investing activities from discontinued operations [1]	23.4	– 748	8 882	889
Total cash flows used in/from investing activities		**– 3 441**	**– 10 784**	**881**
Dividends paid to shareholders of Novartis AG		– 6 475	– 6 643	– 6 810
Acquisition of treasury shares		– 1 109	– 6 071	– 6 915
Proceeds from exercise options and other treasury share transactions		214	1 581	2 400
Increase in non-current financial debts		1 935	4 596	6 024
Repayment of non-current financial debts		– 1 696	– 3 086	– 2 599
Change in current financial debts		1 816	451	– 107
Impact of change in ownership of consolidated entities		– 6		
Dividends paid to non-controlling interests and other financing cash flows		7	– 4	– 140
Cash flows used in financing activities		**– 5 314**	**– 9 176**	**– 8 147**
Effect of exchange rate changes on cash and cash equivalents		– 387	– 286	– 295
Net change in cash and cash equivalents		**2 333**	**– 8 349**	**6 336**
Cash and cash equivalents at January 1		4 674	13 023	6 687
Cash and cash equivalents at December 31		**7 007**	**4 674**	**13 023**

The accompanying Notes form an integral part of the consolidated financial statements.

[1] In 2016, the total net tax payment amounted to USD 2 299 million, of which USD 188 million was included in the cash flows used in investing activities from discontinued operations.
In 2015, the total net tax payment amounted to USD 3 325 million, of which a refund of USD 94 million was included in the cash flows used in operating activities from discontinued operations, and a USD 965 million payment in the cash flows from investing activities of discontinued operations.
In 2014, the total net tax payment amounted to USD 2 645 million, of which USD 7 million was included in the cash flows used in operating activities from discontinued operations, and a USD 459 million payment in the cash flows from investing activities from discontinued operations.

Notes to the Novartis Group consolidated financial statements

1. Significant accounting policies

The Novartis Group (Novartis or Group) is a multinational group of companies specializing in the research, development, manufacturing and marketing of a broad range of healthcare products led by innovative pharmaceuticals and also including eye care products and cost saving generic pharmaceuticals. It is headquartered in Basel, Switzerland.

The consolidated financial statements of the Group are prepared in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB). They are prepared in accordance with the historical cost convention except for items that are required to be accounted for at fair value.

The Group's financial year-end is December 31 which is also the annual closing date of the individual entities' financial statements incorporated into the Group's consolidated financial statements.

The preparation of financial statements requires management to make certain estimates and assumptions, either at the balance sheet date or during the year that affect the reported amounts of assets and liabilities, including any contingent amounts, as well as of revenues and expenses. Actual outcomes and results could differ from those estimates and assumptions.

Listed below are accounting policies of significance to Novartis or, in cases where IFRS provides alternatives, the option adopted by Novartis.

Scope of consolidation

The consolidated financial statements include all entities, including structured entities, over which Novartis AG, Basel, Switzerland, directly or indirectly has control (generally as a result of owning more than 50% of the entity's voting interest). Consolidated entities are also referred to as "subsidiaries".

In cases where Novartis does not fully own a subsidiary it has elected to value any remaining outstanding non-controlling interest at the time of acquiring control of the subsidiary at its proportionate share of the fair value of the net identified assets.

The contribution of a business to an associate or joint venture is accounted for by applying the option under IFRS that permits the accounting for the retained interest of the business contributed at its net book value at the time of the contribution.

Investments in associated companies (generally defined as investments in entities in which Novartis holds between 20% and 50% of voting shares or over which it otherwise has significant influence) and joint ventures are accounted for using the equity method except for selected venture fund investments for which the Group has elected to apply the method of fair value through the consolidated income statement.

Foreign currencies

The consolidated financial statements of Novartis are presented in US dollars (USD). The functional currency of subsidiaries is generally the local currency of the respective entity. The functional currency used for the reporting of certain Swiss and foreign finance entities is USD instead of their respective local currencies. This reflects the fact that the cash flows and transactions of these entities are primarily denominated in these currencies.

For subsidiaries not operating in hyperinflationary economies, the subsidiary's results, financial position and cash flows that do not have USD as their functional currency are translated into USD using the following exchange rates:

- income, expense and cash flows using for each month the average exchange rate with the US dollar values for each month being aggregated during the year.
- balance sheets using year-end exchange rates.
- resulting exchange rate differences are recognized in other comprehensive income.

The only hyperinflationary economy applicable to Novartis is Venezuela. The financial statements of the major subsidiaries in this country are first adjusted for the effect of inflation with any gain or loss on the net monetary position recorded in the related functional lines in the consolidated income statement and then translated into USD.

Acquisition of assets

Acquired assets are initially recognized on the balance sheet at cost if they meet the criteria for capitalization. If acquired as part of a business combination, the fair value of identified assets represents the cost for these assets. If separately acquired, the cost of the asset includes the purchase price and any directly attributable costs for bringing the asset into the condition to operate as intended. Expected costs for obligations to dismantle and remove property, plant and equipment when it is no longer used are included in their cost.

Property, plant and equipment

Property, plant and equipment are depreciated on a straight-line basis in the consolidated income statement over their estimated useful lives. Leasehold land is depreciated over the period of its lease whereas freehold land is not depreciated. The related depreciation expense is included in the costs of the functions using the asset.

Property, plant and equipment are assessed for impairment whenever there is an indication that the balance sheet carrying amount may not be recoverable using cash flow projections for the useful life.

The following table shows the respective useful lives for property, plant and equipment:

	Useful life
Buildings	20 to 40 years
Machinery and other equipment	
Machinery and equipment	7 to 20 years
Furniture and vehicles	5 to 10 years
Computer hardware	3 to 7 years

Government grants obtained for construction activities, including any related equipment, are deducted from the gross acquisition cost to arrive at the balance sheet carrying value of the related assets.

Goodwill and intangible assets

Goodwill

Goodwill arises in a business combination and is the excess of the consideration transferred to acquire a business over the underlying fair value of the net identified assets acquired. It is allocated to groups of cash generating units (CGUs) which are usually represented by the reported segments. Goodwill is tested for impairment annually at the CGU level and any impairment charges are recorded under "Other Expense" in the consolidated income statement.

Intangible assets available-for-use

Novartis has the following classes of available-for-use intangible assets: Currently marketed products; Marketing know-how; Technologies; Other intangible assets (including computer software) and the Alcon brand name.

Currently marketed products represent the composite value of acquired intellectual property, patents, and distribution rights and product trade names.

Marketing know-how represents the value attributable to the expertise acquired for marketing and distributing Alcon surgical equipment.

Technologies represent identified and separable acquired know-how used in the research, development and production processes.

Significant investments in internally developed and acquired computer software are capitalized and included in the "Other" category and amortized once available for use.

The Alcon brand name is shown separately as it is the only Novartis intangible asset that is available for use with an indefinite useful life. Novartis considers that it is appropriate that the Alcon brand name has an indefinite life since Alcon-branded products have a history of strong revenue and cash flow performance, and Novartis has the intent and ability to support the brand with spending to maintain its value for the foreseeable future.

Except for the Alcon brand name, intangible assets available for use are amortized over their estimated useful lives on a straight-line basis and evaluated for potential impairment whenever facts and circumstances indicate that their carrying value may not be recoverable. The Alcon brand name is not amortized, but evaluated for potential impairment annually.

The following table shows the respective useful lives for available-for-use intangible assets and the location in the consolidated income statement in which the respective amortization and any potential impairment charge is recognized:

	Useful life	Income statement location for amortization and impairment charges
Currently marketed products	5 to 20 years	"Cost of goods sold"
Marketing know-how	25 years	"Cost of goods sold"
Technologies	10 to 20 years	"Cost of goods sold" or "Research and Development"
Other (including computer software)	3 to 7 years	In the respective functional expense
Alcon brand name	Not amortized, indefinite useful life	Not applicable

Intangible assets not yet available-for-use

Acquired research and development intangible assets, which are still under development and have accordingly not yet obtained marketing approval, are recognized as In-Process Research & Development (IPR&D).

IPR&D is not amortized, but evaluated for potential impairment on an annual basis or when facts and circumstances warrant. Any impairment charge is recorded in the consolidated income statement under "Research & Development". Once a project included in IPR&D has been successfully developed it is transferred to the "Currently marketed product" category.

Impairment of goodwill and intangible assets

An asset is considered impaired when its balance sheet carrying amount exceeds its estimated recoverable amount, which is defined as the higher of its fair value less costs of disposal and its value in use. Usually, Novartis applies the fair value less costs of disposal method for its impairment assessment. In most cases no directly observable market inputs are available to measure the fair value less costs of disposal. Therefore, an estimate is derived indirectly and is based on net present value techniques utilizing post-tax cash flows and discount rates. In the limited cases where the value in use method would be applied, net present value techniques would be applied using pre-tax cash flows and discount rates.

Fair value less costs of disposal reflects estimates of assumptions that market participants would be expected to use when pricing the asset or CGUs, and for this purpose management considers the range of economic conditions that are expected to exist over the remaining useful life of the asset.

The estimates used in calculating the net present values are highly sensitive and depend on assumptions specific to the nature of the Group's activities with regard to:

- amount and timing of projected future cash flows;
- outcome of R&D activities (compound efficacy, results of clinical trials, etc.);
- amount and timing of projected costs to develop IPR&D into commercially viable products;
- probability of obtaining regulatory approval;
- long-term sales forecasts for periods of up to 20 years;
- sales erosion rates after the end of patent or other intellectual property rights protection and timing of the entry of generic competition;
- selected tax rate;
- behavior of competitors (launch of competing products, marketing initiatives, etc.); and
- selected discount rate.

Generally, for intangible assets with a definite useful life Novartis uses cash flow projections for the whole useful life of these assets. For goodwill and the Alcon brand name, Novartis generally utilizes cash flow projections for a five-year period based on management forecasts, with a terminal value based on cash flow projections usually in line with inflation rates for later periods. Probability-weighted scenarios are typically used.

Discount rates used consider the Group's estimated weighted average cost of capital adjusted for specific country and currency risks associated with cash flow projections to approximate the weighted average cost of capital of a comparable market participant.

Due to the above factors, actual cash flows and values could vary significantly from forecasted future cash flows and related values derived using discounting techniques.

Impairment of associated companies accounted for at equity

Novartis considers investments in associated companies for impairment evaluation whenever objective evidence indicates the net investment may be impaired, including when a quoted share price indicates a fair value less than the per-share balance sheet carrying value for the investment.

If the recoverable amount of the investment is estimated to be lower than the balance sheet carrying amount an impairment charge is recognized for the difference in the consolidated income statement under "Income from associated companies".

Cash and cash equivalents, marketable securities, commodities, derivative financial instruments and non-current financial assets

Cash and cash equivalents include highly liquid investments with original maturities of three months or less which are readily convertible to known amounts of cash. Bank overdrafts are usually presented within current financial debts on the consolidated balance sheet except in cases where a right of offset has been agreed with a bank which then allows for presentation on a net basis.

Marketable securities are financial assets consisting principally of equity and debt securities as well as fund investments. Marketable securities held for short-term non-strategic purposes are principally traded in liquid markets and are classified as marketable securities on the consolidated balance sheet. Marketable securities held for long-term strategic purposes are classified as non-current financial assets on the consolidated balance sheet.

Marketable securities are initially recorded at fair value on their trade date which is different from the settlement date when the transaction is ultimately effected. Quoted securities are re-measured at each reporting date to fair value based on current market prices. If the market for a financial asset is not active or no market is available, fair values are established using valuation techniques. Apart from discounted cash flow analysis and other pricing models, for the majority of investments in what is known as the "Level 3" hierarchy, the valuation is based on the acquisition cost as the best approximation of the fair value of the investee. This is adjusted for a higher or lower valuation in connection with a partial disposal, a new round of financing and for the investee's performance below or above expectations. The fair value of investments in "Level 3" is reviewed regularly for a possible diminution in value.

The Group has classified all its equity and quoted debt securities as well as fund investments as available-for-sale, as they are not acquired to generate profit from short-term fluctuations in price. Unrealized gains, except exchange gains related to quoted debt instruments, are recorded as a fair value adjustment in the consolidated statement of comprehensive income. They are recognized in the consolidated income statement when the

financial asset is sold, at which time the gain is transferred either to "Other financial income and expense", for the marketable securities held for short-term non-strategic purposes, or to "Other income", for all other equity securities and fund investments. Exchange gains related to quoted debt instruments are immediately recognized in the consolidated income statement under "Other financial income and expense".

A security is assessed for impairment when its market value at the balance sheet date is less than initial cost reduced by any previously recognized impairment. Impairments on equity securities, quoted debt securities and fund investments, and exchange rate losses on quoted debt securities in a foreign currency which are held for short-term non-strategic purposes are recorded in "Other financial income and expense". Impairments are recorded for all other equity securities and other fund investments in "Other expense" in the consolidated income statement.

Commodities include gold bullion or coins which are valued at the lower of cost or fair value using current market prices. The changes in fair value below cost are immediately recorded in "Other financial income and expense".

Other non-current financial assets including loans are carried at amortized cost, which reflects the time value of money, less any allowances for uncollectable amounts. Impairments and exchange rate gains and losses on other non-current financial assets, including loans, as well as interest income using the effective interest rate method, are immediately recorded in "Other income" or "Other expense" in the consolidated income statement.

Derivative financial instruments are initially recognized in the balance sheet at fair value and are re-measured to their current fair value at the end of each subsequent reporting period. The valuation of a forward exchange rate contract is based on the discounted cash flow model, using interest curves and spot rates at the reporting date as observable inputs.

Options are valued based on a modified Black-Scholes model using volatility and exercise prices as major observable inputs.

The Group utilizes derivative financial instruments for the purpose of hedging to reduce the volatility in the Group's performance due to the exposure to various types of business risks. The Group, therefore, enters into certain derivative financial instruments which provide effective economic hedges. The risk reduction is obtained because the derivative's value or cash flows are expected, wholly or partly, to move inversely to the hedged item and, therefore, offset changes in the value or cash flows of the hedged item. The overall hedging strategy is aiming to mitigate the currency and interest exposure risk of positions which are contractually agreed and to partially hedge the exposure risk of selected anticipated transactions. However, the Group generally does not hedge the translation risk related to its foreign investments.

Not all of the financial impact of derivative financial instruments can be matched with the financial impact of the economically hedged item. A prerequisite for obtaining this accounting-hedge relationship is extensive documentation on inception and proving on a regular basis that the economic hedge is effective for accounting purposes. Changes in the fair value of any derivative instruments that do not qualify for cash flow hedge accounting are recognized immediately in "Other financial income and expense" in the consolidated income statement.

Inventories

Inventory is valued at acquisition or production cost determined on a first-in first-out basis. This value is used for the "Cost of goods sold" in the consolidated income statement. Unsalable inventory is fully written off in the consolidated income statement under "Cost of goods sold".

Trade receivables

Trade receivables are initially recognized at their invoiced amounts including any related sales taxes less adjustments for estimated revenue deductions such as rebates, chargebacks and cash discounts.

Provisions for doubtful trade receivables are established once there is an indication that it is likely that a loss will be incurred. These provisions represent the difference between the trade receivable's carrying amount in the consolidated balance sheet and the estimated net collectible amount. Significant financial difficulties of a customer, such as probability of bankruptcy, financial reorganization, default or delinquency in payments are considered indicators that recovery of the trade receivable is doubtful. Charges for doubtful trade receivables are recognized in the consolidated income statement within "Marketing & Sales" expenses.

Legal and environmental liabilities

Novartis and its subsidiaries are subject to contingencies arising in the ordinary course of business such as patent litigation, environmental remediation liabilities and other product-related litigation, commercial litigation, and governmental investigations and proceedings. Provisions are recorded where a reliable estimate can be made of the probable outcome of legal or other disputes against the subsidiary.

Contingent consideration

In a business combination or divestment of a business, it is necessary to recognize contingent future payments to previous or from new owners representing contractually defined potential amounts as a liability or asset. Usually for Novartis, these are linked to milestone or royalty payments related to certain assets and are recognized as a financial liability or asset at their fair value which is then re-measured at each subsequent reporting date. These estimations typically depend on factors such as technical milestones or market performance and are adjusted for the probability of their likelihood of payment and if material, appropriately discounted to reflect the impact of time.

Changes in the fair value of contingent consideration liabilities in subsequent periods are recognized in the consolidated income statement in "Cost of goods sold" for currently marketed products and in "Research & Development" for IPR&D. Changes in contingent consideration assets are recognized in "Other revenue", "Other income" or "Other expense", depending on its nature. The effect of unwinding the discount over time is recognized in "Interest expense" in the consolidated income statement.

Novartis does not recognize contingent consideration associated with asset purchases outside of a business combination that are conditional upon future events which are within its control until such time as there is an unconditional obligation. If the contingent consideration is outside the control of Novartis, a liability is recognized once it becomes probable that the contingent consideration will become due. In both cases, if appropriate, a corresponding asset is recorded.

Defined benefit pension plans and other post-employment benefits

The liability in respect of defined benefit pension plans and other post-employment benefits is the defined benefit obligation calculated annually by independent actuaries using the projected unit credit method. The current service cost for such post-employment benefit plans is included in the personnel expenses of the various functions where the associates are employed, while the net interest on the net defined benefit liability or asset is recognized as "Other expense" or "Other income".

Treasury shares

Treasury shares are initially recorded at fair value on their trade date which is different from the settlement date when the transaction is ultimately effected. Treasury shares are deducted from consolidated equity at their nominal value of CHF 0.50 per share. Differences between the nominal amount and the transaction price on purchases or sales of treasury shares with third parties, or the value of services received for the shares allocated to associates as part of share-based compensation arrangements, are recorded in "Retained earnings" in the consolidated statement of changes in equity.

Revenue recognition

Revenue

Revenue is recognized on the sale of Novartis Group products and services and recorded as "Net sales" in the consolidated income statement when there is persuasive evidence that a sales arrangement exists, title and risks and rewards for the products are transferred to the customer, the price is determinable and collectability is reasonably assured. When contracts contain customer acceptance provisions, sales are recognized upon the satisfaction of acceptance criteria. If products are stockpiled at the request of the customer, revenue is only recognized once the products have been inspected and accepted by the customer and there is no right of return or replenishment on product expiry.

Surgical equipment may be sold together with other products and services under a single contract. The total consideration is allocated to the separate elements based on their relative fair values. Revenue is recognized once the recognition criteria have been met for each element of the contract.

For surgical equipment, in addition to cash and instalment sales, revenue is recognized under finance and operating lease arrangements. Arrangements in which Novartis transfers substantially all the risks and rewards incidental to ownership to the customer are treated as finance lease arrangements. Revenue from finance lease arrangements is recognized at amounts equal to the fair values of the equipment, which approximate the present values of the minimum lease payments under the arrangements. As interest rates embedded in lease arrangements are approximately market rates, revenue under finance lease arrangements is comparable to revenue for outright sales. Finance income for arrangements in excess of twelve months is deferred and subsequently recognized based on a pattern that approximates the use of the effective interest method and recorded in "Other income". Operating lease revenue for equipment rentals is recognized on a straight-line basis over the lease term.

Provisions for rebates and discounts granted to government agencies, wholesalers, retail pharmacies, managed healthcare organizations and other customers are recorded as a deduction from revenue at the time the related revenues are recorded or when the incentives are offered. They are calculated on the basis of historical experience and the specific terms in the individual agreements. Provisions for refunds granted to healthcare providers under innovative pay-for-performance agreements are recorded as a revenue deduction at the time the related sales are recorded. They are calculated on the basis of historical experience and clinical data available for the product as well as the specific terms in the individual agreements. In cases where historical

experience and clinical data are not sufficient for a reliable estimation of the outcome, revenue recognition is deferred until such history is available.

Cash discounts are offered to customers to encourage prompt payment and are recorded as revenue deductions. Following a decrease in the price of a product, we generally grant customers a "shelf stock adjustment" for a customer's existing inventory for the involved product. Provisions for shelf stock adjustments, which are primarily relevant within the Sandoz Division, are determined at the time of the price decline or at the point of sale, if the impact of a price decline on the products sold can be reasonably estimated based on the customer's inventory levels of the relevant product. When there is historical experience of Novartis agreeing to customer returns and Novartis can reasonably estimate expected future returns, a provision is recorded for estimated sales returns. In doing so the estimated rate of return is applied, determined based on historical experience of customer returns and considering any other relevant factors. This is applied to the amounts invoiced also considering the amount of returned products to be destroyed versus products that can be placed back in inventory for resale. Where shipments are made on a re-sale or return basis, without sufficient historical experience for estimating sales returns, revenue is only recorded when there is evidence of consumption or when the right of return has expired.

Provisions for revenue deductions are adjusted to actual amounts as rebates, discounts and returns are processed. The provision represents estimates of the related obligations, requiring the use of judgment when estimating the effect of these sales deductions.

Other revenue

"Other revenue" includes royalty income and revenue from activities such as manufacturing services or other services rendered to the extent such revenue is not recorded under net sales.

Research & Development

Internal Research & Development (R&D) costs are fully charged to "Research & Development" in the consolidated income statement in the period in which they are incurred. The Group considers that regulatory and other uncertainties inherent in the development of new products preclude the capitalization of internal development expenses as an intangible asset until marketing approval from a regulatory authority is obtained in a major market such as the United States, the European Union, Switzerland or Japan.

Payments made to third parties in compensation for subcontracted R&D, such as contract research and development organizations, that is deemed not to transfer intellectual property to Novartis are expensed as internal R&D expenses in the period in which they are incurred. Such payments are only capitalized if they meet the criteria for recognition of an internally generated intangible asset, usually when marketing approval has been achieved from a regulatory authority in a major market.

Payments made to third parties in order to in-license or acquire intellectual property rights, compounds and products, including initial upfront and subsequent milestone payments, are capitalized as are payments for other assets, such as technologies to be used in R&D activities. If additional payments are made to the originator company to continue to perform R&D activities, an evaluation is made as to the nature of the payments. Such additional payments will be expensed if they are deemed to be compensation for subcontracted R&D services not resulting in an additional transfer of intellectual property rights to Novartis. Such additional payments will be capitalized if they are deemed to be compensation for the transfer to Novartis of additional intellectual property developed at the risk of the originator company. Subsequent internal R&D costs in relation to IPR&D and other assets are expensed since the technical feasibility of the internal R&D activity can only be demonstrated by the receipt of marketing approval for a related product from a regulatory authority in a major market.

Costs for post-approval studies performed to support the continued registration of a marketed product are recognized as marketing expenses. Costs for activities that are required by regulatory authorities as a condition for obtaining marketing approval are capitalized and recognized as currently marketed product.

Inventory produced ahead of regulatory approval is provisioned against and the charge is included in "Other expense" in the consolidated income statement, as its ultimate use cannot be assured. If this inventory can be subsequently sold, the provision is released to "Other income" in the consolidated income statement either on approval by the appropriate regulatory authority or, exceptionally in Europe, on recommendation by the Committee for Medicinal Products for Human Use (CHMP), if approval is virtually certain.

Share-based compensation

Vested Novartis shares and American Depositary Receipts (ADRs) which are granted as compensation are valued at their market value on the grant date and are immediately expensed in the consolidated income statement.

The fair values of unvested restricted shares, restricted share units (RSUs) and performance share units (PSUs) in Novartis shares and ADRs granted to associates as compensation are recognized as an expense over the related vesting period. The expense recorded in the consolidated income statement is included in the personnel expenses of the various functions where the associates are employed.

Unvested restricted shares, restricted ADRs and RSUs are only conditional on the provision of services by the plan participant during the vesting period. They are valued using their fair value on the grant date. As

RSUs do not entitle the holder to dividends the fair value is based on the Novartis share price at the grant date adjusted for the net present value of the dividends expected to be paid during the holding period. The fair value of these grants, after making adjustment for assumptions related to their forfeiture during the vesting period, are expensed on a straight-line basis over the respective vesting period.

PSUs require the plan participant to not only provide services during the vesting period but they are also subject to certain performance criteria being achieved during the vesting period. PSUs granted under plans defined as "Long-Term Performance Plans" are subject to performance criteria based on Novartis internal performance metrics. The expense is determined taking into account assumptions concerning performance during the period against targets and expected forfeitures due to plan participants not meeting their service conditions. These assumptions are periodically adjusted. Any change in estimates for past services are recorded immediately as an expense or income in the consolidated income statement and amounts for future periods are expensed over the remaining vesting period. As a result, at the end of the vesting period, the total charge during the whole vesting period represents the amount which will finally vest. The number of equity instruments that finally vest is determined at the vesting date.

PSUs granted under the Long-Term Relative Performance Plan (LTRPP) are not only conditional on the provision of services by the plan participant during the vesting period but are also conditional on the Total Shareholder Return (TSR) performance of Novartis relative to a specific peer group of companies over the vesting period. These performance conditions are based on variables which can be observed in the market. IFRS requires that these observations are taken into account in determining the fair value of these PSUs at the date of grant. Novartis has determined the fair value of these PSUs at the date of grant using a "Monte Carlo" simulation model. The total fair value of this grant is expensed on a straight-line basis over the vesting period. Adjustments to the number of equity instruments granted are only made if a plan participant does not fulfill the service conditions.

If a plan participant leaves Novartis, for reasons other than retirement, disability or death, then unvested restricted shares, restricted ADRs, RSUs and related share options and PSUs are forfeited, unless determined otherwise by the provision of the plan rules or by the Compensation Committee, for example, in connection with a reorganization or divestment.

Measuring the fair values of PSUs granted under the LTRPP, requires an estimation of the probability of uncertain future events and various other factors used in the valuation models. The Monte Carlo simulation used for determining the fair value of the PSUs related to the LTRPP requires as input parameters the probability of factors related to uncertain future events; the term of the award; grant price of underlying shares or ADRs; expected volatilities; expected correlation matrix of the underlying equity instruments with those of the peer group of companies and the risk free interest rate.

Government grants

Grants from governments or similar organizations are recognized at their fair value when there is a reasonable assurance that the grant will be received and the Group will comply with all attached conditions.

Government grants related to income are deferred and recognized in the consolidated income statement over the period necessary to match them with the related costs which they are intended to compensate.

The accounting policy for property, plant and equipment describes the treatment of any related grants.

Restructuring charges

Restructuring provisions are recognized for the direct expenditures arising from the restructuring, where the plans are sufficiently detailed and where appropriate communication to those affected has been made.

Charges to increase restructuring provisions are included in "Other expense" in the consolidated income statements. Corresponding releases are recorded in "Other income" in the consolidated income statement.

Taxes

Taxes on income are provided in the same periods as the revenues and expenses to which they relate and include any interest and penalties incurred during the period. Deferred taxes are determined using the comprehensive liability method and are calculated on the temporary differences that arise between the tax base of an asset or liability and its carrying value in the balance sheet prepared for consolidation purposes, except for those temporary differences related to investments in subsidiaries and associated companies, where the timing of their reversal can be controlled and it is probable that the difference will not reverse in the foreseeable future. Since generally the retained earnings are reinvested, withholding or other taxes on eventual distribution of a subsidiary's retained earnings are only taken into account when a dividend has been planned.

The estimated amounts for current and deferred tax assets or liabilities, including any amounts related to any uncertain tax positions, are based on currently known facts and circumstances. Tax returns are based on an interpretation of tax laws and regulations and reflect estimates based on these judgments and interpretations. The tax returns are subject to examination by the competent taxing authorities which may result in an assessment being made requiring payments of additional tax, interest or penalties. Inherent uncertainties exist in the estimates of the tax positions.

Non-current assets held for sale

Non-current assets are classified as assets held for sale when their carrying amount is to be recovered principally through a sale transaction and a sale is considered highly

probable. They are stated at the lower of carrying amount and fair value less costs of disposal. Assets held for sale, included within a disposal group or included within discontinued operations are not depreciated or amortized.

Status of adoption of significant new or amended IFRS standards or interpretations

The adoption of new or amended standards and interpretations which are effective for the financial year beginning on January 1, 2016 did not have a material impact on the Group's consolidated financial statements.

The following new IFRS standards will, based on a Novartis analysis, be of significance to the Group, but have not yet been early adopted:

- IFRS 9 *Financial Instruments* will substantially change the classification and measurement of financial instruments; will require impairments to be based on a forward-looking model; will change the approach to hedging financial exposures and related documentation and also the recognition of certain fair value changes. However, the Group does not expect IFRS 9 to have a significant impact on its consolidated financial statements and will implement the new standard on January 1, 2018.
- IFRS 15 *Revenue from contracts with customers* amends revenue recognition requirements and establishes principles for reporting information about the nature, amount, timing and uncertainty of revenue and cash flows arising from contracts with customers. The standard replaces IAS 18 *Revenue* and IAS 11 *Construction contracts* and related interpretations. However, the Group does not expect IFRS 15 to have a significant impact on its consolidated financial statements and will implement the new standard on January 1, 2018.
- IFRS 16 *Leases* substantially changes the financial statements as the majority of leases will become on-balance sheet liabilities with corresponding right of use assets on the balance sheet. The standard replaces IAS 17 *Leases* and is effective January 1, 2019. The current operating lease commitments of USD 2.9 billion as of December 31, 2016 and disclosed in Note 28 provide, subject to the provision of the standard, an indicator of the impact of the implementation of IFRS 16 on the Group's consolidated balance sheet.

There are no other IFRS standards or interpretations which are not yet effective which would be expected to have a material impact on the Group.

2. Significant transactions

Significant transactions in 2016

ALCON – ACQUISITION OF TRANSCEND MEDICAL, INC.

On February 17, 2016, Alcon entered into an agreement to acquire Transcend Medical, Inc. (Transcend), a privately-held, US-based company focused on developing minimally-invasive surgical devices to treat glaucoma. The transaction closed on March 23, 2016, and the fair value of the total purchase consideration was USD 332 million. The amount consisted of an initial cash payment of USD 240 million and the net present value of the contingent consideration of USD 92 million due to the Transcend shareholders, which they are eligible to receive upon achievement of specified development and commercialization milestones. The purchase price allocation resulted in net identifiable assets of USD 294 million and goodwill of USD 38 million. Results of operations since the date of acquisition were not material.

INNOVATIVE MEDICINES – ACQUISITION OF SELEXYS PHARMACEUTICALS CORPORATION

On November 18, 2016, Novartis acquired Selexys Pharmaceuticals Corporation (Selexys), a privately held, US-based company specializing in development of therapeutics in certain hematologic and inflammatory disorders following receipt of results of the SUSTAIN study. The previously held interest of 19% is adjusted to its fair value of USD 64 million through the consolidated income statement at acquisition date. This re-measurement resulted in a gain of USD 53 million.

The fair value of the total purchase consideration for acquiring the 81% stake Novartis did not already own amounted to USD 268 million. The amount consisted of an initial cash payment of USD 194 million and the net present value of the contingent consideration of USD 74 million due to the Selexys shareholders, which they are eligible to receive upon achievement of specified development and commercialization milestones. The purchase price allocation resulted in net identifiable assets of USD 332 million. No goodwill was recognized. Results of operations since the date of acquisition were not material.

Significant transactions entered into in 2016 and closed in January 2017

INNOVATIVE MEDICINES – ACQUISITION OF ZIARCO GROUP LIMITED

On December 16, 2016, Novartis entered into an agreement to acquire Ziarco Group Limited, a privately held company focused on the development of novel treatments in dermatology. This acquisition will add a once daily oral H4 receptor antagonist in development for atopic dermatitis (AD), commonly known as eczema, to complement the Novartis dermatology portfolio and pipeline. The transaction closed on January 20, 2017, and the preliminary fair value of the total purchase consideration was USD 420 million before ordinary purchase price adjustments. The amount consisted of an initial cash payment of USD 325 million before ordinary purchase price adjustments and the preliminary net pres-

ent value of the contingent consideration of USD 95 million, due to the Ziarco shareholders, which they are eligible to receive upon achievement of specified development milestones. The preliminary purchase price allocation resulted in net identifiable assets of USD 382 million and goodwill of USD 38 million.

INNOVATIVE MEDICINES – ACQUISITION OF ENCORE VISION, INC.

On December 20, 2016, Novartis entered into a definitive agreement for the acquisition of Encore Vision, Inc., a privately-held company in Fort Worth, Texas, USA, focused on the development of a novel treatment in presbyopia. The transaction closed on January 20, 2017, and the preliminary fair value of the total purchase consideration was USD 465 million before ordinary purchase price adjustments. The amount consisted of an initial cash payment of USD 375 million before ordinary purchase price adjustments and the preliminary net present value of the contingent consideration of USD 90 million, due to the Encore shareholders, which they are eligible to receive upon achievement of specified development and commercialization milestones. The preliminary purchase price allocation resulted in net identifiable assets of USD 374 million and goodwill of USD 91 million.

Significant transactions in 2015

Portfolio transformation transactions

TRANSACTION WITH ELI LILLY AND COMPANY

On January 1, 2015, Novartis closed its transaction with Eli Lilly and Company, USA (Lilly) announced in April 2014 to divest its Animal Health business for USD 5.4 billion in cash. This resulted in a pre-tax gain of USD 4.6 billion, which is recorded in operating income from discontinued operations.

TRANSACTIONS WITH GLAXOSMITHKLINE PLC

On March 2, 2015, Novartis closed its transactions with GlaxoSmithKline plc, Great Britain (GSK) announced in April 2014, with the following consequences:

INNOVATIVE MEDICINES – ACQUISITION OF GSK ONCOLOGY PRODUCTS

Novartis acquired GSK's oncology products and certain related assets for an aggregate cash consideration of USD 16.0 billion. Up to USD 1.5 billion of this cash consideration at the acquisition date is contingent on certain development milestones. The fair value of this potentially refundable consideration as at the acquisition date is USD 0.1 billion. In addition, under the terms of the agreement, Novartis is granted a right of first negotiation over the co-development or commercialization of GSK's current and future oncology R&D pipeline, excluding oncology vaccines. The right of first negotiation is for a period of 12.5 years from the acquisition closing date. The purchase price allocation of the fair value of the consideration of USD 15.9 billion resulted in net identified assets of USD 13.5 billion and goodwill of USD 2.4 billion. In 2015, from the date of the acquisition the business generated net sales of USD 1.8 billion. Management estimates net sales for the entire year 2015 would have amounted to USD 2.1 billion had the oncology products been acquired at the beginning of the 2015 reporting period. The 2015 net results from operations on a reported basis since the acquisition date were not material.

VACCINES – DIVESTMENT

Novartis divested its Vaccines business (excluding its Vaccines influenza business) to GSK for up to USD 7.1 billion plus royalties. The USD 7.1 billion consists of USD 5.25 billion paid at closing and up to USD 1.8 billion in future milestone payments. The fair value of the contingent future milestones and royalties as at the acquisition date is USD 1.0 billion, resulting in a fair value of consideration received of USD 6.25 billion. Included in this amount is a USD 450 million milestone payment received in late March 2015. The sale of this business resulted in a pre-tax gain of USD 2.8 billion, which is recorded in operating income from discontinued operations.

Novartis's Vaccines influenza business was excluded from the GSK Vaccines business acquisition. However, GSK entered into a future option arrangement with Novartis in relation to the Vaccines influenza business, pursuant to which Novartis could have unilaterally required GSK to acquire the entire or certain parts of its Vaccines influenza business for consideration of up to USD 250 million (the Influenza Put Option) if the divestment to CSL Limited, Australia (CSL), discussed below, had not been completed. The option period was 18 months from the closing date of the GSK transaction, but terminated with the sale of the Vaccines influenza business to CSL on July 31, 2015. Novartis paid GSK a fee of USD 5 million in consideration for the grant of the Influenza Put Option.

CONSUMER HEALTH – COMBINATION OF NOVARTIS OTC WITH GSK CONSUMER HEALTHCARE

Novartis and GSK agreed to create a combined consumer healthcare business through the combination between Novartis OTC and GSK Consumer Healthcare businesses. On March 2, 2015, a new entity, GlaxoSmithKline Consumer Healthcare Holdings Ltd. (GSK Consumer Healthcare) was formed via contribution of businesses from both Novartis and GSK. Novartis has a 36.5% interest in the newly created entity. Novartis has valued the contribution of 63.5% of its OTC Division in exchange for 36.5% of the GSK Consumer Healthcare business at fair value. Based on the estimates of fair values exchanged, an investment in an associated company of USD 7.6 billion was recorded. The resulting pre-tax gain, net of transaction related costs, of USD 5.9 billion is recorded in operating income from discontinued operations.

Novartis has four of eleven seats on the GSK Consumer Healthcare Board of Directors. Furthermore, Novartis has customary minority rights and also exit rights at a pre-defined, market based pricing mechanism.

The investment is accounted for using the equity method of accounting using estimated results for the last quarter of the year. Any differences between this estimate and actual results, when available, will be adjusted in the Group's consolidated financial statements in the following year.

ADDITIONAL GSK RELATED COSTS

The GSK transaction resulted in USD 0.6 billion of additional transaction-related costs that were expensed, thereof USD 0.3 billion paid in 2015.

TRANSACTION WITH CSL

On October 26, 2014, Novartis entered into an agreement with CSL to sell its Vaccines influenza business to CSL for USD 275 million. Entering into the separate divestment agreement with CSL resulted in the Vaccines influenza business being classified as a separate disposal group consisting of a group of cash generating units within the Vaccines Division, requiring the performance of a separate valuation of the Vaccines influenza business net assets. This triggered the recognition of an exceptional impairment charge in 2014 of USD 1.1 billion as the estimated net book value of the Vaccines influenza business net assets was above the USD 275 million consideration. The transaction with CSL was completed on July 31, 2015, resulting in a partial reversal of the impairment recorded in 2014 in the amount of USD 0.1 billion, which is included in operating income from discontinued operations.

Other significant transactions in 2015

INNOVATIVE MEDICINES – ACQUISITION OF SPINIFEX PHARMACEUTICALS, INC.

On June 29, 2015, Novartis entered into an agreement to acquire Spinifex Pharmaceuticals, Inc. (Spinifex), a US and Australia based, privately held development stage company, focused on developing a peripheral approach to treat neuropathic pain. The transaction closed on July 24, 2015, and the fair value of the total purchase consideration was USD 312 million. The amount consisted of an initial cash payment of USD 196 million and the net present value of the contingent consideration of USD 116 million due to previous Spinifex shareholders, which they are eligible to receive upon achievement of specified development and commercialization milestones. The purchase price allocation resulted in net identifiable assets of USD 263 million and goodwill of USD 49 million. The 2015 results of operations since the date of acquisition were not material.

INNOVATIVE MEDICINES – ACQUISITION OF ADMUNE THERAPEUTICS LLC

On October 16, 2015, Novartis entered into an agreement to acquire Admune Therapeutics LLC (Admune), a US-based, privately held company, broadening Novartis' pipeline of cancer immunotherapies. The fair value of the total purchase consideration amounted to USD 258 million. This amount consists of an initial cash payment of USD 140 million and the net present value of the contingent consideration of USD 118 million due to Admune's previous owners, which they are eligible to receive upon the achievement of specified development and commercialization milestones. The purchase price allocation resulted in net identifiable assets of USD 258 million. No goodwill was recognized. The 2015 results of operations since the date of acquisition were not material.

Significant transactions in 2014

VACCINES – DIVESTMENT OF BLOOD TRANSFUSION DIAGNOSTICS UNIT

On January 9, 2014, Novartis completed the divestment of its blood transfusion diagnostics unit announced on November 11, 2013 to the Spanish company Grifols S.A., for USD 1.7 billion in cash. The pre-tax gain on this transaction was USD 0.9 billion and was recorded in operating income from discontinued operations.

INNOVATIVE MEDICINES – ACQUISITION OF COSTIM PHARMACEUTICALS, INC.

On February 17, 2014, Novartis acquired all of the outstanding shares of CoStim Pharmaceuticals, Inc., a Cambridge, Massachusetts, US-based, privately held biotechnology company focused on harnessing the immune system to eliminate immune-blocking signals from cancer, for a total purchase consideration of USD 248 million (at fair value excluding cash acquired). This amount consists of an initial cash payment and the net present value of contingent consideration of USD 153 million due to previous CoStim shareholders, which they are eligible to receive upon the achievement of specified development and commercialization milestones. The purchase price allocation resulted in net identified assets of USD 152 million (excluding cash acquired) and goodwill of USD 96 million. The 2014 results of operations since the acquisition were not material.

INNOVATIVE MEDICINES – DIVESTMENT OF IDENIX PHARMACEUTICALS, INC. (IDENIX) SHAREHOLDING

On August 5, 2014, Merck & Co., USA completed a tender offer for Idenix. As a result, Novartis divested its 22% shareholding in Idenix and realized a gain of approximately USD 0.8 billion which was recorded in income from associated companies.

ALCON – ACQUISITION OF WAVETEC VISION SYSTEMS, INC. (WAVETEC)

On October 16, 2014, Alcon acquired all of the outstanding shares of WaveTec, a privately held company, for USD 350 million in cash. The purchase price allocation resulted in net identified assets of USD 180 million and goodwill of USD 170 million. The 2014 results of operations since the date of acquisition were not material.

CORPORATE – DIVESTMENT OF LTS LOHMANN THERAPIE-SYSTEME AG (LTS) SHAREHOLDING

On November 5, 2014, Novartis divested its 43% shareholding in LTS and realized a gain of approximately USD 0.4 billion which was recorded in income from associated companies.

3. Segmentation of key figures 2016, 2015 and 2014

The businesses of Novartis are divided operationally on a worldwide basis into three identified reporting segments, Innovative Medicines, Sandoz and Alcon. In addition, we separately report Corporate activities.

Reporting segments are presented in a manner consistent with the internal reporting to the chief operating decision maker which is the Executive Committee of Novartis. The reporting segments are managed separately because they each research, develop, manufacture, distribute, and sell distinct products that require differing marketing strategies.

The Executive Committee of Novartis is responsible for allocating resources and assessing the performance of the reporting segments.

Following the internal reorganization announced on January 27, 2016, the reporting segments and their financial results have been adapted to reflect in all years presented the transfers of:

— Alcon Ophthalmic Pharmaceuticals business franchise from the Alcon Division to the Innovative Medicines Division, the products of which will continue to be marketed with the Alcon brand name.
— Selected mature products from the Innovative Medicines Division to the Retail Generics business franchise of the Sandoz Division.
— The Alcon brand name intangible asset from the Alcon Division to Corporate as it is used to market the products of Alcon Division and products within the Ophthalmology business franchise of the Innovative Medicines Division.

The consolidated financial statement disclosures by segment have been restated to reflect the above mentioned internal reorganization. Accordingly, the net assets, including a proportionate share of goodwill, and the income and expenses related to the activities transferred have been reallocated to the respective reporting segment in all periods presented in this financial report.

Innovative Medicines – formerly named the 'Pharmaceuticals Division' – researches, develops, manufactures, distributes and sells patented prescription medicines. The Innovative Medicines Division is organized into two global business units: Novartis Oncology business unit, which consists of the global business franchises Oncology and Novartis Pharmaceuticals business unit, which consists of the global business franchises Ophthalmology, Neuroscience, Immunology and Dermatology, Respiratory, Cardio-Metabolic and Established Medicines.

Sandoz develops, manufactures, distributes and sells prescription medicines, as well as pharmaceutical active substances, which are not protected by valid and enforceable third-party patents. The Sandoz Division is organized globally in three business franchises: Retail Generics, Anti-Infectives and Biopharmaceuticals. In Retail Generics, Sandoz develops, manufactures and markets active ingredients and finished dosage forms of pharmaceuticals to third parties. Retail Generics includes the areas of dermatology, respiratory, oncology and ophthalmics, as well as cardiovascular, metabolism, central nervous system, pain, gastrointestinal and hormonal therapies. Finished dosage form anti-infectives sold to third parties are also part of Retail Generics. In Anti-Infectives, Sandoz manufactures active pharmaceutical ingredients and intermediates – mainly antibiotics – for internal use by Retail Generics and for sale to third party customers. In Biopharmaceuticals, Sandoz develops, manufactures and markets protein- or other biotechnology-based products known as biosimilars, and provides biotechnology manufacturing services to other companies.

Alcon researches, discovers, develops, manufactures, distributes and sells eye care products. The Alcon Division is the global leader in eye care, with product offerings in eye care devices and vision care. The Alcon Division is organized globally in two global business franchises as follows: In Surgical, Alcon develops, manufactures, distributes and sells ophthalmic surgical equipment, instruments, disposable products and intraocular lenses. In Vision Care, Alcon develops, manufactures, distributes and sells contact lenses and lens care products.

Income and expenses relating to Corporate include the costs of the Group headquarters and those of corporate coordination functions in major countries. In addition, Corporate includes other items of income and expense that are not attributable to specific segments, such as certain revenues from intellectual property rights, certain expenses related to post-employment benefits, environmental remediation liabilities, charitable activities, donations and sponsorships. Usually, no allocation of Corporate items is made to the segments. As a result, Corporate assets and liabilities principally consist of net liquidity (cash and cash equivalents, marketable securities less financial debts), investments in associated companies and current and deferred taxes and non-segment specific environmental remediation and post-employment benefit liabilities. Corporate also includes the Alcon brand name intangible asset as it is used to market the products of Alcon Division and products within the Ophthalmology business franchise of the Innovative Medicines Division.

Our divisions are supported by the Novartis Institutes for BioMedical Research, Novartis Business Services, Global Drug Development and Novartis Technical Operations organizations.

— The Novartis Institutes for BioMedical Research (NIBR) conducts research activities of the Innovative Medicines Division.
— Novartis Business Services (NBS) started operations in January 2015 as a shared services organization providing business support services across the Group such as information technology, real estate and facility services, procurement, product lifecycle services, human resources and financial reporting and accounting operations.
— Global Drug Development organization started operations in July 2016 to oversee all drug development activities for our Innovative Medicines Division and the biosimilars portfolio of our Sandoz division.
— Novartis Technical Operations organization started operations in July 2016, in order to centralize management of our manufacturing operations across our Innovative Medicines and Sandoz divisions.

Following the Portfolio Transformation transactions in 2015, described in Note 2, Novartis has separated the Group's reported financial data into "continuing" operations and "discontinued" operations:

Continuing operations comprise:
— Innovative Medicines: Innovative patent-protected prescription medicines
— Sandoz: Generic and biosimilar pharmaceuticals
— Alcon: Eye care devices and vision care
— Corporate activities

Discontinued operations comprise:
— Vaccines: Preventive human vaccines and the blood transfusion diagnostics unit. Excluded are certain intellectual property rights and related other revenues of the Vaccines Division which are now reported under Corporate activities.
— Consumer Health: OTC (over-the-counter medicines) and Animal Health. These two divisions were managed separately. However, neither was material enough to the Group to be disclosed separately as a reporting segment.
— Corporate: certain transactional and other expenses related to the portfolio transformation.

The accounting policies mentioned in Note 1 are used in the reporting of segment results. Inter-segmental sales are made at amounts which are considered to approximate arm's length transactions. The Executive Committee of Novartis evaluates segmental performance and allocates resources among the segments based on a number of measures including net sales, operating income and net operating assets. Segment net operating assets consist primarily of property, plant and equipment, intangible assets, goodwill, inventories and trade and other operating receivables less operating liabilities.

Segmentation – Consolidated income statements

	Innovative Medicines[1]		Sandoz		Alcon		Corporate (including eliminations)		Group	
(USD millions)	**2016**	2015 restated[2]	**2016**	2015 restated[2]	**2016**	2015 restated[2]	**2016**	2015 restated[2]	**2016**	2015
Net sales to third parties from continuing operations	**32 562**	33 345	**10 144**	10 070	**5 812**	5 999			**48 518**	49 414
Sales to other segments	624	518	104	128			– 728	– 620		26
Net sales from continuing operations	**33 186**	33 863	**10 248**	10 198	**5 812**	5 999	**– 728**	**– 620**	**48 518**	49 440
Other revenues	815	792	37	25	4	23	62	107	918	947
Cost of goods sold	– 9 331	– 9 204	– 5 971	– 5 844	– 3 092	– 3 145	874	789	– 17 520	– 17 404
Gross profit from continuing operations	**24 670**	25 451	**4 314**	4 379	**2 724**	2 877	**208**	276	**31 916**	32 983
Marketing & Sales	– 8 435	– 8 430	– 1 681	– 1 679	– 1 882	– 1 663			– 11 998	– 11 772
Research & Development	– 7 709	– 7 685	– 814	– 782	– 516	– 468			– 9 039	– 8 935
General & Administration	– 978	– 1 031	– 300	– 346	– 410	– 450	– 506	– 648	– 2 194	– 2 475
Other income	1 091	1 149	185	109	48	54	603	737	1 927	2 049
Other expense	– 1 213	– 1 639	– 259	– 381	– 96	– 69	– 776	– 784	– 2 344	– 2 873
Operating income from continuing operations	**7 426**	7 815	**1 445**	1 300	**– 132**	281	**– 471**	**– 419**	**8 268**	8 977
Income from associated companies			6	2			697	264	703	266
Interest expense									– 707	– 655
Other financial income and expense									– 447	– 454
Income before taxes from continuing operations									**7 817**	8 134
Taxes									– 1 119	– 1 106
Net income from continuing operations									**6 698**	7 028
Net income from discontinued operations										10 766
Net income									**6 698**	17 794
Attributable to:										
Shareholders of Novartis AG									*6 712*	*17 783*
Non-controlling interests									*– 14*	*11*
Included in net income from continuing operations are:										
Interest income									43	33
Depreciation of property, plant & equipment	– 883	– 839	– 260	– 277	– 229	– 237	– 117	– 117	– 1 489	– 1 470
Amortization of intangible assets	– 2 470	– 2 384	– 450	– 450	– 929	– 912	– 12	– 9	– 3 861	– 3 755
Impairment charges on property, plant & equipment, net	– 93	39	– 2	– 97	– 5	– 1	– 2	– 21	– 102	– 80
Impairment charges on intangible assets, net	– 522	– 138	– 65	– 27	– 4	– 1			– 591	– 166
Impairment charges and fair value gains on financial assets, net	– 55	– 32					– 77	– 72	– 132	– 104
Additions to restructuring provisions	– 236	– 232	– 46	– 93	– 36	– 25	– 25	– 49	– 343	– 399
Equity-based compensation of Novartis equity plans	– 582	– 620	– 47	– 53	– 53	– 66	– 164	– 164	– 846	– 903

[1] Formerly named the Pharmaceuticals Division

[2] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016

(USD millions)	Innovative Medicines[1] 2015 restated[2]	Innovative Medicines[1] 2014 restated[2]	Sandoz 2015 restated[2]	Sandoz 2014 restated[2]	Alcon 2015 restated[2]	Alcon 2014 restated[2]	Corporate (including eliminations) 2015 restated[2]	Corporate (including eliminations) 2014 restated[2]	Group 2015	Group 2014
Net sales to third parties from continuing operations	**33 345**	**34 828**	**10 070**	**10 736**	**5 999**	**6 616**			**49 414**	**52 180**
Sales to other segments	518	698	128	287			– 620	– 746	26	239
Net sales from continuing operations	**33 863**	**35 526**	**10 198**	**11 023**	**5 999**	**6 616**	**– 620**	**– 746**	**49 440**	**52 419**
Other revenues	792	631	25	12	23	32	107	540	947	1 215
Cost of goods sold	– 9 204	– 8 724	– 5 844	– 6 293	– 3 145	– 3 204	789	876	– 17 404	– 17 345
Gross profit from continuing operations	**25 451**	**27 433**	**4 379**	**4 742**	**2 877**	**3 444**	**276**	**670**	**32 983**	**36 289**
Marketing & Sales	– 8 430	– 8 809	– 1 679	– 1 871	– 1 663	– 1 697			– 11 772	– 12 377
Research & Development	– 7 685	– 7 787	– 782	– 833	– 468	– 466			– 8 935	– 9 086
General & Administration	– 1 031	– 1 114	– 346	– 376	– 450	– 508	– 648	– 618	– 2 475	– 2 616
Other income	1 149	737	109	97	54	76	737	481	2 049	1 391
Other expense	– 1 639	– 1 634	– 381	– 189	– 69	– 89	– 784	– 600	– 2 873	– 2 512
Operating income from continuing operations	**7 815**	**8 826**	**1 300**	**1 570**	**281**	**760**	**– 419**	**– 67**	**8 977**	**11 089**
Income from associated companies		812	2	4			264	1 102	266	1 918
Interest expense									– 655	– 704
Other financial income and expense									– 454	– 31
Income before taxes from continuing operations									**8 134**	**12 272**
Taxes									– 1 106	– 1 545
Net income from continuing operations									**7 028**	**10 727**
Net income/loss from discontinued operations									10 766	– 447
Net income									**17 794**	**10 280**
Attributable to:										
Shareholders of Novartis AG									*17 783*	*10 210*
Non-controlling interests									*11*	*70*
Included in net income from continuing operations are:										
Interest income									33	33
Depreciation of property, plant & equipment	– 839	– 902	– 277	– 317	– 237	– 261	– 117	– 106	– 1 470	– 1 586
Amortization of intangible assets	– 2 384	– 1 416	– 450	– 448	– 912	– 906	– 9	– 5	– 3 755	– 2 775
Impairment charges on property, plant & equipment, net	39	– 15	– 97	– 7	– 1	1	– 21	– 23	– 80	– 44
Impairment charges on intangible assets, net	– 138	– 238	– 27	– 39	– 1				– 166	– 277
Impairment charges and fair value gains on financial assets, net	– 32	– 20		– 1			– 72	– 48	– 104	– 69
Additions to restructuring provisions	– 232	– 464	– 93	– 4	– 25	– 33	– 49	– 3	– 399	– 504
Equity-based compensation of Novartis and Alcon equity plans	– 620	– 705	– 53	– 51	– 66	– 72	– 164	– 179	– 903	– 1 007

[1] Formerly named the Pharmaceuticals Division

[2] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016

Segmentation – Consolidated balance sheets

(USD millions)	Innovative Medicines[1] 2016	Innovative Medicines[1] 2015 restated[2]	Sandoz 2016	Sandoz 2015 restated[2]	Alcon 2016	Alcon 2015 restated[2]	Corporate (including eliminations) 2016	Corporate (including eliminations) 2015 restated[2]	Group 2016	Group 2015
Total assets	**51 911**	54 769	**17 611**	18 530	**22 970**	23 291	**37 632**	34 966	**130 124**	131 556
Total liabilities	**– 10 007**	– 10 798	**– 3 168**	– 3 545	**– 2 520**	– 2 403	**– 39 538**	– 37 688	**– 55 233**	– 54 434
Total equity									**74 891**	77 122
Net debt									16 025	16 484
Net operating assets	**41 904**	43 971	**14 443**	14 985	**20 450**	20 888			**90 916**	93 606
Included in assets and liabilities are:										
Total property, plant & equipment	10 410	10 464	2 374	2 788	2 163	2 025	694	705	15 641	15 982
Additions to property, plant & equipment[3]	996	1 380	316	421	396	494	127	224	1 835	2 519
Total goodwill and intangible assets	31 630	33 783	10 774	11 253	16 914	17 343	3 002	3 012	62 320	65 391
Additions to goodwill and intangible assets[3]	865	996	45	44	63	108	5	11	978	1 159
Total investment in associated companies	16	8	18	15			14 270	15 291	14 304	15 314
Additions to investment in associated companies[3]	4	5					37	57	41	62
Cash and cash equivalents, marketable securities, commodities, time deposits and derivative financial instruments							7 777	5 447	7 777	5 447
Financial debts and derivative financial instruments							23 802	21 931	23 802	21 931
Current income tax and deferred tax liabilities							8 260	8 072	8 260	8 072

[1] Formerly named the Pharmaceuticals Division
[2] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016
[3] Excluding impact of business combinations

The following table shows countries that accounted for more than 5% of at least one of the respective Group totals and regional information for net sales for the years ended December 31, 2016, 2015 and 2014 and for selected non-current assets for the years ended December 31, 2016 and 2015:

(USD millions)	Net sales[1] 2016	%	2015	%	2014	%	Total of selected non-current assets[2] 2016	%	2015	%
Country										
Switzerland	830	2	774	2	658	1	44 413	48	47 054	49
United States	17 117	35	18 079	37	17 337	33	28 484	31	28 677	30
United Kingdom	1 182	2	1 277	3	1 379	3	6 892	7	7 769	8
Germany	3 634	7	3 262	7	3 742	7	2 733	3	2 908	3
France	2 390	5	2 269	5	2 638	5	199		188	
Japan	3 267	7	3 163	6	3 781	7	145		142	
Other	20 098	42	20 590	40	22 645	44	9 399	11	9 949	10
Group	**48 518**	**100**	**49 414**	**100**	**52 180**	**100**	**92 265**	**100**	**96 687**	**100**
Region										
Europe	17 079	35	16 472	33	18 690	36	59 879	65	63 681	66
Americas	20 998	43	22 414	45	22 218	43	29 831	32	30 375	31
Asia/Africa/Australasia	10 441	22	10 528	22	11 272	21	2 555	3	2 631	3
Group	**48 518**	**100**	**49 414**	**100**	**52 180**	**100**	**92 265**	**100**	**96 687**	**100**

[1] Net sales from operations by location of third-party customer
[2] Total of property, plant and equipment; goodwill; intangible assets; and investment in associated companies

The Group's largest, second and third largest customer accounts for approximately 16%, 12% and 6% of net sales, respectively (2015: 14%, 11% and 5%; 2014: 12%, 11% and 5% respectively). No other customer accounted for 5% or more of net sales, in any year.

The highest amounts of trade receivables outstanding were for these same three customers. They amounted to 14%, 9% and 6%, respectively, of the trade receivables at December 31, 2016 (2015: 13%, 9% and 6% respectively).

Innovative Medicines[1] net sales by business franchise

	2016 USD millions	2015 restated USD millions[2]	Change (2015 to 2016) USD %	2014 restated USD millions[2]	Change (2014 to 2015) USD %
Oncology					
Gleevec/Glivec	3 323	4 658	– 29	4 746	– 2
Tasigna	1 739	1 632	7	1 529	7
Subtotal Bcr-Abl portfolio	**5 062**	**6 290**	**– 20**	**6 275**	**0**
Sandostatin	1 646	1 630	1	1 650	– 1
Afinitor/Votubia	1 516	1 607	– 6	1 575	2
Exjade/Jadenu	956	917	4	926	– 1
Votrient	729	565	nm	0	nm
Tafinlar/Mekinist	672	453	nm	0	nm
Promacta/Revolade	635	402	nm	0	nm
Jakavi	581	410	42	279	47
Zykadia	91	79	15	31	155
Other	902	951	– 5	918	4
Total Oncology business unit	**12 790**	**13 304**	**– 4**	**11 654**	**14**
Ophthalmology					
Lucentis	1 835	2 060	– 11	2 441	– 16
Travoprost Group	619	631	– 2	734	– 14
Systane Group	377	380	– 1	378	1
Topical Olopatadine Group	335	457	– 27	515	– 11
Other	2 297	2 395	– 4	2 647	– 10
Total Ophthalmology	**5 463**	**5 923**	**– 8**	**6 715**	**– 12**
Neuroscience					
Gilenya	3 109	2 776	12	2 477	12
Exelon/Exelon Patch	444	728	– 39	1 009	– 28
Other	124	141	– 12	243	– 42
Total Neuroscience	**3 677**	**3 645**	**1**	**3 729**	**– 2**
Immunology and Dermatology					
Cosentyx	1 128	261	nm	0	nm
Neoral/Sandimmun(e)	515	570	– 10	684	– 17
Zortress/Certican	398	335	19	327	2
Myfortic	383	441	– 13	543	– 19
Ilaris	283	236	20	199	19
Other	172	160	8	173	– 8
Subtotal Immunology and Dermatology, excluding everolimus stent drug	**2 879**	**2 003**	**44**	**1 926**	**4**
Everolimus stent drug	136	134	1	205	– 35
Total Immunology and Dermatology	**3 015**	**2 137**	**41**	**2 131**	**0**
Respiratory					
Ultibro Breezhaler	363	260	40	118	120
Seebri Breezhaler	149	150	– 1	146	3
Onbrez Breezhaler/ Arcapta Neohaler	143	166	– 14	220	– 25
Subtotal COPD[3] portfolio	**655**	**576**	**14**	**484**	**19**
Xolair[4]	835	755	11	777	– 3
Other	31	37	– 16	39	– 5
Total Respiratory	**1 521**	**1 368**	**11**	**1 300**	**5**
Cardio-Metabolic					
Galvus	1 193	1 140	5	1 224	– 7
Entresto	170	21	nm	0	nm
Other	14	0	nm	8	nm
Total Cardio-Metabolic	**1 377**	**1 161**	**19**	**1 232**	**– 6**
Established Medicines					
Diovan/Co-Diovan	1 073	1 284	– 16	2 345	– 45
Exforge	926	1 047	– 12	1 396	– 25
Voltaren/Cataflam	525	558	– 6	632	– 12
Ritalin/Focalin	282	365	– 23	492	– 26
Other	1 913	2 553	– 25	3 202	– 20
Total Established Medicines	**4 719**	**5 807**	**– 19**	**8 067**	**– 28**
Total Pharmaceutical business unit	**19 772**	**20 041**	**– 1**	**23 174**	**– 14**
Total division net sales	**32 562**	**33 345**	**– 2**	**34 828**	**– 4**

[1] Formerly named the Pharmaceuticals Division
[2] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016
[3] Chronic obstructive pulmonary disease
[4] Net sales reflect *Xolair* sales for all indications (e.g., including *Xolair* SAA and *Xolair* CSU, which is managed by the Immunology and Dermatology franchise)
nm = not meaningful

The product portfolio of other segments is widely spread in 2016, 2015 and 2014.

4. Associated companies

	Net income statement effect			Other comprehensive income effect			Total comprehensive income effect		
(USD millions)	**2016**	2015	2014	**2016**	2015	2014	**2016**	2015	2014
Roche Holding AG, Switzerland	464	343	599	– 39	– 149	– 51	425	194	548
GlaxoSmithKline Consumer Healthcare Holdings Ltd., UK	234	– 79		710	– 4		944	– 83	
Idenix Pharmaceuticals Inc., US			812						812
LTS Lohmann Therapie-Systeme AG, Germany			436						436
Others	5	2	71			20	5	2	91
Associated companies related to continuing operations	**703**	**266**	**1 918**	**671**	**– 153**	**– 31**	**1 374**	**113**	**1 887**

Novartis has significant investments in Roche Holding AG, Basel (Roche) and in GlaxoSmithKline Consumer Healthcare Holdings Ltd, Brentford, Middlesex, UK as well as certain other smaller investments which are accounted for as associated companies.

	Balance sheet value	
(USD millions)	**December 31, 2016**	December 31, 2015
Roche Holding AG, Switzerland	7 644	7 919
GlaxoSmithKline Consumer Healthcare Holdings Ltd., UK	6 448	7 194
Others	212	201
Total	**14 304**	**15 314**

Roche Holding AG

The Group's holding in Roche voting shares was 33.3% at December 31, 2016, 2015 and 2014. This investment represents approximately 6.3% of Roche's total outstanding voting and non-voting equity instruments at December 31, 2016, 2015 and 2014.

Since full-year 2016 financial data for Roche is not available when Novartis produces its consolidated financial results, a survey of analyst estimates is used to estimate the Group's share of Roche's net income. Any differences between these estimates and actual results will be adjusted in the Group's 2017 consolidated financial statements when available.

The following tables show summarized financial information of Roche, including current values of fair value adjustments made at the time of the acquisition of the shares, for the year ended December 31, 2015 and for the six months ended June 30, 2016 (since full year 2016 data is not yet available):

(CHF billions)	Current assets	Non-current assets	Current liabilities	Non-current liabilities
December 31, 2015	28.2	63.7	23.8	28.7
June 30, 2016	26.6	62.6	24.5	29.0

(CHF billions)	Revenue	Net income	Other comprehensive income	Total comprehensive income
December 31, 2015	48.1	6.8	– 0.8	6.0
June 30, 2016	25.0	4.3	– 0.5	3.8

A purchase price allocation was performed on the basis of publicly available information at the time of acquisition of the investment. The December 31, 2016 balance sheet value allocation is as follows:

(USD millions)	**December 31, 2016**
Novartis share of Roche's estimated net assets	2 200
Novartis share of re-appraised intangible assets	824
Implicit Novartis goodwill	2 785
Current value of share in net identifiable assets and goodwill	**5 809**
Accumulated equity accounting adjustments and translation effects less dividends received	1 835
Balance sheet value	**7 644**

The identified intangible assets principally relate to the value of currently marketed products and are amortized on a straight-line basis over their estimated average useful life of 20 years.

In 2016, dividends received from Roche in relation to the distribution of its 2015 net income amounted to USD 433 million (2015: USD 429 million in relation with the distribution of its 2014 net income).

The consolidated income statement effects from applying Novartis accounting principles for this investment in 2016, 2015 and 2014 are as follows:

(USD millions)	**2016**	2015	2014
Novartis share of Roche's estimated current-year consolidated net income	678	650	813
Prior-year adjustment	– 68	– 157	– 56
Amortization of fair value adjustments relating to intangible assets, net of taxes of USD 42 million (2015: USD 41 million; 2014: USD 45 million)	– 146	– 150	– 158
Net income effect	**464**	**343**	**599**

The publicly quoted market value of the Novartis interest in Roche (SIX symbol: RO) at December 31, 2016, was USD 12.4 billion (2015: USD 14.9 billion).

GlaxoSmithKline Consumer Healthcare Holdings Ltd.

On March 2, 2015, Novartis closed its transactions with GlaxoSmithKline plc, Great Britain (GSK) announced in April 2014. As part of these transactions, Novartis and GSK agreed to create a combined consumer healthcare business through a combination between Novartis OTC and GSK Consumer Healthcare. On March 2, 2015, a new entity GlaxoSmithKline Consumer Healthcare Holdings Ltd (GSK Consumer Healthcare) was formed via the contribution of businesses from both Novartis and GSK.

At December 31, 2016 and 2015, Novartis has a 36.5% interest in GSK Consumer Healthcare and four of eleven seats on the GSK Consumer Healthcare Board of Directors. Furthermore, Novartis has customary minority rights and also exit rights at a pre-defined, market-based pricing mechanism.

Novartis has valued the contribution of 63.5% of its OTC Division in exchange for 36.5% of the GSK Consumer Healthcare business at fair value. Based on the estimates of fair values exchanged, an investment in associated company of USD 7.6 billion was recorded on March 2, 2015.

The December 31, 2016 balance sheet value allocation is as follows:

(USD millions)	December 31, 2016
Novartis share of GSK Consumer Healthcare's estimated net assets	1 502
Novartis share of re-appraised intangible assets	3 517
Implicit Novartis goodwill	1 606
Current value of share in net identifiable assets and goodwill	**6 625**
Accumulated equity accounting adjustments and translation effects less dividends received	– 177
Balance sheet value	**6 448**

The identified intangible assets principally relate to the value of the indefinite life GSK Consumer Healthcare intangible assets. The identified intangible assets with a definite life are amortized on a straight-line basis over their estimated average useful life of 20 years.

The following tables show summarized financial information of GSK Consumer Healthcare, including current values of fair value adjustments made at the time of acquisition, for the ten-month period ended December 31, 2015, and for the nine months ended September 30, 2016 (interim unaudited), since full year 2016 data is not yet available:

(GBP billions)	Current assets	Non-current assets	Current liabilities	Non-current liabilities
December 31, 2015	3.8	19.5	2.8	1.8
September 30, 2016	4.2	21.2	3.0	2.1

(GBP billions)	Revenue	Net income	Other comprehensive income	Total comprehensive income
December 31, 2015	4.6	0.0	0.0	0.0
September 30, 2016	4.7	0.5	2.1	2.6

Since full-year 2016 financial data for GSK Consumer Healthcare is not available when Novartis produces its consolidated financial results, a projection of the latest internal management reporting is used to estimate the Group's share of GSK Consumer Healthcare's net result for the year. Any differences between this estimate and actual results will be adjusted in the Group's 2017 consolidated financial statements when available.

In 2016, dividends received from GSK Consumer Healthcare amounted to USD 463 million (2015: nil).

The consolidated income statement effects from applying Novartis accounting principles for this investment in 2016 and 2015 are as follows:

(USD millions)	2016	2015
Novartis share of GSK Consumer Healthcare's estimated current-year consolidated net income	268	– 17
Prior-year adjustment	– 22	
Amortization of fair value adjustments relating to intangible assets and inventory, net of taxes of USD 2 million (2015: USD 18 million)	– 12	– 62
Net income effect	**234**	**– 79**

Other associated companies

During 2014, the shareholdings of 22% in Idenix Pharmaceuticals, Inc. and 43% in LTS Lohmann Therapie-Systeme AG were sold, realizing gains of USD 812 million and USD 421 million, respectively. Others include a gain of USD 64 million recorded on investments in associated companies held by the Novartis Venture Funds, which are accounted at fair value from January 1, 2014 onwards, consistent with other investments held by these Funds.

5. Interest expense and other financial income and expense

Interest expense

(USD millions)	2016	2015	2014
Interest expense	– 709	– 669	– 701
Income/(expense) arising from discounting long-term liabilities	2	14	– 3
Total interest expense	**– 707**	**– 655**	**– 704**

Other financial income and expense

(USD millions)	2016	2015	2014
Interest income	43	33	33
Dividend income	1	1	1
Net capital losses on available-for-sale securities	– 1	– 8	– 2
Income on forward contracts and options		1	1
Impairment of commodities and available-for-sale securities, net	7	– 132	
Other financial expense	– 20	– 23	– 25
Monetary loss from hyperinflation accounting		– 72	– 61
Currency result, net	– 477	– 254	22
Total other financial income and expense	**– 447**	**– 454**	**– 31**

6. Taxes

Income before taxes

(USD millions)	2016	2015	2014
Switzerland	3 110	5 765	5 245
Foreign	4 707	2 369	7 027
Income before taxes from continuing operations	**7 817**	**8 134**	**12 272**
Income/(loss) before taxes from discontinued operations		12 479	– 351
Total income before taxes	**7 817**	**20 613**	**11 921**

Current and deferred income tax expense

(USD millions)	2016	2015	2014
Switzerland	– 709	– 317	– 661
Foreign	– 1 418	– 1 333	– 1 952
Current income tax expense from continuing operations	**– 2 127**	**– 1 650**	**– 2 613**
Switzerland	765	– 68	309
Foreign	243	612	759
Deferred tax income from continuing operations	**1 008**	**544**	**1 068**
Income tax expense from continuing operations	**– 1 119**	**– 1 106**	**– 1 545**
Income tax expense from discontinued operations		– 1 713	– 96
Total income tax expense	**– 1 119**	**– 2 819**	**– 1 641**

Analysis of tax rate

The main elements contributing to the difference between the Group's overall applicable tax rate (which can change each year since it is calculated as the weighted average tax rate based on pre-tax income of each subsidiary) and the effective tax rate are:

(As a percentage)	2016	2015	2014
Applicable tax rate	13.2	12.4	11.7
Effect of disallowed expenditures	3.5	3.5	2.9
Effect of utilization of tax losses brought forward from prior periods	– 0.2	– 0.2	– 0.3
Effect of income taxed at reduced rates	– 0.2	– 0.3	– 0.6
Effect of tax credits and allowances	– 2.8	– 2.7	– 1.8
Effect of tax rate change on opening balance	0.2	– 0.5	
Effect of write-off of deferred tax assets	0.5		
Effect of write down and reversal of write-down of investments in subsidiaries	– 1.0	– 0.9	0.9
Effect of tax benefits expiring in 2017	– 0.5	– 0.4	– 0.8
Effect of non-deductible losses in Venezuela	1.3	1.2	
Effect of prior year items	0.2	1.0	0.8
Effect of other items [1]	0.1	0.5	– 0.2
Effective tax rate for continuing operations	**14.3**	**13.6**	**12.6**
Effective tax rate for discontinued operations		13.7	– 27.4
Effective tax rate	**14.3**	**13.7**	**13.8**

[1] Other items in 2016 (+0.1%) include one-time impacts for the deferred tax effects on the net assets of certain subsidiaries resulting from the change in their tax status (-6.2%), the changes in uncertain tax positions (+5.1%) and other items (+1.2%).

Novartis has a substantial business presence in many countries and is therefore subject to different income and expense items that are non-taxable (permanent differences) or taxed at different rates in those tax jurisdictions. This results in a difference between our applicable tax rate and effective tax rate, as shown in the table above.

The utilization of tax-loss carry-forwards lowered the tax charge by USD 18 million in 2016 and by USD 15 million and USD 34 million in 2015 and 2014, respectively.

7. Earnings per share

	2016	2015	2014
Net income/loss attributable to shareholders of Novartis AG (USD millions)			
– Continuing operations	6 712	7 025	10 654
– Discontinued operations		10 758	– 444
– Total	**6 712**	**17 783**	**10 210**
Number of shares (in millions)			
Weighted average number of shares outstanding used in basic earnings per share	2 378	2 403	2 426
Adjustment for vesting of restricted shares, restricted share units and dilutive shares from options	22	35	44
Weighted average number of shares in diluted earnings per share	2 400	2 438	2 470
Basic earnings per share (USD)			
– Continuing operations	2.82	2.92	4.39
– Discontinued operations		4.48	– 0.18
– Total	**2.82**	**7.40**	**4.21**
Diluted earnings per share (USD)			
– Continuing operations	2.80	2.88	4.31
– Discontinued operations		4.41	– 0.18
– Total	**2.80**	**7.29**	**4.13**

Basic earnings per share (EPS) is calculated by dividing net income attributable to shareholders of Novartis AG by the weighted average number of shares outstanding in a reporting period. This calculation excludes the average number of issued shares purchased by the Group and held as treasury shares.

For diluted EPS, the weighted average number of shares outstanding is adjusted to assume the vesting of all restricted shares, restricted share units and the conversion of all potentially dilutive shares arising from options on Novartis shares that have been issued.

No options were excluded from the calculation of diluted EPS in 2014, 2015, or 2016 as all options were dilutive in all years.

8. Changes in consolidated statements of comprehensive income

The consolidated statements of comprehensive income include the Group's net income for the year as well as all other valuation adjustments recorded in the Group's consolidated balance sheet but which under IFRS are not recorded in the consolidated income statement. These include fair value adjustments to financial instruments, actuarial gains or losses on defined benefit pension and other post-employment plans and currency translation effects, net of tax.

The following table summarizes these value adjustments and currency translation effects attributable to Novartis shareholders:

(USD millions)	Fair value adjustments on marketable securities	Fair value adjustments on deferred cash flow hedges	Actuarial losses from defined benefit plans	Cumulative currency translation effects	Total value adjustments
Value adjustments at January 1, 2014	**344**	**– 59**	**– 4 544**	**4 625**	**366**
Fair value adjustments on financial instruments	89	21			110
Net actuarial losses from defined benefit plans [1]			– 822		– 822
Currency translation effects [2]				– 2 219	– 2 219
Total value adjustments in 2014	**89**	**21**	**– 822**	**– 2 219**	**– 2 931**
Value adjustments at December 31, 2014	**433**	**– 38**	**– 5 366**	**2 406**	**– 2 565**
Fair value adjustments on financial instruments	28	20			48
Net actuarial losses from defined benefit plans [1]			– 147		– 147
Currency translation effects [2]				– 1 659	– 1 659
Total value adjustments in 2015	**28**	**20**	**– 147**	**– 1 659**	**– 1 758**
Fair value adjustments related to divestments			100		100
Value adjustments at December 31, 2015	**461**	**– 18**	**– 5 413**	**747**	**– 4 223**
Fair value adjustments on financial instruments	– 113	15			– 98
Net actuarial losses from defined benefit plans			– 514		– 514
Currency translation effects				– 2 389	– 2 389
Total value adjustments in 2016	**– 113**	**15**	**– 514**	**– 2 389**	**– 3 001**
Fair value adjustments related to divestments			12		12
Value adjustments at December 31, 2016	**348**	**– 3**	**– 5 915**	**– 1 642**	**– 7 212**

[1] Net actuarial gains of USD 10 million in 2015 and net actuarial losses of USD 65 million in 2014 were attributable to discontinued operations up to the respective divestment dates
[2] Currency translation losses of USD 29 million in 2015 and USD 37 million in 2014 were attributable to discontinued operations up to the respective divestment dates

8.1) The 2016, 2015 and 2014 changes in the fair value of financial instruments were as follows:

(USD millions)	Fair value adjustments on marketable securities	Fair value adjustments on deferred cash flow hedges	Total
Fair value adjustments at January 1, 2016	**461**	**– 18**	**443**
Changes in fair value:			
– Available-for-sale marketable securities	1		1
– Available-for-sale financial investments	– 87		– 87
Realized net gains transferred to the consolidated income statement:			
– Marketable securities sold	– 1		– 1
– Other financial assets sold	– 154		– 154
Amortized net losses on cash flow hedges transferred to the consolidated income statement		16	16
Impaired financial assets transferred to the consolidated income statement	131		131
Deferred tax on above items	– 3	– 1	– 4
Fair value adjustments during the year	**– 113**	**15**	**– 98**
Fair value adjustments at December 31, 2016	**348**	**– 3**	**345**

(USD millions)	Fair value adjustments on marketable securities	Fair value adjustments on deferred cash flow hedges	Total
Fair value adjustments at January 1, 2015	**433**	**– 38**	**395**
Changes in fair value:			
– Available-for-sale marketable securities	– 130		– 130
– Available-for-sale financial investments	80		80
– Associated companies' movements in comprehensive income	– 8		– 8
Realized net gains transferred to the consolidated income statement:			
– Marketable securities sold	– 1		– 1
– Other financial assets sold	– 103		– 103
Amortized net losses on cash flow hedges transferred to the consolidated income statement		21	21
Impaired financial assets transferred to the consolidated income statement	194		194
Deferred tax on above items	– 4	– 1	– 5
Fair value adjustments during the year	**28**	**20**	**48**
Fair value adjustments at December 31, 2015	**461**	**– 18**	**443**

(USD millions)	Fair value adjustments on marketable securities	Fair value adjustments on deferred cash flow hedges	Total
Fair value adjustments at January 1, 2014	**344**	**– 59**	**285**
Changes in fair value:			
– Available-for-sale marketable securities	– 3		– 3
– Available-for-sale financial investments	91		91
– Associated companies' movements in comprehensive income	5		5
Realized net gains transferred to the consolidated income statement:			
– Marketable securities sold	– 4		– 4
– Other financial assets sold	– 81		– 81
Amortized net losses on cash flow hedges transferred to the consolidated income statement		23	23
Impaired financial assets transferred to the consolidated income statement	87		87
Deferred tax on above items	– 6	– 2	– 8
Fair value adjustments during the year	**89**	**21**	**110**
Fair value adjustments at December 31, 2014	**433**	**– 38**	**395**

8.2) In 2015, cumulative currency translation losses of USD 10 million have been recycled through the income statement as a result of the divestments of subsidiaries. No currency translation losses have been recycled through income statement in 2016 and 2014.

8.3) Remeasurements from defined benefit plans arise as follows:

(USD millions)	**2016**	2015	2014
Defined benefit pension plans before tax	– 667	– 252	– 999
Other post-employment benefit plans before tax	12	168	– 235
Taxation on above items	140	– 63	412
Total after tax	**– 515**	**– 147**	**– 822**
Attributable to:			
Shareholders of Novartis AG	*– 514*	*– 147*	*– 822*
Non-controlling interests	*– 1*		

9. Changes in consolidated equity

9.1) A dividend of CHF 2.70 per share was approved at the 2016 Annual General Meeting (AGM) for the year ended December 31, 2015, resulting in a total dividend payment of USD 6.5 billion in 2016 (2015: the CHF 2.60 per share dividend amounted to USD 6.6 billion, 2014: the CHF 2.45 per share dividend amounted to USD 6.8 billion). The amount available for distribution as a dividend to shareholders is based on the available distributable retained earnings of Novartis AG determined in accordance with the legal provisions of the Swiss Code of Obligations.

9.2) During 2016, 12.9 million shares were purchased for USD 1.0 billion (2015: 63.6 million shares for USD 6.1 billion, 2014: 79.2 million shares for USD 6.9 billion). These share purchases comprise of 10.3 million shares, which were repurchased for USD 0.8 billion on the SIX Swiss Exchange second trading line under the CHF 10 billion share buyback approved by the shareholders at the Annual General Meeting (AGM) in 2016, to offset the dilutive impact from equity-based participation plans (2015, 49.9 million shares for USD 4.8 billion, and in 2014, 27.0 million shares for USD 2.4 billion repurchased on the SIX Swiss Exchange second trading line under the USD 5 billion share buyback announced in November 2013, which was completed in November 2015). Furthermore, 2.6 million shares were acquired for USD 0.2 billion from employees which were previously granted to them under the respective programs (2015: 4.1 million shares for USD 0.4 billion, 2014: 5.4 million shares for USD 0.5 billion). In 2016 no shares were repurchased on the SIX Swiss Exchange first trading line (2015: 9.6 million shares were repurchased for USD 0.9 billion, 2014: 46.8 million shares for USD 4.1 billion).

9.3) In 2016, Novartis reduced its share capital by cancelling a total of 49.9 million shares which were repurchased during 2015 on the SIX Swiss Exchange second trading line. In 2015, 29.2 million shares were cancelled which were repurchased during 2013 and 2014. In 2014 no shares were cancelled.

9.4) 4.1 million shares were delivered as a result of options being exercised related to equity-based participation plans and the delivery of treasury shares, which contributed USD 0.2 billion (2015: 27.0 million shares for USD 1.6 billion, 2014: 41.4 million shares for USD 2.4 billion). The average share price of the shares delivered was significantly below market price reflecting the strike price of the options exercised.

9.5) Equity-settled share-based compensation is expensed in the consolidated income statement in accordance with the vesting period of the share-based compensation plans. The value for the shares and options granted is credited to consolidated equity over the respective vesting period. In 2016, 9.0 million shares were transferred to associates as part of equity-settled compensation (2015: 11.9 million shares, 2014: 10.3 million shares). In addition, tax benefits arising from tax deductible amounts exceeding the expense recognized in the income statement are credited to equity.

9.6) During 2016, interests in subsidiaries were acquired. The reduction in equity of USD 7 million represents the excess of the amount paid to non-controlling interest over their carrying value and equity allocation to non-controlling interest due to change in ownership percentage (2015: nil, 2014: nil).

9.7) In 2014, Novartis entered into an irrevocable, non-discretionary arrangement with a bank to repurchase Novartis own shares on the second trading line under its USD 5 billion share buyback as well as to mitigate dilution from equity-based participation plans. The commitment under this arrangement amounted to USD 658 million as of December 31, 2014, reflecting the expected purchases by the bank under such trading plan over a rolling 90 days period. In 2015, this trading plan was fully executed and expired. As a result, there is no contingent liability related to this plan as of December 31, 2015 and December 31, 2016.

9.8) Changes in non-controlling interests in subsidiaries resulted in a reduction in consolidated equity of USD 10 million in 2015 and USD 120 million in 2014. No change to non-controlling interests in subsidiaries in 2016.

10. Property, plant & equipment

The following table summarizes the movements of property, plant and equipment during 2016:

(USD millions)	Land	Buildings	Construction in progress	Machinery & other equipment	Total
Cost					
January 1, 2016	**688**	**12 857**	**2 810**	**15 093**	**31 448**
Reclassifications [1]	4	630	– 1 226	592	
Additions	24	176	1 226	409	1 835
Disposals and derecognitions [2]	– 8	– 178	– 19	– 656	– 861
Currency translation effects	– 21	– 372	– 111	– 622	– 1 126
December 31, 2016	**687**	**13 113**	**2 680**	**14 816**	**31 296**
Accumulated depreciation					
January 1, 2016	**– 40**	**– 5 188**	**– 7**	**– 10 231**	**– 15 466**
Depreciation charge	– 3	– 530		– 956	– 1 489
Accumulated depreciation on disposals and derecognitions [2]	5	157	1	630	793
Impairment charge	– 3	– 47	– 11	– 61	– 122
Reversal of impairment charge		6	1	13	20
Currency translation effects	1	166	1	441	609
December 31, 2016	**– 40**	**– 5 436**	**– 15**	**– 10 164**	**– 15 655**
Net book value at December 31, 2016	**647**	**7 677**	**2 665**	**4 652**	**15 641**
Net book value of property, plant & equipment under finance lease contracts					**81**
Commitments for purchases of property, plant & equipment					**223**

[1] Reclassifications between various asset categories due to completion of plant and other equipment under construction
[2] Derecognition of assets that are no longer used and are not considered to have a significant disposal value or other alternative use

Borrowing costs on new additions to property, plant and equipment eligible for capitalization have been capitalized and amounted to USD 9 million in 2016 (2015: USD 21 million, 2014: USD 20 million). The capitalization rate used to determine the amount of borrowing costs eligible for capitalization is 25% (2015: 25%, 2014: 25%) and the interest rate used is 4% (2015: 4%, 2014: 4%).

The following table summarizes the movements of property, plant and equipment during 2015:

(USD millions)	Land	Buildings	Construction in progress	Machinery & other equipment	Total
Cost					
January 1, 2015	**744**	**11 312**	**3 985**	**15 387**	**31 428**
Reclassifications [1]	12	1 833	– 2 601	756	
Additions	4	408	1 665	442	2 519
Disposals and derecognitions [2]	– 41	– 332	– 59	– 704	– 1 136
Currency translation effects	– 31	– 364	– 180	– 788	– 1 363
December 31, 2015	**688**	**12 857**	**2 810**	**15 093**	**31 448**
Accumulated depreciation					
January 1, 2015	**– 30**	**– 5 093**	**– 37**	**– 10 285**	**– 15 445**
Depreciation charge	– 3	– 462		– 1 005	– 1 470
Accumulated depreciation on disposals and derecognitions [2]	2	246	32	594	874
Impairment charge	– 12	– 37	– 4	– 82	– 135
Reversal of impairment charge		9		46	55
Currency translation effects	3	149	2	501	655
December 31, 2015	**– 40**	**– 5 188**	**– 7**	**– 10 231**	**– 15 466**
Net book value at December 31, 2015	**648**	**7 669**	**2 803**	**4 862**	**15 982**
Net book value of property, plant & equipment under finance lease contracts					**85**
Commitments for purchases of property, plant & equipment					**359**

[1] Reclassifications between various asset categories due to completion of plant and other equipment under construction
[2] Derecognition of assets that are no longer used and are not considered to have a significant disposal value or other alternative use

11. Goodwill and intangible assets

The following table summarizes the movements of goodwill and intangible assets in 2016:

	Goodwill	Intangible Assets other than Goodwill						
(USD millions)	Total	Acquired research & development	Alcon brand name	Technologies	Currently marketed products	Marketing know-how	Other intangible assets	Total
Cost								
January 1, 2016	**31 585**	**4 119**	**2 980**	**6 563**	**33 385**	**5 960**	**1 341**	**54 348**
Impact of business combinations	56	690			451			1 141
Reclassifications [1]		– 158			6		152	
Additions		599			223		156	978
Disposals and derecognitions [2]		– 23			– 464		– 130	– 617
Currency translation effects	– 260	– 77		– 15	– 594		– 27	– 713
December 31, 2016	**31 381**	**5 150**	**2 980**	**6 548**	**33 007**	**5 960**	**1 492**	**55 137**
Accumulated amortization								
January 1, 2016	**– 411**	**– 650**		**– 3 070**	**– 14 221**	**– 1 192**	**– 998**	**– 20 131**
Reclassifications		225			– 225			
Amortization charge				– 576	– 2 926	– 238	– 121	– 3 861
Accumulated impairments on disposals and derecognitions[2]		22			390		123	535
Impairment charge		– 490			– 96		– 5	– 591
Currency translation effects	10	7		9	215		20	251
December 31, 2016	**– 401**	**– 886**		**– 3 637**	**– 16 863**	**– 1 430**	**– 981**	**– 23 797**
Net book value at December 31, 2016	**30 980**	**4 264**	**2 980**	**2 911**	**16 144**	**4 530**	**511**	**31 340**

[1] Reclassifications between various asset categories as a result of product launches of acquired In-Process Research & Development and completion of software development.
[2] Derecognitions of assets that are no longer used or being developed and are not considered to have a significant disposal value or other alternative use.

The following table summarizes the allocation of the net book values of goodwill and intangible assets by reporting segment at December 31, 2016:

	Goodwill	Intangible Assets other than Goodwill						
(USD millions)	Total	Acquired research & development	Alcon brand name	Technologies	Currently marketed products	Marketing know-how	Other intangible assets	Total
Innovative Medicines	15 010	3 512		11	12 821		276	16 620
Sandoz	7 669	613		563	1 904		25	3 105
Alcon	8 293	139		2 337	1 419	4 530	196	8 621
Corporate	8		2 980				14	2 994
Net book value at December 31, 2016	**30 980**	**4 264**	**2 980**	**2 911**	**16 144**	**4 530**	**511**	**31 340**

The Innovative Medicines, Sandoz and Alcon divisions' cash generating units, to which goodwill are allocated, each comprise a group of smaller cash generating units. The valuation method of the recoverable amount of the cash generating units, to which goodwill is allocated, is based on the fair value less costs of disposal.

The Alcon brand name is a Corporate asset with an indefinite life. The intangible asset is allocated to Corporate as it is used to market the Alcon-branded products of both the Alcon Division and the Ophthalmology business franchise of the Innovative Medicines Division. Net sales of these products together are the grouping of cash generating units, which is used to determine the recoverable amount. The valuation method is based on the fair value less costs of disposal.

The following assumptions are used in the calculations:

(As a percentage)	Innovative Medicines	Sandoz	Alcon	Corporate
Terminal growth rate	1.5	2.0	3.0	2.5
Discount rate (post-tax)	6.5	6.5	6.5	6.5

The Alcon terminal growth rate assumption of 3% is higher than the expected inflation rate of the medical device industry, and more specifically the ophthalmic sub-segment of the industry. The growth rates are expected to exceed such long-term inflation rate, due to the impact of the demographic trend of the aging population to which Alcon's products are prescribed is growing faster than the general population.

The discount rates for all Divisions consider the Group's weighted average cost of capital, adjusted to approximate the weighted average cost of capital of a comparable market participant.

The fair value less costs of disposal, for all groupings of cash generating units containing goodwill or indefinite life intangible assets, is reviewed for the impact of reasonably possible changes in key assumptions. In particular we considered an increase in the discount rate, a decrease in the terminal growth rate and certain negative impacts on the forecasted cash flows. These reasonably possible changes in key assumptions did not indicate an impairment.

Note 1, Significant accounting policies – Impairment of goodwill and intangible assets, provides additional disclosures on how the Group performs goodwill and intangible asset impairment testing.

In 2016, intangible asset impairment charges for continuing operations amounted to USD 591 million (USD 522 million in the Innovative Medicines Division, USD 65 million in the Sandoz Division and USD 4 million in the Alcon Division).

In 2015, intangible asset impairment charges in continuing operations amounted to USD 206 million (USD 178 million in the Innovative Medicines Division and USD 27 million in the Sandoz Division and USD 1 million in the Alcon Division).

In 2016, there was no reversal of prior year impairment charges (2015: USD 40 million).

The following table summarizes the movements of goodwill and intangible assets in 2015:

	Goodwill	Intangible Assets other than Goodwill						
(USD millions)	Total	Acquired research & development	Alcon brand name	Technologies	Currently marketed products	Marketing know-how	Other intangible assets	Total
Cost								
January 1, 2015	**29 737**	**2 843**	**2 980**	**6 658**	**20 916**	**5 960**	**1 251**	**40 608**
Impact of business combinations	2 438	730			12 970		15	13 715
Reclassifications [1]		– 36			5		31	
Additions		881			217		61	1 159
Disposals and derecognitions [2]		– 294			– 26		– 4	– 324
Currency translation effects	– 590	– 5		– 95	– 697		– 13	– 810
December 31, 2015	**31 585**	**4 119**	**2 980**	**6 563**	**33 385**	**5 960**	**1 341**	**54 348**
Accumulated amortization								
January 1, 2015	**– 426**	**– 685**		**– 2 539**	**– 11 684**	**– 954**	**– 914**	**– 16 776**
Amortization charge				– 580	– 2 848	– 238	– 89	– 3 755
Accumulated impairments on disposals and derecognitions,[2] reclassifications		68			241		4	313
Impairment charge		– 33			– 164		– 9	– 206
Reversal of impairment charge					40			40
Currency translation effects	15			49	194		10	253
December 31, 2015	**– 411**	**– 650**		**– 3 070**	**– 14 221**	**– 1 192**	**– 998**	**– 20 131**
Net book value at December 31, 2015	**31 174**	**3 469**	**2 980**	**3 493**	**19 164**	**4 768**	**343**	**34 217**

[1] Reclassifications between various asset categories as a result of product launches of acquired In-Process Research & Development and completion of software development.
[2] Derecognitions of assets that are no longer used or being developed and are not considered to have a significant disposal value or other alternative use.

The following table summarizes the allocation of the net book values of goodwill and intangible assets by reporting segment at December 31, 2015:

	Goodwill[1]	Intangible Assets other than Goodwill[1]						
(USD millions)	Total	Acquired research & development	Alcon brand name	Technologies	Currently marketed products	Marketing know-how	Other intangible assets	Total
Innovative Medicines	15 110	2 770		13	15 698		192	18 673
Sandoz	7 802	490		631	2 308		22	3 451
Alcon	8 255	202		2 849	1 158	4 768	111	9 088
Corporate	7	7	2 980				18	3 005
Net book value at December 31, 2015	**31 174**	**3 469**	**2 980**	**3 493**	**19 164**	**4 768**	**343**	**34 217**

[1] Restated to reflect the new divisional structures and product transfers between divisions, announced on January 27, 2016

12. Deferred tax assets and liabilities

(USD millions)	Property, plant & equipment	Intangible assets	Pensions and other benefit obligations of associates	Inventories	Tax loss carry-forwards	Other assets, provisions and accruals	Total
Gross deferred tax assets at January 1, 2016	**216**	**611**	**1 730**	**3 821**	**62**	**2 866**	**9 306**
Gross deferred tax liabilities at January 1, 2016	**– 639**	**– 3 962**	**– 401**	**– 565**	**– 5**	**– 1 132**	**– 6 704**
Net deferred tax balance at January 1, 2016	**– 423**	**– 3 351**	**1 329**	**3 256**	**57**	**1 734**	**2 602**
At January 1, 2016	**– 423**	**– 3 351**	**1 329**	**3 256**	**57**	**1 734**	**2 602**
Credited/(charged) to income	– 13	1 057	53	373	55	– 517	1 008
Charged to equity						– 44	– 44
Credited/(charged) to other comprehensive income			140			– 2	138
Impact of business combinations	4	– 400			23	37	– 336
Other movements	27	6	– 41	20	11	– 14	9
Net deferred tax balance at December 31, 2016	**– 405**	**– 2 688**	**1 481**	**3 649**	**146**	**1 194**	**3 377**
Gross deferred tax assets at December 31, 2016	224	1 331	1 839	4 160	146	2 597	10 297
Gross deferred tax liabilities at December 31, 2016	– 629	– 4 019	– 358	– 511		– 1 403	– 6 920
Net deferred tax balance at December 31, 2016	**– 405**	**– 2 688**	**1 481**	**3 649**	**146**	**1 194**	**3 377**

After offsetting USD 263 million of deferred tax assets and liabilities within the same tax jurisdiction the balance amounts to:	
Deferred tax assets at December 31, 2016	10 034
Deferred tax liabilities at December 31, 2016	– 6 657
Net deferred tax balance at December 31, 2016	**3 377**

Gross deferred tax assets at January 1, 2015	**268**	**214**	**1 749**	**3 470**	**85**	**2 587**	**8 373**
Gross deferred tax liabilities at January 1, 2015	**– 639**	**– 4 242**	**– 410**	**– 578**	**– 3**	**– 606**	**– 6 478**
Net deferred tax balance at January 1, 2015	**– 371**	**– 4 028**	**1 339**	**2 892**	**82**	**1 981**	**1 895**
At January 1, 2015	**– 371**	**– 4 028**	**1 339**	**2 892**	**82**	**1 981**	**1 895**
Credited/(charged) to income	– 57	296	83	376	– 22	– 132	544
Charged to equity						– 216	– 216
(Charged)/credited to other comprehensive income			– 63			29	– 34
Impact of business combinations		390				– 13	377
Other movements	5	– 9	– 30	– 12	– 3	85	36
Net deferred tax balance at December 31, 2015	**– 423**	**– 3 351**	**1 329**	**3 256**	**57**	**1 734**	**2 602**
Gross deferred tax assets at December 31, 2015	216	611	1 730	3 821	62	2 866	9 306
Gross deferred tax liabilities at December 31, 2015	– 639	– 3 962	– 401	– 565	– 5	– 1 132	– 6 704
Net deferred tax balance at December 31, 2015	**– 423**	**– 3 351**	**1 329**	**3 256**	**57**	**1 734**	**2 602**

After offsetting USD 349 million of deferred tax assets and liabilities within the same tax jurisdiction the balance amounts to:	
Deferred tax assets at December 31, 2015	8 957
Deferred tax liabilities at December 31, 2015	– 6 355
Net deferred tax balance at December 31, 2015	2 602

Deferred tax assets of USD 4.8 billion (2015: USD 3.9 billion) and deferred tax liabilities of USD 5.9 billion (2015: USD 5.8 billion) are expected to have an impact on current taxes payable after more than twelve months.

At December 31, 2016, unremitted earnings of USD 63 billion (2015: USD 65 billion) have been retained by consolidated entities for reinvestment. Therefore, no provision is made for income taxes that would be payable upon the distribution of these earnings. If these earnings were remitted, an income tax charge could result based on the tax statutes currently in effect.

(USD millions)	**2016**	2015
Temporary differences on which no deferred tax has been provided as they are permanent in nature related to:		
– Investments in subsidiaries	2 358	2 644
– Goodwill from acquisitions	– 28 189	– 28 202

The gross value of tax-loss carry-forwards that have, or have not, been capitalized as deferred tax assets, with their expiry dates is as follows:

(USD millions)	Not capitalized	Capitalized	**2016 total**
One year	21	12	33
Two years	30	5	35
Three years	50	5	55
Four years	75	3	78
Five years	73	25	98
More than five years	405	1 913	2 318
Total	**654**	**1 963**	**2 617**

In 2016, USD 19 million (2015: USD 13 million, 2014: USD 14 million) of tax-loss carry-forwards expired.

(USD millions)	Not capitalized	Capitalized	**2015 total**
One year	22	39	61
Two years	80	25	105
Three years	37	6	43
Four years	54	7	61
Five years	222		222
More than five years	465	712	1 177
Total	**880**	**789**	**1 669**

Deferred tax assets related to taxable losses of relevant Group entities are recognized to the extent it is considered probable that future taxable profits will be available against which such losses can be utilized in the foreseeable future.

13. Financial and other non-current assets

Financial assets

(USD millions)	**2016**	2015
Available-for-sale long-term financial investments	1 096	1 263
Long-term receivables from customers	231	317
Minimum lease payments from finance lease agreements	147	216
Contingent consideration receivables [1]	586	550
Long-term loans, advances and security deposits	136	120
Total financial assets	**2 196**	**2 466**

[1] Note 29 provides additional disclosures related to contingent consideration.

Other non-current assets

(USD millions)	**2016**	2015
Deferred compensation plans	451	409
Prepaid post-employment benefit plans	47	36
Other non-current assets	200	156
Total other non-current assets	**698**	**601**

Minimum finance lease payments

The following table shows the receivables of the gross investments in finance leases and the net present value of the minimum lease payments, as well as unearned finance income, related to surgical equipment lease arrangements. The finance income is recorded in "Other income".

	2016				
(USD millions)	Total future payments	Unearned interest income	Present value	Provision	Net book value
Not later than one year [1]	91	– 5	86	– 2	84
Between one and five years	182	– 16	166	– 37	129
Later than five years	63	– 4	59	– 41	18
Total	**336**	**– 25**	**311**	**– 80**	**231**

[1] The current portion of the minimum lease payments is recorded in trade receivables or other current assets (to the extent not yet invoiced).

	2015				
(USD millions)	Total future payments	Unearned interest income	Present value	Provision	Net book value
Not later than one year [1]	89	– 6	83	– 1	82
Between one and five years	221	– 17	204	– 10	194
Later than five years	61	– 5	56	– 34	22
Total	**371**	**– 28**	**343**	**– 45**	**298**

[1] The current portion of the minimum lease payments is recorded in trade receivables or other current assets (to the extent not yet invoiced).

14. Inventories

(USD millions)	2016	2015
Raw material, consumables	705	658
Work in progress	2 700	2 905
Finished products	2 850	2 663
Total inventories	**6 255**	**6 226**

The amount of inventory recognized as an expense in "Cost of goods sold" in the consolidated income statements during 2016 amounted to USD 10.3 billion (2015: USD 10.5 billion, 2014: USD 11.6 billion).

The group recognized inventory provisions amounting to USD 283 million (2015: USD 356 million, 2014: USD 1.1 billion) and reversed inventory provisions amounting to USD 67 million (2015: USD 148 million, 2014: USD 379 million).

The reversals mainly result from the release of products initially requiring additional quality control inspections and from the reassessment of inventory values manufactured prior to regulatory approval but for which approval was subsequently received.

15. Trade receivables

(USD millions)	**2016**	2015
Total gross trade receivables	8 364	8 322
Provisions for doubtful trade receivables	– 162	– 142
Total trade receivables, net	**8 202**	**8 180**

The following table summarizes the movement in the provision for doubtful trade receivables:

(USD millions)	**2016**	2015	2014
January 1	**– 142**	**– 156**	**– 195**
Provisions for doubtful trade receivables related to discontinued operations			15
Provisions for doubtful trade receivables charged to the consolidated income statement	– 76	– 68	– 92
Utilization or reversal of provisions for doubtful trade receivables	54	71	101
Currency translation effects	2	11	15
December 31	**– 162**	**– 142**	**– 156**

The following sets forth the trade receivables that are not overdue as specified in the payment terms and conditions established with Novartis customers as well as an analysis of overdue amounts and related provisions for doubtful trade receivables:

(USD millions)	**2016**	2015
Not overdue	7 386	7 318
Past due for not more than one month	262	265
Past due for more than one month but less than three months	223	255
Past due for more than three months but less than six months	185	193
Past due for more than six months but less than one year	145	156
Past due for more than one year	163	135
Provisions for doubtful trade receivables	– 162	– 142
Total trade receivables, net	**8 202**	**8 180**

Trade receivable balances include sales to drug wholesalers, retailers, private health systems, government agencies, managed care providers, pharmacy benefit managers and government-supported healthcare systems. Novartis continues to monitor sovereign debt issues and economic conditions in Greece, Italy, Portugal, Spain, Brazil, Russia and Saudi Arabia and evaluates trade receivables in these countries for potential collection risks. The majority of the outstanding trade receivables from these closely monitored countries are due directly from local governments or from government-funded entities except for Russia, which are due from private entities. Deteriorating credit and economic conditions and other factors in these closely monitored countries have resulted in, and may continue to result in an increase in the average length of time that it takes to collect these trade receivables and may require Novartis to re-evaluate the collectability of these trade receivables in future periods.

The gross trade receivables from these closely monitored countries at December 31, 2016 amount to USD 1.5 billion (2015: USD 1.6 billion), of which USD 82 million are past due for more than one year (2015: USD 80 million) and for which provisions of USD 62 million have been recorded (2015: USD 56 million). At December 31, 2016 amounts past due for more than one year are not significant in any of these countries on a standalone basis.

Trade receivables include amounts denominated in the following major currencies:

(USD millions)	**2016**	2015
US dollar (USD)	3 432	3 311
Euro (EUR)	1 366	1 536
Japanese yen (JPY)	567	740
Chinese yuan (CNY)	264	244
British pound (GBP)	160	187
Swiss franc (CHF)	135	124
Other currencies	2 278	2 038
Total trade receivables, net	**8 202**	**8 180**

16. Marketable securities, commodities, time deposits, derivative financial instruments and cash and cash equivalents

Marketable securities, commodities, time deposits and derivative financial instruments

(USD millions)	2016	2015
Debt securities	306	339
Equity securities		6
Fund investments	31	33
Total available-for-sale marketable securities	**337**	**378**
Commodities	94	86
Time deposits with original maturity more than 90 days	108	164
Derivative financial instruments	230	143
Accrued interest on debt securities and time deposits	1	2
Total marketable securities, commodities, time deposits and derivative financial instruments	**770**	**773**

At December 31, 2016 all debt securities are denominated in USD except for USD 12 million in EUR (2015: USD 22 million) and USD 10 million in JPY (2015: nil).

Cash and cash equivalents

(USD millions)	2016	2015
Current accounts	1 912	3 074
Time deposits and short-term investments with original maturity less than 90 days	5 095	1 600
Total cash and cash equivalents	**7 007**	**4 674**

17. Other current assets

(USD millions)	2016	2015
VAT receivable	521	609
Withholding tax recoverable	282	97
Income tax receivables	156	171
Prepaid expenses		
– Third parties	692	617
– Associated companies	5	4
Receivables from associated companies	7	31
Other receivables and current assets	1 034	1 463
Total other current assets	**2 697**	**2 992**

18. Details of share capital and share movements

The following table shows the movement in the share capital:

(USD millions)	Jan 1, 2014	Movement in year	Dec 31, 2014	Movement in year	Dec 31, 2015	Movement in year	**Dec 31, 2016**
Share capital	1 001		1 001	– 10	991	– 19	972
Treasury shares	– 89	– 14	– 103	2	– 101	25	– 76
Outstanding share capital	**912**	**– 14**	**898**	**– 8**	**890**	**6**	**896**

The following table shows the movement in the shares:

(Number of shares) [1]	Jan 1, 2014	Movement in year	Dec 31, 2014	Movement in year	Dec 31, 2015	Movement in year	**Dec 31, 2016**
Total Novartis shares	2 706 193 000		2 706 193 000	– 29 200 000	2 676 993 000	– 49 878 180	2 627 114 820
Total treasury shares	– 280 108 692	– 27 458 051	– 307 566 743	4 468 560	– 303 098 183	50 042 376	– 253 055 807
Total outstanding shares	**2 426 084 308**	**– 27 458 051**	**2 398 626 257**	**– 24 731 440**	**2 373 894 817**	**164 196**	**2 374 059 013**

[1] All shares are voting shares, which are registered, authorized, issued and fully paid

In 2016, Novartis reduced its share capital by cancelling a total of 49.9 million shares which were repurchased during 2015 on the SIX Swiss Exchange second trading line.

During 2016, 13.1 million treasury shares were delivered as a result of options being exercised and physical share deliveries related to equity-based participation plans (2015: 38.9 million shares, 2014: 51.7 million shares). Novartis repurchased 10.3 million shares on the SIX Swiss Exchange second trading line under the CHF 10 billion share buyback approved at the Annual General Meeting (AGM) in 2016, to offset the dilutive impact from equity-based participation plans (in 2015 49.9 million shares and in 2014 27.0 million shares under the USD 5 billion share buyback announced in November 2013, which was completed in November 2015). In addition, 2.6 million shares were acquired from employees, which were previously granted to them under the respective programs (2015: 4.1 million, 2014: 5.4 million). No shares were repurchased on the SIX Swiss Exchange first trading line in 2016 (2015: 9.6 million, 2014: 46.8 million). With these transactions, the total number of shares outstanding was increased by 0.2 million shares in 2016 (2015: reduction of 24.7 million shares; 2014: reduction of 27.5 million shares). At December 31, 2016, the market maker held 10 million written call options, originally issued as part of the share-based compensation for associates that have not yet been exercised. The weighted average exercise price of these options is USD 62.40 and they have contractual lives of 10 years.

19. Non-current financial debt

(USD millions)	2016	2015
Straight bonds	17 285	17 193
Liabilities to banks and other financial institutions [1]	708	706
Finance lease obligations	82	87
Total, including current portion of non-current financial debt	**18 075**	**17 986**
Less current portion of non-current financial debt	– 178	– 1 659
Total non-current financial debts	**17 897**	**16 327**

Straight bonds		
5.125% USD 3 000 million bond 2009/2019 of Novartis Securities Investment Ltd., Hamilton, Bermuda, issued at 99.822%	2 995	2 993
4.25% EUR 1 500 million bond 2009/2016 of Novartis Finance S.A., Luxembourg, Luxembourg, issued at 99.757%		1 639
4.4% USD 1 000 million bond 2010/2020 of Novartis Capital Corporation, New York, United States, issued at 99.237%	996	994
2.4% USD 1 500 million bond 2012/2022 of Novartis Capital Corporation, New York, United States, issued at 99.225%	1 490	1 488
3.7% USD 500 million bond 2012/2042 of Novartis Capital Corporation, New York, United States, issued at 98.325%	489	488
3.4% USD 2 150 million bond 2014/2024 of Novartis Capital Corporation, New York, United States, issued at 99.287%	2 132	2 130
4.4% USD 1 850 million bond 2014/2044 of Novartis Capital Corporation, New York, United States, issued at 99.196%	1 823	1 823
0.75% EUR 600 million bond 2014/2021 of Novartis Finance S.A., Luxembourg, Luxembourg, issued at 99.134%	625	650
1.625% EUR 600 million bond 2014/2026 of Novartis Finance S.A., Luxembourg, Luxembourg, issued at 99.697%	627	652
0.25% CHF 500 million bond 2015/2025 of Novartis AG, Basel, Switzerland, issued at 100.64%	491	507
0.625% CHF 550 million bond 2015/2029 of Novartis AG, Basel, Switzerland, issued at 100.502%	539	557
1.050% CHF 325 million bond 2015/2035 of Novartis AG, Basel, Switzerland, issued at 100.479%	318	329
3.0% USD 1 750 million bond 2015/2025 of Novartis Capital Corporation, New York, United States, issued at 99.010%	1 728	1 726
4.0% USD 1 250 million bond 2015/2045 of Novartis Capital Corporation, New York, United States, issued at 98.029%	1 217	1 217
0.125% EUR 1 250 million bond 2016/2023 of Novartis Finance S.A., Luxembourg, Luxembourg, issued at 99.127%	1 299	
0.625% EUR 500 million bond 2016/2028 of Novartis Finance S.A., Luxembourg, Luxembourg, issued at 98.48%	516	
Total straight bonds	**17 285**	**17 193**

[1] Average interest rate 0.4% (2015: 0.7%)

The following tables provide a breakdown of total non-current financial debt, including current portion by maturity and currency:

Breakdown by maturity:

(USD millions)	2016	2015
2016		1 659
2017	178	170
2018	345	335
2019	3 168	3 161
2020	1 000	998
2021	628	658
After 2021	12 756	11 005
Total	**18 075**	**17 986**

Breakdown by currency:

(USD millions)	2016	2015
USD	12 952	12 946
EUR	3 092	2 981
JPY	683	665
CHF	1 348	1 393
Others		1
Total	**18 075**	**17 986**

The following table shows the comparison of balance sheet and fair value of total non-current financial debt, including current portion:

(USD millions)	2016 Balance sheet	2016 Fair values	2015 Balance sheet	2015 Fair values
Straight bonds	17 285	17 943	17 193	17 770
Others	790	790	793	793
Total	**18 075**	**18 733**	**17 986**	**18 563**

The fair values of straight bonds are determined by quoted market prices. Other financial debts are recorded at notional amounts which are a reasonable approximation of the fair values.

The following table shows the collateralized non-current financial debt and pledged assets:

(USD millions)	2016	2015
Total amount of collateralized non-current financial debts		7
Total net book value of property, plant & equipment pledged as collateral for non-current financial debts	94	112

The Group's collateralized non-current financial debt consists of loan facilities at usual market conditions.

The percentage of fixed rate financial debt to total financial debt was 76% at December 31, 2016, and 82% at December 31, 2015.

Financial debts, including current financial debts, contain only general default covenants. The Group is in compliance with these covenants.

The average interest rate on total financial debt in 2016 was 2.8% (2015: 2.9%).

20. Provisions and other non-current liabilities

(USD millions)	**2016**	2015
Accrued liability for employee benefits:		
Defined benefit pension plans [1]	4 490	3 952
Other long-term employee benefits and deferred compensation	545	507
Other post-employment benefits [1]	1 005	960
Environmental remediation provisions	708	791
Provisions for product liabilities, governmental investigations and other legal matters	264	451
Contingent consideration [2]	840	712
Other non-current liabilities	618	671
Total provisions and other non-current liabilities	**8 470**	**8 044**

[1] Note 25 provides additional disclosures related to post-employment benefits.
[2] Note 29 provides additional disclosures related to contingent consideration.

Novartis believes that its total provisions are adequate based upon currently available information. However, given the inherent difficulties in estimating liabilities in this area, Novartis may incur additional costs beyond the amounts provided. Management believes that such additional amounts, if any, would not be material to the Group's financial condition but could be material to the results of operations or cash flows in a given period.

Environmental remediation provisions

The material components of the environmental remediation provisions consist of costs to sufficiently clean and refurbish contaminated sites to the extent necessary, and to treat, and where necessary, continue surveillance at sites where the environmental remediation exposure is less significant. The provision recorded at December 31, 2016, totals USD 0.8 billion (2015: USD 0.9 billion), of which USD 65 million (2015: USD 80 million) is current.

A substantial portion of the environmental remediation provisions relate to the remediation of Basel regional landfills in the adjacent border areas in Switzerland, Germany and France. The provisions are re-assessed on a yearly basis and are adjusted as necessary.

In the United States, Novartis has been named under federal legislation (the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended) as a potentially responsible party (PRP) in respect of certain sites. Novartis actively participates in, or monitors, the clean-up activities at the sites in which it is a PRP. The provision takes into consideration the number of other PRPs at each site, and the identity and financial position of such parties in light of the joint and several nature of the liability.

The following table shows the movements in the environmental liability provisions during 2016, 2015 and 2014:

(USD millions)	**2016**	2015	2014
January 1	**871**	**923**	**1 061**
Cash payments	– 75	– 52	– 33
Releases		– 5	– 6
Additions	1	6	2
Currency translation effects	– 24	– 1	– 101
December 31	**773**	**871**	**923**
Less current provision	– 65	– 80	– 95
Non-current environmental remediation provisions at December 31	**708**	**791**	**828**

The expected timing of the related cash outflows as of December 31, 2016, is currently projected as follows:

(USD millions)	Expected cash outflows
Due within two years	127
Due later than two years, but within five years	76
Due later than five years, but within ten years	427
Due after ten years	143
Total environmental remediation liability provisions	**773**

Provisions for product liabilities, governmental investigations and other legal matters

Novartis has established provisions for certain product liabilities, governmental investigations and other legal matters, where a potential cash outflow is probable and Novartis can make a reliable estimate of the amount of the outflow. These provisions represent the Group's current best estimate of the total financial effect for the matters described below and for other less significant mat-

ters. Potential cash outflows reflected in a provision may be fully or partially off-set by insurance in certain circumstances.

Novartis has not established provisions for potential damage awards for certain additional legal claims against its subsidiaries if Novartis currently believes that a payment is either not probable or cannot be reliably estimated. In total, these not-provisioned-for matters include fewer than 500 individual product liability cases and certain other legal matters. Plaintiffs' alleged claims in these matters, which Novartis does not believe to be entirely remote but which do not fulfill the conditions for the establishment of provisions, currently aggregate to, according to Novartis' current best belief, approximately USD 1.5 billion. In addition, in some of these matters there are claims for punitive or multiple (treble) damages, civil penalties and disgorgement of profits that in Novartis' view are either wholly or partially unspecified or wholly or partially unquantifiable at present; the Group believes that information about these amounts claimed by plaintiffs generally is not meaningful for purposes of determining a reliable estimate of a loss that is probable or more than remote.

A number of other legal matters are in such early stages or the issues presented are such that the Group has not made any provisions since it cannot currently estimate either a potential outcome or the amount of any potential losses. For these reasons, among others, the Group generally is unable to make a reliable estimate of possible loss with respect to such cases. It is therefore not practicable to provide information about the potential financial impact of those cases.

There might also be cases for which the Group was able to make a reliable estimate of the possible loss or the range of possible loss, but the Group believes that publication of such information on a case-by-case basis would seriously prejudice the Group's position in ongoing legal proceedings or in any related settlement discussions. Accordingly, in such cases, information has been disclosed with respect to the nature of the contingency, but no disclosure is provided as to an estimate of the possible loss or range of possible loss.

Note 28 contains additional information on contingencies.

Summary of significant legal proceedings

The following is a summary of significant legal proceedings to which Novartis or its subsidiaries are a party or were a party and that concluded in 2016.

Investigations and related litigations

SOUTHERN DISTRICT OF NEW YORK (S.D.N.Y.) MARKETING PRACTICES INVESTIGATION AND LITIGATION

In April 2013, the US government filed a civil complaint in intervention to an individual *qui tam* action against Novartis Pharmaceuticals Corporation (NPC) in the United States District Court (USDC) for the S.D.N.Y. involving several of NPC's cardiovascular medications. The suit is related to a previously disclosed 2011 investigation of the United States Attorney's Office (USAO) for the S.D.N.Y. relating to marketing practices, including the remuneration of healthcare providers, in connection with three NPC products (*Lotrel*, *Starlix* and *Valturna*). The complaint, as subsequently amended, asserts federal False Claims Act and common law claims with respect to speaker programs and other promotional activities for certain NPC cardiovascular medications allegedly serving as mechanisms to provide kickbacks to healthcare professionals (HCPs). It seeks unspecified damages, which according to the complaint are "substantial", including treble damages and maximum civil penalties per claim, as well as disgorgement of Novartis profits from the alleged unlawful conduct. In August 2013, New York State filed a civil complaint in intervention asserting similar claims. Neither government complaint in intervention adopted the individual relator's claims with respect to off-label promotion of *Valturna*, which were subsequently dismissed with prejudice by the court. The individual relator continues to litigate the kickback claims on behalf of other states and municipalities. NPC vigorously contests the S.D.N.Y., New York State and individual claims, both as to alleged liability and amount of damages and penalties.

S.D.N.Y. / WESTERN DISTRICT OF NEW YORK HEALTHCARE FRAUD INVESTIGATION

In 2011, Alcon Laboratories, Inc. (ALI) received a subpoena from the United States Department of Health & Human Services relating to an investigation into allegations of healthcare fraud. The subpoena requests the production of documents relating to marketing practices, including the remuneration of healthcare providers, in connection with certain ALI products (*Vigamox*, *Nevanac*, *Omnipred*, *Econopred*; surgical equipment). ALI is cooperating with this investigation.

S.D.N.Y. *GILENYA* MARKETING PRACTICES INVESTIGATION

In 2013, NPC received a civil investigative demand from the USAO for the S.D.N.Y. requesting the production of documents and information relating to marketing practices for *Gilenya*, including the remuneration of healthcare providers in connection therewith. NPC is cooperating with this investigation.

NEW YORK STATE PRICING POLICY INVESTIGATION

In November 2014, ALI received a civil subpoena from the New York state attorney general relating to an investigation into a unilateral pricing policy program. ALI is cooperating with this investigation.

EASTERN DISTRICT OF PENNSYLVANIA (E.D. PA.) GENERIC PRICING ANTITRUST INVESTIGATION, ANTITRUST CLASS ACTIONS

In March 2016, Sandoz Inc. received a subpoena from the Antitrust Division of the US Department of Justice (DoJ) requesting documents related to the marketing and pricing of generic pharmaceutical products sold by Sandoz Inc. and its subsidiaries, including Fougera Pharmaceuticals, Inc. (Fougera), and related communications with competitors. Sandoz Inc. is cooperating with this investigation which it believes to be part of a broader inquiry into industry practice.

Since September 2016, Sandoz Inc., Fougera, Lek Pharmaceuticals d.d., Novartis AG (NAG), and Novartis International AG (NIAG) have been sued alongside other generic pharmaceutical companies in more than 25 putative class actions in the S.D.N.Y. and E.D. Pa. alleging that defendants engaged in anti-competitive conduct with regard to the sales of various generic drugs, asserting violations of federal and state antitrust laws as well as consumer protection laws. The claims are being vigorously contested.

DISTRICT OF MASSACHUSETTS (D. MASS.) CHARITABLE FOUNDATION INVESTIGATION

In May 2016, NPC received a subpoena from the USAO for the D. Mass. requesting documents related to NPC's support of 501(c)(3) organizations that provide co-payment assistance to Medicare patients who are prescribed Novartis medicines, as well as related to pricing strategies related to *Gleevec*. NPC is cooperating with this investigation which it believes to be part of a broader inquiry into industry practices.

LUCENTIS/AVASTIN® MATTERS IN ITALY AND FRANCE

In 2013, the Italian Competition Authority (ICA) opened an investigation to assess whether Novartis Farma S.p.A., NAG, F. Hoffmann-La Roche AG, Genentech Inc. and Roche S.p.A. colluded to artificially preserve the market positions of Avastin® and *Lucentis*. In March 2014, the ICA imposed a fine equivalent to USD 125 million on NAG and Novartis Farma S.p.A. and a fine on F. Hoffmann-La Roche AG and Roche S.p.A. equivalent to USD 122 million. As required by Italian law, Novartis paid the ICA fine, subject to the right to later claim recoupment. Novartis is appealing against the fines before the Consiglio di Stato (CdS) which has referred five legal questions to the European Court of Justice (ECJ) for a preliminary ruling. The ECJ's judgment is pending. Novartis is also appealing at the CdS the decision of the Tribunale amministrativo regionale del Lazio which has upheld a decision by the Italian Medicines Agency to include Avastin® in a list of drugs to be reimbursed off-label for age-related macular degeneration (AMD). The CdS has referred four legal questions to the ECJ for a preliminary ruling. The ECJ's judgment is pending. In the second quarter of 2014, the Italian Ministry of Health indicated in a letter that it intended to seek a total equivalent of approximately USD 1.2 billion in damages from Novartis and Roche entities based on the above allegations, and in the first quarter of 2015 the Lombardia region sent a payment request equivalent to approximately USD 61 million.

In 2014, the French Competition Authority opened an investigation against Novartis Groupe France with respect to the French market for anti-vascular endothelial growth factor (VEGF) products indicated for the treatment of wet AMD. Novartis' appeal against the Authority's inspection was rejected by the Supreme Court in 2016. Also in France, Novartis' appeal is pending against a temporary recommendation of use and reimbursement of off-label Avastin® for neovascular AMD by hospital ophthalmologists, in force since September 2015. Novartis' appeal against the decree on which the recommendation is based was rejected by the Administrative Supreme Court in 2016. In both Italy and France, Novartis believes that allowing the widespread off-label use and reimbursement of Avastin®, despite the presence of available licensed alternatives, would result in a breach of applicable regulations. Novartis continues to vigorously contest all claims in Italy and France.

JAPAN INVESTIGATION

In December 2015, trial started against a former Novartis Pharma K.K. (NPKK) employee, and also NPKK under the dual liability concept in Japanese law, over allegations brought by the Tokyo District Public Prosecutor Office in two counts for alleged manipulation of data in sub-analysis publications of the Kyoto Heart Study regarding valsartan. The charges against NPKK are subject to a maximum total fine of JPY 4 million.

SOUTH KOREA INVESTIGATION

In Q1 2016, the Seoul Western District Prosecutor initiated a criminal investigation into, among other things, allegations that Novartis Korea utilized medical journals to provide inappropriate economic benefits to HCPs. In September 2016, a criminal trial began concerning the Prosecutor's allegations that Novartis Korea utilized medical journals to provide inappropriate economic benefits to HCPs. Separately, upon request by the Prosecutor's office, the Korea Fair Trade Commission is investigating whether sponsorships by Novartis Korea of HCPs to overseas academic conferences constitute a violation of fair trade laws. In addition, the Ministry of Food and Drug Safety and the Ministry of Health and Welfare are also reviewing the matter and are evaluating administrative sanctions on Novartis Korea.

GREECE INVESTIGATION

Novartis is investigating allegations of potentially inappropriate economic benefits in Greece to HCPs and others. Information has been provided to the Greek authorities by Novartis (Hellas) S.A.C.I. related to these allegations. Novartis is also responding to document requests from the US Securities and Exchange Commission (SEC) and DoJ in connection with such allegations and is cooperating with their investigation.

Antitrust class actions

SOLODYN®

Since the third quarter of 2013, seventeen putative class action complaints and three other complaints have been filed against manufacturers of the brand drug Solodyn® and its generic equivalent, including Sandoz Inc. The cases have been consolidated and transferred for pretrial purposes to the federal district court in Mass. The plaintiffs purport to represent direct and indirect purchasers of Solodyn® branded products and assert violations of federal and state antitrust laws, including allegations in connection with separate settlements by Medicis with each of the other defendants, including Sandoz Inc., of patent litigation relating to Solodyn®. Sandoz is vigorously contesting the claims.

CONTACT LENSES

Since March 2015, more than 50 putative class action complaints have been filed in several courts across the US naming contact-lens manufacturers, including ALI, and alleging violations of federal antitrust law as well as state antitrust, consumer protection and unfair competition laws of various states in connection with the sale of contact lenses. The cases have been consolidated in the Middle District of Florida by the Judicial Panel on Multidistrict Litigation and the claims are being vigorously contested.

GLEEVEC

Since June 2015, NPC, Novartis Corporation (NC) and NAG have been sued in five putative antitrust class action complaints alleging that Novartis unlawfully obtained delayed generic entry of *Gleevec*. The initial complaint seeking to prevent Novartis from enforcing the agreement with Sun Pharmaceuticals was dismissed in the first quarter of 2016. Plaintiffs have filed a consolidated amended complaint in the D. Mass. seeking damages on behalf of all indirect purchasers of *Gleevec* in 24 different states based on alleged violations of the respective state antitrust laws. In November 2016, a similar class action complaint was filed in the same court on behalf of direct purchasers of *Gleevec*. The claims are being vigorously contested.

ENOXAPARIN

In October 2015, Sandoz and Momenta Pharmaceuticals were sued in a putative antitrust class action in federal court in Tennessee alleging that Momenta and Sandoz engaged in anticompetitive conduct with regard to sales of enoxaparin, and the same allegations were made by Amphastar in a lawsuit filed in federal court in California and subsequently moved to federal court in Mass. (Sandoz, Momenta Pharmaceuticals and Amphastar are currently engaged in patent litigation concerning enoxaparin in federal court in Mass.). The claims are being vigorously contested.

Other matters

AVERAGE WHOLESALE PRICE (AWP) LITIGATION

Lawsuits have been brought, the latest in February 2016, by various US state governmental entities and private parties against various pharmaceutical companies, including certain Sandoz entities and NPC, alleging that they fraudulently overstated the AWP that is or has been used by payors, including state Medicaid agencies, to calculate reimbursements to healthcare providers. In 2016, the Mississippi Supreme Court denied Sandoz' motion for reconsideration of its decision which had upheld the USD 30 million Chancery Court verdict against Sandoz. NPC remains a defendant in an action brought by the state of Illinois and in a putative class action brought by private payors in New Jersey, and Sandoz is a defendant in an individual and a putative class action in Pennsylvania. The claims are being vigorously contested.

RECLAST/ACLASTA PRODUCT LIABILITY LITIGATION

NPC is a defendant in 22 US product liability actions involving *Reclast* and alleging atypical femur fracture injuries and osteonecrosis of the jaw, most of which are in New Jersey state or federal court coordinated with claims against other bisphosphonate manufacturers. After the Saskatchewan and Alberta putative class actions were discontinued by plaintiffs in 2016 and 2017, one Canadian putative class action brought against numerous bisphosphonate manufacturers including NPC, Novartis Pharmaceuticals Canada Inc. and NIAG remains pending in Quebec. All claims are being vigorously contested.

ORIEL LITIGATION

In October 2013, Shareholder Representative Services LLC filed a complaint in New York State Court against Sandoz Inc., two affiliates and two former officers of Sandoz AG asserting various common law and statutory contract, fraud and negligent misrepresentation claims arising out of Sandoz Inc.'s purchase of Oriel Therapeutics, Inc. In March 2015, the court dismissed all parties and claims but for a breach of contract claim against Sandoz Inc. Sandoz Inc. continues to vigorously contest the claim.

EYE DROP PRODUCTS CONSUMER CLASS ACTIONS

Since November 2012, six putative consumer fraud class action litigations were commenced against Alcon (and in four of those cases, Sandoz) in federal courts in the Southern Districts of Illinois and Florida and the Districts of Missouri, Mass. and New Jersey (D.N.J.). They claim that Alcon's, Sandoz's and many other manufacturer defendants' eye drop products for glaucoma were deceptively designed so that the drop dosage is more than necessary to be absorbed in the eye or there is too much solution in each bottle for the course of one-month's treatment, leading to wastage and higher costs to patient consumers. Three cases remain pending against Alcon (and two against Sandoz) at the US Court of Appeals for the Third and Sixth Circuits and in the D. Mass. and D.N.J. Novartis is vigorously contesting the claims.

Concluded legal matters

NORTHERN DISTRICT OF TEXAS (NDTX) INVESTIGATION

In 2016, Alcon achieved civil settlements with the US Office of Foreign Assets Control (OFAC) and with the US Department of Commerce's Bureau of Industry and Security to pay a total of USD 9.4 million in civil monetary penalties. The settlements relate to the sale and export of medical end-use surgical and pharmaceutical products that were licensable and in fact had been previously and subsequently licensed by OFAC for Alcon. The USAO for the NDTX has advised Alcon that it has closed its investigation without taking action.

CHINA INVESTIGATIONS

After reports of Chinese government investigations of other pharmaceutical companies for alleged improper use of certain China-based travel agencies to reward healthcare providers, Novartis commenced an internal

investigation in 2013 concerning its local affiliates' relationships with China-based travel agencies (and other vendors). In March 2016, NAG achieved a civil settlement with the SEC to pay USD 25 million to settle charges that it violated the internal controls and books-and-records provisions of the Foreign Corrupt Practices Act, without admitting or denying the findings. Novartis also agreed for two years to report to the SEC on the status of its remediation and anti-corruption compliance.

ITALY *MF59* INVESTIGATION

In May 2014, the public prosecutor of Siena had initiated a criminal investigation with respect to allegations that the transfer price of the adjuvant *MF59* was unlawfully marked up. The investigation concerned whether the *Focetria* vaccine sold to the government was over-priced and whether the Italian Ministry of Health paid an inflated amount in a dispute settlement relating to the supply of *Focetria* during the 2009 pandemic. Having found no elements to sustain the charges at trial, in 2016 the Judicial Authority of Siena issued a decree of dismissal of the investigation.

METOCLOPRAMIDE PRODUCT LIABILITY LITIGATION

Sandoz is a defendant, along with numerous brand and generic manufacturers of Reglan® (metoclopramide), in 376 product liability actions in the state courts in Pennsylvania and California claiming that the use of metoclopramide caused personal injuries including tardive dyskinesia. All cases are in the process of being resolved through voluntary dismissal or settlement, the payment of which is not material to Novartis.

TEKTURNA/RASILEZ/VALTURNA PRODUCT LIABILITY LITIGATION

NPC and certain other Novartis affiliates had been defendants in 12 individual lawsuits pending in the USDC for the D.N.J., and one in Alberta, Canada, claiming that treatment with *Tekturna*, *Rasilez* and/or *Valturna* caused renal failure, kidney disease or stroke. In 2016, the D.N.J. cases have been resolved through settlement, the payment of which was not material to Novartis. The remaining Alberta case is being vigorously contested, but is not material to Novartis.

EQUA ARBITRATION

In 2013, Sanofi K.K. had commenced an arbitration against NPKK relating to the termination of a co-promotion agreement in Japan of *Equa* (*Galvus*), which is used to treat type 2 diabetes. The matter was concluded in 2016.

QUI TAM ACTIONS

NPC was a defendant in a relator's *qui tam* action in the USDC for the E.D. Pa. asserting federal and state False Claims Act claims relating to certain alleged marketing practices involving Elidel®. The federal government and several states had declined to intervene in the relator's action. In 2016, NPC settled this matter with the relator, the federal government and eight states for an amount not material to Novartis.

In 2006, 2010 and 2012, *qui tam* complaints were filed in D. Mass. asserting various federal False Claims Act and state claims relating to certain alleged improper marketing practices involving *Xolair* against various Novartis, Genentech and Roche entities. In 2011, the US and various state governments declined to intervene in the relators' actions, and closed their investigations. In June 2014, the relator in the 2010 action voluntarily dismissed his complaint with prejudice; the US and various states subsequently consented to the dismissal. In the second quarter of 2016, the Court of Appeals affirmed a decision by the USDC for the D. Mass. which had dismissed with prejudice all federal claims in connection with alleged improper marketing practices asserted by the relators; the Court of Appeals remanded relators' state claims to the district court for dismissal without prejudice. Two similar complaints were filed in October 2016 in state courts in New York and Mass. Novartis continues to vigorously contest the claims, but they are not material to Novartis.

EMPLOYMENT ACTION

In March 2015, ALI and NC had been sued in an individual and collective action filed in the S.D.N.Y. The claims had asserted inter alia gender discrimination, pay discrimination and retaliation at Alcon. In 2016, the parties have finalized a class settlement and settlements for the individual plaintiffs for amounts that were not material to Novartis.

Summary of product liability, governmental investigations and other legal matters provision movements

(USD millions)	**2016**	2015	2014
January 1	**1 194**	**849**	**924**
Provisions related to discontinued operations			– 37
Cash payments	– 811	– 256	– 454
Releases of provisions	– 239	– 223	– 135
Additions to provisions	243	832	549
Currency translation effects	8	– 8	2
December 31	**395**	**1 194**	**849**
Less current portion	– 131	– 743	– 328
Non-current product liabilities, governmental investigations and other legal matters provisions at December 31	**264**	**451**	**521**

Novartis believes that its total provisions for investigations, product liability, arbitration and other legal matters are adequate based upon currently available information. However, given the inherent difficulties in estimating liabilities, there can be no assurance that additional liabilities and costs will not be incurred beyond the amounts provided.

21. Current financial debt and derivative financial instruments

(USD millions)	2016	2015
Interest-bearing accounts of associates payable on demand	1 601	1 645
Bank and other financial debt	836	1 185
Commercial paper	3 174	1 085
Current portion of non-current financial debt	178	1 659
Fair value of derivative financial instruments	116	30
Total current financial debt and derivative financial instruments	**5 905**	**5 604**

The consolidated balance sheet amounts of current financial debt, other than the current portion of non-current financial debt, approximate the estimated fair value due to the short-term nature of these instruments.

The weighted average interest rate on the bank and other current financial debt (including employee deposits from the compensation of associates employed by Swiss entities) was 3.0% in 2016 and 2.7% in 2015.

Details on commercial papers are provided in Note 29 – Liquidity risk.

22. Provisions and other current liabilities

(USD millions)	2016	2015
Taxes other than income taxes	547	551
Restructuring provisions	222	260
Accrued expenses for goods and services received but not invoiced	880	1 124
Accruals for royalties	550	550
Provisions for deductions from revenue	4 183	3 790
Accruals for compensation and benefits including social security	1 993	1 932
Environmental remediation liabilities	65	80
Deferred income	287	385
Provisions for product liabilities, governmental investigations and other legal matters [1]	131	743
Accrued share-based payments	199	209
Contingent considerations [2]	49	78
Other payables	722	1 017
Total provisions and other current liabilities	**9 828**	**10 719**

[1] Note 20 provides additional disclosures related to legal provisions
[2] Note 29 provides additional disclosures related to contingent consideration

Provisions are based upon management's best estimate and adjusted for actual experience. Such adjustments to the historic estimates have not been material.

Provisions for deductions from revenue

The following table shows the movement of the provisions for deductions from revenue:

(USD millions)	**2016**	2015	2014
January 1	**3 790**	**3 533**	**4 182**
Provisions related to discontinued operations			– 234
Impact of business combinations		3	
Additions	16 622	15 603	14 119
Payments/utilizations	– 16 189	– 15 218	– 13 907
Changes in offset against gross trade receivables	10	50	– 420
Currency translation effects	– 50	– 181	– 207
December 31	**4 183**	**3 790**	**3 533**

Restructuring provisions movements

(USD millions)	**2016**	2015	2014
January 1	**260**	**333**	**174**
Provisions related to discontinued operations			– 4
Additions	343	399	504
Cash payments	– 260	– 435	– 295
Releases	– 66	– 36	– 52
Transfers	– 76		
Currency translation effects	21	– 1	6
December 31	**222**	**260**	**333**

In 2016, additions to provisions of USD 343 million were mainly related to the following reorganizations:

— The Innovative Medicines division Pharmaceuticals business unit, realigned its operations to improve its operating agility, to focus resources on key growth drivers. Furthermore, research is realigning and focusing its operations resulting in redundancies from the consolidation of certain research teams and the outsourcing of certain activities to qualified third party vendors.
— Alcon division launched several initiatives to improve its efficiencies resulting in redundancies, as it realigns its operations to focus on its surgical and vision care business franchises after the transfer of its ophthalmic pharmaceuticals business to Innovative Medicines division.
— Sandoz division launched an initiative to reallocate resources to priority, high growth and higher profitability countries.
— Various groupwide initiatives to simplify organizational structure, including consolidation of manufacturing sites and support services.

In 2015, additions to provisions of USD 399 million were mainly related to the following reorganizations:

— Innovative Medicines division implemented a restructuring program targeted at efficiency gains in the business franchises, other than in Oncology. It also initiated initiatives related to the integration of the oncology business acquired from GSK.
— Alcon division extended its initiative started in the prior year to realize productivity opportunities.
— Various groupwide initiatives to simplify the organizational structure, mainly related to the manufacturing footprint and support services.

In 2014, additions to provisions of USD 504 million were mainly related to the following reorganizations:

— Innovative Medicines division initiatives in drug development targeted at establishing an organizational model for its activities that allows for greater focus on high priority programs in specialty medicines, more flexibility to adapt to changes in the portfolio, and which strengthens operational excellence. Furthermore Innovative Medicines implemented a program targeted at increasing operational leverage.
— Alcon division established an initiative to realize productivity opportunities.
— Various groupwide initiatives to simplify organizational structure, including consolidation of manufacturing sites and support services.

23. Details to the consolidated cash flow statements

23.1) Adjustments for non-cash items from continuing operations

(USD millions)	2016	2015	2014
Taxes	1 119	1 106	1 545
Depreciation, amortization and impairments on:			
Property, plant & equipment	1 591	1 550	1 630
Intangible assets	4 452	3 921	3 052
Financial assets [1]	132	104	69
Income from associated companies	– 703	– 266	– 1 918
Gains on disposal of property, plant & equipment, intangible, financial and other non-current assets, net	– 935	– 869	– 622
Equity-settled compensation expense	671	773	744
Change in provisions and other non-current liabilities	956	1 642	1 490
Net financial expense	1 154	1 109	735
Total	**8 437**	**9 070**	**6 725**

[1] Including unrealized fair value gains

23.2) Cash flows from changes in working capital and other operating items included in operating cash flow from continuing operations

(USD millions)	2016	2015	2014
(Increase) in inventories	– 235	– 482	– 506
(Increase) in trade receivables	– 229	– 513	– 367
(Decrease)/Increase in trade payables	– 587	378	142
Change in other net current assets and other operating cash flow items	974	– 246	106
Total	**– 77**	**– 863**	**– 625**

23.3) Cash flows arising from acquisitions and divestments of businesses

The following is a summary of the cash flow impact of acquisitions and divestments. The most significant transactions are described in Note 2.

(USD millions)	**2016 Acquisitions**	**2016 Divestments**	2015 Acquisitions	2015 Divestments	2014 Acquisitions	2014 Divestments
Property, plant & equipment				1 000		145
Currently marketed products	– 451		– 12 970	646	– 234	91
(Acquired)/divested research & development	– 690		– 730	13	– 248	
Technologies				113		
Other intangible assets			– 15	86		
Financial and other assets including deferred tax assets [1]	– 39		– 555	40	– 53	7
Inventories	– 4			893	– 1	87
Trade receivables and other current assets	– 1		– 3	529	– 3	159
Cash and cash equivalents	– 1		– 25	311	– 2	
Current and non-current financial debts				– 601		
Trade payables and other liabilities including deferred tax liabilities	372		212	– 841	186	– 50
Net identifiable assets (acquired) or divested	**– 814**		**– 14 086**	**2 189**	**– 355**	**439**
Currency translation effects				98		– 3
Acquired/(divested) liquidity	1		25	– 479	2	
Fair value of previously held equity interests	64					
Subtotal	**– 749**		**– 14 061**	**1 808**	**– 353**	**436**
Refinancing of intercompany financial debt, net				578		
Goodwill [1]	– 56		– 2 438	1 042	– 131	267
Divestment gain				7 401		876
Taxes paid and other portfolio transformation related cash flows		– 748		– 1 337		– 566
Receivables and payables contingent consideration, net [2]	84		– 8	– 519	153	
Other payments and deferred consideration, net	– 44					
(Deferred)/prepaid portion of sales price [3]				– 49		47
Net cash flows	**– 765**	**– 748**	**– 16 507**	**8 924**	**– 331**	**1 060**
Of which:						
Net cash flows used in/from discontinued operations		– 748		8 924		1 060
Net cash flows used in continuing operations	– 765		– 16 507		– 331	

[1] 2014 Acquisitions include an adjustment regarding a previous acquisition to deferred tax assets of USD 21 million and goodwill of USD 135 million.
[2] The contingent consideration of the 2016 Transcend Medical, Inc. acquisition amounted to USD 92 million. Of this amount, USD 60 million has been paid in 2016.
[3] Divestments include USD 49 million proceeds for the divestment of the Animal Health business received in 2014.

Notes 2 and 24 provide further information regarding acquisitions and divestments of businesses. All acquisitions were for cash.

23.4) Cash flows from discontinued operations

(USD millions)	**2016**	2015	2014
Cash flows used in operating activities		**– 188**	**– 1**
Purchase of property, plant & equipment		– 41	– 223
Proceeds from sales of property, plant & equipment		1	4
Purchase of intangible assets			– 18
Proceeds from sales of intangible assets			79
Purchase of financial and other non-current assets, net		– 2	– 13
Divestments of businesses [1]	– 748	8 924	1 060
Cash flows used in/from investing activities	**– 748**	**8 882**	**889**
Total net cash flows used in/from discontinued operations	**– 748**	**8 694**	**888**

[1] 2016 includes mainly payments for capital gains taxes and other payments related to the portfolio transformation transaction. 2015 includes proceeds of USD 10 925 million reduced by USD 2 001 million, for payments of capital gains taxes, transaction-related costs and purchase price adjustments. 2014 includes the net proceeds related to the divestment of the blood transfusion diagnostics unit.

24. Acquisitions of businesses

Fair value of assets and liabilities arising from acquisitions

(USD millions)	**2016**	2015	2014
Currently marketed products	451	12 970	234
Acquired research & development	690	730	248
Other intangible assets		15	
Deferred tax assets [1]	39	555	53
Inventories	4		1
Trade receivables and other current assets	1	3	3
Cash and cash equivalents	1	25	2
Payables and other liabilities including deferred tax liabilities	– 372	– 212	– 186
Net identifiable assets acquired	**814**	**14 086**	**355**
Acquired liquidity	– 1	– 25	– 2
Goodwill [1]	56	2 438	131
Net assets recognized as a result of business combinations	**869**	**16 499**	**484**

[1] 2014 Acquisitions include an adjustment regarding a previous acquisition to deferred tax assets of USD 21 million and goodwill of USD 135 million.

Note 2 details significant acquisition of businesses, which in 2016 were Transcend and Selexys, in 2015, were the GSK Oncology products, Spinifex and Admune and in 2014 CoStim and WaveTech. The goodwill arising out of these acquisitions is attributable to buyer specific synergies, assembled workforce and to the accounting for deferred tax liabilities on the acquired assets. Goodwill of USD 18 million from 2016 and of USD 2.4 billion from 2015 is tax deductible.

25. Post-employment benefits for associates

Defined benefit plans

In addition to the legally required social security schemes, the Group has numerous independent pension and other post-employment benefit plans. In most cases, these plans are externally funded in entities that are legally separate from the Group. For certain Group companies, however, no independent plan assets exist for the pension and other post-employment benefit obligations of associates. In these cases the related unfunded liability is included in the balance sheet. The defined benefit obligations (DBOs) of all major pension and other post-employment benefit plans are reappraised annually by independent actuaries. Plan assets are recognized at fair value. The major plans are based in Switzerland, the United States, the United Kingdom, Germany and Japan, which represent 95% of the Group's total DBO for pension plans. Details of the plans in the two most significant countries of Switzerland and the US are provided below.

Swiss-based pension plans represent the most significant portion of the Group's total DBO and plan assets. For the active insured members born on or after January 1, 1956, or having joined the plans after December 31, 2010, the benefits are partially linked to the contributions paid into the plan. Certain features of Swiss pension plans required by law preclude the plans being categorized as defined contribution plans. These factors include a minimum interest guarantee on retirement savings accounts, a pre-determined factor for converting the accumulated savings account balance into a pension and embedded death and disability benefits.

All benefits granted under Swiss-based pension plans are vested, and Swiss legislation prescribes that the employer has to contribute a fixed percentage of an associate's pay to an external pension fund. Additional employer contributions may be required whenever the plan's statutory funding ratio falls below a certain level. The associate also contributes to the plan. The pension plans are run by separate legal entities, each governed by a Board of Trustees, which, for the principal plans, consists of representatives nominated by Novartis and the active insured associates. The Boards of Trustees are responsible for the plan design and asset investment strategy.

In June 2015, the Board of Trustees of the Novartis Swiss Pension Fund agreed to adjust the annuity conversion rate at retirement with effect from January 1, 2016. This amendment did not have an impact on existing members receiving benefits or on plan members born before January 1, 1956. This amendment resulted in a net pre-tax curtailment gain of USD 110 million (CHF 103 million) recognized in the 2015 financial statements.

The US pension plans represent the second largest component of the Group's total DBO and plan assets. The principal plans (Qualified Plans) are funded, whereas plans providing additional benefits for executives (Restoration Plans) are unfunded. Employer contributions are required for Qualified Plans whenever the statutory funding ratio falls below a certain level. Furthermore, associates in the US are covered under other post-employment benefit plans and post-retirement medical plans.

The following tables are a summary of the funded and unfunded defined benefit obligation for pension and other post-employment benefit plans of associates at December 31, 2016 and 2015:

	Pension plans		Other post-employment benefit plans	
(USD millions)	**2016**	2015	**2016**	2015
Benefit obligation at January 1	**23 402**	**24 178**	**1 132**	**1 253**
Current service cost	437	451	35	32
Interest cost	390	399	48	46
Past service costs and settlements	– 73	– 138		
Administrative expenses	29	23		
Remeasurement losses/(gains) arising from changes in financial assumptions	1 299	– 16	46	– 34
Remeasurement (gains) arising from changes in demographic assumptions	– 7	– 41	– 26	– 30
Experience-related remeasurement losses/(gains)	117	56	– 33	– 110
Currency translation effects	– 896	– 358	7	– 14
Benefit payments	– 1 250	– 1 406	– 51	– 50
Contributions of associates	207	223		
Effect of acquisitions, divestments or transfers	– 41	31		39
Benefit obligation at December 31	**23 614**	**23 402**	**1 158**	**1 132**
Fair value of plan assets at January 1	**19 536**	**20 434**	**172**	**199**
Interest income	293	300	6	6
Return on plan assets excluding interest income	742	– 286	– 1	– 6
Currency translation effects	– 757	– 223		
Novartis Group contributions	542	494	27	23
Contributions of associates	207	223		
Settlements	– 77	– 3		
Benefit payments	– 1 250	– 1 406	– 51	– 50
Effect of acquisitions, divestments or transfers	– 11	3		
Fair value of plan assets at December 31	**19 225**	**19 536**	**153**	**172**
Funded status	**– 4 389**	**– 3 866**	**– 1 005**	**– 960**
Limitation on recognition of fund surplus at January 1	**– 50**	**– 58**		
Change in limitation on recognition of fund surplus (incl. exchange rate differences)		12		
Interest income on limitation of fund surplus	– 4	– 4		
Limitation on recognition of fund surplus at December 31	**– 54**	**– 50**		
Net liability in the balance sheet at December 31	**– 4 443**	**– 3 916**	**– 1 005**	**– 960**

The reconciliation of the net liability from January 1 to December 31 is as follows:

	Pension plans		Other post-employment benefit plans	
(USD millions)	**2016**	2015	**2016**	2015
Net liability at January 1	**– 3 916**	**– 3 802**	**– 960**	**– 1 054**
Current service cost	– 437	– 451	– 35	– 32
Net interest expense	– 101	– 103	– 42	– 40
Administrative expenses	– 29	– 23		
Past service costs and settlements	– 4	135		
Remeasurements	– 667	– 285	12	168
Currency translation effects	139	135	– 7	14
Novartis Group contributions	542	494	27	23
Effect of acquisitions, divestments or transfers	30	– 28		– 39
Change in limitation on recognition of fund surplus		12		
Net liability at December 31	**– 4 443**	**– 3 916**	**– 1 005**	**– 960**

Amounts recognized in the consolidated balance sheet				
Prepaid benefit cost	47	36		
Accrued benefit liability	– 4 490	– 3 952	– 1 005	– 960

The following table shows a breakdown of the DBO for pension plans by geography and type of member and the breakdown of plan assets into the geographical locations in which they are held:

	2016				2015			
(USD millions)	Switzerland	United States	Rest of the world	Total	Switzerland	United States	Rest of the world	Total
Benefit obligation at December 31	**15 436**	**3 783**	**4 395**	**23 614**	**15 453**	**3 783**	**4 166**	**23 402**
Thereof unfunded		*739*	*497*	*1 236*		*736*	*466*	*1 202*
By type of member								
Active	6 426	891	1 460	8 777	6 196	990	1 392	8 578
Deferred pensioners		831	1 515	2 346		909	1 489	2 398
Pensioners	9 010	2 061	1 420	12 491	9 257	1 884	1 285	12 426
Fair value of plan assets at December 31	**13 958**	**2 282**	**2 985**	**19 225**	**14 347**	**2 358**	**2 831**	**19 536**
Funded status	**– 1 478**	**– 1 501**	**– 1 410**	**– 4 389**	**– 1 106**	**– 1 425**	**– 1 335**	**– 3 866**

The following table shows the principal weighted average actuarial assumptions used for calculating defined benefit plans and other post-employment benefits of associates:

	Pension plans			Other post-employment benefit plans		
	2016	2015	2014	**2016**	2015	2014
Weighted average assumptions used to determine benefit obligations at December 31						
Discount rate	1.4%	1.8%	1.8%	4.2%	4.4%	3.8%
Expected rate of pension increase	0.4%	0.4%	0.4%			
Expected rate of salary increase	2.2%	2.9%	3.2%			
Interest on savings account	0.5%	0.8%	0.9%			
Current average life expectancy for a 65-year-old male/female	22/24 years	21/24 years	21/24 years	21/23 years	21/23 years	22/24 years

Changes in the aforementioned actuarial assumptions can result in significant volatility in the accounting for the Group's pension plans in the consolidated financial statements. This can result in substantial changes in the Group's other comprehensive income, long-term liabilities and prepaid pension assets.

The DBO is significantly impacted by assumptions regarding the rate that is used to discount the actuarially determined post-employment benefit liability. This rate is based on yields of high-quality corporate bonds in the country of the plan. Decreasing corporate bond yields decrease the discount rate, so that the DBO increases and the funded status decreases.

In Switzerland, an increase in the DBO due to lower discount rates is slightly offset by lower future benefits expected to be paid on the associate's savings account where the assumption on interest accrued changes in line with the discount rate.

The impact of decreasing interest rates on a plan's assets is more difficult to predict. A significant part of the plan assets is invested in bonds. Bond values usually rise when interest rates decrease and may therefore partially compensate for the decrease in the funded status. Furthermore, pension assets also include significant holdings of equity instruments. Share prices tend to rise when interest rates decrease and therefore often counteract the negative impact of the rising defined benefit obligation on the funded status (although the correlation of interest rates with equities is not as strong as with bonds, especially in the short term).

The expected rate for pension increases significantly affects the DBO of most plans in Switzerland, Germany and the United Kingdom. Such pension increases also decrease the funded status, although there is no strong correlation between the value of the plan assets and pension/inflation increases.

Assumptions regarding life expectancy significantly impact the DBO. An increase in longevity increases the DBO. There is no offsetting impact from the plan assets, as no longevity bonds or swaps are held by the pension funds. Generational mortality tables are used where this data is available.

The following table shows the sensitivity of the defined benefit pension obligation to the principal actuarial assumptions for the major plans in Switzerland, the United States, the United Kingdom, Germany and Japan on an aggregated basis:

(USD millions)	Change in 2016 year-end defined benefit pension obligation
25 basis point increase in discount rate	– 767
25 basis point decrease in discount rate	814
1 year increase in life expectancy	830
25 basis point increase in rate of pension increase	524
25 basis point decrease in rate of pension increase	– 130
25 basis point increase of interest on savings account	65
25 basis point decrease of interest on savings account	– 64
25 basis point increase in rate of salary increase	69
25 basis point decrease in rate of salary increase	– 72

The healthcare cost trend rate assumptions used for other post-employment benefits are as follows:

	2016	2015	2014
Healthcare cost trend rate assumed for next year	7.0%	7.5%	7.0%
Rate to which the cost trend rate is assumed to decline	5.0%	5.0%	5.0%
Year that the rate reaches the ultimate trend rate	2022	2022	2021

The following table shows the weighted average plan asset allocation of funded defined benefit pension plans at December 31, 2016 and 2015:

	Pension plans		
(as a percentage)	Long-term target	**2016**	2015
Equity securities	15–40	31	34
Debt securities	20–60	35	35
Real estate	5–20	15	14
Alternative investments	0–20	15	14
Cash and other investments	0–15	4	3
Total		**100**	**100**

Cash and most of the equity and debt securities have a quoted market price in an active market. Real estate and alternative investments, which include hedge fund and private equity investments, usually do not have a quoted market price.

The strategic allocation of assets of the different pension plans is determined with the objective of achieving an investment return that, together with the contributions paid by the Group and its associates, is sufficient to maintain reasonable control over the various funding risks of the plans. Based upon the market and economic environments, actual asset allocations may temporarily be permitted to deviate from policy targets. The asset allocation currently includes investments in shares of Novartis AG, which, at December 31, 2016 totaled 11 million shares with a market value of USD 0.8 billion (2015: 11 million shares with a market value of USD 1.0 billion). The weighted average duration of the defined benefit obligation is 14.5 years (2015: 14.1 years).

The Group's ordinary contribution to the various pension plans is based on the rules of each plan. Additional contributions are made whenever this is required by statute or law (i.e., usually when statutory funding levels fall below pre-determined thresholds). The only significant plans that are foreseen to require additional funding are those in the United Kingdom.

The expected future cash flows in respect of pension and other post-employment benefit plans at December 31, 2016, were as follows:

(USD millions)	Pension plans	Other post-employment benefit plans
Novartis Group contributions		
2017 (estimated)	434	62
Expected future benefit payments		
2017	1 262	63
2018	1 209	65
2019	1 208	67
2020	1 208	69
2021	1 198	70
2022–2026	5 882	361

Defined contribution plans

In many subsidiaries associates are covered by defined contribution plans. Contributions charged to the 2016 consolidated income statement for the defined contribution plans were USD 338 million (2015: USD 359 million; 2014: USD 348 million). The 2015 and 2014 amount excludes USD 1 million and USD 14 million, respectively, related to discontinued operations.

26. Equity-based participation plans for associates

The expense related to all equity-based participation plans in the 2016 consolidated income statement was USD 846 million (2015: USD 968 million; 2014: USD 1.1 billion), resulting in total liabilities arising from equity-based payment transactions of USD 199 million (2015: USD 209 million; 2014: USD 277 million, of which USD 248 million was recognized in continuing operations). In 2015 and 2014, out of the total expense an amount of USD 903 million and USD 1.0 billion was recognized in continuing operations and USD 65 million and USD 124 million was recognized in discontinued operations.

Equity-based participation plans can be separated into the following plans:

Annual Incentive

The Annual Incentive of the Novartis Group CEO and the other Executive Committee members is paid 50% in cash in February or March of the year following the performance period, and 50% in Novartis restricted shares or Restricted Share Units (RSUs) that are granted in January of the year following the performance period, deferred and restricted for three years. In 2016, this Annual Incentive was extended to Novartis Top Leaders (NTLs). The payout will be 70% in cash and 30% in Novartis restricted shares or RSUs. Each restricted share is entitled to voting rights and payment of dividends

during the vesting period. Each RSU is equivalent to one Novartis share and is converted into one share at the vesting date. RSUs do not carry any dividend, dividend equivalent or voting rights. The executives may elect to also receive their cash incentive partially or fully in shares or share units that will not be subject to vesting conditions. In 2016, 396 executives participate in the plan.

Share savings plans

A number of associates in certain countries as well as certain key executives worldwide are encouraged to invest their Annual Incentive, and in the United Kingdom also their salary, in a share savings plan. Under the share savings plan, participants may elect to receive their Annual Incentive fully or partially in Novartis shares in lieu of cash. As a reward for their participation in the share savings plan, at no additional cost to the participant, Novartis matches their investments in shares after a holding period of three or five years.

Novartis currently has three share savings plans:

— Worldwide, 35 key executives were invited to participate in the Leveraged Share Savings Plan (LSSP) based on their performance in 2015. At the participant's election, the Annual Incentive is awarded partly or entirely in shares. The elected number of shares was delivered in 2016 and is subject to a holding period of five years. At the end of the holding period, Novartis will match the invested shares at a ratio of 1-to-1 (i.e. one share awarded for each invested share). In the US both the LSSP award and the corresponding match are cash settled.

— In Switzerland, the Employee Share Ownership Plan (ESOP) was available to 12 253 associates in 2015. ESOP participants may choose to receive their Annual Incentive (i) 100% in shares, (ii) 50% in shares and 50% in cash or (iii) 100% in cash. After expiration of a three-year holding period for Novartis shares invested under the ESOP, each participant will receive one matching share for every two Novartis shares invested. A total of 6 173 associates chose to receive shares under the ESOP for their performance in 2015 and the invested shares were delivered in 2016.

— In the United Kingdom, 1 540 associates can invest up to 5% of their monthly salary in shares (up to a maximum of GBP 125) and also may be invited to invest all or part of their net Annual Incentive in shares. Two invested shares are matched with one share with a holding period of three years. During 2016, 1 227 participants elected to participate in this plan.

Following the introduction of the new compensation programs in 2014, the Novartis Group CEO and the other Executive Committee members are no longer eligible to participate in the share savings plans. From the 2016 performance period onwards, the NTLs are also no longer eligible to participate in these share savings plans.

Associates may only participate in one of these plans in any given year.

Novartis Equity Plan "Select"

The Equity Plan "Select" is a global equity incentive plan under which eligible associates, including Executive Committee members up to performance year 2013 and NTLs up to performance year 2015, may annually be awarded a grant subject to a three year vesting period. No awards are granted for performance ratings below a certain threshold.

The Equity Plan "Select" currently allows its participants in Switzerland to choose the form of their equity compensation in restricted shares or restricted share units (RSUs). In all other jurisdictions, RSUs are typically granted. Until 2013, participants could also choose to receive part or the entire grant in the form of tradable share options.

Tradable share options expire on their 10th anniversary from the grant date. Each tradable share option entitles the holder to purchase after vesting (and before the 10th anniversary from the grant date) one Novartis share at a stated exercise price that equals the closing market price of the underlying share at the grant date.

Options under Novartis Equity Plan "Select" outside North America

The following table shows the activity associated with the share options during the period. The weighted average prices in the table below are translated from Swiss Francs into USD at historical rates.

	2016		2015	
	Options (millions)	Weighted average exercise price (USD)	Options (millions)	Weighted average exercise price (USD)
Options outstanding at January 1	**11.7**	**59.9**	**16.1**	**59.2**
Sold or exercised	– 2.2	61.8	– 4.1	56.7
Forfeited or expired			– 0.3	66.0
Outstanding at December 31	**9.5**	**59.4**	**11.7**	**59.9**
Exercisable at December 31	**9.5**	**59.4**	**7.4**	**56.4**

All share options were granted at an exercise price which was equal to the closing market price of the Group's shares at the grant date. The weighted average share price at the dates of sale was USD 75.2.

The following table summarizes information about share options outstanding at December 31, 2016:

	Options outstanding		
Range of exercise prices (USD)	Number outstanding (millions)	Average remaining contractual life (years)	Weighted average exercise price (USD)
45–49	0.7	2.0	46.7
50–54	1.2	3.0	54.4
55–59	4.2	3.2	57.7
65–70	3.4	6.0	66.0
Total	**9.5**	**4.1**	**59.4**

Options under Novartis equity plan "Select" for North America

The following table shows the activity associated with the American Depositary Receipts (ADR) options during the period:

	2016		2015	
	ADR options (millions)	Weighted average exercise price (USD)	ADR options (millions)	Weighted average exercise price (USD)
Options outstanding at January 1	**31.9**	**60.2**	**44.4**	**59.6**
Sold or exercised	– 6.0	61.7	– 11.8	57.8
Forfeited or expired			– 0.7	63.3
Outstanding at December 31	**25.9**	**59.9**	**31.9**	**60.2**
Exercisable at December 31	**25.9**	**59.9**	**19.2**	**56.3**

All ADR options were granted at an exercise price which was equal to the closing market price of the ADRs at the grant date. The weighted average ADR price at the dates of sale or exercise was USD 77.7.

The following table summarizes information about ADR options outstanding at December 31, 2016:

	ADR options outstanding		
Range of exercise prices (USD)	Number outstanding (millions)	Average remaining contractual life (years)	Weighted average exercise price (USD)
45–49	2.1	2.0	46.4
50–54	2.5	3.0	53.7
55–59	11.0	4.0	58.0
65–69	10.3	6.0	66.1
Total	**25.9**	**4.5**	**59.9**

Long-Term Performance Plans

In 2014, a new Long-Term Performance Plan (LTPP) was introduced for the Novartis Group CEO and other key executives designed to not only drive long-term shareholder value, but also innovation. From 2015 onwards, this LTPP was extended to all NTLs.

The rewards of the LTPP are based on three-year performance objectives focused on financial and innovation measures. The financial measure is Novartis Cash Value Added (NCVA). The weighting of this measure is 75%. The NCVA target is approved by the Board of Directors.

The innovation measure is based on an holistic approach under which divisional innovation targets are set at the beginning of the cycle, comprised of up to ten target milestones that represent the most important research and development project milestones for each division. At the end of the performance period, the Research & Development Committee assists the Board of Directors and the Compensation Committee in evaluating performance against the innovation targets at the end of the cycle. The weighting of this measure is 25%.

Until 2014 (2013 for the Novartis Group CEO and other key executives), the OLTPP was available. The rewards are based on rolling three year performance objectives focused on the Novartis Economic Value Added (NVA). The NVA is calculated based on Group operating income and income from associated companies adjusted for interest, taxes and cost of capital charge. The performance realization of a plan cycle is obtained right after the end of the third plan year by adding together the annual NVA realizations of all plan years of the plan cycle. The performance ratio for a plan cycle is obtained by dividing the performance realization for the plan cycle with the performance target for the plan cycle, expressing the result as a percentage. The OLTPP only allows a payout if the actual NVA exceeds predetermined target thresholds. The payout is capped at 200% of target.

Under the LTPP and OLTPP, participants are granted a target number of Performance Share Units (PSUs) at the beginning of every performance period, which are converted into Novartis shares after the performance period. PSUs granted under the LTPP do not carry voting rights, but do carry dividend equivalents that are reinvested in additional PSUs and paid at vesting to the extent that performance conditions have been met. PSUs granted under the OLTPP do not carry any dividend, dividend equivalent or voting rights.

At the end of the three-year performance period, the Compensation Committee adjusts the target number of PSUs earned based on actual performance. PSUs are converted into unrestricted Novartis shares without an additional vesting period.

In 2016, 375 key executives received PSU grants under LTPP. No PSUs were granted in 2016 and 2015 under the OLTPP.

Long-Term Relative Performance Plan

The Long-Term Relative Performance Plan (LTRPP) was introduced in 2014, and is an equity plan for the Novartis Group CEO and other key executives. From 2016 onwards, NTLs are also participating in this plan. For the 2016 grant the target incentive is 125% of base compensation for the Novartis Group CEO and ranges from 30% to 80% for other Executive Committee members. It is capped at 200% of target. LTRPP is based on the achievement of long-term Group Total Shareholder Return (TSR) versus our peer group of 12 companies in the healthcare industry over rolling three-year performance periods. TSR is calculated in USD as share price growth plus dividends over the three-year performance period. The calculation will be based on Bloomberg standard published TSR data, which is publicly available. The position in the peer group determines the payout range.

In 2016, 366 executives received PSU grants under the LTRPP.

Other share awards

Selected associates, excluding the Executive Committee members, may exceptionally receive Special Share Awards of restricted shares or RSUs. These Special Share Awards provide an opportunity to reward outstanding achievements or exceptional performance and aim at retaining key contributors. They are based on a formal internal selection process, in which the individual performance of each candidate is thoroughly assessed at several management levels. Special Share Awards generally have a five-year vesting period. In exceptional circumstances, Special Share Awards may be rewarded to attract special expertise and new talents into the organization. These grants are consistent with market practice and Novartis' philosophy to attract, retain and motivate best-in-class talents around the world.

Worldwide, 532 associates at different levels in the organization were awarded restricted shares and RSUs in 2016.

In addition, in 2016, Board members received unrestricted shares as part of their regular compensation.

Summary of non-vested share movements

The table below provides a summary of non-vested share movements (restricted shares, RSUs and PSUs) for all plans:

	2016			2015		
	Number of shares in millions	Weighted average fair value at grante date in USD	Fair value at grante date in USD millions	Number of shares in millions	Weighted average fair value at grante date in USD	Fair value at grante date in USD millions
Non-vested shares at January 1	**20.1**	**87.1**	**1 751**	**24.2**	**70.4**	**1 703**
Granted						
– Annual incentive	0.1	73.8	7	0.1	96.6	10
– Share savings plans	4.4	78.1	344	5.0	89.6	448
– Select North America	4.8	72.4	348	3.9	98.8	385
– Select outside North America	1.6	74.4	119	1.7	96.7	165
– Long-Term Performance Plan	1.2	79.2	95	0.7	81.0	57
– Long-Term Relative Performance Plan	0.3	58.5	18	0.1	55.8	6
– Other share awards	0.7	65.8	46	0.9	95.1	86
Vested	– 10.4	68.8	– 716	– 14.4	67.3	– 969
Forfeited	– 1.8	73.1	– 132	– 2.1	66.7	– 140
Non-vested shares at December 31	**21.0**	**89.5**	**1 880**	**20.1**	**87.1**	**1 751**

Alcon, Inc., equity plans granted to associates prior to the merger

At the completion of the merger of Alcon, Inc., into Novartis on April 8, 2011, all awards outstanding under the Alcon equity plans were converted into awards based upon Novartis shares with a conversion factor of 3.0727 as defined in the Merger Agreement. The plans are fully vested.

Share options entitle the recipient to purchase Novartis shares at the closing market price of the former Alcon, Inc., share on the day of grant divided by the conversion factor.

Share-settled appreciation rights (SSAR) entitle the participant to receive, in the form of Novartis shares, the difference between the values of the former Alcon, Inc., share at the date of grant, converted into Novartis shares using the conversion factor, and the Novartis share price at the date of exercise.

The following table shows the activity associated with the converted Novartis share options and SSARs during 2016 and 2015:

	Number of options (millions)	Weighted average exercise price (USD)	Number of SSARs (millions)	Weighted average exercise price (USD)
Outstanding at January 1, 2015	**0.7**	**30.1**	**2.4**	**35.6**
Exercised	– 0.5	27.4	– 0.6	32.5
Outstanding at December 31, 2015	**0.2**	**36.8**	**1.8**	**36.6**
Exercisable at December 31, 2015	**0.2**	**36.8**	**1.8**	**36.6**
Outstanding at January 1, 2016	**0.2**	**36.8**	**1.8**	**36.6**
Exercised	– 0.1	37.6	– 0.4	38.9
Outstanding at December 31, 2016	**0.1**	**36.0**	**1.4**	**35.9**
Exercisable at December 31, 2016	**0.1**	**36.0**	**1.4**	**35.9**

27. Transactions with related parties

Genentech/Roche

Novartis has two agreements with Genentech, Inc., USA, a subsidiary of Roche Holding AG which is indirectly included in the consolidated financial statements using equity accounting since Novartis holds 33.3% of the outstanding voting shares of Roche.

LUCENTIS

Novartis has licensed the exclusive rights to develop and market *Lucentis* outside the United States for indications related to diseases of the eye. As part of this agreement, Novartis paid Genentech/Roche an initial milestone and shared the cost for the subsequent development by making additional milestone payments upon the achievement of certain clinical development points and product approval. Novartis also pays royalties on the net sales of *Lucentis* products outside the United States. In 2016, *Lucentis* sales of USD 1.8 billion (2015: USD 2.1 billion, 2014: USD 2.4 billion) have been recognized by Novartis.

XOLAIR

In February 2004, Novartis Pharma AG, Genentech, Inc., and Tanox, Inc., finalized a three-party collaboration to govern the development and commercialization of certain anti-IgE antibodies including *Xolair* and TNX-901. Under this agreement, all three parties co-developed *Xolair*. On August 2, 2007, Genentech, Inc. completed the acquisition of Tanox, Inc. and has taken over its rights and obligations. Novartis and Genentech/Roche are co-promoting *Xolair* in the United States where Genentech/Roche records all sales. Novartis records sales outside of the United States.

Novartis markets *Xolair* and records all sales and related costs outside the United States as well as co-promotion costs in the United States. Genentech/Roche and Novartis share the resulting profits from sales in the United States, Europe and other countries, according to agreed profit-sharing percentages. In 2016, Novartis recognized total sales of *Xolair* of USD 835 million (2015: USD 755 million, 2014: USD 777 million) including sales to them for the United States market.

The net expense for royalties, cost sharing and profit sharing arising out of the *Lucentis* and *Xolair* agreements with Genentech/Roche totaled USD 217 million in 2016 (2015: USD 309 million, 2014: USD 536 million).

Furthermore, Novartis has several patent license, supply and distribution agreements with Roche.

Executive Officers and Non-Executive Directors Compensation

During 2016, there were 14 Executive Committee members ("Executive Officers"), including those who stepped down during the year (11 members in 2015 and 14 members in 2014 also including those who stepped down).

The total compensation for members of the Executive Committee and the 13 Non-Executive Directors (12 in 2015, 14 in 2014) using the Group's accounting policies for equity-based compensation and pension benefits was as follows:

	Executive Officers			Non-Executive Directors			Total		
(USD millions)	**2016**	2015	2014	**2016**	2015	2014	**2016**	2015	2014
Benefits other than equity-based compensation	20.8	17.1	18.3	4.0	4.7	6.2	24.8	21.8	24.5
Post-employment benefits	2.2	1.9	2.1			0.1	2.2	1.9	2.2
Equity-based compensation	46.2	52.9	81.7	4.6	4.4	4.9	50.8	57.3	86.6
Total	**69.2**	**71.9**	**102.1**	**8.6**	**9.1**	**11.2**	**77.8**	**81.0**	**113.3**

During 2016, there was a decrease in the IFRS compensation expense for Executive Officers compared to 2015. This was mainly due to lower equity-based compensation expense attributable to lower performance factors, which was partially offset by higher benefits other than equity-based compensation resulting from the increase in the number of Executive Officers.

During 2015, there was a decrease in the IFRS compensation expense for Executive Officers compared to 2014 mainly due to the decrease in number of Executive Officers.

The annual incentive award, which is fully included in equity-based compensation even when paid out in cash, is granted in January in the year following the reporting period.

The disclosures required by the Swiss Code of Obligations and in accordance with the Swiss Ordinance against Excessive Compensation in Stock Exchange Listed Companies on Board and Executive compensation are shown in the Compensation Report.

Transactions with former members of the Board of Directors

During 2016, 2015 and 2014, the following payments (or waivers of claims) were made to former Board members or to "persons closely" linked to them:

Prof. Dr. William R. Brody and Prof. Dr. Rolf M. Zinkernagel, who stepped down from the Board of Directors at the 2014 AGM, received delegated Board membership fees for their work on the Boards of the Novartis Institute for Tropical Diseases (Prof. Dr. Zinkernagel) and the Genomics Institute of the Novartis Research Foundation (Prof. Dr. Brody and Prof. Dr. Zinkernagel). During 2016, an amount of CHF 25 000 (2015: CHF 100 000) and CHF 50 000 (2015: CHF 200 000) was paid to Prof. Dr. Brody and Prof. Dr. Zinkernagel, respectively, for their work on these Boards. No further payments related to these Board memberships will be made, as their respective mandates have ended.

Dr. Alex Krauer, Honorary Chairman, is entitled to an amount of CHF 60 000 for annual periods from one AGM to the next. This amount was fixed in 1998 upon his departure from the Board in 1999, and has not been revised since that date. An amount of CHF 60 000 was paid to Dr. Krauer during 2016 and 2015. Due to a change in the timing of payments, an amount of CHF 45 000 was paid to Dr. Krauer, during 2014.

In 2016, Dr. Daniel Vasella, Honorary Chairman, received the contractual minimum compensation of USD 250 000 (2015: USD 250 000, 2014: USD 363 552) under an agreement which became effective on November 1, 2013 and ended in 2016. Under this agreement, Dr. Vasella is compensated at a rate of USD 25 000 per day, with an annual guaranteed minimum fee of USD 250 000. This amount is in line with compensation practices at other large companies when retired Chairmen or CEOs were retained in consulting agreements after leaving the board of directors.

In 2014, Dr. Vasella acquired an asset from a consolidated entity at fair value and exercised an option to acquire, at a future date, real estate in Risch, Zug, Switzerland. The real estate transaction closed in 2015 and Dr. Vasella acquired the Group assets from a consolidated entity for an arm's length transaction price determined on the basis of two independent external assessments.

Transactions with an Executive Officer prior to start of employment

As announced on September 24, 2015, Dr. James E. Bradner succeeded Dr. Mark Fishman as President of the Novartis Institutes for BioMedical Research (NIBR) and member of the ECN with effect from March 1, 2016. In 2015, a subsidiary acquired Dr. Bradner's 10 million shares (7% interest) in a non-material entity for USD 10 million. The arm's length transaction price was determined based on the most recent round of financing of this entity.

The above disclosures related to Dr. Vasella and Dr. Bradner are made on a voluntary basis.

28. Commitments and contingencies

Leasing commitments

The Group has entered into various fixed term operational leases, mainly for cars and real estate. As of December 31, 2016 the Group's commitments with respect to these leases, including estimated payment dates, were as follows:

(USD millions)	2016
2017	262
2018	192
2019	132
2020	104
2021	82
Thereafter	2 125
Total	**2 897**
Expense of current year	**335**

Research & Development commitments

The Group has entered into long-term research agreements with various institutions which provide for potential milestone payments by Novartis that may be capitalized. As of December 31, 2016 the Group's commitments to make payments under those agreements, and their estimated timing, were as follows:

(USD millions)	2016
2017	385
2018	465
2019	389
2020	771
2021	1 512
Thereafter	653
Total	**4 175**

Other commitments

The Novartis Group entered into various purchase commitments for services and materials as well as for equipment in the ordinary course of business. These commitments are generally entered into at current market prices and reflect normal business operations.

Contingencies

Group companies have to observe the laws, government orders and regulations of the country in which they operate.

A number of Novartis companies are, and will likely continue to be, subject to various legal proceedings and investigations that arise from time to time, including proceedings regarding product liability, sales and marketing practices, commercial disputes, employment, and wrongful discharge, antitrust, securities, health and safety, environmental, tax, international trade, privacy, and intellectual property matters. As a result, the Group may become subject to substantial liabilities that may not be covered by insurance and could affect our business, financial position and reputation. While Novartis does not believe that any of these legal proceedings will have a material adverse effect on its financial position, litigation is inherently unpredictable and large judgments sometimes occur. As a consequence, Novartis may in the future incur judgments or enter into settlements of claims that could have a material adverse effect on its results of operations or cash flow.

Governments and regulatory authorities around the world have been stepping up their compliance and law enforcement activities in recent years in key areas, including marketing practices, pricing, corruption, trade restrictions, embargo legislation, insider trading, antitrust, cyber security and data privacy. Further, when one government or regulatory authority undertakes an investigation, it is not uncommon for other governments or regulators to undertake investigations regarding the same or similar matters. Responding to such investigations is costly and requires an increasing amount of management's time and attention. In addition, such investigations may affect our reputation, create a risk of potential exclusion from government reimbursement programs in the US and other countries, and may lead to (or arise from) litigation. These factors have contributed to decisions by Novartis and other companies in the healthcare industry, when deemed in their interest, to enter into settlement agreements with governmental authorities around the world prior to any formal decision by the authorities or a court. Those government settlements have involved and may continue to involve, in current government investigations and proceedings, large cash payments, sometimes in the hundreds of millions of dollars or more, including the potential repayment of amounts allegedly obtained improperly and other penalties, including treble damages. In addition, settlements of government healthcare fraud cases often require companies to enter into corporate integrity agreements, which are intended to regulate company behavior for a period of years. Our affiliate Novartis Pharmaceuticals Corporation is a party to such an agreement, which will expire in 2020. Also, matters underlying governmental investigations and settlements may be the subject of separate private litigation.

While provisions have been made for probable losses, which management deems to be reasonable or appropriate, there are uncertainties connected with these estimates.

Note 20 contains additional information on these matters.

A number of Group companies are involved in legal proceedings concerning intellectual property rights. The inherent unpredictability of such proceedings means that there can be no assurances as to their ultimate outcome. A negative result in any such proceeding could potentially adversely affect the ability of certain Novartis companies to sell their products or require the payment of substantial damages or royalties.

In the opinion of management, however, the outcome of these actions will not materially affect the Group's financial position but could be material to the results of operations or cash flow in a given period.

The Group's potential environmental remediation liability is assessed based on a risk assessment and investigation of the various sites identified by the Group as at risk for environmental remediation exposure. The Group's future remediation expenses are affected by a number of uncertainties. These uncertainties include, but are not limited to, the method and extent of remediation, the percentage of material attributable to the Group at the remediation sites relative to that attributable to other parties, and the financial capabilities of the other potentially responsible parties.

Note 20 contains additional information on environmental liabilities.

29. Financial instruments – additional disclosures

(USD millions)	Note	**2016**[1]	2015[1]
Cash and cash equivalents	16	**7 007**	**4 674**
Financial assets – measured at fair value through other comprehensive income			
Available-for-sale marketable securities			
Debt securities	16	306	339
Equity securities	16		6
Fund investments	16	31	33
Total available-for-sale marketable securities		**337**	**378**
Available-for-sale long-term financial investments			
Equity securities	13	989	1 173
Fund investments	13	107	90
Contingent consideration receivables	13	586	550
Total available-for-sale long-term financial investments		**1 682**	**1 813**
Total financial assets – measured at fair value through other comprehensive income		**2 019**	**2 191**
Financial assets – measured at amortized costs			
Trade receivables and other current assets (excluding pre-payments)	15/17	10 202	10 551
Accrued interest on debt securities and time deposits	16	1	2
Time deposits with original maturity more than 90 days	16	108	164
Long-term loans and receivables from customers and finance lease, advances, security deposits	13	514	653
Total financial assets – measured at amortized costs		**10 825**	**11 370**
Financial assets – measured at fair value through the consolidated income statement			
Associated companies at fair value through profit and loss		188	181
Derivative financial instruments	16	230	143
Total financial assets – measured at fair value through the consolidated income statement		**418**	**324**
Total financial assets		**20 269**	**18 559**
Financial liabilities – measured at amortized costs			
Current financial debt			
Interest-bearing accounts of associates payable on demand	21	1 601	1 645
Bank and other financial debt	21	836	1 185
Commercial paper	21	3 174	1 085
Current portion of non-current debt	21	178	1 659
Total current financial debt		**5 789**	**5 574**
Non-current financial debt			
Straight bonds	19	17 285	17 193
Liabilities to banks and other financial institutions	19	708	706
Finance lease obligations	19	82	87
Current portion of non-current debt	19	– 178	– 1 659
Total non-current financial debt		**17 897**	**16 327**
Trade payables		**4 873**	**5 668**
Total financial liabilities – measured at amortized costs		**28 559**	**27 569**
Financial liabilities – measured at fair value through the consolidated income statement			
Contingent consideration (see Note 20/22) and other financial liabilities		1 018	1 105
Derivative financial instruments	21	116	30
Total financial liabilities – measured at fair value through the consolidated income statement		**1 134**	**1 135**
Total financial liabilities		**29 693**	**28 704**

[1] Except for straight bonds (see Note 19), the carrying amount is a reasonable approximation of fair value.

Derivative financial instruments

The following tables show the contract or underlying principal amounts and fair values of derivative financial instruments analyzed by type of contract at December 31, 2016 and 2015. Contract or underlying principal amounts indicate the gross volume of business outstanding at the consolidated balance sheet date and do not represent amounts at risk. The fair values are determined by reference to market prices or standard pricing models that use observable market inputs at December 31, 2016 and 2015.

	Contract or underlying principal amount		Positive fair values		Negative fair values	
(USD millions)	**2016**	2015	**2016**	2015	**2016**	2015
Currency-related instruments						
Forward foreign exchange rate contracts	8 220	8 795	230	142	– 116	– 30
Over-the-Counter currency options		459		1		
Total of currency-related instruments	**8 220**	**9 254**	**230**	**143**	**– 116**	**– 30**
Total derivative financial instruments included in marketable securities and in current financial debts	**8 220**	**9 254**	**230**	**143**	**– 116**	**– 30**

The following table shows by currency contract or underlying principal amount the derivative financial instruments at December 31, 2016 and 2015:

	2016				
(USD millions)	EUR	USD	JPY	Other	Total
Currency-related instruments					
Forward foreign exchange rate contracts	3 623	3 427	43	1 127	8 220
Total derivative financial instruments	**3 623**	**3 427**	**43**	**1 127**	**8 220**

	2015				
(USD millions)	EUR	USD	JPY	Other	Total
Currency-related instruments					
Forward foreign exchange rate contracts	2 828	4 713	42	1 212	8 795
Over-the-Counter currency options	459				459
Total of currency-related instruments	**3 287**	**4 713**	**42**	**1 212**	**9 254**
Total derivative financial instruments	**3 287**	**4 713**	**42**	**1 212**	**9 254**

Derivative financial instruments effective for hedge accounting purposes

At the end of 2016 and 2015, there were no open hedging instruments for anticipated transactions.

Fair value by hierarchy

As required by IFRS, financial assets and liabilities recorded at fair value in the consolidated financial statements are categorized based upon the level of judgment associated with the inputs used to measure their fair value. There are three hierarchical levels, based on an increasing amount of subjectivity associated with the inputs to derive fair valuation for these assets and liabilities, which are as follows:

The assets carried at Level 1 fair value are equity and debt securities listed in active markets.

The assets generally included in Level 2 fair value hierarchy are foreign exchange and interest rate derivatives and certain debt securities. Foreign exchange and interest rate derivatives are valued using corroborated market data. The liabilities generally included in this fair value hierarchy consist of foreign exchange and interest rate derivatives.

Level 3 inputs are unobservable for the asset or liability. The assets generally included in Level 3 fair value hierarchy are various investments in hedge funds and unquoted equity security investments. Contingent consideration carried at fair value is included in this category.

	2016				
(USD millions)	Level 1	Level 2	Level 3	Valued at amortized cost	Total
Financial assets					
Debt securities	284	22			306
Fund investments	31				31
Total available-for-sale marketable securities	**315**	**22**			**337**
Time deposits with original maturity more than 90 days				108	108
Derivative financial instruments		230			230
Accrued interest on debt securities				1	1
Total marketable securities, time deposits and derivative financial instruments	**315**	**252**		**109**	**676**
Available-for-sale financial investments	513		476		989
Fund investments			107		107
Contingent consideration receivables			586		586
Long-term loans and receivables from customers and finance lease, advances, security deposits				514	514
Financial investments and long-term loans	**513**		**1 169**	**514**	**2 196**
Associated companies at fair value through profit and loss			**188**		**188**
Financial liabilities					
Contingent consideration payables			– 889		– 889
Other financial liabilities			– 129		– 129
Derivative financial instruments		– 116			– 116
Total financial liabilities at fair value		**– 116**	**– 1 018**		**– 1 134**

	2015				
(USD millions)	Level 1	Level 2	Level 3	Valued at amortized cost	Total
Financial assets					
Debt securities	316	23			339
Equity securities	6				6
Fund investments	29		4		33
Total available-for-sale marketable securities	**351**	**23**	**4**		**378**
Time deposits with original maturity more than 90 days				164	164
Derivative financial instruments		143			143
Accrued interest on debt securities				2	2
Total marketable securities, time deposits and derivative financial instruments	**351**	**166**	**4**	**166**	**687**
Available-for-sale financial investments	700		473		1 173
Fund investments			90		90
Contingent consideration receivables			550		550
Long-term loans and receivables from customers and finance lease, advances, security deposits				653	653
Financial investments and long-term loans	**700**		**1 113**	**653**	**2 466**
Associated companies at fair value through profit and loss			**181**		**181**
Financial liabilities					
Contingent consideration payables			– 790		– 790
Other financial liabilities			– 315		– 315
Derivative financial instruments		– 30			– 30
Total financial liabilities at fair value		**– 30**	**– 1 105**		**– 1 135**

The analysis above includes all financial instruments including those measured at amortized cost or at cost.

The change in carrying values associated with Level 3 financial instruments using significant unobservable inputs during the year ended December 31 are set forth below:

	2016					
(USD millions)	Associated companies at fair value through profit and loss	Fund investments	Available-for-sale financial investments	Contingent consideration receivables	Contingent consideration payables	Other financial liabilities
January 1	**181**	**94**	**473**	**550**	**– 790**	**– 315**
Fair value gains and other adjustments, including from divestments recognized in the consolidated income statement	26		1	51		3
Fair value losses (including impairments and amortizations) and other adjustments recognized in the consolidated income statement	– 28	– 1	– 24		– 156	
Fair value adjustments recognized in the consolidated statement of comprehensive income		14	– 8			
Purchases	41	5	122		– 172	
Cash receipts and payments				– 15	229	183
Disposals	– 3	– 5	– 18			
Reclassification	– 29		– 70			
December 31	**188**	**107**	**476**	**586**	**– 889**	**– 129**
Total of fair value gains and losses recognized in the consolidated income statement for assets and liabilities held at December 31, 2016	– 2	– 1	– 23	51	– 156	3

	2015					
(USD millions)	Associated companies at fair value through profit and loss	Fund investments	Available-for-sale financial investments	Contingent consideration receivables	Contingent consideration payables	Other financial liabilities
January 1	**168**	**77**	**332**		**– 756**	
Impact of business combinations				75		
Fair value gains and other adjustments, including from divestments recognized in the consolidated income statement	9	7	41	1 000		
Fair value losses (including impairments and amortizations) and other adjustments recognized in the consolidated income statement	– 25	– 1	– 35	– 75	– 57	– 587
Fair value adjustments recognized in the consolidated statement of comprehensive income		17	22			
Purchases	62	24	142		– 255	
Cash receipts and payments				– 450	278	272
Disposals		– 15	– 56			
At equity investments reclassified due to loss of significant influence			18			
Reclassification	– 33	– 15	9			
December 31	**181**	**94**	**473**	**550**	**– 790**	**– 315**
Total of fair value gains and losses recognized in the consolidated income statement for assets and liabilities held at December 31, 2015	– 16	6	6	925	– 57	– 587

During 2016, there were several individually non-significant transfers of available-for-sale financial investments from level 3 to level 1 for USD 75 million mainly due to Initial Public Offerings of the invested companies. No significant transfers from one level to the other occurred during the 2015 reporting period.

Realized gains and losses associated with Level 3 available-for-sale marketable securities are recorded in the consolidated income statement under "Other financial income and expense" and realized gains and losses associated with Level 3 available-for-sale financial investments are recorded in the consolidated income statement under "Other income" or "Other expense", respectively.

If the pricing parameters for the Level 3 input were to change for associated companies at fair value through profit and loss, equity securities, fund investments and for available-for-sale financial investments by 10% positively or negatively, this would change the amounts recorded in the consolidated statement of comprehensive income by USD 77 million.

For the determination of the fair value of a contingent consideration various unobservable inputs are used. A change in these inputs might result in a significantly higher or lower fair value measurement. The significance and usage of these inputs may vary among the existing contingent considerations due to differences in the triggering events for payments or in the nature of the asset the contingent consideration relates to. Among others, the inputs used are the probability of success, sales forecast and assumptions regarding the discount rate, timing and different scenarios of triggering events. The inputs are interrelated. If the most significant parameters for the Level 3 input were to change by 10% positively or negatively, or where the probability of success (POS) is the most significant input parameter 10% were added or deducted from the applied probability of success, for contingent consideration payables, other financial liabilities and contingent consideration receivables, this would change the amounts recorded in the consolidated income statement by USD 207 million and USD 182 million, respectively.

Nature and extent of risks arising from financial instruments

Market risk

Novartis is exposed to market risk, primarily related to foreign currency exchange rates, interest rates and the market value of the investments of liquid funds. The Group actively monitors and seeks to reduce, where it deems it appropriate to do so, fluctuations in these exposures. It is the Group's policy and practice to enter into a variety of derivative financial instruments to manage the volatility of these exposures and to enhance the yield on the investment of liquid funds. It does not enter into any financial transactions containing a risk that cannot be quantified at the time the transaction is concluded. In addition, it does not sell short assets it does not have, or does not know it will have, in the future. The Group only sells existing assets or enters into transactions and future transactions (in the case of anticipatory hedges) that it confidently expects it will have in the future, based on past experience. In the case of liquid funds, the Group writes call options on assets it has, or writes put options on positions it wants to acquire and has the liquidity to acquire. The Group expects that any loss in value for these instruments generally would be offset by increases in the value of the underlying transactions.

Foreign currency exchange rate risk

The Group uses the USD as its reporting currency. As a result, the Group is exposed to foreign currency exchange movements, primarily in European, Japanese and emerging market currencies. Fluctuations in the exchange rates between the US dollar and other currencies can have a significant effect on both the Group's results of operations, including reported sales and earnings, as well as on the reported value of our assets, liabilities and cash flows. This, in turn, may significantly affect the comparability of period-to-period results of operations.

Because our expenditures in Swiss francs are significantly higher than our revenues in Swiss francs, volatility in the value of the Swiss franc can have a significant impact on the reported value of our earnings, assets and liabilities, and the timing and extent of such volatility can be difficult to predict. In addition, there is a risk that certain countries could take other steps which could significantly impact the value of their currencies.

The Group is exposed to a potential adverse devaluation risk on its intercompany funding and total investment in certain subsidiaries operating in countries with exchange controls. The most significant country in this respect is Venezuela, where the Group is exposed to potential devaluation losses in the income statement on its total intercompany balances with its subsidiaries in Venezuela.

The Group's subsidiaries in Venezuela are experiencing a significant reduction in approvals for remittance of US dollars outside the country at the exchange rate available for imports of specific goods and services of national priority, including medicines and medical supplies. As a result, in November 2016, the Group changed the exchange rate applied to translate the financial statements of its Venezuelan subsidiaries from VEF 11 per USD to the floating rate of DICOM (Sistema de Divisa Complementaria) which was VEF 658 per USD as of November 1, 2016. A corresponding USD 0.3 billion revaluation loss on the outstanding intercompany balances was recognized in the fourth quarter of 2016. Due to the reserves against the intercompany balances, the net outstanding intercompany payable balance of Venezuela subsidiaries was reduced to an insignificant amount as per December 31, 2016.

The Group has an equivalent of approximately USD 2 million of cash in Venezuela local currency (VEF), which is subject to loss of purchase power due to high inflation in the country.

The Group manages its currency exposure by engaging in hedging transactions where management deems appropriate. Novartis may enter into various contracts

that reflect the changes in the value of foreign currency exchange rates to preserve the value of assets, commitments and anticipated transactions. Novartis also uses forward contracts and foreign currency option contracts to hedge.

Net investments in subsidiaries in foreign countries are long-term investments. Their fair value changes through movements of foreign currency exchange rates. The Group only hedges the net investments in foreign subsidiaries in exceptional cases.

Commodity price risk

The Group has only a very limited exposure to price risk related to anticipated purchases of certain commodities used as raw materials by the Group's businesses. A change in those prices may alter the gross margin of a specific business, but generally by not more than 10% of the margin and thus below the Group's risk management tolerance levels. Accordingly, the Group does not enter into significant commodity futures, forward and option contracts to manage fluctuations in prices of anticipated purchases.

Interest rate risk

The Group addresses its net exposure to interest rate risk mainly through the ratio of its fixed rate financial debt to variable rate financial debt contained in its total financial debt portfolio. To manage this mix, Novartis may enter into interest rate swap agreements, in which it exchanges periodic payments based on a notional amount and agreed upon fixed and variable interest rates.

Equity risk

The Group may purchase equities as investments of its liquid funds. As a policy, it limits its holdings in an unrelated company to less than 5% of its liquid funds. Potential investments are thoroughly analyzed. Call options are written on equities that the Group owns, and put options are written on equities which the Group wants to buy and for which cash is available.

Credit risk

Credit risks arise from the possibility that customers may not be able to settle their obligations as agreed. To manage this risk, the Group periodically assesses the financial reliability of customers, taking into account their financial position, past experience and other factors. Individual risk limits are set accordingly.

The Group's largest customer accounted for approximately 16% of net sales, and the second and third largest customers accounted for 12% and 6% of net sales, respectively (2015: 14%, 11% and 5%, respectively). No other customer accounted for 5% or more of net sales in either year.

The highest amounts of trade receivables outstanding were for these same three customers. They amounted to 14%, 9% and 6%, respectively, of the Group's trade receivables at December 31, 2016 (2015: 13%, 9% and 6% respectively). There is no other significant concentration of credit risk.

Counterparty risk

Counterparty risk encompasses issuer risk on marketable securities and money market instruments, credit risk on cash, time deposits and derivatives as well as settlement risk for different instruments. Issuer risk is reduced by only buying securities which are at least A-rated. Counterparty credit risk and settlement risk are reduced by a policy of entering into transactions with counterparties (banks or financial institutions) that feature a strong credit rating. Exposure to these risks is closely monitored and kept within predetermined parameters. The limits are regularly assessed and determined based upon credit analysis including financial statement and capital adequacy ratio reviews. In addition, reverse repurchasing agreements are contracted and Novartis has entered into credit support agreements with various banks for derivative transactions.

The Group's cash and cash equivalents are held with major regulated financial institutions, the three largest ones hold approximately 16.5%, 6.9% and 6.7%, respectively (2015: 21.8%, 9.6% and 8.6%, respectively).

The Group does not expect any losses from non-performance by these counterparties and does not have any significant grouping of exposures to financial sector or country risk.

Liquidity risk

Liquidity risk is defined as the risk that the Group could not be able to settle or meet its obligations on time or at a reasonable price. Group Treasury is responsible for liquidity, funding and settlement management. In addition, liquidity and funding risks, and related processes and policies, are overseen by management. Novartis manages its liquidity risk on a consolidated basis according to business needs, tax, capital or regulatory considerations, if applicable, through numerous sources of financing in order to maintain flexibility. Management monitors the Group's net debt or liquidity position through rolling forecasts on the basis of expected cash flows.

Novartis has two US commercial paper programs under which it can issue up to USD 9.0 billion in the aggregate of unsecured commercial paper notes. Novartis also has a Japanese commercial paper program under which it can issue up to JPY 150 billion (approximately USD 1.3 billion) of unsecured commercial paper notes. Commercial paper notes totaling USD 3.2 billion under these three programs were outstanding as per December 31, 2016 (2015: USD 1.1 billion). Novartis further has a committed credit facility of USD 6.0 billion, entered into on September 23, 2015. This credit facility is provided by a syndicate of banks and is intended to be used as a backstop for the US commercial paper programs. It matures in September 2020 and was undrawn as per December 31, 2016 and December 31, 2015.

The following table sets forth how management monitors net debt or liquidity based on details of the remaining contractual maturities of current financial assets and liabilities excluding trade receivables and payables as well as contingent considerations at December 31, 2016 and December 31, 2015:

	2016					
(USD millions)	Due within one month	Due later than one month but less than three months	Due later than three months but less than one year	Due later than one year but less than five years	Due after five years	Total
Current assets						
Marketable securities and time deposits	32	126	110	124	53	445
Commodities					94	94
Derivative financial instruments and accrued interest	38	102	91			231
Cash and cash equivalents	5 907	1 100				7 007
Total current financial assets	**5 977**	**1 328**	**201**	**124**	**147**	**7 777**
Non-current liabilities						
Financial debt				– 5 141	– 12 756	– 17 897
Financial debt – undiscounted				*– 5 155*	*– 12 901*	*– 18 056*
Total non-current financial debt				**– 5 141**	**– 12 756**	**– 17 897**
Current liabilities						
Financial debt	– 5 099	– 250	– 440			– 5 789
Financial debt – undiscounted	*– 5 099*	*– 250*	*– 440*			*– 5 789*
Derivative financial instruments	– 15	– 72	– 29			– 116
Total current financial debt	**– 5 114**	**– 322**	**– 469**			**– 5 905**
Net debt	**863**	**1 006**	**– 268**	**– 5 017**	**– 12 609**	**– 16 025**

	2015					
(USD millions)	Due within one month	Due later than one month but less than three months	Due later than three months but less than one year	Due later than one year but less than five years	Due after five years	Total
Current assets						
Marketable securities and time deposits	22	11	200	247	62	542
Commodities					86	86
Derivative financial instruments and accrued interest	40	67	38			145
Cash and cash equivalents	4 674					4 674
Total current financial assets	**4 736**	**78**	**238**	**247**	**148**	**5 447**
Non-current liabilities						
Financial debt				– 4 664	– 11 663	– 16 327
Financial debt – undiscounted				*– 4 676*	*– 11 797*	*– 16 473*
Total non-current financial debt				**– 4 664**	**– 11 663**	**– 16 327**
Current liabilities						
Financial debt	– 3 258	– 289	– 2 027			– 5 574
Financial debt – undiscounted	*– 3 258*	*– 289*	*– 2 028*			*– 5 575*
Derivative financial instruments	– 8	– 20	– 2			– 30
Total current financial debt	**– 3 266**	**– 309**	**– 2 029**			**– 5 604**
Net debt	**1 470**	**– 231**	**– 1 791**	**– 4 417**	**– 11 515**	**– 16 484**

The consolidated balance sheet amounts of financial liabilities included in the above analysis are not materially different to the contractual amounts due on maturity. The positive and negative fair values on derivative financial instruments represent the net contractual amounts to be exchanged at maturity.

The Group's contractual undiscounted potential cash flows from derivative financial instruments to be settled on a gross basis are as follows:

	2016			
(USD millions)	Due within one month	Due later than one month but less than three months	Due later than three months but less than one year	Total
Derivative financial instruments and accrued interest on derivative financial instruments				
Potential outflows in various currencies – from financial derivative liabilities	– 1 087	– 1 246	– 2 027	– 4 360
Potential inflows in various currencies – from financial derivative assets	1 109	1 287	2 051	4 447

	2015			
(USD millions)	Due within one month	Due later than one month but less than three months	Due later than three months but less than one year	Total
Derivative financial instruments and accrued interest on derivative financial instruments				
Potential outflows in various currencies – from financial derivative liabilities	– 1 418	– 2 800	– 1 602	– 5 820
Potential inflows in various currencies – from financial derivative assets	1 448	2 819	1 601	5 868

Other contractual liabilities which are not part of management's monitoring of the net debt or liquidity consist of the following items:

	2016				
(USD millions)	Due later than one month but less than three months	Due later than three months but less than one year	Due later than one year but less than five years	Due after five years	Total
Contractual interest on non-current liabilities	– 104	– 433	– 1 694	– 4 015	– 6 246
Trade payables	– 4 873				– 4 873

	2015				
(USD millions)	Due later than one month but less than three months	Due later than three months but less than one year	Due later than one year but less than five years	Due after five years	Total
Contractual interest on non-current liabilities	– 104	– 499	– 1 878	– 4 332	– 6 813
Trade payables and commitment for repurchase of own shares (see Note 22)	– 5 668				– 5 668

Capital risk management

Novartis strives to maintain a strong credit rating. In managing its capital, Novartis focuses on maintaining a strong balance sheet. Moody's rated the Group as Aa3 for long-term maturities and as P-1 for short-term maturities and Standard & Poor's had a rating of AA- for long-term and A-1+ for short-term maturities. Fitch had a long-term rating of AA and a short-term rating of F1+.

The debt/equity ratio increased to 0.32:1 at December 31, 2016, compared to 0.28:1 at the beginning of the year.

Value at risk

The Group uses a value at risk (VAR) computation to estimate the potential ten-day loss in the fair value of its financial instruments.

A ten-day period is used because of an assumption that not all positions could be undone in one day given the size of the positions. Apart from contingent consideration, finance lease obligations, and long-term loans and receivables, advances and security deposits the VAR computation includes all financial assets and financial liabilities as set forth above in this Note. Trade payables and receivables are considered only to the extent they comprise a foreign currency exposure. In addition, commodities are included in the computation.

The VAR estimates are made assuming normal market conditions, using a 95% confidence interval. The Group uses a "Delta Normal" model to determine the observed inter-relationships between movements in interest rates, stock markets and various currencies. These inter-relationships are determined by observing interest rate, stock market movements and forward foreign currency rate movements over a sixty-day period for the calculation of VAR amounts.

The estimated potential ten-day loss in pre-tax income from the Group's foreign currency instruments, the estimated potential ten-day loss of its equity holdings, and the estimated potential ten-day loss in fair value of its interest rate sensitive instruments (primarily financial debt and investments of liquid funds under normal market conditions) as calculated in the VAR model are the following:

(USD millions)	**2016**	2015
All financial instruments	541	387
Analyzed by components:		
Instruments sensitive to foreign currency exchange rates	222	224
Instruments sensitive to equity market movements	26	50
Instruments sensitive to interest rates	328	353

The average, high, and low VAR amounts are as follows:

	2016		
(USD millions)	Average	High	Low
All financial instruments	402	541	316
Analyzed by components:			
Instruments sensitive to foreign currency exchange rates	203	245	147
Instruments sensitive to equity market movements	50	99	26
Instruments sensitive to interest rates	308	407	234

	2015		
(USD millions)	Average	High	Low
All financial instruments	337	387	237
Analyzed by components:			
Instruments sensitive to foreign currency exchange rates	313	418	173
Instruments sensitive to equity market movements	55	111	33
Instruments sensitive to interest rates	294	380	251

The VAR computation is a risk analysis tool designed to statistically estimate the maximum potential ten day loss from adverse movements in foreign currency exchange rates, equity prices and interest rates under normal market conditions. The computation does not purport to represent actual losses in fair value on earnings to be incurred by the Group, nor does it consider the effect of favorable changes in market rates. The Group cannot predict actual future movements in such market rates and it does not claim that these VAR results are indicative of future movements in such market rates or are representative of any actual impact that future changes in market rates may have on the Group's future results of operations or financial position.

In addition to these VAR analyses, the Group uses stress testing techniques that aim to reflect a worst case scenario on the marketable securities which are monitored by Group Treasury. For these calculations, the Group uses the six-month period with the worst performance observed over the past twenty years in each category. For 2016 and 2015, the worst case loss scenario was calculated as follows:

(USD millions)	**2016**	2015
All financial instruments	6	12
Analyzed by components:		
Instruments sensitive to foreign currency exchange rates		1
Instruments sensitive to equity market movements		4
Instruments sensitive to interest rates	6	7

In the Group's risk analysis, Novartis considered this worst case scenario acceptable as it could reduce income, but would not endanger the solvency or investment grade credit standing of the Group.

30. Discontinued operations

Discontinued operations consolidated income statement segmentation

	Vaccines		Consumer Health[1]		Corporate (including eliminations)		Total discontinued operations	
(USD millions)	2015	2014	2015	2014	2015	2014	2015	2014
Net sales to third parties of discontinued operations	**145**	**1 537**	**456**	**4 279**			**601**	**5 816**
Sales to continuing segments	18	65	1	13			19	78
Net sales of discontinued operations	**163**	**1 602**	**457**	**4 292**			**620**	**5 894**
Other revenues	18	32	5	33			23	65
Cost of goods sold	– 192	– 1 336	– 184	– 1 737			– 376	– 3 073
Gross profit of discontinued operations	**– 11**	**298**	**278**	**2 588**			**267**	**2 886**
Marketing & Sales	– 57	– 280	– 187	– 1 532			– 244	– 1 812
Research & Development	– 151	– 545	– 30	– 312			– 181	– 857
General & Administration	– 26	– 118	– 32	– 313			– 58	– 431
Other income	2 870	905	10 558	99	– 8	3	13 420	1 007
Other expense	– 57	– 812	– 14	– 60	– 656	– 274	– 727	– 1 146
Operating income/loss of discontinued operations	**2 568**	**– 552**	**10 573**	**470**	**– 664**	**– 271**	**12 477**	**– 353**
Income from associated companies	2	2					2	2
Income/loss before taxes of discontinued operations							**12 479**	**– 351**
Taxes							– 1 713	– 96
Net income/loss of discontinued operations							**10 766**	**– 447**

[1] Consumer Health is the aggregation of the OTC and Animal Health divisions.

The following are included in net income from discontinued operations:

(USD millions)	2015	2014
Depreciation of property, plant & equipment		– 66
Amortization of intangible assets		– 77
Impairment charges on property, plant & equipment, net	83	– 736
Impairment charges on intangible assets, net		– 405
Additions to restructuring provisions	– 1	– 14
Equity-based compensation of Novartis equity plans	– 65	– 124

31. Events subsequent to the December 31, 2016 consolidated balance sheet date

Significant transactions closed in January 2017
For significant transactions entered into in 2016 and closed in January 2017, see Note 2.

Dividend proposal for 2016 and approval of the Group's 2016 consolidated financial statements
On January 24, 2017, the Novartis AG Board of Directors proposed the acceptance of the 2016 consolidated financial statements of the Novartis Group for approval by the Annual General Meeting on February 28, 2017. Furthermore, also on January 24, 2017, the Board proposed a dividend of CHF 2.75 per share to be approved at the Annual General Meeting on February 28, 2017. If approved, total dividend payments would amount to approximately USD 6.4 billion (2015: USD 6.6 billion) using the CHF/USD December 31, 2016 exchange rate.

32. Principal Group subsidiaries and associated companies

The following table lists the principal subsidiaries controlled by Novartis and associated companies in which Novartis is deemed to have significant influence. The equity interest percentage shown in the table also represents the share in voting rights in those entities, except where explicitly noted.

As at December 31, 2016	Share/paid-in capital [1]	Equity interest %
Algeria		
Société par actions SANDOZ, Algiers	DZD 650.0 m	100
Argentina		
Novartis Argentina S.A., Buenos Aires	ARS 906.1 m	100
Alcon Laboratorios S.A., Buenos Aires	ARS 83.9 m	100
Australia		
Novartis Australia Pty Ltd, North Ryde, NSW	AUD 2.2	100
Novartis Pharmaceuticals Australia Pty Ltd, North Ryde, NSW	AUD 3.8 m	100
Alcon Laboratories (Australia) Pty Ltd, Frenchs Forest, NSW	AUD 2.6 m	100
Sandoz Pty Ltd, North Ryde, NSW	AUD 11.6 m	100
Austria		
Novartis Austria GmbH, Vienna	EUR 1.0 m	100
Novartis Pharma GmbH, Vienna	EUR 1.1 m	100
Alcon Ophthalmika GmbH, Vienna	EUR 36 336	100
Sandoz GmbH, Kundl	EUR 32.7 m	100
EBEWE Pharma Ges.m.b.H Nfg. KG, Unterach am Attersee	EUR 1.0 m	100
Bangladesh		
Novartis (Bangladesh) Limited, Gazipur	BDT 162.5 m	60
Belgium		
N.V. Novartis Pharma S.A., Vilvoorde	EUR 7.1 m	100
S.A. Alcon-Couvreur N.V., Puurs	EUR 360.6 m	100
N.V. Alcon S.A., Vilvoorde	EUR 141 856	100
N.V. Sandoz S.A., Vilvoorde	EUR 19.2 m	100
Bermuda		
Triangle International Reinsurance Limited, Hamilton	CHF 1.0 m	100
Novartis Securities Investment Limited, Hamilton	CHF 30 000	100
Novartis BioVentures Ltd., Hamilton	USD 12 000	100
Trinity River Insurance Co Limited, Hamilton	USD 370 000	100
Novartis Investment Limited, Hamilton	USD 30 000	100
Novartis Pharmaceutical Proprietary Ltd., Hamilton	CHF 100 000	100
Brazil		
Novartis Biociências S.A., São Paulo	BRL 265.0 m	100
Sandoz do Brasil Indústria Farmacêutica Ltda., Cambé, PR	BRL 190.0 m	100
Canada		
Novartis Pharmaceuticals Canada Inc., Dorval, Quebec	CAD 0 [2]	100
Alcon Canada Inc., Mississauga, Ontario	CAD 0 [2]	100
CIBA Vision Canada Inc., Mississauga, Ontario	CAD 1	100
Sandoz Canada Inc., Boucherville, Quebec	CAD 76.8 m	100
Chile		
Novartis Chile S.A., Santiago de Chile	CLP 2.0 bn	100
Alcon Laboratorios Chile Ltd., Santiago de Chile	CLP 2.0 bn	100
China		
Beijing Novartis Pharma Co., Ltd., Beijing	USD 30.0 m	100
Novartis Pharmaceuticals (HK) Limited, Hong Kong	HKD 200	100
China Novartis Institutes for BioMedical Research Co., Ltd., Shanghai	USD 320.0 m	100
Suzhou Novartis Pharma Technology Co., Ltd., Changshu	USD 103.4 m	100
Shanghai Novartis Trading Ltd., Shanghai	USD 3.2 m	100
Alcon Hong Kong Limited, Hong Kong	HKD 77 000	100
Alcon (China) Ophthalmic Product Co., Ltd., Beijing	USD 2.2 m	100
Sandoz (China) Pharmaceutical Co., Ltd., Zhongshan	USD 36.5 m	100
Colombia		
Novartis de Colombia S.A., Santafé de Bogotá	COP 7.9 bn	100
Laboratorios Alcon de Colombia S.A., Santafé de Bogotá	COP 20.9 m	100
Croatia		
Sandoz d.o.o., Zagreb	HRK 25.6 m	100
Czech Republic		
Novartis s.r.o., Prague	CZK 51.5 m	100
Alcon Pharmaceuticals (Czech Republic) s.r.o., Prague	CZK 31.0 m	100
Sandoz s.r.o., Prague	CZK 44.7 m	100

As at December 31, 2016	Share/paid-in capital [1]	Equity interest %
Denmark		
Novartis Healthcare A/S, Copenhagen	DKK 14.0 m	100
Alcon Nordic A/S, Copenhagen	DKK 0.5 m	100
Sandoz A/S, Copenhagen	DKK 10.0 m	100
Ecuador		
Novartis Ecuador S.A., Quito	USD 4.0 m	100
Egypt		
Novartis Pharma S.A.E., Cairo	EGP 193.8 m	99.77
Sandoz Egypt Pharma S.A.E., New Cairo City	EGP 250 000	100
Finland		
Novartis Finland Oy, Espoo	EUR 459 000	100
France		
Novartis Groupe France S.A., Rueil-Malmaison	EUR 103.0 m	100
Novartis Pharma S.A.S., Rueil-Malmaison	EUR 43.4 m	100
Laboratoires Alcon S.A.S., Rueil-Malmaison	EUR 12.9 m	100
Sandoz S.A.S., Levallois-Perret	EUR 5.4 m	100
Germany		
Novartis Deutschland GmbH, Wehr	EUR 155.5 m	100
Novartis Pharma GmbH, Nuremberg	EUR 25.6 m	100
Novartis Pharma Produktions GmbH, Wehr	EUR 2.0 m	100
Alcon Pharma GmbH, Freiburg im Breisgau	EUR 512 000	100
WaveLight GmbH, Erlangen	EUR 6.6 m	100
CIBA Vision GmbH, Grosswallstadt	EUR 15.4 m	100
Sandoz International GmbH, Holzkirchen	EUR 100 000	100
1 A Pharma GmbH, Oberhaching	EUR 26 000	100
Salutas Pharma GmbH, Barleben	EUR 42.1 m	100
HEXAL AG, Holzkirchen	EUR 93.7 m	100
Aeropharm GmbH, Rudolstadt	EUR 26 000	100
Novartis Business Services GmbH, Wehr	EUR 25 000	100
Gibraltar		
Novista Insurance Limited, Gibraltar City	CHF 130.0 m	100
Greece		
Novartis (Hellas) S.A.C.I., Metamorphosis / Athens	EUR 23.4 m	100
Alcon Laboratories Hellas-Commercial and Industrial S.A., Maroussi, Athens	EUR 5.7 m	100
Hungary		
Novartis Hungary Healthcare Limited Liability Company, Budapest	HUF 545.6 m	100
Sandoz Hungary Limited Liability Company, Budapest	HUF 883.0 m	100
India		
Novartis India Limited, Mumbai	INR 140.7 m	73.4
Novartis Healthcare Private Limited, Mumbai	INR 60.0 m	100
Alcon Laboratories (India) Private Limited, Bangalore	INR 1.1 bn	100
Sandoz Private Limited, Mumbai	INR 32.0 m	100
Indonesia		
PT. Novartis Indonesia, Jakarta	IDR 7.7 bn	100
PT. CIBA Vision Batam, Batam	IDR 11.9 bn	100
Ireland		
Novartis Ireland Limited, Dublin	EUR 25 000	100
Novartis Ringaskiddy Limited, Ringaskiddy, County Cork	EUR 2.0 m	100
Alcon Laboratories Ireland Limited, Cork City	EUR 541 251	100
Israel		
Novartis Israel Ltd., Petach Tikva	ILS 1 000	100
Optonol Ltd., Neve-Ilan	ILS 454 252	100
Italy		
Novartis Farma S.p.A., Origgio	EUR 18.2 m	100
Alcon Italia S.p.A., Milan	EUR 3.7 m	100
Sandoz S.p.A., Origgio	EUR 1.7 m	100
Sandoz Industrial Products S.p.A., Rovereto	EUR 2.6 m	100
Japan		
Novartis Holding Japan K.K., Tokyo	JPY 10.0 m	100
Novartis Pharma K.K., Tokyo	JPY 6.0 bn	100
Alcon Japan Ltd., Tokyo	JPY 500.0 m	100
Sandoz K.K., Tokyo	JPY 100.0 m	100
Luxembourg		
Novartis Investments S.à r.l., Luxembourg-Ville	USD 100.0 m	100
Novartis Finance S.A., Luxembourg-Ville	USD 100 000	100
Malaysia		
Novartis Corporation (Malaysia) Sdn. Bhd., Kuala Lumpur	MYR 3.3 m	100
Alcon Laboratories (Malaysia) Sdn. Bhd., Petaling Jaya	MYR 1.0 m	100
CIBA Vision Johor Sdn. Bhd., Kuala Lumpur	MYR 10.0 m	100

As at December 31, 2016	Share/paid-in capital [1]	Equity interest %
Mexico		
Novartis Farmacéutica, S.A. de C.V., Mexico City	MXN 205.0 m	100
Alcon Laboratorios, S.A. de C.V., Mexico City	MXN 5.9 m	100
Sandoz, S.A. de C.V., Mexico City	MXN 468.2 m	100
Morocco		
Novartis Pharma Maroc SA, Casablanca	MAD 80.0 m	100
Netherlands		
Novartis Netherlands B.V., Arnhem	EUR 1.4 m	100
Novartis Pharma B.V., Arnhem	EUR 4.5 m	100
Alcon Nederland B.V., Arnhem	EUR 18 151	100
Sandoz B.V., Almere	EUR 907 560	100
New Zealand		
Novartis New Zealand Ltd, Auckland	NZD 820 000	100
Norway		
Novartis Norge AS, Oslo	NOK 1.5 m	100
Pakistan		
Novartis Pharma (Pakistan) Limited, Karachi	PKR 3.9 bn	99.99
Panama		
Novartis Pharma (Logistics), Inc., Panama City	USD 10 000	100
Alcon Centroamerica S.A., Panama City	PAB 1 000	100
Philippines		
Novartis Healthcare Philippines, Inc., Manila	PHP 298.8 m	100
Alcon Laboratories (Philippines), Inc., Manila	PHP 16.5 m	100
Sandoz Philippines Corporation, Manila	PHP 30.0 m	100
Poland		
Novartis Poland Sp. z o.o., Warszawa	PLN 44.2 m	100
Alcon Polska Sp. z o.o., Warszawa	PLN 750 000	100
Sandoz Polska Sp. z o.o., Warszawa	PLN 25.6 m	100
Lek S.A., Strykow	PLN 11.4 m	100
Portugal		
Novartis Portugal SGPS Lda., Porto Salvo	EUR 500 000	100
Novartis Farma – Produtos Farmacêuticos S.A, Porto Salvo	EUR 2.4 m	100
Alcon Portugal-Produtos e Equipamentos Oftalmológicos Lda., Porto Salvo	EUR 4.5 m	100
Sandoz Farmacêutica Lda., Porto Salvo	EUR 499 900	100
Romania		
Novartis Pharma Services Romania S.R.L., Bucharest	RON 3.0 m	100
Alcon Romania S.R.L., Bucharest	RON 10.8 m	100
Sandoz S.R.L., Targu-Mures	RON 105.2 m	100
Russian Federation		
Novartis Pharma LLC, Moscow	RUB 20.0 m	100
Alcon Farmacevtika LLC, Moscow	RUB 44.1 m	100
ZAO Sandoz, Moscow	RUB 57.4 m	100
Novartis Neva LLC, St. Petersburg	RUB 1.3 bn	100
Saudi Arabia		
Saudi Pharmaceutical Distribution Co. Ltd., Riyadh	SAR 26.8 m	75
Singapore		
Novartis (Singapore) Pte Ltd., Singapore Country	SGD 100 000	100
Novartis Singapore Pharmaceutical Manufacturing Pte Ltd, Singapore Country	SGD 45.0 m	100
Novartis Asia Pacific Pharmaceuticals Pte Ltd, Singapore Country	SGD 39.0 m	100
Novartis Institute for Tropical Diseases Pte Ltd, Singapore Country	SGD 2 004	100
Alcon Singapore Manufacturing Pte Ltd, Singapore Country	SGD 101 000	100
CIBA Vision Asian Manufacturing and Logistics Pte Ltd., Singapore Country	SGD 1.0 m	100
Alcon Pte Ltd, Singapore Country	SGD 164 000	100
Slovakia		
Novartis Slovakia s.r.o., Bratislava	EUR 2.0 m	100
Slovenia		
Lek Pharmaceuticals d.d., Ljubljana	EUR 48.4 m	100
Sandoz Pharmaceuticals d.d., Ljubljana	EUR 1.5 m	100
South Africa		
Novartis South Africa (Pty) Ltd, Midrand	ZAR 86.3 m	100
Alcon Laboratories (South Africa) (Pty) Ltd., Midrand	ZAR 201 820	100
Sandoz South Africa (Pty) Ltd, Kempton Park	ZAR 3.0 m	100
South Korea		
Novartis Korea Ltd., Seoul	KRW 24.5 bn	98.55
Alcon Korea Ltd., Seoul	KRW 33.8 bn	100
Sandoz Korea Ltd., Seoul	KRW 17.8 bn	100
Spain		
Novartis Farmacéutica S.A., Barcelona	EUR 63.0 m	100
Alcon Cusi S.A., El Masnou / Barcelona	EUR 11.6 m	100
Sandoz Farmacéutica S.A., Aravaca / Madrid	EUR 270 450	100
Sandoz Industrial Products S.A., Les Franqueses del Vallés / Barcelona	EUR 9.3 m	100
Abadia Retuerta S.A., Sardón de Duero / Valladolid	EUR 6.0 m	100

As at December 31, 2016	Share/paid-in capital [1]	Equity interest %
Sweden		
Novartis Sverige AB, Täby / Stockholm	SEK 5.0 m	100
Switzerland		
Novartis International AG, Basel	CHF 10.0 m	100
Novartis Holding AG, Basel	CHF 100.2 m	100
Novartis International Pharmaceutical AG, Basel	CHF 100 000	100
Novartis Research Foundation, Basel	CHF 29.3 m	100
Novartis Foundation for Management Development, Basel	CHF 100 000	100
Novartis Foundation for Employee Participation, Basel	CHF 100 000	100
Novartis Sanierungsstiftung, Basel	CHF 2.0 m	100
Novartis Pharma AG, Basel	CHF 350.0 m	100
Novartis Pharma Services AG, Basel	CHF 20.0 m	100
Novartis Pharma Schweizerhalle AG, Muttenz	CHF 18.9 m	100
Novartis Pharma Stein AG, Stein	CHF 251 000	100
Novartis Pharma Schweiz AG, Risch	CHF 5.0 m	100
Alcon Switzerland SA, Risch	CHF 100 000	100
Alcon Pharmaceuticals Ltd., Fribourg	CHF 200 000	100
ESBATech, a Novartis company GmbH, Schlieren	CHF 14.0 m	100
Sandoz AG, Basel	CHF 5.0 m	100
Sandoz Pharmaceuticals AG, Risch	CHF 100 000	100
Roche Holding AG, Basel	CHF 160.0 m	33/6 [3]
Taiwan		
Novartis (Taiwan) Co., Ltd., Taipei	TWD 170.0 m	100
Thailand		
Novartis (Thailand) Limited, Bangkok	THB 302.0 m	100
Alcon Laboratories (Thailand) Limited, Bangkok	THB 228.1 m	100
Turkey		
Novartis Saglik, Gida ve Tarim Ürünleri Sanayi ve Ticaret A.S., Istanbul	TRY 98.0 m	100
Alcon Laboratuvarlari Ticaret A.S., Istanbul	TRY 25.2 m	100
Sandoz Ilaç Sanayi ve Ticaret A.S., Istanbul	TRY 165.2 m	99.99
Sandoz Syntek Ilaç Hammaddeleri Sanayi ve Ticaret A.S., Tuzla – Istanbul	TRY 46.0 m	100
Sandoz Grup Saglik Ürünleri Ilaçlari Sanayi ve Ticaret A.S., Gebze – Kocaeli	TRY 50.0 m	100
United Arab Emirates		
Novartis Middle East FZE, Dubai	AED 7.0 m	100
United Kingdom		
Novartis UK Limited, Frimley/Camberley	GBP 25.5 m	100
Novartis Pharmaceuticals UK Limited, Frimley/Camberley	GBP 5.4 m	100
Novartis Grimsby Limited, Frimley/Camberley	GBP 250.0 m	100
Alcon Eye Care UK Limited, Frimley/Camberley	GBP 550 000	100
Sandoz Limited, Frimley/Camberley	GBP 2.0 m	100
Glaxosmithkline Consumer Healthcare Holdings Limited, Brentford, Middlesex	GBP 100 000	36.5
United States of America		
Novartis Corporation, East Hanover, NJ	USD 72.2 m	100
Novartis Finance Corporation, New York, NY	USD 1 000	100
Novartis Capital Corporation, New York, NY	USD 1	100
Novartis Pharmaceuticals Corporation, East Hanover, NJ	USD 5.2 m	100
Novartis Institutes for BioMedical Research, Inc., Cambridge, MA	USD 1	100
Novartis Institute for Functional Genomics, Inc., San Diego, CA	USD 21 000	100
Genoptix, Inc., Carlsbad, CA	USD 1	100
Alcon Laboratories Holding Corporation, Fort Worth, TX	USD 10	100
Alcon Laboratories, Inc., Fort Worth, TX	USD 1 000	100
Alcon Refractivehorizons, LLC, Fort Worth, TX	USD 10	100
Alcon Research, Ltd., Fort Worth, TX	USD 12.5	100
Alcon Lensx, Inc., Aliso Viejo, CA	USD 100	100
Sandoz Inc., Princeton, NJ	USD 25 000	100
Fougera Pharmaceuticals Inc., Melville, NY	USD 1	100
Eon Labs, Inc., Princeton, NJ	USD 1	100
Novartis Vaccines and Diagnostics, Inc., Cambridge, MA	USD 3	100
Novartis Services, Inc., East Hanover, NJ	USD 1	100
Venezuela		
Novartis de Venezuela, S.A., Caracas	VEF 1.4 m	100
Alcon Pharmaceutical, C.A., Caracas	VEF 5.5 m	100

In addition, the Group is represented by subsidiaries and associated companies in the following countries: Bosnia/Herzegovina, Bulgaria, Dominican Republic, Guatemala, the Former Yugoslav Republic of Macedonia, Nigeria, Peru, Puerto Rico, Ukraine and Uruguay.

[1] Share/paid-in capital may not reflect the taxable share/paid-in capital amount and does not include any paid-in surplus.

[2] Shares without par value

[3] Approximately 33% of voting shares; approximately 6% of total net income and equity attributable to Novartis

m = million; bn = billion

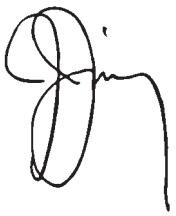
Report of Novartis management on internal control over financial reporting

The Board of Directors and management of the Group are responsible for establishing and maintaining adequate internal control over financial reporting. The Novartis Group's internal control system was designed to provide reasonable assurance to the Novartis Group's management and Board of Directors regarding the reliability of financial reporting and the preparation and fair presentation of its published consolidated financial statements.

All internal control systems, no matter how well designed, have inherent limitations. Therefore, even those systems determined to be effective may not prevent or detect misstatements and can provide only reasonable assurance with respect to financial statement preparation and presentation. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions or that the degree of compliance with the policies or procedures may deteriorate.

Novartis Group management assessed the effectiveness of the Group's internal control over financial reporting as of December 31, 2016. In making this assessment, it used the criteria established in *Internal Control – Integrated Framework(2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on its assessment, management has concluded that, as of December 31, 2016, the Novartis Group's internal control over financial reporting was effective based on those criteria.

PricewaterhouseCoopers AG, Switzerland, an independent registered public accounting firm, has issued an opinion on the existence and effectiveness of the Group's internal control over financial reporting which is included in this financial report on the pages 249 and 254 respectively.



Joseph Jimenez
Chief Executive Officer

Harry Kirsch
Chief Financial Officer

Basel, January 24, 2017

Report of the statutory auditor on the consolidated financial statements of Novartis AG

To the general meeting of Novartis AG, Basel

Opinion

We have audited the consolidated financial statements of Novartis AG and its consolidated subsidiaries ("Novartis Group"), which comprise the consolidated income statements, consolidated statements of comprehensive income, consolidated statements of changes in equity, consolidated balance sheets and consolidated cash flow statements and notes (pages 178 to 247) for the year ended December 31, 2016.

In our opinion the consolidated financial statements give a true and fair view of the consolidated financial position of the Group as at December 31, 2016, and its consolidated financial performance and its consolidated cash flows for the year then ended in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board and comply with Swiss law.

Basis for opinion

We conducted our audit in accordance with Swiss law, Swiss Auditing Standards and International Standards on Auditing (ISAs). Our responsibilities under those provisions and standards are further described in the Auditor's responsibilities for the audit of the consolidated financial statements section of our report.

We are independent of the Group in accordance with the provisions of Swiss law and the requirements of the Swiss audit profession, as well as the IESBA Code of Ethics for Professional Accountants, and we have fulfilled our other ethical responsibilities in accordance with these requirements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Our audit approach

Overview

- Overall Group materiality: USD 400 million which represents 5% of income before taxes from continuing operations, rounded.
- We concluded full scope audit work at the Group's three operating divisions and at 28 reporting entities, including reporting entities of the Corporate Division, in 13 countries
- Our audit scope addressed over 67% of the Group's net sales and 79% of Group's total assets
- In addition, specified procedures were performed on a further 14 reporting entities in 11 countries representing a further 4% of the Group's net sales and 6% of the Group's total assets

As key audit matters, the following areas of focus have been identified:

- Carrying value of goodwill following group reorganization
- Carrying value of intangible assets other than goodwill
- Governmental investigations and litigations
- Rebates, discounts, allowances and returns

Audit scope

We designed our audit by determining materiality and assessing the risks of material misstatement in the consolidated financial statements. In particular, we considered where subjective judgements were made; for example, in respect of significant accounting estimates that involved making assumptions and considering future events that are inherently uncertain. As in all of our audits, we also addressed the risk of management override of internal controls, including among other matters consideration of whether there was evidence of bias that represented a risk of material misstatement due to fraud.

How we tailored the audit scope

We tailored the scope of our audit in order to perform sufficient work to enable us to provide an opinion on the financial statements as a whole, taking into account the structure of the Group, the accounting processes and controls, and the industry in which the Group operates.

The Group financial statements are a consolidation of over 300 reporting entities. We identified 28 reporting entities that, in our view, required an audit of their complete financial information due to their size or risk characteristics. We worked very closely with and received full scope reporting from the divisional audit teams for Innovative Medicines, Alcon and Sandoz, in Switzerland, the United States of America and Germany, respectively. Specific procedures were also carried out at a further 14 reporting entities to give appropriate coverage of material balances. None of the reporting entities excluded from our Group audit scope individually contributed more than 5% to net sales or total assets. Further specific audit procedures over group functions (including taxation, treasury, post-retirement benefits and litigation) and the Group consolidation were executed directly by the Group audit team.

In order to exercise the appropriate direction and supervision over the work of the divisional and reporting entity auditors, the Group engagement team performed selected site visits, audit working paper reviews and conference calls with the divisional and reporting entity auditors and attended selected clearance meetings with divisional auditors. In addition, we hosted a planning workshop in May 2016 for audit Partners and Managers responsible for divisional and reporting entities.

Materiality

The scope of our audit was influenced by our application of materiality. Our audit opinion aims to provide reasonable assurance that the consolidated financial state-

ments are free from material misstatement. Misstatements may arise due to fraud or error. They are considered material if individually or in aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the consolidated financial statements.

Based on our professional judgement, we determined certain quantitative thresholds for materiality, including the overall group materiality for the consolidated financial statements as a whole, as listed below. These, together with qualitative considerations, helped us to determine the scope of our audit and the nature, timing and extent of our audit procedures and to evaluate the effect of misstatements, if any, both individually and in aggregate on the consolidated financial statements as a whole.

Overall group materiality
USD 400 million

How we determined it
5% of income before taxes from continuing operations, rounded

Rationale for the materiality benchmark applied
We chose income before taxes as the measure because, in our view, it is the measure against which the performance of the Group is most commonly assessed and is a generally accepted benchmark.

We agreed with the Audit and Compliance Committee that we would report to them misstatements identified during our audit above USD 20 million as well as any misstatements below that amount which, in our view, warranted reporting for qualitative reasons.

Key Audit Matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements of the current period. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

Key audit matter	How our audit addressed the key audit matter
Carrying value of goodwill following group reorganization The Group has goodwill of USD 31.0 billion at December 31, 2016. In January 2016 the Group announced changes to the divisional structure with the former Pharmaceuticals Division becoming the Innovative Medicines Division and undertook the reorganization described in more detail in Note 3 on page 193 of the annual report (Segmentation of key figures 2016, 2015 and 2014). Following the reorganization, management updated its assessment of the groups of cash generating units (CGUs) used as a basis for assessing goodwill and reallocated the goodwill amongst CGUs based on the relative fair values of the individual businesses. The assessment of the carrying value of the goodwill balances is dependent on the estimation of future cash flows. In particular, those assessments and judgments made to support the carrying value of the goodwill allocated to the Alcon Division were critical, given the 2016 underlying results of Alcon. Refer to Note 1 Significant accounting policies (pages 184 to 185) and Note 11 Goodwill and intangible assets (pages 207 to 208).	We assessed and tested the design and operating effectiveness of the Group's controls over the assessment of the carrying value of goodwill and concluded that these operate effectively. In relation to the reorganization we assessed the aggregation of CGUs through review of the relevant documents of the Executive Committee of Novartis (ECN) confirming that it is the lowest level at which management monitors goodwill for internal purposes and that no grouping of CGUs for goodwill impairment testing purposes is larger than any of the Group's operating segments. With respect to the reallocation of goodwill relating to the Ophthalmic Pharmaceuticals franchise, we tested the respective models determining the relative fair values of the businesses and the related goodwill focusing on the reasonableness of the key assumptions, including revenue and profitability growth, the success of new product launches, terminal values and discount rates, by challenging management to substantiate its assumptions and comparing them to the relevant industry and economic forecasts. We tested, with the support of our valuation specialists, the carrying value of the goodwill allocated to Alcon as at December 31, 2016 focusing on the reasonableness of the cash flows growth rate after the forecast period assumption of 3%, given that this rate is above both the growth rate achieved by Alcon recently and the rate of inflation in key markets at the end of 2016. We also challenged management to substantiate its key assumptions in the cash flow projections during the forecast period and its intention and ability to execute their strategic initiatives and evaluated the reasonableness of the discount rate applied to those future cash flows. We assessed management's sensitivity analysis around key estimates to quantify the downside changes in assumptions that could result in an impairment and the disclosures included in Note 11 Goodwill and intangible assets (pages 207 to 208) of the annual report. As a result of our procedures, as discussed with the Audit and Compliance Committee, we determined that the conclusions reached by management with regard to the carrying value of goodwill were reasonable and supportable.

Key audit matter	How our audit addressed the key audit matter
Carrying value of intangible assets other than goodwill The Group has intangible assets other than goodwill totaling USD 31.3 billion at December 31, 2016, comprising research and development acquired, currently marketed products, marketing know-how, technologies, the Alcon brand name and other intangible assets. The Group recognized specific impairments of intangible assets other than goodwill of USD 591 million during the year. The assessment of the carrying values of intangible assets is dependent on future cash flows and if these are below initial expectations there is a risk that the assets will be impaired. The reviews of carrying values performed by the Group contain a number of significant judgements and estimates such as scientific success, revenue growth, the success of new product launches, profit margins and discount rates. The carrying value assessments of the following intangible assets includes the most significant risk and highest level of judgement: — The Alcon brand name is an indefinite life corporate asset and not subject to amortization. — Certain currently marketed products which have performed below management's expectation or were, in our view, at a greater risk of impairment. — Products in development, as the assessment of their carrying value is challenging due to management being required to make judgements both as to the probability of scientific success and regulatory approval of the developments across indications, as well as the probability of commercial success of the subsequent product launches. Refer to Note 1 Significant accounting policies (pages 184 to 185) and Note 11 Goodwill and intangible assets (pages 207 to 208).	We assessed and tested the design and operating effectiveness of the Group's controls over the assessment of the carrying value of intangible asset other than goodwill and concluded that these operate effectively, specifically in respect to the identification of impairment triggering events. We obtained the Group's carrying value calculations and assessed the key assumptions. For the Alcon brand name and the currently marketed products these assumptions specifically included pricing, market size and share and competition assumptions. In addition, for the assessment of the Alcon brand name we challenged the indefinite life designation of the asset considering the performance of the business in 2016 and the internal reorganization described in Note 3 on page 193 of the annual report (Segmentation of key figures 2016, 2015 and 2014). We discussed with the Audit and Compliance Committee and management their judgements and conclusion on the indefinite life designation of the Alcon brand name as well as their strategic initiatives. For selected currently marketed products and products in development, with the support of our valuation specialists, we considered third party sources to challenge expected future revenues due to actions by competitors or due to changes in relevant markets. Furthermore, for products in development we also considered key scientific developments. We performed our own sensitivity analysis around these key estimates to ascertain the extent of change in those assumptions that either individually or collectively would be required for the intangible assets tested to be impaired. As a result of our procedures we did not propose any adjustments to the amount of impairment recognized in 2016. For those intangible assets where management determined that no impairment was required, we found that the assessments made by management were based upon reasonable assumptions, consistently applied.

Key audit matter	How our audit addressed the key audit matter
Governmental investigations and litigations The pharmaceuticals industry is heavily regulated which increases inherent litigation risk. The Group is subject to various government investigations, of which the most significant are disclosed in Note 20 Provisions and other non-current liabilities. We specifically assessed the investigations and related litigations in the US given their significance and the inherent uncertainty of outcomes. Refer to Note 1 Significant accounting policies on page 186 and Note 20 Provisions and other non-current liabilities (pages 216 to 220).	We assessed and tested the design and operating effectiveness of the Group's controls over the completeness, assessment for recognition, measurement and disclosures of provisions for governmental investigations and other legal matters and concluded that these operate effectively. We evaluated management's judgments in connection with the investigations and related litigations in the US, read the respective court filings and minutes of Board of Directors and management meetings and inquired with the Audit and Compliance Committee, management, internal and external legal counsel. We concluded that the judgements made by management were in accordance with the accounting policies described in Note 1.

Key audit matter	How our audit addressed the key audit matter
Rebates, discounts, allowances and returns The Group distributes its products in many cases through wholesale distributors, however the ultimate net selling prices are determined based on the contractual arrangements that the Group has with the ultimate patient's insurer or other payment program. The initial revenue recognition, usually upon shipment to the distributor requires an estimate of the net selling price taking into consideration rebates and discounts as well as sales returns. The estimate depends on contract terms and regulation, as well as forecasts of sales volumes by sales channel. The dispensing of the product to the patient and the final determination of the selling price may be several months later. We focused our testing on the accruals for both rebates and discounts together with sales returns recognized at the year end because, specifically for Medicaid and Medicare or equivalent programs in the US, the estimation processes involve large volumes of data, require significant judgement and can be at risk of management bias. The provision reported as of December 31, 2016 for revenue deductions amounted to USD 4.2 billion. Refer to Note 22 Provisions and other current liabilities (pages 221 and 222).	We performed procedures to assess the design and operating effectiveness of the controls related to the recording of rebates, discounts and sales returns and the estimation of related period end reserves. We obtained management's calculations for the respective estimates and performed one or more of the following procedures on each of them: developed an independent expectation of the reserve and/or tested management's estimation process to assess the reasonableness of the recorded reserve balances, performed retrospective reviews and assessed subsequent events. We also performed testing of credits issued and payments made throughout the year, reviewed related contracts and independently confirmed sales terms with significant customers and inventory levels with the largest wholesalers. We did not identify any material differences between our independent expectations and the accruals and we found the judgements made by management to be reasonable.

Other information in the annual report

The Board of Directors is responsible for the other information in the annual report. The other information comprises all information included in the annual report, but does not include the consolidated financial statements, the stand-alone financial statements of Novartis AG and our auditor's reports thereon. Our opinion on the consolidated financial statements does not cover the other information in the annual report and we do not express any form of assurance conclusion thereon.

In connection with our audit of the consolidated financial statements, our responsibility is to read the other information in the annual report and, in doing so, consider whether the other information is materially inconsistent with the consolidated financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact.

We have nothing to report in this regard.

Responsibilities of the Board of Directors for the consolidated financial statements

The Board of Directors is responsible for the preparation of the consolidated financial statements that give a true and fair view in accordance with International Financial Reporting Standards and the provision of Swiss law, and for such internal control as the Board of Directors determines is necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, the Board of Directors is responsible for assessing the Group's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the Board of Directors either intends to liquidate the Group or to cease operations, or has no realistic alternative but to do so.

Auditor's responsibilities for the audit of the consolidated financial statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Swiss law, ISAs and Swiss Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

As part of an audit in accordance with Swiss law, ISAs and Swiss Auditing Standards, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made.
- Conclude on the appropriateness of Board of Directors' use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.
- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinion.

We communicate with the Board of Directors or its relevant committee regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide the Board of Directors or its relevant committee with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated with the Board of Directors or its relevant committee, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, we determine that a matter should not be communicated in our report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

Report on other legal and statutory requirements

In accordance with article 728a paragraph 1 item 3 CO and Swiss Auditing Standard 890, we confirm that an internal control system exists which has been designed for the preparation of consolidated financial statements according to the instructions of the Board of Directors.

We recommend that the consolidated financial statements submitted to you be approved.

PricewaterhouseCoopers AG

pwc

Bruno Rossi
Audit expert
Auditor in charge

Stephen Johnson
Global relationship partner

Basel, January 24, 2017

The report set out on pages 249 to 253 is included in accordance with the requirements of Swiss Law and does not form part of the Novartis AG Annual Report pursuant to section 13 or 15(d) of the securities exchange act of 1934 as filed with the US Securities and Exchange Commission (SEC) on Form 20-F. The report of the Independent Registered Public Accounting Firm as included in the Form 20-F is reprinted for information purposes on page 254.

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors of Novartis AG, Basel

In our opinion, the accompanying consolidated balance sheets and the related consolidated income statements, consolidated statements of comprehensive income, consolidated statements of changes in equity, consolidated cash flow statements and notes (as referred to in item 18 of this Form 20-F) present fairly, in all material respects, the financial position of Novartis AG and its consolidated subsidiaries (Group or Company) at December 31, 2016 and December 31, 2015, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2016 in conformity with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

The Novartis' Board of Directors and management of the Group are responsible for these financial statements, for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the *"Report of Novartis Management on Internal Control Over Financial Reporting"* in item 15(b) of this Form 20-F. Our responsibility is to express opinions on these financial statements and on the Company's internal control over financial reporting based on our integrated audits. We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board of the United States of America. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement and whether effective internal control over financial reporting was maintained in all material respects. Our audits of the financial statements included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with IFRS. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with IFRS, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

PricewaterhouseCoopers AG

pwc

Bruno Rossi
Audit expert
Auditor in charge

Stephen Johnson
Global relationship partner

Basel, January 24, 2017

The report of the Independent Registered Public Accounting Firm set out above is reprinted for information purposes only and is a copy of the report included in the Novartis AG Annual Report pursuant to section 13 or 15(d) of the securities exchange act of 1934 as filed with the US Securities and Exchange Commission (SEC), on Form 20-F. The report does not form part of the reporting to the general meeting as required by Swiss Law.

Financial statements of Novartis AG

Income statements

(For the years ended December 31, 2016 and 2015)

(CHF millions)	Note	2016	2015
Income from investment in Group subsidiaries		7 291	6 168
License income		1 445	1 098
Gain from disposal of intangibles assets		495	558
Other income		11	8
Total income		9 242	7 832
Amortization of goodwill and other intangible assets	3	– 1 140	– 1 143
Administrative expenses		– 26	– 27
Other expenses		– 4	– 31
Total expenses		– 1 170	– 1 201
Operating income		**8 072**	**6 631**
Financial income	4	440	562
Financial expenses	4	– 194	– 253
Income before extraordinary income and taxes		**8 318**	**6 940**
Extraordinary income, net	5		1 422
Extraordinary expenses, net	5		– 56
Income before taxes		**8 318**	**8 306**
Direct taxes		– 177	– 265
Net income of the year		**8 141**	**8 041**

The accompanying Notes form an integral part of these financial statements.

Balance sheets

(At December 31, 2016 and 2015)

(CHF millions)	Note	**2016**	2015
Assets			
Current assets			
Cash and cash equivalents		3	103
Receivables			
Group subsidiaries		4 163	3 318
Third parties		24	159
Total current assets		**4 190**	**3 580**
Non-current assets			
Financial assets			
Group subsidiaries		14 978	15 884
Third parties			
Investments	6		
Group subsidiaries		12 630	10 996
Third parties		0	0
Goodwill and other intangible assets	3	15 507	16 647
Total non-current assets		**43 115**	**43 527**
Total assets		**47 305**	**47 107**
Liabilities and equity			
Current liabilities			
Other current liabilities			
Group subsidiaries		48	77
Third parties		8	118
Accrued expenses		185	378
Deferred income		19	55
Total current liabilities		**260**	**628**
Non-current liabilities			
Interest-bearing non-current liabilities			
Bonds	7	1 378	1 378
Non-current provisions		502	505
Total non-current liabilities		**1 880**	**1 883**
Equity			
Share capital	8	**1 314**	**1 338**
Legal capital reserves – capital contribution reserve		**198**	**198**
General reserve		320	320
Reserve for treasury shares held by subsidiaries	9	3 417	4 009
Total legal retained earnings		**3 737**	**4 329**
Free reserves	10	30 527	34 560
Retained earnings		2 040	806
Net income of the year		8 141	8 041
Retained earnings available for distribution at the end of the year		10 181	8 847
Total unappropriated earnings		**40 708**	**43 407**
Treasury shares held by Novartis AG	9	**– 792**	**– 4 676**
Total equity		**45 165**	**44 596**
Total liabilities and equity		**47 305**	**47 107**

The accompanying Notes form an integral part of these financial statements.

Notes to the financial statements of Novartis AG

1. Introduction

The financial statements of Novartis AG, with its registered office in Basel, comply with the requirements of the Swiss accounting legislation of the Swiss Code of Conduct.

Novartis AG is presenting consolidated financial statements according to IFRS. As a result, these financial statements and notes do not include additional disclosures, cash flow statements or a management report.

2. Accounting policies

Financial income and expenses

Current assets and current liabilities denominated in foreign currencies are converted at year-end exchange rates. Realized exchange gains and losses, and all unrealized exchange losses arising from these as well as those from business transactions are recorded net as financial income or financial expenses.

Derivative financial instruments

Derivative financial instruments are used for hedging purposes. These instruments are valued at fair value. When different accounting policies apply for the hedged item and the derivative financial instrument, hedge accounting is applied through measuring the hedged item together with the derivative financial instrument.

Financial assets

Financial assets are valued at acquisition cost less adjustments for foreign currency losses and any other impairment of value.

Investments

Investments are initially recognized at cost. Investments in Novartis Group subsidiaries are assessed annually and in case of an impairment adjusted to their recoverable amount within their category.

Goodwill and other intangible assets

Goodwill and other intangible assets are capitalized and amortized over a period of between five and 20 years. Goodwill and other intangible assets are reviewed for impairment on a yearly basis. If necessary, an impairment loss is recognized.

Bonds

Bonds are valued at nominal value. Any bond premium is accrued over the duration of the bond so that at maturity the balance sheet amount will equal the amount that is due to be paid.

Provisions

Provisions are made to cover general business risks of the Group.

3. Goodwill and other intangible asset movements

(CHF millions)	**2016**	2015
Goodwill		
Gross cost [1]	**22 350**	**22 350**
Accumulated amortization		
January 1	**– 5 703**	**– 4 560**
Amortization charges	– 1 140	– 1 143
December 31	**– 6 843**	**– 5 703**
Net book value at December 31	**15 507**	**16 647**
Other intangible assets		
Cost		
January 1	**11**	**255**
Additions		
Disposal as a result of the Novartis OTC divestment to GSK		– 244
December 31	**11**	**11**
Accumulated amortization		
January 1	**– 11**	**– 120**
Amortization charges		– 3
Disposal as a result of the Novartis OTC divestment to GSK		112
December 31	**– 11**	**– 11**
Net book value at December 31	**0**	**0**
Goodwill and other intangible assets		
Net book value at December 31	**15 507**	**16 647**

[1] There was no change to cost value of Goodwill during 2016 and 2015.

4. Financial income and expenses

	2016		2015	
(CHF millions)	Income	Expenses	Income	Expenses
Interest	440	– 134	562	– 176
Foreign exchange		– 58		– 74
Others		– 2		– 3
Total	**440**	**– 194**	**562**	**– 253**

5. Extraordinary income and expenses, net

In 2015, a net divestment gain of CHF 1 422 million due to the Novartis Animal Health divestment to Eli Lilly and Company, USA, and an extraordinary expense related to prior year direct taxes of CHF 56 million, were recorded.

6. Investments

The principal direct and indirect subsidiaries and other holdings of Novartis AG are shown in Note 32 to the Group's consolidated financial statements.

7. Bonds

Straight bonds

(CHF millions)	2016	2015
0.250% CHF 500 million bond 2015/2025 of Novartis AG, Basel, Switzerland, issued at 100.64%	502	502
0.625% CHF 550 million bond 2015/2029 of Novartis AG, Basel, Switzerland, issued at 100.502%	551	551
1.050% CHF 325 million bond 2015/2035 of Novartis AG, Basel, Switzerland, issued at 100.479%	325	325
Total straight bonds	**1 378**	**1 378**

Breakdowns by maturity

(CHF millions)	2016	2015
After 2021	1 378	1 378
Total	**1 378**	**1 378**

Comparison of balance sheet and fair value

(CHF millions)	2016 Balance sheet	2016 Fair values	2015 Balance sheet	2015 Fair values
Straight bonds	1 378	1 407	1 378	1 356
Total	**1 378**	**1 407**	**1 378**	**1 356**

On June 26, 2008, Novartis AG issued a CHF 800 million bond bearing interest at 3.625% per annum. The bond was repaid on June 26, 2015. On February 13, 2015, Novartis AG issued three new bonds of CHF 500 million (bearing interest at 0.25% per annum), CHF 550 million (bearing interest at 0.625% per annum), and CHF 325 million (bearing interest at 1.050% per annum).

8. Share capital

	2016		2015	
	Number of shares	Share capital CHF millions	Number of shares	Share capital CHF millions
January 1	**2 676 993 000**	**1 338.5**	**2 706 193 000**	**1 353.1**
Number of shares canceled/capital reduced during the period	– 49 878 180	– 24.9	– 29 200 000	– 14.6
December 31	**2 627 114 820**	**1 313.6**	**2 676 993 000**	**1 338.5**

The Novartis AG share capital consists of registered shares with a nominal value of CHF 0.50 each.

The total share capital decreased from CHF 1 338.5 million at December 31, 2015, to CHF 1 313.6 million at December 31, 2016, due to a share capital reduction as a result of the cancellation of 49.9 million repurchased shares with a nominal value of CHF 24.9 million. The cancellation was approved at the Annual General Meeting of February 23, 2016, and became effective on April 28, 2016. During 2015, the total share capital decreased from CHF 1 353.1 million at December 31, 2014, to CHF 1 338.5 million at December 31, 2015, due to a share capital reduction as a result of the cancellation of 29.2 million repurchased shares with a nominal value of CHF 14.6 million. The cancellation was approved at the Annual General Meeting of February 27, 2015, and became effective on May 6, 2015.

In 2014, Novartis entered into an irrevocable, non-discretionary arrangement with a bank to repurchase its own shares on the second trading line under its USD 5 billion share buyback as well as to mitigate dilution from employee participation programs. In 2015, this trading plan was fully executed and expired. As a result, there is no contingent liability related to this plan as of December 31, 2015 and December 31, 2016.

9. Reserve for treasury shares

	2016		2015	
	Number of shares	Reserve for treasury shares held by subsidiaries CHF millions	Number of shares	Reserve for treasury shares held by subsidiaries CHF millions
Treasury shares held by subsidiaries [1]				
January 1	**65 176 383**	**4 009**	**73 564 212**	**4 522**
Number of shares purchased/sold; reserves transferred	– 8 328 580	– 592	– 8 387 829	– 513
December 31	**56 847 803**	**3 417**	**65 176 383**	**4 009**

[1] Excluding foundations

	2016		2015	
	Number of shares	Reserve for treasury shares held by Novartis AG CHF millions	Number of shares	Reserve for treasury shares held by Novartis AG CHF millions
Treasury shares held by Novartis AG				
January 1	**101 185 638**	**4 676**	**80 507 458**	**2 373**
Number of shares purchased/canceled; reserves transferred	– 39 608 180	– 3 884	20 678 180	2 303
December 31	**61 577 458**	**792**	**101 185 638**	**4 676**

	2016		2015	
	Number of shares	Total reserve for treasury shares CHF millions	Number of shares	Total reserve for treasury shares CHF millions
Total treasury shares [1]				
January 1	**166 362 021**	**8 685**	**154 071 670**	**6 895**
Total number of shares purchased/sold or canceled; reserves transferred	– 47 936 760	– 4 476	12 290 351	1 790
December 31	**118 425 261**	**4 209**	**166 362 021**	**8 685**

[1] Excluding foundations

Novartis AG has met the legal requirements for legal reserves under Articles 659 et. seq. and 663b.10 SCO for the treasury shares.

Treasury share purchases during 2016 totaled 12.9 million (2015: 63.6 million), with an average purchase price of CHF 75 (2015: CHF 93). Treasury share sales totaled 4.1 million (2015: 27.0 million), with an average sale price of CHF 56 (2015: CHF 56), and share-based compensation transactions totaled 8.8 million shares (2015: 11.3 million shares).

The number of treasury shares held by the company and its subsidiaries meet the definitions and requirements of Article 659b SCO. At December 31, 2016, treasury shares held by Novartis AG and its subsidiaries totaled 118 425 261. As per the dividend payment date, Novartis AG and its subsidiaries are expected to hold 108 579 219 shares. These shares are non-dividend-bearing shares. It should be noted that within the Novartis Group's IFRS consolidated financial statements, some entities are included in the consolidation scope – mainly foundations, which do not qualify as subsidiaries in the sense of Article 659b SCO.

10. Free reserves

(CHF millions)	**2016**	2015
January 1	**34 560**	**36 380**
Reduction due to cancellation of treasury shares (CHF 4 651 million / CHF 2 348 million of repurchased shares less their nominal value of CHF 25 million / CHF 15 million)	– 4 626	– 2333
Transfer from reserve for treasury shares	593	513
December 31	**30 527**	**34 560**

11. Contingent liabilities

(CHF millions)	**Dec 31, 2016**	Dec 31, 2015
Guarantees in favor of subsidiaries to cover capital and interest of bonds, credit facilities and commercial paper programs – total maximum amount CHF 39 369 million (2015: CHF 38 445 million)	19 708	16 850
Other guarantees in favor of subsidiaries, associated companies and others – total maximum amount CHF 4 155 million (2015: CHF 2 707 million)	2 253	1 672
Total contingent liabilities	**21 961**	**18 522**

Novartis AG is part of the Swiss Novartis value added tax (VAT) group and is therefore jointly liable for existing and future VAT claims from the Swiss Federal Tax Administration.

12. Registration, voting restrictions and major shareholders

The company's Articles of Incorporation state that no person or entity shall be registered with the right to vote for more than 2% of the share capital as set forth in the Commercial Register. In particular cases, the Board of Directors may allow exemptions from the limitation for registration in the share register.

According to the share register, shareholders owning 2% or more of the Company's capital at December 31, excluding treasury shares held by Novartis AG and its subsidiaries that restrict their availability for use, are as follows:

	% Holding of share capital Dec 31, 2016	% Holding of share capital Dec 31, 2015
Novartis Foundation for Employee Participation, Basel	2.6	2.6
Emasan AG, Basel	3.4	3.3
UBS Fund Management (Switzerland) AG, Basel	2.1	1.8

Furthermore, there are the following other significant shareholders:

Shareholders registered as nominees:
- Chase Nominees Ltd., London, holds 8.5% (2015: 8.8%).
- Nortrust Nominees, London, holds 3.9% (2015: 3.2%).
- The Bank of New York Mellon, New York, holds 4.4% (2015: 4.6%) through its nominees The Bank of New York Mellon, Everett, with a holding of 1.8% (2015: 1.7%) and The Bank of New York Mellon, Brussels, with a holding of 2.6% (2015: 2.9%).

Shareholder acting as American Depositary Share (ADS) depositary:
- JPMorgan Chase Bank, New York, holds 12.0% (2015: 11.2%).

Shareholder disclosed through a notification filed with Novartis AG:
- Norges Bank (Central Bank of Norway), Oslo, holds 2.02%.

Shareholders disclosed through notifications filed with Novartis AG and the SIX Swiss Exchange:
- Capital Group Companies, Inc., Los Angeles, holds between 3% and 5%.
- BlackRock, Inc., New York, holds between 3% and 5%.

13. Equity instrument disclosures for the Board of Directors and Executive Committee members

Share ownership requirements for Board members

The Chairman is required to own a minimum of 30 000 Novartis shares, and other members of the Board of Directors are required to own at least 4 000 Novartis shares within three years after joining the Board of Directors, to ensure alignment of their interests with shareholders. Board members are prohibited from hedging or pledging their ownership positions in Novartis shares that are part of their guideline share ownership requirement, and are required to hold these shares for 12 months after retiring from the Board of Directors. As at December 31, 2016, all members of the Board of Directors who have served at least three years on the Board of Directors have complied with the share ownership guidelines.

Shares, ADRs and share options owned by Board members

The total number of vested Novartis shares and ADRs owned by members of the Board of Directors and "persons closely linked"[1] to them as at December 31, 2016 is shown in the table below.

As at December 31, 2016, no members of the Board of Directors together with "persons closely linked"[1] to them owned 1% or more of the outstanding shares (or ADRs) of Novartis. As at the same date, no members of the Board of Directors held any share options to purchase Novartis shares.

Shares and ADRs owned by Board members[1]

	Number of shares[2]	
	At December 31, 2016	At December 31, 2015
Joerg Reinhardt	497 762	480 404
Enrico Vanni	17 853	15 566
Nancy Andrews	2 308	609
Dimitri Azar	11 217	9 292
Ton Buechner (from February 24, 2016)	1 398	NA
Srikant Datar	34 998	32 629
Elizabeth Doherty (from February 24, 2016)	839	NA
Ann Fudge	17 530	15 605
Pierre Landolt[3]	58 061	54 866
Andreas von Planta	127 740	124 868
Charles L. Sawyers	6 029	4 252
William T. Winters	9 257	5 998
Total[4]	**784 992**	**744 089**

NA – Not applicable.

[1] Includes holdings of "persons closely linked" to Board members (see definition in this Note 13)

[2] Each share provides entitlement to one vote.

[3] According to Pierre Landolt, the Sandoz Family Foundation is the economic beneficiary of the shares.

[4] Verena A. Briner stepped down from the Board of Directors on February 23, 2016. On February 23, 2016, Dr. Briner owned 7 507 shares.

Share ownership requirements for Executive Committee members

Executive Committee members are required to own at least a minimum multiple of their annual base compensation in Novartis shares, Restricted Stock Units (RSUs) or share options within five years of hire or promotion, as set out in the table below.

In the event of a substantial rise or drop in the share price, the Board of Directors may, at its discretion, amend that time period accordingly.

Function	Ownership level
CEO	5 x base compensation
Other Executive Committee members	3 x base compensation

The determination of equity amounts against the share ownership requirements is defined to include vested and unvested Novartis shares or ADRs, as well as RSUs acquired under the compensation plans. However, unvested matching shares granted under the Leveraged Share Savings Plan (LSSP), the Employee Share Ownership Plan (ESOP), and any unvested Performance Share Units (PSUs) are excluded. The determination also includes other shares as well as vested options of Novartis shares or ADRs that are owned directly or indirectly by "persons closely linked"[1] to an Executive Committee member. The Compensation Committee reviews compliance with the share ownership guideline on an annual basis.

As at December 31, 2016, all members who have served at least five years on the Executive Committee have met or exceeded their personal Novartis share ownership requirements.

Shares, ADRs, equity rights and share options owned by Executive Committee members

The following table shows the total number of shares, ADRs, and other equity rights owned by Executive Committee members and "persons closely linked"[1] to them as at December 31, 2016.

As at December 31, 2016, no Executive Committee members together with "persons closely linked" to them owned 1% or more of the outstanding shares (or ADRs) of Novartis. As at the same date, no member of the Executive Committee held any share options to purchase Novartis shares, with the exception of André Wyss who held 373 000.

[1] "Persons closely linked" are (i) their spouse, (ii) their children below age 18, (iii) any legal entities that they own or otherwise control, and (iv) any legal or natural person who is acting as their fiduciary.

Shares, ADRs and other equity rights owned by Executive Committee members[1]

	Vested shares and ADRs	Unvested shares and other equity rights[2]	**Total at December 31, 2016**	Vested shares and ADRs	Unvested shares and other equity rights[2]	**Total at December 31, 2015**
Joseph Jimenez (CEO)	347 278	273 930	621 208	284 405	322 200	606 605
Steven Baert	11 111	50 827	61 938	1 700	44 977	46 677
F. Michael Ball	0	49 081	49 081	NA	NA	NA
James Bradner	0	14 479	14 479	NA	NA	NA
Felix R. Ehrat	137 290	122 196	259 486	92 435	107 870	200 305
Richard Francis	22 424	49 550	71 974	14 357	37 722	52 079
Paul Hudson	0	24 027	24 027	NA	NA	NA
Harry Kirsch	47 437	108 686	156 123	46 579	100 359	146 938
Vasant Narasimhan	7 271	79 703	86 974	NA	NA	NA
Bruno Strigini	4 310	92 383	96 693	NA	NA	NA
André Wyss	61 475	92 875	154 350	44 660	79 917	124 577
Total[3]	**638 596**	**957 737**	**1 596 333**	484 136	693 045	1 177 181

NA – Not applicable.

[1] Includes holdings of "persons closely linked" to Executive Committee members (see definition in this Note 13)

[2] Includes restricted shares, RSUs and target number of PSUs. Matching shares under the ESOP and LSSP, and target number of PSUs are disclosed pro-rata to December 31, unless the award qualified for full vesting under the relevant plan rules. Awards under all other incentive plans are disclosed in full.

[3] David Epstein, Mark C. Fishman and Jeff George stepped down from the Executive Committee in 2016. At the time they stepped down from the Executive Committee, Mr. Epstein owned 116 027 vested shares, and 250 225 unvested shares and other equity rights; Dr. Fishman owned 117 792 vested shares, and 83 311 unvested shares and other equity rights; and Mr. George owned 144 368 vested shares, 141 396 vested share options, and 74 189 unvested shares and other equity rights.

Appropriation of available earnings of Novartis AG as per balance sheet and declaration of dividend

(CHF)	2016	2015
Available unappropriated earnings		
Balance brought forward	2 039 915 695	805 551 128
Net income of the year	8 140 581 612	8 040 648 710
Total available earnings at the disposal of the Annual General Meeting	**10 180 497 307**	**8 846 199 838**
Appropriation proposed by the Board of Directors		
Payment of a gross dividend (before taxes and duties) of CHF 2.75 (2015: CHF 2.70) on 2 518 535 601 (2015: 2 520 845 979) dividend-bearing shares[1] with a nominal value of CHF 0.50 each	– 6 925 972 903	– 6 806 284 143
Balance to be carried forward	**3 254 524 404**	**2 039 915 695**

[1] No dividend will be declared on treasury shares held by Novartis AG, and certain treasury shares held by other Group companies.

Assuming that this proposal by the Board of Directors is approved by the Annual General Meeting of shareholders, payment of the dividend will be made as from March 6, 2017. The last trading day with entitlement to receive the dividend is March 1, 2017. As from March 2, 2017 the shares will be traded ex-dividend.

Report of the statutory auditor on the financial statements of Novartis AG

To the General Meeting of Novartis AG, Basel

Opinion

As statutory auditor, we have audited the financial statements of Novartis AG which comprise the balance sheet as at December 31, 2016 and the income statement and notes (pages 255 to 264) for the year then ended.

In our opinion the accompanying financial statements as at December 31, 2016 comply with Swiss law and the company's articles of incorporation.

Basis for opinion

We conducted our audit in accordance with Swiss law and Swiss Auditing Standards. Our responsibilities under those provisions and standards are further described in the Auditor's responsibilities for the audit of the financial statements section of our report.

We are independent of the entity in accordance with the provisions of Swiss law and the requirements of the Swiss audit profession and we have fulfilled our other ethical responsibilities in accordance with these requirements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Our audit approach

Audit scope

We designed our audit by determining materiality and assessing the risks of material misstatement in the financial statements. In particular, we considered where subjective judgements were made; for example, in respect of significant accounting estimates that involved making assumptions and considering future events that are inherently uncertain. As in all of our audits, we also addressed the risk of management override of internal controls, including among other matters, consideration of whether there was evidence of bias that represented a risk of material misstatement due to fraud.

Materiality

The scope of our audit was influenced by our application of materiality. Our audit opinion aims to provide reasonable assurance that the financial statements are free from material misstatement. Misstatements may arise due to fraud or error. They are considered material if individually or in aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the financial statements.

Based on our professional judgement, we determined certain quantitative thresholds for materiality, including the overall materiality for the financial statements as a whole as listed below. These, together with qualitative considerations, helped us to determine the scope of our audit and the nature, timing and extent of our audit procedures and to evaluate the effect of misstatements, both individually and in aggregate on the financial statements as a whole.

— Overall materiality: CHF 400 million
— How we determined it: 5% of income before taxes, rounded
— Rationale for the materiality benchmark applied: We chose income before taxes as the measure because, in our view, it is the measure against which the performance of the entity is most commonly assessed and is a generally accepted benchmark.

We agreed with the Audit Committee that we would report to them misstatements identified during our audit above CHF 20 million as well as any misstatements below that amount which, in our view, warranted reporting for qualitative reasons.

Key Audit Matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the financial statements of the current period. We have determined that there are no such matters to report.

Responsibilities of the Board of Directors for the financial statements

The Board of Directors is responsible for the preparation of the financial statements in accordance with the provisions of Swiss law and the company's articles of incorporation, and for such internal control as the Board of Directors determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Board of Directors is responsible for assessing the entity's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the Board of Directors either intends to liquidate the entity or to cease operations, or has no realistic alternative but to do so.

Auditor's responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Swiss law and Swiss Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Swiss law and Swiss Auditing Standards, we exercise professional judgment and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made.
- Conclude on the appropriateness of the Board of Directors' use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the entity's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the entity to cease to continue as a going concern.

We communicate with the Board of Directors or its relevant committee regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide the Board of Directors or its relevant committee with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated with the Board of Directors or its relevant committee, we determine those matters that were of most significance in the audit of the financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, we determine that a matter should not be communicated in our report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

Report on other legal and regulatory requirements

In accordance with article 728a paragraph 1 item 3 CO and Swiss Auditing Standard 890, we confirm that an internal control system exists, which has been designed for the preparation of financial statements according to the instructions of the Board of Directors.

We further confirm that the proposed appropriation of available earnings complies with Swiss law and the company's articles of incorporation. We recommend that the financial statements submitted to you be approved.

PricewaterhouseCoopers AG

pwc

Bruno Rossi
Audit expert
Auditor in charge

Stephen Johnson
Global relationship partner

Basel, January 24, 2017

Other information

Each year, Novartis commissions a photographer to portray a unique, personal and artistic perspective of healthcare around the world. Depicting the diversity of patients, medical professionals, researchers and caregivers, the photographs demonstrate the complex realities of global healthcare. We are grateful to Andrea Bruce and to those who shared their experiences for the Annual Report 2016.

Aurelia Mendez Pablo has blood drawn as part of research in Guatemala aimed at reducing the health impact of smoke from cooking fires.

Andrea Bruce

Andrea Bruce is a documentary photographer who brings attention to people living in the aftermath of war. She concentrates on the social issues that are sometimes ignored and often ignited in war's wake.

Ms. Bruce started working in Iraq in 2003, following the intricacies and obstacles of the conflict experienced by Iraqis and the US military. For more than 10 years, she has chronicled the world's most troubled areas, focusing on Iraq and Afghanistan. Currently she is a member and co-owner of the photo agency NOOR.

For eight years, she worked as a staff photographer for The Washington Post and later as part of the VII Network (2010-2011). At The Post, she originated and authored a weekly column called "Unseen Iraq." She also worked at The Concord Monitor and The St. Petersburg Times after graduating from the University of North Carolina at Chapel Hill in the US in 1995.

Her awards include top honors from the White House News Photographers Association (WHNPA), where she has been named Photographer of the Year four times; several awards from the International Pictures of the Year contest; and the prestigious John Faber Award from the Overseas Press Club in New York. She received the WHNPA grant in 2010 for her work in Ingushetia, and she was a 2011 recipient of the Alicia Patterson Foundation Fellowship. In 2012, she was the recipient of the first Chris Hondros Fund Award for the "commitment, willingness and sacrifice shown in her work." The World Press Photo awarded her 2nd prize in the category "Daily Life," singles, for the image "Soldier's Funeral" in 2014.

In 2016, Ms. Bruce finished Harvard's Nieman Fellowship for journalists, and she is currently based in Cambridge, Massachusetts in the US.

Key dates for 2017

Anticipated reporting dates

Annual General Meeting
February 28, 2017

First quarter 2017 results
April 25, 2017

Novartis investor event in Boston, USA
May 30-31, 2017

Second quarter and first half 2017 results
July 18, 2017

Third quarter and first nine months 2017 results
October 24, 2017

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Further detail

www.novartis.com
www.novartis.com/annualreport2016
www.novartis.com/order2016annualreport

Forward-looking statements

These materials contain forward-looking statements that can be identified by words such as "potential," "expected," "will," "planned," "pipeline," "outlook," or similar terms, or by express or implied discussions regarding potential new products, potential new indications for existing products, or regarding potential future revenues from any such products; potential shareholder returns or credit ratings; or regarding the potential financial or other impact on Novartis or any of our divisions of the significant reorganizations of recent years, including the creation of the Pharmaceuticals and Oncology business units to form the Innovative Medicines Division, the creation of the Global Drug Development organization and Novartis Operations (including Novartis Technical Operations and Novartis Business Services), the transfer of the Ophthalmic Pharmaceuticals products of our Alcon Division to the Innovative Medicines Division, the transfer of selected mature, non-promoted pharmaceutical products from the Innovative Medicines Division to the Sandoz Division, and the transactions with GSK, Lilly or CSL; or regarding potential future sales or earnings of the Novartis Group or any of its divisions; or by discussions of strategy, plans, expectations or intentions. You should not place undue reliance on these statements. Such forward looking statements are based on the current beliefs and expectations of management regarding future events, and are subject to significant known and unknown risks and uncertainties. Should one or more of these risks or uncertainties materialize, or should underlying assumptions prove incorrect, actual results may vary materially from those set forth in the forward looking statements. There can be no guarantee that any new products will be approved for sale in any market, or that any new indications will be approved for any existing products in any market, or that any approvals which are obtained will be obtained at any particular time, or that any such products will achieve any particular revenue levels. Nor can there be any guarantee that Novartis will be able to realize any of the potential strategic benefits, synergies or opportunities as a result of the significant reorganizations of recent years, including the creation of the Pharmaceuticals and Oncology business units to form the Innovative Medicines Division, the creation of the Global Drug Development organization and Novartis Operations (including Novartis Technical Operations and Novartis Business Services), the transfer of the Ophthalmic Pharmaceuticals products of our Alcon Division to the Innovative Medicines Division, the transfer of selected mature, non-promoted pharmaceutical products from the Innovative Medicines Division to the Sandoz Division, and the transactions with GSK, Lilly or CSL. Neither can there be any guarantee that shareholders will achieve any particular level of shareholder returns. Nor can there be any guarantee that the Group, or any of its divisions, will be commercially successful in the future, or achieve any particular credit rating or financial results. In particular, management's expectations could be affected by, among other things: regulatory actions or delays or government regulation generally; the potential that the strategic benefits, synergies or opportunities expected from the significant reorganizations of recent years, including the creation of the Pharmaceuticals and Oncology business units to form the Innovative Medicines Division, the creation of the Global Drug Development organization and Novartis Operations (including Novartis Technical Operations and Novartis Business Services), the transfer of the Ophthalmic Pharmaceuticals products of our Alcon Division to the Innovative Medicines Division, the transfer of selected mature, non-promoted pharmaceutical products from the Innovative Medicines Division to the Sandoz Division, and the transactions with GSK, Lilly or CSL may not be realized or may take longer to realize than expected; the inherent uncertainties involved in predicting shareholder returns or credit ratings; the uncertainties inherent in the research and development of new healthcare products, including clinical trial results and additional analysis of existing clinical data; our ability to obtain or maintain proprietary intellectual property protection, including the ultimate extent of the impact on Novartis of the loss of patent protection and exclusivity on key products which commenced in prior years and will continue this year; safety, quality or manufacturing issues; global trends toward health care cost containment, including ongoing pricing and reimbursement pressures, such as from increased publicity on pharmaceuticals pricing, including in certain large markets; uncertainties regarding actual or potential legal proceedings, including, among others, actual or potential product liability litigation, litigation and investigations regarding sales and marketing practices, intellectual property disputes and government investigations generally; general economic and industry conditions, including uncertainties regarding the effects of the persistently weak economic and financial environment in many countries; uncertainties regarding future global exchange rates; uncertainties regarding future demand for our products; and uncertainties regarding potential significant breaches of data security or disruptions of our information technology systems; and other risks and factors referred to in Novartis AG's current Form 20-F on file with the US Securities and Exchange Commission. Novartis is providing the information in these materials as of this date and does not undertake any obligation to update any forward-looking statements as a result of new information, future events or otherwise.

The business policy of Novartis takes into account the OECD's Guidelines for Multinational Enterprises, with their recommendations on the disclosure of information.

Our Annual Report is published in English; a German translation is also available.

Publisher: Novartis International AG, Basel, Switzerland
Design: phorbis communications, Basel, Switzerland
Production: Management Digital Data AG, Lenzburg, Switzerland
Management Photography: Thomas Stöckli, Zürich, Switzerland
Printer: Neidhart + Schön Group, Zürich, Switzerland

Photo on the right
Field worker Expedita Ramírez Marroquín works with women in rural Guatemala, focusing on diet, prenatal health and household characteristics. She also assists with a program around the town of San Lorenzo aimed at reducing the health impact of smoke from cooking fires, which contributes to respiratory illness.
Back cover
Antonina Hernández, who suffers from Alzheimer's, exercises four days a week under the guidance of her son, Juan Pedro García Hernández, who is also her full-time caregiver.


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