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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-K

X ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended **December 31, 2021**
or
☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF
For the transition period from _____ to _____

Commission File Number: **001-37758**
Moleculin Biotech, Inc.
(Exact name of registrant as specified in its charter)

Delaware	**2834**	**47-4671997**
(State or Other Jurisdiction of Incorporation or Organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

5300 Memorial Drive, Suite 950
Houston, Texas 77007
(713) 300-5160
(Address of Principal Executive Offices, Zip Code and Registrant's Telephone Number)

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	**Trading Symbol (s)**	**Name of Each exchange on which registered**
Common Stock, par value $0.001 per share	MBRX	Nasdaq Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No X

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No X

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter periods as the registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days. Yes X No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes X No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act. (check one)

Large accelerated filer ☐
Non-accelerated filer X
Accelerated filer ☐
Smaller reporting company X
Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 USC. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No X

The aggregate market value of the registrant's voting equity held by non-affiliates of the registrant, computed by reference to the price at which the common stock was last sold as of the last business day of the registrant's most recently completed second fiscal quarter, was $101 million. In determining the market value of the voting equity held by non-affiliates, securities of the registrant beneficially owned by directors, officers and 10% or greater shareholders of the registrant have been excluded. This determination of affiliate status is not necessarily a conclusive determination for other purposes. The number of shares of the registrant's common stock outstanding as of March 14, 2022 was 28,578,338.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of this registrant's definitive proxy statement for its 2022 Annual Meeting of Stockholders to be filed with the SEC no later than 120 days after the end of the registrant's fiscal year are incorporated herein by reference in Part III of this Annual Report on Form 10-K.

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Moleculin Biotech, Inc.
CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

The Securities and Exchange Commission, referred to herein as the SEC, encourages companies to disclose forward-looking information so that investors can better understand a company's future prospects and make informed investment decisions. Certain statements that we may make from time to time, including, without limitation, statements contained in this report constitute "forward- looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995.

We make forward-looking statements under the "Risk Factors," "Business," "Management's Discussion and Analysis of Financial Condition and Results of Operations" and in other sections of this report. In some cases, you can identify these statements by forward-looking words such as "may," "might," "should," "would," "could," "expect," "plan," "anticipate," "intend," "believe," "estimate," "predict," "potential" or "continue," and the negative of these terms and other comparable terminology. These forward-looking statements, which are subject to known and unknown risks, uncertainties and assumptions about us, may include projections of our future financial performance based on our growth strategies and anticipated trends in our business. These statements are only predictions based on our current expectations and projections about future events. There are important factors that could cause our actual results, level of activity, performance or achievements to differ materially from the results, level of activity, performance or achievements expressed or implied by the forward-looking statements. In particular, you should consider the numerous risks and uncertainties described under "Risk Factors."

While we believe we have identified material risks, these risks and uncertainties are not exhaustive. Other sections of this report describe additional factors that could adversely impact our business and financial performance. Moreover, we operate in a very highly regulated, competitive and rapidly changing environment. New risks and uncertainties emerge from time to time, and it is not possible to predict all risks and uncertainties, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements.

Although we believe the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, level of activity, performance or achievements. Moreover, neither we nor any other person assumes responsibility for the accuracy or completeness of any of these forward-looking statements. You should not rely upon forward-looking statements as predictions of future events. We are under no duty to update any of these forward-looking statements after the date of this report to conform our prior statements to actual results or revised expectations, and we do not intend to do so.

Forward-looking statements include, but are not limited to, statements about:

- Our ability to continue our relationship with MD Anderson, including, but not limited to, our ability to maintain current licenses and license future intellectual property resulting from our sponsored research agreements with MD Anderson;
- The success or the lack thereof, including the ability to recruit subjects, for a variety of reasons, of our clinical trials through all phases of clinical development;
- Our ability to satisfy any requirements imposed by the FDA (or its foreign equivalents) as a condition of our clinical trials proceeding or beginning as planned;
- The COVID-19 pandemic effect on our clinical trials, clinical drug candidate supplies, preclinical activities and our ability to raise future financing;
- Our ability to obtain additional funding to commence or continue our clinical trials, fund operations and develop our product candidates;
- The need to obtain and retain regulatory approval of our drug candidates, both in the United States and in Europe, and in countries deemed necessary for future trials;
- Our ability to complete our clinical trials in a timely fashion and within our expected budget and resources;
- Compliance with obligations under intellectual property licenses with third parties;
- Any delays in regulatory review and approval of drug candidates in clinical development;
- Potential efficacy of our drug candidates;
- Our ability to commercialize our drug candidates;
- Market acceptance of our drug candidates;
- Competition from existing therapies or new therapies that may emerge;
- Potential product liability claims;
- Our dependency on third-party manufacturers to successfully, and timely, supply or manufacture our drug candidates for our preclinical work and our clinical trials;
- Our ability to establish or maintain collaborations, licensing or other arrangements;
- The ability of our sublicense partners to successfully develop our product candidates in accordance with our sublicense agreements;
- Our ability and third parties' abilities to protect intellectual property rights;
- Our ability to adequately support future growth; and
- Our ability to attract and retain key personnel to manage our business effectively.

We caution you not to place undue reliance on the forward-looking statements, which speak only as of the date of this Form 10-K in the case of forward-looking statements contained in this Form 10-K.

PART I

References in this Annual Report on Form 10-K to "MBI", "Moleculin" or "the Company", "we", "our" and "us" are used herein to refer to Moleculin Biotech, Inc.

ITEM 1. BUSINESS

Overview

Our Business

We are a clinical stage pharmaceutical company with a growing pipeline of clinical programs for the treatment of highly resistant cancers and viruses. We have three core technologies, based substantially on discoveries made at and licensed from MD Anderson Cancer Center (MD Anderson) in Houston, Texas. We have six drug candidates, three of which have now shown human activity in clinical trials.

Core Technologies

Our core technologies consist of the following: a) Annamycin, a "next generation" anthracycline designed to be different than currently approved anthracyclines by eliminating cardiotoxicity and avoiding the multidrug resistance mechanisms that can limit the efficacy of the approved products. (Annamycin has shown no cardiotoxicity in subjects treated to date in Moleculin's clinical trials); b) our WP1066 Portfolio, which includes WP1066 and WP1220, two of several Immune/Transcription Modulators in the portfolio designed to inhibit p-STAT3 (phosphorylated signal transducer and activator of transcription) among other transcription factors associated with tumor activity, while also stimulating a natural immune response to tumors by inhibiting the errant activity of Regulatory T-Cells (TRegs); and c) our WP1122 Portfolio, which contains compounds (including WP1122, WP1096, WP1097) designed to exploit the potential uses of inhibitors of glycolysis such as 2-deoxy-D-glucose (2-DG), which we believe may provide an opportunity to cut off the fuel supply of tumors by taking advantage of their high level of dependence on glucose in comparison to healthy cells.

Clinical Trials

In the US and Europe, we have completed or are currently conducting clinical trials for three of our drug candidates – Annamycin, WP1066, and WP1220. All trials are or were in the Phase 1 portion, except the WP1220 trial, which was a proof-of-concept clinical trial. During 2021, we had four active clinical trials evaluating either Annamycin or WP1066 in the US and Europe. In 2021 and early 2022, there were also three "right-to-try" (or their foreign equivalent) uses of Annamycin and WP1066. Of the four clinical trials active in 2021, two of those are internally funded trials (the difference between "internally" and "externally" funded trials is discussed below) of Annamycin. One is studying relapsed and refractory acute myeloid leukemia (AML) in Europe, and one is investigating soft tissue sarcoma metastasized to the lungs (STS lung metastases) in the US. The other two trials are externally funded studies of WP1066 in brain tumors, both in the US, one of which was terminated during the year because the Principal Investigator in that trial moved to a new institution. We successfully concluded an internally funded Phase 1 AML clinical trial in Europe in early 2022, establishing a Recommended Phase 2 Dose (RP2D) for Annamycin as a single agent. We are in the process of locking the database and beginning the completion of the Clinical Study Report (CSR) for that study.

During 2021, we filed applications or began recruiting for four clinical trials in the US and Europe. The investigational new drug (IND) application in the US for a Phase 1b/2 trial of Annamycin for the treatment of STS lung metastases was filed in late 2020 with the US Food and Drug Administration (FDA). The IND went into effect in early 2021 and this trial began recruiting subjects shortly thereafter. In 2021, we also filed and received clearance for an IND for a Phase 1 trial for WP1122 treating glioblastoma multiforme (GBM) in adults, and consistent with our strategy of leveraging external funding for many of our clinical trials, we intend to seek opportunities for an investigator-initiated clinical trial in cancer patients in 2022. We also filed in October 2021 a clinical trial application (CTA) to commence a Phase 1a clinical trial of WP1122 in the United Kingdom for the treatment of COVID-19 for which we later received the appropriate authorization to proceed. In early March 2022, we filed an amended protocol with both the Riverside Ethics Committee and Medicines and Healthcare Products Regulatory Agency (MHRA). The amendment updated the level of dilution of the oral solution to ensure that WP1122 is fully dissolved in a wider range of pharmacy environments. We believe that the risk/benefit aspect of the study was not affected by this change. Once this amendment is approved, we expect this internally funded trial to begin in the first half of 2022.

We also filed a CTA in Poland in November 2021 for a Phase 1/2 trial for the treatment of relapsed and refractory AML with a combination of Annamycin and Cytarabine (AnnAraC) for which we received Central Ethics approval in December 2021. Upon receipt of approval from the Office for Registration of Medicinal Products, Medical Devices and Biocidal Products (URPL), we plan to proceed with this trial. This trial builds on the safety and dosage data from the two successfully concluded single agent Annamycin AML Phase 1 trials in the US and Europe and is supported by preclinical animal data from our ongoing sponsored research at MD Anderson. The AnnAraC trial is expected to begin during the first half of 2022.

In addition to the trials described above, we expect that an investigator sponsored trial will be initiated in Europe in 2022 to study an alternative dosing regimen for Annamycin in the treatment of STS lung metastases. During 2022, we may also have another investigator led trial outside of the US (partially internally funded) focused on the use of WP1122 for the treatment of subjects with COVID-19. The volatility and unpredictability of COVID-19 incidence in various countries may limit our ability to recruit certain subjects and could make it infeasible for us to conduct a Phase 2 clinical trial on a timely basis, or at all. As mentioned earlier, the WP1066 brain tumor trial at MD Anderson was terminated in 2021, as the original lead physician investigator moved to another institution. We expect another externally funded Phase 1/2 investigator led trial to replace the MD Anderson trial in 2022. That trial's IND will likely reference our WP1066 GBM IND filed in early 2022, once cleared by the FDA. We expect this new trial to investigate WP1066 in combination with radiation for the treatment of adult brain tumors.

As summarized and explained further below, we expect up to ten clinical trials (or more, if we proceed with a COVID-19 trial in addition to the UK trial) to be active or concluded by the end of 2022.

Clinical Summary as of this filing1 **Unless CSR Completed – Data are preliminary and subject to change**						
Drug Candidate	**Trial / Indication / Location**	**Phase** (Funding Source: Internal unless noted as External)	**Status**	**Comments**	**Safety Data**	**Human Activity**
Annamycin	MB-104 / R/R AML / US	1/2	Phase 1 concluded and CSR completed. Phase 2 start awaits further data from other trials	Maximum Dose allowed per protocol 120 mg/m2	Met safety endpoints; no cardiotoxicity	14.3% MLFS (subtherapeutic dose level when compared to MB-105)
Annamycin	MB-105 / R/R AML / Poland	1/2	Phase 1 concluded and database lock is in process	Maximum Dose and RP2D 240 mg/m2	Met safety endpoints; no cardiotoxicity	60% ORR in last cohort (2 PRs and 1 CRi)
Annamycin	MB-107 / STS Lung Metastases / US	1b/2	In Phase 1b; cohort 4 at 390 mg/m2; cohort expanded due to DLT	Recruiting and estimate expansion phase in 2022	No cardiotoxicity to date	Some subjects exhibited stable disease with one PR as best overall response to date
Annamycin in Combination with Cytarabine	MB-106 / R/R AML / Europe	1/2	Expected to begin recruiting Phase 1 in 2022	CTA submitted, awaiting approval	Not applicable as trial has not started (N/A)	N/A
Annamycin	IIT / STS Lung Metastases / Poland	1b/2 External	Expect to begin Phase 1b recruiting in 2022	Investigator led trial with a different dosing regimen than MB-107	N/A	N/A
WP1066	IIT / Adult GBM / US	1 External	Terminated by site	Investigator left for another institution	No drug related serious adverse events noted	No activity demonstrated. RP2D or MTD not established.
WP1066 in combination with radiation	IIT / Adult GBM / US	1 External	Expect to begin recruiting in 2022	To be led by investigator with prior experience with WP1066	N/A	N/A
WP1066	IIT / Pediatric Brain Tumors / US	1 External	In Dose Level 3 at 8mg/kg	Ongoing recruitment	No drug related serious adverse events noted	1 DIPG patient had a temporary clinical response
WP1220	MB-201 / CTCL / Poland	1b / Proof of Concept	Concluded and CSR completed	Believe results warrant a Phase 2 study	Met safety endpoints	60% of subjects documented PR
WP1122	MB-301 / COVID-19 / UK	1a	Expect to begin in first half of 2022	First in human trial for WP1122	N/A	N/A

1 This is a summary of the detailed discussion below and does not include compassionate use/right-to-try usage of our drug candidates. Terms are defined elsewhere in this document including "internal" versus "external" funding. Additionally, "Met safety endpoints" means that no drug-related serious and unexpected adverse events occurred as defined in the trial protocol. All data presented are preliminary unless a CSR has been issued for the trial referenced.

Human Activity

Three of our drug candidates have shown activity in humans to date. Prior to 2021, a US Phase 1 trial for Annamycin in AML successfully met its safety endpoint (including the absence of cardiotoxicity) and demonstrated human activity in the reduction of circulating bone marrow blasts despite the trial being conducted at what were expected to be subtherapeutic dosages (not exceeding 120 mg/m2) based on the European AML study. This US study's CSR was issued in 2021. In the final cohort of the European Phase 1 single-agent Annamycin trial, where the RP2D was determined to be 240 mg/m2, there was a preliminary objective response rate (ORR) of 60% (three out of five) in subjects receiving a full course of treatment.

In an investigator-initiated trial (IIT) trial of WP1066 (our lead inhibitor of p-STAT3) for the treatment of pediatric brain tumors, both a clinical and an objective response was demonstrated in a patient with diffuse interstitial pontine glioma (DIPG), one of several indications for which WP1066 has been granted a "rare pediatric disease" designation, which could potentially qualify WP1066 for a priority review voucher upon approval of a New Drug Application (NDA).

The CSR issued in 2021 for a clinical trial of WP1220, another drug candidate in the WP1066 Portfolio, for the topical treatment of cutaneous T-cell lymphoma (CTCL) documented in 60% of subjects (3 out of 5) PR that was confirmed by a subsequent evaluation one month later with one of the subjects having a near total resolution of their lesions (93% decrease). The median time to PR was 56 days. Stable disease was the best response documented for remaining 40% of subjects (2 out of 5), resulting in clinical benefit for 100% of subjects. All subjects (100%) survived up to 112 days of follow-up.

Funding Strategy

By "internally funded" we mean that the primary costs of the preclinical activity and clinical trials are funded and sponsored by us. By "externally funded" we mean that the preclinical work is performed by external collaborators and for the clinical trials are physician-sponsored or IITs. For externally funded research, any grant funds that support such preclinical work or clinical trials and most of the associated expenses do not flow through our financial statements. For externally funded preclinical activities and clinical trials, we do provide drug product and other supporting activities for which costs are shown in our financial statements.

Additionally, we are seeking collaborative partners to further clinical research on all three of our core programs. Specifically, we have ongoing discussions with potential partners to support a Phase 2 clinical trial of WP1220 in CTCL. The ultimate course of action depends on the outcome of additional regulatory and preclinical work. These trials may be internally or externally funded, depending on the timing and nature of the studies. Utilizing our sponsored research, we are further evaluating WP1122 and other molecules in that portfolio (WP1096 and WP1097) for the treatment of COVID-19 and other viruses. These discussions, unless otherwise described herein, are preliminary. The volatility and unpredictability of COVID-19 incidence in various countries may limit our ability to recruit certain subjects and could make it infeasible for us to conduct a Phase 2 clinical trial on a timely basis, or at all.

Working Environment

Our headquarters and laboratory are in Houston, Texas, and our workforce, as of year-end 2021, consisted of twenty-one full and part-time employees, including contractors devoting more than 20 hours per week, in the US and Europe, which are leveraged with other service providers and contractors worldwide working in a primarily virtual environment, even prior to the COVID-19 pandemic. This number increased to twenty-two in early 2022. We do not have manufacturing facilities and all manufacturing activities are contracted out to third parties. Additionally, we do not have a sales organization. Our overall strategy is to seek the best value for our shareholders either via potential outlicensing or collaborative opportunities with other pharmaceutical companies with existing marketing, sales and distribution or via the development of contracted marketing, sales and distribution capability if and when our drugs are approved.

The spread of COVID-19 has caused significant volatility in US and international markets, including Poland, where we conduct some of our clinical trials, and Italy, where our drug supply is produced. There has been limited temporary interruption of our drug supply, and the ability to monitor activities were limited at most Polish clinics where we are conducting trials, which could delay our ability to collect data and authorize new subject recruitment. Additionally, we believe COVID-19 has materially slowed the ability of approved sites to recruit subjects for our trials in Poland. Although, the impact of the pandemic appears to be lessened, this continues to be a volatile situation that could continue to improve or worsen at any time. Furthermore, there is significant uncertainty around the breadth and duration of business disruptions related to COVID-19, including the impact on the US and international economies and, as such, we are therefore unable to determine if those circumstances will have a material impact to our operations.

Additionally, war, terrorism, geopolitical uncertainties (such as the current crisis in Ukraine) and other business interruptions could cause damage to, disrupt or cancel the conduct of our clinical trials on a global or regional basis, which could have a material adverse effect on our business, clinical sites or vendors with which we do business. Such events could also decrease the availability of subjects interested or able to enroll in our clinical trials or make it difficult or impossible for us to deliver products and services to our clinical investigational sites. In addition, territorial invasions can lead to cybersecurity attacks on technology companies, such as ours, located outside of the conflict zone. In the event of prolonged business interruptions due to geopolitical events, we could incur significant losses, require substantial recovery time and experience significant expenditures in order to resume our business or clinical operations. While having operations in neighboring Poland, we have no operations directly in Russia or Ukraine, but we do not and cannot know if the current uncertainties in these geopolitical areas, which are unfolding in real-time, will escalate and result in broad economic and security conditions or rationing of medical supplies or production facilities, which could limit our ability to conduct clinical trials or result in material implications for our business. In addition, our insurance policies typically contain a war exclusion of some description and we do not know how our insurers are likely to respond in the event of a loss alleged to have been caused by geopolitical uncertainties.

We cannot determine whether these events will materially impact our overall business and operations, recruitment, and our drug supply in the future.

Mission and Strategy Overview

We are a clinical stage pharmaceutical company with a growing pipeline of clinical development programs for the treatment of highly resistant cancers and viruses. For cancers, these include AML, GBM, STS lung metastases, pancreatic cancer, CTCL, other vital organ metastases, and others. With regard to viruses, our current focus is the possible treatment of COVID-19, its variants and potential future coronaviruses, while additional preclinical work has demonstrated possible activity against HIV, Zika, and Dengue fever. Our diverse pipeline of technologies was built around the recognition that many highly resistant tumors tend to have a common set of traits, including an increase in multidrug resistance mechanisms, an evasion of the natural immune system, a marked upregulation of certain key oncogenic transcription factors and an increased dependence on glycolysis for energy production. Many of these traits are also common to certain viruses and we believe each of these elements may be addressed by the unique and innovative mechanisms introduced by one or more of our three core technologies. As detailed within, although we have conducted a significant amount of preclinical and early-stage clinical work that we consider promising, there is no guarantee that any future study will be conducted or will be successful, or that our product candidates, if approved, will ultimately be successfully commercialized.

We believe our technologies may provide an opportunity to help the many patients in need of alternative therapies, both as single agents and in combination with numerous existing technologies that often fail as tumors present immediate or acquired resistance. We believe showing even modest improvements in highly resistant cancers and viruses may lead to approval pathways that may potentially reduce the time and capital required to ultimately realize success.

Our technology is licensed from MD Anderson via exclusive licenses, which are discussed in more detail below. In February 2019, we announced our sublicensing agreement to WPD Pharmaceuticals (WPD), an entity associated with one of our cofounders and the chair of our science advisory board, Dr. Waldemar Priebe. WPD recently announced their facilitation of a grant equivalent to $1.5 million to the Maria Sklodowska-Curie National Research Institute of Oncology (MSCNRIO) to fund a Phase 1b/2 clinical trial of Annamycin for the treatment of STS lung metastases. The grant-funded clinical trial is led by Prof. Piotr Rutkowski, MD, PhD, Head of Department of Soft Tissue/Bone Sarcoma and Melanoma at the MSCNRIO in Warsaw, Poland. As we continue to generate additional human data, we intend to pursue additional strategic collaborations on a regional basis for each of our drug candidates. Additionally, we are independently exploring other grant funded opportunities.

This increase in potential outside funding should allow us to concentrate our internal resources primarily on Annamycin, WP1122, and alternate methods of delivery for WP1066. This allows us to prioritize our internal funding to core clinical trials that we think may lead to an approval pathway and/or a strategic licensing opportunity. Accordingly, we have increased our focus on clinical trial pathways for Annamycin, which is now in clinical trials for two different indications. We have now seen human activity in three drug candidates, some of which that we think are capable of supporting an approval pathway with continued positive developments in their respective clinical trials. We continue to internally fund our WP1122 antiviral program, as we now have an approved CTA for a Phase 1 clinical trial intended to establish an RP2D, however the volatility and unpredictability of COVID-19 incidence in various countries may limit our ability to recruit certain subjects and could make it infeasible for us to conduct a Phase 2 clinical trial on a timely basis, or at all. In addition, the FDA recently cleared an IND for the study of WP1122 in GBM and we intend to identify investigators interested in collaborating on the potential oncology indications for this drug candidate.

Intellectual Property

We have obtained worldwide, exclusive licenses from MD Anderson Cancer Center (MD Anderson) to issued US patents and pending US patent applications for each of our drug candidates, as well as pending foreign patent applications or issued foreign patents. With respect to certain patents or patent applications, we are co-owners with MD Anderson, in which instances we have exclusively licensed MD Anderson's rights in those patents or patent applications. Where MD Anderson has sole ownership of patents licensed to us, MD Anderson is responsible for the prosecution and maintenance of those patent applications, with input from us and at our expense. Where MD Anderson jointly owns patent applications with us, we are responsible for prosecution and maintenance of those patents and patent applications at our expense. As new discoveries arise with respect to our drug candidates, we and MD Anderson seek to protect our rights to those inventions by filing new patent applications. There can be no assurance that patent applications will issue as patents or, with respect to issued patents, that they will provide us with significant protection.

Issued patents generally expire 20 years after their filing date, subject to adjustment or extension under certain circumstances. For instance, the expiration of US patents may be adjusted to account for prosecution delays, if any, by the United States Patent and Trademark Office (USPTO). Some jurisdictions, including the US and countries belonging to the European Patent Convention, will extend the expiration of an unexpired patent for an approved pharmaceutical product by some portion of time required for clinical development and regulatory review. We intend to seek patent term extensions for patents for our product candidates where available. In addition, certain pharmaceutical regulatory bodies, including the US FDA and the European Medicines Agency (EMA), provide some period of exclusivity for new pharmaceutical products independent of patent protection. In the US, regulatory exclusivity can range from three (3) years for a product with a previously approved active pharmaceutical ingredient to seven (7) years for a novel product designated as an Orphan Drug. We have obtained Orphan Drug designation (ODD) from the FDA for Annamycin for the treatment of AML and intend to seek ODD for Annamycin and other product candidates for other orphan diseases for which we seek to develop these drugs.

The following provides a general description of our patent portfolio and is not intended to represent an assessment of claim limitations or claim scope.

Annamycin

We have pending patent applications directed to the synthetic processes for lyophilized Annamycin and for reconstitution of our Annamycin drug product candidate. We have exclusively licensed MD Anderson's rights in these applications, which are co-owned by MD Anderson and us. The applications are pending in jurisdictions worldwide, including but not limited to Australia, Brazil, Canada, China, European Patent Organization, Japan and the US Both applications have a filing date of June 25, 2020. We also have rights to a patent application, filed on November 23, 2020, directed to the use of Annamycin for the treatment of certain lung cancers.

p-STAT3 Inhibitors

WP1066. We have rights to four issued US patents for WP1066. These patents claim WP1066 and other molecules, as well as methods of treating disease using WP1066. Foreign counterparts to the US patents are issued in Canada, Europe, Israel, India, Japan and South Korea. These patents have an international filing date in December 2004, and in certain instances have had the patent term adjusted. We also have rights to a patent application directed to the combination of WP1066 with checkpoint inhibitors.

WP1220. We have rights to three issued US patents which claim compositions of WP1220, as well as foreign counterparts issued in China, Eurasia, Europe, Japan, Mexico, New Zealand, Singapore and Ukraine. These patents have an international filing date in June 2009. In addition, we have rights to an issued US patent for the treatment of skin disorders using WP1220, with a filing date in September 2009.

WP1122

We have rights to an issued US patent with claims to compositions of WP1122 and methods for treating cancer using WP1122, with an international filing date in June 2009. We also have rights to foreign counterparts issued in China, Europe, and Japan. In addition, we have rights to US and foreign patent applications directed to the treatment of viral diseases with WP1122 and other anti-metabolites including WP1096 and WP1097, with a filing date in March 2021.

Our Drug Candidate Programs

Annamycin Program

Overview

We consider Annamycin to be a "next generation" anthracycline, unlike any currently approved anthracyclines, as it is designed to avoid multidrug resistance mechanisms and cardiotoxicity (the efficacy of all currently approved anthracyclines is limited by both multidrug resistance and cardiotoxicity). Our preclinical studies support this intended design and, to date, we have demonstrated no signs of cardiotoxicity in our three Phase 1 clinical trials utilizing Annamycin as assessed, as recently as January 2022, by an expert in cardiotoxicity associated with chemotherapy at the Cleveland Clinic. Additionally, we reported from our clinical trials evidence that Annamycin may have a substantially lower incidence of alopecia (hair loss) than currently prescribed anthracyclines such as doxorubicin.

The FDA granted Orphan Drug Designation (ODD) to Annamycin for the treatment of AML and for soft tissue sarcomas, which means the agency believes we have established a medically plausible basis for using the drug for those indications. Additionally, Fast Track Designation was also granted by the FDA for Annamycin for both the treatment of AML and STS lung metastases. A drug that receives Fast Track designation is eligible for some or all of the following:

- More frequent meetings with FDA to discuss the drug's development plan and ensure collection of appropriate data needed to support drug approval;
- More frequent written communication from FDA about such things as the design of the proposed clinical trials and use of biomarkers;
- Eligibility for other FDA expedited programs, if relevant criteria are met; and
- New Drug Application (NDA) for review by FDA, rather than waiting until every section of the NDA is completed before the entire application can be reviewed. NDA review usually does not begin until the sponsor has submitted the entire application to the FDA

A Phase 1 clinical trial of Annamycin as a single agent for the treatment of relapsed and refractory (R/R) AML in the US was successfully concluded in 2020. The FDA requested that we demonstrate that Annamycin could be safely administered to subjects up to the lifetime maximum allowable level of anthracycline (LTMAD) established by the FDA and the trial met this primary endpoint. The FDA established the LTMAD because of concerns about cardiotoxicity associated with currently approved anthracyclines when administered above the LTMAD. An updated independent safety review in early 2022 of certain preliminary data of the first 30 subjects in our three Annamycin clinical trials (treating both AML and STS lung metastases) concluded there was no evidence of cardiotoxicity. 19 of the 30 subjects evaluated had been treated above the LTMAD and none have shown evidence of any cardiotoxicity.

As a result of discussions with the FDA, we focused our continuing efforts on establishing an RP2D for Annamycin in our Phase 1/2 single agent R/R AML clinical trial Europe, which was ongoing throughout 2021. In February 2022, we successfully concluded the Phase 1 portion of that trial and established the RP2D of 240 mg/m2. In that trial we continue to demonstrate no signs in cardiotoxicity in subjects treated. In the final cohort, five subjects received a full course of Annamycin and demonstrated an ORR of 60% with two partial responses (PRs) and one complete response with incomplete recovery of neutrophils and/or platelets (CRi). In light of recent preclinical research suggesting that the combination of Annamycin with Cytarabine (AnnAraC) may be more effective for R/R AML patients than Annamycin as a single agent, we have elected to begin the process of commencing a Phase 1/2 clinical trial in Europe evaluating AnnAraC rather than to expend resources on the expansion (Phase 2) arm of the single agent trial. These preclinical animal studies showed that AnnAraC was 68% more effective (median overall survival or OS) than Annamycin as a single agent and 241% more effective than Cytarabine (also known as Ara-C) alone.

Accordingly, we filed a CTA with the URPL in Poland in November 2021 for a Phase 1/2 trial treating AML with AnnAraC and received approval in December 2021 from the Bioethics Committee of the Medical University of Karol Marcinkiewicz in Poznań (Ethics Committee). We are in correspondence with the URPL and expect to receive their approval and to begin this trial in the first half of 2022. We can provide no assurance that such approval will be received.

We received clearance from the FDA to proceed with a Phase 1b/2 clinical trial of Annamycin as a potential treatment for soft tissue sarcomas (STS) metastasized to the lungs. Our preclinical work on Annamycin demonstrated activity against certain cancers (including STS) metastasized to the lungs. In December 2020, the FDA allowed our IND to go into effect to study Annamycin for the treatment of soft tissue sarcoma lung metastases. This allowed us to begin a Phase 1b/2 clinical trial in the US for patients with STS lung metastases after first-line therapy for their disease. The trial began in the first half of 2021. In December 2021, we reported preliminary interim results from this clinical trial as we concluded the safety review of the third cohort and opened the fourth cohort in a dose escalation trial, which continues to document preliminary clinical activity for this drug. We are currently in the fourth cohort and have expanded the cohort due to a dose limiting toxicity (DLT). The first three subjects in this cohort preliminarily exhibited stable disease per the protocol after two cycles and continued in the study. Due to the DLT, the fourth cohort is being expanded to enroll an additional three subjects at this dose level. In the absence of any additional DLTs at this dose level, we have the option to continue escalation to explore the fifth cohort at 450 mg/m2 dose level or to declare the RP2D to be 390 mg/m2.

Additionally, we announced in February 2021 promising preclinical studies involving Annamycin targeting osteosarcoma metastasized to the lungs. Via our sponsored research, we plan to further investigate the treatment of other cancer metastases and other cancers such as liver, colorectal, and pancreatic cancers among others.

Prior Development

We took over the development of Annamycin after two prior drug development companies, Callisto Pharmaceuticals and Aronex Pharmaceuticals, ceased development work for various clinical and business reasons, leading to the termination of their INDs by the FDA. The basis for our decision to proceed notwithstanding the most recent prior developer's abandoning the project is that we believed the actual clinical data as reported by Dr. Robert Shepard, our Chief Medical Officer and the prior developer's Chief Medical Officer at the time of the clinical trials, to the 2009 Annual Meeting of the American Society of Clinical Oncology (ASCO), and as further reported by the Principal Investigators of the clinical trials in a peer-reviewed journal article (Clin Lymphoma Myeloma Leuk. 2013 August; 13(4): 430-434. doi:10.1016/j.clml.2013.03.015.), supported further clinical evaluation. In addition, the conclusion published in the 2013 Clinical Lymphoma, Myeloma & Leukemia Journal article was that "Single agent nanomolecular liposomal annamycin appears to be well-tolerated and (demonstrates) evidence of clinical activity as a single agent in refractory adult ALL." As reported in both the ASCO presentation and the 2013 journal article referenced, the definition of efficacy is based on the following Response Criteria: "Response criteria were achievement of CR defined as ≤5% blasts, granulocyte count of ≥1×109/L, and a platelet count of ≥100×109/L. Partial remission was defined the same as CR, except for the presence of 6% to 25% blasts. Hematologic improvement was defined as for CR but platelet count of ≥1×109/L." The summary of subject response from the 2013 journal article reads: "After determining the MTD, a 10-patient phase IIA was conducted. Eight of the patients completed one cycle of the three days of treatment at the MTD. Of these, five (62%) demonstrated encouraging anti-leukemic activity with complete clearing of circulating peripheral blasts. Three of these subjects also cleared bone marrow blasts with one subsequently proceeding onto successful stem cell transplantation. The other two subjects developed tumor lysis syndrome and unfortunately expired prior to response assessment." In our review of these trials, we confirmed that the activity demonstrated in this summary corresponds with a "Partial Remission" as described in the Response Criteria and that the three subjects who "cleared bone marrow blasts" correspond with "CR" (Complete Response).

The Callisto trial was the second trial to study Annamycin in acute leukemia. The first trial was sponsored by Aronex Pharmaceuticals. When Callisto acquired the technology and made changes in manufacturing methods, they had to conduct another Phase 1 dose ranging trial. Both trials yielded some human activity with Annamycin in AML but at different MTDs. We believe the different MTDs were due to subtle differences in the manufacturing and reconstitution processes of Aronex and Callisto, mainly regarding liposomes.

The production of liposome formulated anthracyclines is very sensitive to subtle changes in production method and starting materials. It is partly for this reason that, more than 10 years later and with entirely new contractors, we had to run additional Phase 1 dose ranging studies and the technology we assisted in developing yielded additional new patent applications for formulation and reconstitution of Annamycin.

The Importance of No Cardiotoxicity

We have received multiple reports from an independent expert cardiology assessment and the last such report in January 2022 continued to confirm the absence of any cardiotoxicity relating to treatment with Annamycin in our three Phase 1 clinical trials to date. That report updated the independent safety review of certain preliminary data for the first 30 subjects in our clinical trials in the US and Europe with Annamycin targeting AML and the STS lung metastases which concluded there was no evidence of cardiotoxicity. The review included analysis of ejection fraction, echo strain and certain troponin levels intended to assess the potential for both acute and chronic heart damage. Additionally, we reported evidence that Annamycin may have a substantially lower incidence of alopecia (hair loss) than currently prescribed anthracyclines such as doxorubicin. Although 65%-92% of subjects treated with doxorubicin typically experience hair loss, the incidence to date in subjects treated with Annamycin is less than 10% (Gonzalez et al. 2018; DOXORUBICIN HYDROCHLORIDE -package insert. New York, NJ: Pfizer Injectables; 2019). Alopecia is considered an important factor in quality of life for many cancer patients.

Chemotherapy continues to be a cornerstone of cancer therapy. Despite the progress made with immunotherapy and precision medicine, the first-line treatment for many cancers continues to include chemotherapy. And, in part because of the emphasis placed on alternatives to chemotherapy, we believe that not enough has been done to improve chemotherapeutic agents to make them safer, especially with regard to cardiotoxicity (damage to the heart), and more effective. Anthracyclines are a class of chemotherapy drugs designed to destroy the DNA (by creating iron-mediated free oxygen radicals, damaging the DNA and cell membranes, and inhibiting topoisomerase II) of rapidly producing cancer cells. Acute leukemia is one of a number of cancers that are usually treated with anthracyclines. In the case of acute leukemia, anthracyclines are typically used in "induction therapy," where the goal is often to induce sufficient remission of patients' blood-born tumor cells to allow for a potentially curative bone marrow transplant.

Two key factors limit the safety and effectiveness of anthracyclines: cardiotoxicity and multidrug resistance. We believe Annamycin may significantly reduce the impact of these two factors. If early human data from the clinical activity thus far are borne out, of which there can be no assurance, Annamycin may ultimately provide clinically meaningful benefits over currently approved anthracyclines in treating certain cancers. Preliminary data from very early-stage clinical trials suggest acute leukemia as a potentially opportune indication in which to further study Annamycin.

One of the key dose-limiting toxicities associated with currently available anthracyclines (including the anthracycline in the approved drug, Vyxeos) is the propensity to induce life-threatening heart damage (also known as cardiotoxicity). This is a particularly significant risk for pediatric leukemia patients, whose life spans can be severely shortened by the induction therapy intended to cure them of acute leukemia. In the animal model recommended by the FDA as an indicator of human cardiotoxicity, the non-liposomal (free) form of Annamycin has been shown to be significantly less likely than doxorubicin to create heart lesions in mice, and the liposomal formulation (L-Annamycin) has been shown in these same models to have reduced cardiotoxicity to the point where it is unlikely to cause harm to human patients. If this same characteristic continues to be shown in humans, it may allow Annamycin to be used more aggressively to help patients achieve remission. This would be especially valuable in the case of pediatric acute leukemia (both AML and ALL) because of the potential impact of cardiotoxicity on long-term survival. In our clinical trials for Annamycin, we are collecting data to further validate the design intent of Annamycin to have little or no cardiotoxicity. Unless otherwise noted, all of our references to Annamycin refer to the liposomal form (L-Annamycin).

In addition, the effectiveness of currently approved anthracyclines is limited by their propensity for succumbing to "multidrug resistance." This can occur where, as a natural defense mechanism, transmembrane proteins acting as transporters (one type of which is referred to as a "P-glycoprotein pump" or "ABCB1 transporter") develop on the outer surface of cells to expel perceived threats like anthracyclines. In many instances, the likelihood of cardiotoxicity (and other serious side effects) prevents increasing the dosing of current therapies in order to overcome multidrug resistance. As a result, most patients cannot receive current anthracyclines in doses that are adequate to produce lasting remission and thereby qualify for a bone marrow transplant. A laboratory study has suggested that Annamycin may resist being expelled by P-glycoprotein pumps and similar multidrug resistance transporters, which may mean the drug circumvents multidrug resistance. This characteristic has been shown in pre-clinical testing to allow for higher drug uptake in diseased cells, which we believe could allow for more effective induction therapy with less risk to the patient, especially in relapsed patients.

Annamycin as a Single Agent in AML

The prior development history of Annamycin in acute leukemia suggested that a possible approval pathway exists by positioning Annamycin as a single agent for the treatment of R/R AML. Notwithstanding the recent approval of multiple drugs for this indication, most of these drugs are targeted therapies that are helpful to only a small percentage of the overall AML patient population. A significant unmet need still exists for those patients that are refractory to or relapse from the traditional first-line induction therapy (known as "7+3") designed to induce remission of AML and, in some cases, prepare patients for a curative bone marrow transplant. Unfortunately, the majority of AML patients do not respond adequately to the current first-line therapies. In addition, approximately 40% of AML patients are deemed "unfit" for 7+3 due to the intensity of this chemotherapy. We estimate that a significant portion of those patients are deemed unfit because of the potential for cardiotoxicity inherent in the anthracyclines currently used in 7+3. Given its lack of cardiotoxicity, single agent Annamycin may also provide a viable treatment alternative for such patients. Hence our initial clinical trials in R/R AML, as discussed more fully below, were focused on Annamycin as a single agent, and establishing an RP2D, which we were able to establish in early 2022.

Annamycin in Combination with Cytarabine (also known as Ara-C) in AML

As a part of our ongoing sponsored research at MD Anderson, animal testing has indicated that the combination of Annamycin with Ara-C (AnnAraC) provides a synergistic effect that is more effective in AML mouse models than either drug alone. These data were presented at the 62nd Annual Meeting & Exposition of the American Society for Hematology (ASH) under the title: "High Efficacy of Liposomal Annamycin (L-ANN) in Combination with Cytarabine in Syngeneic p53-null AML Mouse Model."

This study was conducted in a highly aggressive AML mouse model where median survival is approximately 13 days. For animals treated with AnnAraC, median survival ranged from 56 to 76 days, thus expanding median survival by 585%, with some animals, after treatment, having no signs of any tumors. Additionally, when looking at median overall survival (OS), AnnAraC demonstrated a 68% improvement in the OS compared to Annamycin as a single agent and a 241% increase in OS compared to Cytarabine alone. We believe these experiments support initiation of clinical development of the combination of Annamycin and Ara-C in AML patients.

Although Annamycin has already shown human activity as a single agent in its two Phase 1 AML clinical trials and has shown no signs of cardiotoxicity, the observed synergy in vitro and confirmatory in vivo data suggest that the combination of Annamycin and Ara-C could be more effective in a clinical setting than Annamycin as a single agent. This would be consistent with current practice to use Ara-C in combination with an anthracycline like Annamycin. The current first-line therapy for AML patients is the combination of an anthracycline and Ara-C in a regimen referred to as "7+3" where Ara-C is administered daily for 7 days in parallel with 3 daily doses of an anthracycline. Simply substituting the currently used anthracycline in a similar 7+3 regimen with Annamycin would represent a familiar and well-practiced treatment modality. Beyond that, we believe it would have the added advantages that Annamycin has been shown in published research to be active against tumor cells resistant to doxorubicin and, importantly, has the potential to remove the concern for cardiotoxicity, a significant toxic side effect of currently used anthracyclines. Thus, we are now focusing our efforts on an AnnAraC trial for the treatment of AML in Europe in the first half of 2022.

Annamycin as a Single Agent in STS Lung Metastases

We announced in April 2019 that our ongoing sponsored research at MD Anderson demonstrated that Annamycin can significantly improve survival in an aggressive form of triple negative breast cancer metastasized to the lungs in animal models. We know that Annamycin was previously shown to be significantly more potent than doxorubicin in both Lewis lung carcinoma in vivo and small cell lung cancer in vitro models. In addition to seeing activity in animal models of triple negative breast cancer metastasized to the lungs, we are also seeing activity in colon cancer metastasized to the lungs. The particular animal models used in our testing are considered to represent very aggressive forms of cancer.

Furthermore, a poster entitled, "Liposomal annamycin inhibition of lung localized breast cancer," was presented at the San Antonio Breast Cancer Symposium held in December 2019. The published poster (https://www.moleculin.com/san-antonio-bc-symposium-poster/) shows substantially increased survival in both triple negative breast cancer and colon cancer lung metastases animal models. It should also be noted that treatment with Annamycin resulted in long-term survival of a significant number of animals, even when cancer was reintroduced into the animals post initial treatment, suggesting the development of beneficial immune memory. A reduction in tumor growth was demonstrated as well as a reversal of tumor activity resulting in an almost complete reduction of tumor burden.

We announced in early 2021 that Annamycin demonstrated consistently high antitumor activity in vivo in tested animal models of different types of lung-localized cancers, including sarcoma. These promising findings correlate with surprisingly high uptake of Annamycin to the lungs in animal models. We found in our studies that the Annamycin uptake is over 30-fold higher than that of doxorubicin, the primary first-line chemotherapy for soft tissue sarcoma. The limited pulmonary uptake of doxorubicin in animal models may help explain its limited activity against STS lung metastases in humans. Additionally, our clinical data to date show no cardiotoxicity associated with the use of Annamycin, and the published research demonstrate Annamycin's ability to avoid multidrug resistance mechanisms, both of which are often treatment-limiting effects of anthracyclines (which includes doxorubicin) in this setting. Taken together, these factors suggest that Annamycin could represent an important treatment to help address a significant unmet need in patients with STS lung metastases.

In February 2021, we announced that a preclinical study in animals has confirmed a significant therapeutic benefit of Annamycin against metastatic osteosarcoma. As of day 130 of the study, the survival rate for animals treated with Annamycin was 100%, compared with only 10% for untreated animals. Computerized tomography scans demonstrated that animals treated with Annamycin exhibited suppression of tumor growth and not a single death was observed in the treated animals, whereas observed tumor burden was believed to have contributed to the rapid death of 90% of untreated animals. We believe these data are a promising indication of the possibility of Annamycin's impact on other cancers metastasized to the lungs. We caution that these are preclinical animal data and we can provide no assurance that we will see similar results in our clinical trials.

It is estimated that there are approximately 36,000 new cases of STS in the seven major markets (US, EU5 and Japan) each year. Our clinical advisors estimate that approximately half of all STS patients will eventually develop lung metastases from their primary tumor. Although first-line treatments such as surgical resection, chemotherapy and radiation may provide initial therapeutic benefit for approximately one third of those patients, there are no approved or emerging second-line therapies for the remaining patients who relapse or are refractory. Although the lungs tend to be a major site of relapse, when we began our own clinical trial using Annamycin against STS lung metastases, we were aware of only two active clinical trials specifically targeting STS lung metastases, indicating that Annamycin currently faces limited competition in this area of development.

Along with the results in STS lung metastases, our animal models have shown activity in other lung metastases, including osteosarcoma, colorectal and triple negative breast cancer, as well as meaningful concentration levels of Annamycin in the liver, spleen and pancreas. Additionally, when tested in a highly aggressive AML mouse model, Annamycin significantly reduced tumor burden in the spleen, lungs and liver, leading to an increase in survival. Based on these promising preclinical data, we believe the ultimate market opportunity for Annamycin could be larger than just STS lung metastases. As such, we may expand our clinical trials into these areas in the near term using externally funded trials.

Clinical Trials for Annamycin

In 2022, we expect there will be three clinical trials ongoing that involve Annamycin for the treatment of R/R AML or STS lung metastases. We recently concluded our Annamycin single agent AML trial in Europe, safely establishing an RP2D, and are now focusing on a European Phase 1/2 AML trial with AnnAraC (combination of Annamycin with Ara-C) which we believe will begin in the first half of 2022. Additionally, our Phase 1b/2 clinical trial in the US for the treatment of STS lung metastases is ongoing, and a third investigator led trial with Annamycin treating STS lung metastases using a different dosing regimen than the US trial should begin in Poland during the second half of 2022. This is in addition to the successfully completed US Phase 1 clinical trial of single agent Annamycin treating R/R AML.

US R/R AML Trial

We filed our IND application for a Phase 1/2 trial in the US with Annamycin for the treatment of R/R AML, with the clinical strategy of increasing the prior developers' MTD mentioned above, in February 2017, which was allowed in September 2017. The FDA required us to limit dosages to subjects to a lifetime maximum anthracycline exposure of 550 mg/m2 in this trial which in effect limited the maximum dose in our trial to 120 mg/m2. Subject treatment began in the US in March 2018. In February 2020, we announced that our open label, single arm US Phase 1 portion of a Phase 1/2 trial had concluded its second cohort and met its primary objective of demonstrating the safety of Annamycin in treating relapsed or refractory AML. At that time, we received an independent expert cardiology assessment confirming the absence of cardiotoxicity in the first 19 subjects treated with Annamycin in both our US and European Phase 1 clinical trials.

The FDA requested that we demonstrate that Annamycin could be safely administered to subjects up to the lifetime maximum allowable level of anthracycline (LTMAD) established by the FDA and the trial met this primary endpoint. The FDA established the LTMAD because of concerns about cardiotoxicity associated with currently approved anthracyclines when administered above the LTMAD. An updated independent safety review in early 2022 of certain preliminary data of the first 30 subjects in our three Annamycin clinical trials concluded there was no evidence of cardiotoxicity. Importantly, 19 of the 30 subjects evaluated were treated above the LTMAD. As stated in our CSR, one of seven (or 14.3%) subjects achieved a morphological leukemia-free state (MLFS). MLFS is defined as <5% blasts in the bone marrow with no blasts with Auer rods and no extramedullary disease. This was at what we viewed as a subtherapeutic dose level when compared to MB-105. As a result of discussions with the FDA, we focused on establishing an RP2D in our single agent R/R AML trial in Europe (discussed below), which we have recently announced, and, as requested by the FDA, we continue to generate additional safety and efficacy data prior to considering continuation of our US R/R AML trial.

European R/R AML Trial

In August 2017, we met with the European Medicines Agency (EMA) to discuss a CTA (Clinical Trial Authorization) in Europe for the study of Annamycin for the treatment of R/R AML. In December 2017, the Ethics Committee in Poland approved our Phase 1/2 trial of Annamycin for the treatment of relapsed or refractory AML. A final approval was required by the Polish National Office which was received in June 2018. This enabled our Phase 1/2 clinical trial there to study Annamycin for the treatment of relapsed or refractory AML to begin. The EMA did not impose a lifetime maximum anthracycline exposure limit in this trial.

In the final cohort of this trial, subjects were treated at 240 mg/m2. Two subjects were preliminarily reported to have DLT events which were later classified as adverse events (AEs) following a review by the Safety Review Committee of the protocol DLT definitions. However due to the preliminary DLT designation at the time, the cohort was expanded and eventually enrolled a total of eight subjects, with five receiving the full course of Annamycin. An amendment to the Annamycin clinical trial protocol allowed for a change in the DLT criteria as it relates to transient grade 3 elevations and allowed dosing of three additional subjects in the 240 mg/m2 cohort. Of the eight subjects that were dosed three subjects experienced AEs or SAEs. One fully resolved and another resolved to a grade 2 in the same day. One subject treated experienced an SAE (grade 2 infusion reaction) not currently listed in the investigator brochure (IB) therefore this is a Suspected Unexpected Serious Adverse Reaction (SUSAR) that required reporting to regulatory bodies, which was done. In this cohort the eight subjects received an average of approximately seven prior regimens, representing heavily treated subjects.

Of the five receiving a full course of Annamycin at 240 mg/m2, a 60% ORR was experienced with two PRs and one CRi. Coupling these data with the preclinical animal studies showing AnnAraC having greater efficacy than Annamycin or Cytarabine alone, as mentioned above, we established 240 mg/m2 as the RP2D for this trial and switched our focus to initiating the combination study. We also continued to see no signs of cardiotoxicity with all but three subjects having been reviewed by the expert, as mentioned above. These last three subjects will be included in future updated reviews by the expert. With these data we successfully concluded the Phase 1 portion of this trial in February of 2022 and will now focus on treating AML utilizing AnnAraC, as discussed more fully below.

While this will establish an RP2D for Annamycin in this single agent AML trial and will assist in establishing the starting dose in our planned trial using AnnAraC in treating AML, we do not believe it will limit the dose escalation in either the AnnAraC or STS trials, which are both discussed in more detail below.

Plans for a Phase 1/2 Trial of AnnAraC in AML in Europe

Based on the preclinical data discussed above, we are preparing to start a new clinical trial for the treatment of relapsed or refractory AML with the combination of Annamycin with Ara-C. We expect this clinical trial to begin in the first half of 2022. We intend for our planned study of AnnAraC in AML to have a similar trial design to the recently concluded Phase 1/2 study of Annamycin as a single agent in AML. We believe safety data from our current single agent trial will enable us to begin the combination trial at a higher starting dose of Annamycin in the Phase 1 portion that our starting does in our monotherapy AML trial.

As part of these plans in 2021, we filed a CTA in Poland for a Phase 1/2 trial treating AML with a combination of Annamycin and Cytarabine (AnnAraC) and received approval in December 2021 from the Bioethics Committee of the Medical University of Karol Marcinkiewicz in Poznań (Ethics Committee) and we expect allowance from the URPL in time to begin this trial in the first half of 2022. However, we cannot provide assurance that such approval will be received. This trial builds on the safety and dosage data from the two prior single agent Annamycin AML Phase 1 trials in the US and Europe that have been successfully concluded. We also utilized preclinical animal data from our sponsored research conducted simultaneous with our clinical trials to support this new combination trial. In that animal study Annamycin in combination with Cytarabine demonstrated a 68% improvement in the median overall survival (OS) compared to Annamycin as a single agent and a 241% increase in OS compared to Cytarabine alone.

Study Design for R/R AML -

We have been studying Annamycin in both the US and Europe in Phase 1/2 open label, single arm clinical trials to assess the safety and efficacy of Annamycin as a single agent for the treatment of adults with relapsed or refractory AML. The US and European trials had essentially the same study design, consisting of a Phase 1 intended to establish a "Recommended Phase 2 Dose" (RP2D), to which the studies may then proceed in the Phase 2 portion. The Phase 1 portion of the studies provided for escalating doses in cohorts of 3 subjects each, with each successive cohort receiving the next higher dose level until "dose limiting toxicities" prevent further increases. Cohorts 1, 2, 3 and 4 in Europe received a dose of 120, 150, 180 and 210 mg/m2, respectively, and the results allowed us to advance to Cohort 5 with dosing at 240 mg/m2. Refer to the discussion above for an update on this trial.

Cohort 1 in the US started at 100 mg/m2, and the results supported moving to Cohort 2 at 120 mg/m2, which has now been fully recruited, treated, and evaluated. Our US Phase 1 trial met its primary endpoint, demonstrating the safety of Annamycin in treating AML when delivered to subjects at or below the lifetime maximum anthracycline dose established by the FDA. The primary safety signal was the absence of cardiotoxicity, a serious and often treatment-limiting issue prevalent with currently approved anthracyclines. The European trial benefited from a more aggressive dose escalation scheme than was allowed in the US trial and, as a result, reached higher dose levels.

We have been and intend to continue reporting top-line results by cohort in all of our Annamycin clinical trials, with each announcement also including an update on any other related trials. Top-line results will include reporting of any drug-related adverse events (AEs) and assessment of cardiotoxicity, including ECHO (echocardiogram) or MUGA (MUGA stands for multiple-gated acquisition and is also known as radionuclide ventriculography (RVG, RNV) or radionuclide angiography (RNA); it is a type of nuclear imaging test intended to show how well the heart is pumping) scans measuring change in ejection fraction and measuring certain blood troponin levels, which is considered a biomarker for potential long-term cardiovascular impairment. Top-line results will also include the number of partial responses (PRs), complete responses (CRs) and subjects deemed capable of progressing to a potentially curative bone marrow transplant, which we term "bridge to transplant" (BTs), each of which is essentially a function of the magnitude of reduction in a subject's bone marrow blasts. For purposes of these clinical trials, a CR means that the subject's bone marrow blasts reduced to 5% or less (with CRi meaning a CR where there was incomplete recovery of white blood cell and/or platelet counts), a PR means the subject's bone marrow blasts reduced by 50% and resulted in a blast count of 25% or less, and a BT means subjects are deemed capable of progressing to a potentially curative bone marrow transplant.

Safety of Annamycin in R/R AML Subjects -

Our US Phase 1 trial met its primary endpoint, demonstrating the safety of Annamycin in treating R/R AML when delivered to subjects at or below the lifetime maximum anthracycline dose established by the FDA. The primary safety signal was the absence of cardiotoxicity, a serious and often treatment-limiting issue prevalent with currently approved anthracyclines. Additionally, we recently concluded our European R/R AML trial, as discussed above, and not only set an RP2D but also met the trial's primary safety signal with the absence of cardiotoxicity. As discussed above, this was determined by echocardiograms, as well as cardiac health biomarkers, principally certain blood troponin levels, which are considered an indicator of potential long-term heart damage. The data showed no cardiotoxicity in all of the subjects evaluated in the both Phase 1 trials.

An updated independent safety review in early 2022 of certain preliminary data of the first 30 subjects in our three Annamycin Phase 1 clinical trials, which again concluded there was no evidence of cardiotoxicity. Importantly, 19 of the 30 subjects have been treated above the LTMAD.

Compared to previous studies of other anthracyclines, we believe this is an important event. For example, a review published in Cardiovascular Drugs and Therapy (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5346598/) reported that 65% of patients who received the equivalent of 550 mg/m2 of doxorubicin (a current standard of care anthracycline) exhibited sub-clinical cardiotoxicity, defined as a reduction in left ventricular ejection fraction >10% points to a value <50%. In the 5 subjects mentioned above who were treated in our European trial above 550 mg/m2, no evidence of cardiotoxicity was detected. The same published review also suggested that a better long-term indicator of cardiotoxicity may be the measurement of an increase in a biomarker called troponin. When measured as an early biomarker of cancer therapy-related cardiotoxicity, troponin rise occurs consistently in 21% - 40% of patients after treatment with current standard of care anthracycline chemotherapy and, per the published review, such an increase in troponin is associated with an increased risk of heart disease later in life. Overall, some form of cardiotoxicity, short-term or long-term, occurs in 65% of such patients. Of the 30 subjects treated thus far in all three of our Annamycin clinical trials and where safety has been assessed, none has shown a clinically significant increase in troponin levels, again supporting the absence of cardiotoxicity. As previously noted, although these data are, in our view, promising, there remains significant additional clinical investigation to be done, and there can be no guarantee of the future results.

US STS Lung Metastases Trials

Our preclinical work on Annamycin demonstrated activity against certain cancers metastasized to the lungs, including soft tissue sarcoma (STS), osteosarcoma and triple negative breast cancer. In December 2020, we disclosed that the FDA allowed our IND to go into effect to study Annamycin for the treatment of soft tissue sarcoma lung metastases. This allowed us to begin a Phase 1b/2 clinical trial in the US for subjects with this indication after first-line therapy for their disease. This trial began in June of 2021. We also disclosed in December 2020 that the FDA had granted ODD to Annamycin for the treatment of soft tissue sarcomas, in addition to the existing ODD for Annamycin in relapsed or refractory AML.

Also, in December 2021, we reported preliminary interim results from our US Phase 1b/2 clinical trial as we concluded the safety review of the third cohort and opened the fourth cohort in the dose escalation portion of trial, which continues to document preliminary human activity for this drug. The Phase 1b/2 study is a US multi-center, open-label, single-arm study that in Phase 1b will determine the MTD and/or the RP2D and safety of Annamycin. The Phase 2 portion of the study will explore the efficacy of Annamycin as a single agent at the RP2D for the treatment of subjects with STS with lung metastases for whom prior chemotherapy has failed, and for whom new chemotherapy is considered appropriate. A minimum of three subjects will be enrolled in each cohort of the Phase 1b portion of the study until an MTD is identified, after which there will be a determination of the RP2D based on an assessment of both safety and efficacy. Up to 25 subjects will be enrolled at the RP2D in Phase 2 to further evaluate efficacy.

Three of the six subjects in the first two cohorts reached four or more months with stable disease or better. In a patient population where the median progression free survival time in patients with soft tissue sarcoma with metastases that have failed initial systemic therapy is approximately 1.6 to 2.0 months, without effective therapy which includes subjects treated with a placebo. (A. Comandone, F. Petrelli, A Boglione, S. Barn: Salvage Therapy in Advanced Adult Soft Tissue Sarcoma. The Oncologist 2017;22:1518–1527), we believe Annamycin has the potential to bring a new and effective treatment option to patients with this significant unmet need. We are also encouraged by the pace of recruitment to date for this trial.

The summary of interim data from the first four cohorts of the study are as follows:

First Cohort (210 mg/m2):

- Two subjects had stable disease up to 6 cycles (4.5 months) but were then discontinued due to progressive disease.
- One subject discontinued after the first cycle. The end of study scan was performed, and stable disease was observed. However, the subject discontinued from the study because the initiation of the second cycle was delayed greater than 6 weeks from the previous dose.

Second Cohort (270 mg/m2):

- In one subject, the scan at the end of the second cycle showed that there was a partial response (PR, >30% reduction in tumor size), and this was stable when the subject was scanned at the end of cycle 4. The subject subsequently discontinued from the study due to that subject electing to undergo surgical resection to potentially eradicate disease.
- One subject was discontinued from the study after 2 cycles after the end of cycle 2 scan revealed progressive disease.
- One subject received 1 cycle of treatment but discontinued treatment for reasons unrelated to Annamycin. The end of study scan revealed progressive disease.

Third Cohort (330 mg/m2):

- One subject discontinued after the first cycle. An interim, unscheduled scan revealed progressive disease and the subject was discontinued from the study.
- One subject was discontinued from the study after 2 cycles as a scan after the end of cycle 2 revealed progressive disease.
- One subject received 2 cycles and end of cycle 2 scans showed stable disease. However, subject withdrew consent from the study to pursue local standard of care.

Fourth Cohort (390 mg/m2):

Efficacy data for the fourth cohort are incomplete as not all subjects have received their scans.

- One subject received 2 cycles and end of Cycle 2 scans showed Stable Disease. The subject currently continues on study with Cycle 3.
- One subject is currently in Cycle 2. This subject experienced a DLT of febrile neutropenia. It did resolve and the subject continued in the study. End of Cycle 2 scans showed Stable Disease. The subject currently continues on study with Cycle 3.
- One subject received 2 cycles and end of Cycle 2 scans showed Stable Disease. The subject currently continues on study with Cycle 3.

The statements above are based on interim data and should be considered preliminary and subject to change.

We have now completed initial enrollment in the fourth cohort of the Phase 1b portion of the study with dosing increased to 390 mg/m2 and expect to announce that cohort's full preliminary results in the near term. Due to the DLT noted above, the fourth cohort is being expanded to enroll an additional three subjects at this dose level. In the absence of any additional DLTs at this dose level, we have the option to continue escalation to explore the fifth cohort at 450 mg/m2 dose level or to declare the RP2D to be 390 mg/m2. If a second DLT occurs at the 390mg/m2 dose level, three subjects may be enrolled into one additional dose level at 360mg/m2 to confirm the MTD/RP2D. If the fifth cohort is deemed safe, we may continue to escalate until an MTD is reached. Therefore, up to twenty-one subjects or more may be enrolled in the Phase 1b portion of the study, unless a determination is made to add additional cohorts beyond the fifth cohort or we establish an RP2D.

We are also collaborating with WPD and physicians in Poland and are currently pursuing a physician-sponsored clinical trial in Europe. WPD announced their facilitation of a grant equivalent to $1.5 million USD to the Maria Sklodowska-Curie National Research Institute to fund a Phase 1b/2 clinical trial of Annamycin for the treatment of STS lung metastases. The grant-funded clinical trial will be led by Prof. Piotr Rutkowski, MD, PhD, Head of Department of Soft Tissue/Bone Sarcoma and Melanoma at the Maria Sklodowska-Curie National Research Institute of Oncology in Warsaw, Poland, and it will be operated independently of our study in the US. The trial will use a dosing regimen of once per week rather than once every 21 days as in the US trial. We expect this trial to begin in 2022.

US STS Lung Metastases Trial - Study Design

In Phase 1b, Annamycin is administered as an intravenous (IV) infusion over 2 hours on Day 1, followed by 20 days off (1 cycle = 21 days). Subjects visit the study site every 21 days (±3 days) at which time safety monitoring, including adverse events (AEs), a physical examination, laboratory evaluations (clinical chemistry, complete blood count), vital signs, weight measurements, Eastern Cooperative Oncology Group (ECOG) performance status, and electrocardiograms (ECGs) are performed, followed by an IV infusion of study drug. Cardiac function is followed by echocardiogram (ECHO) scans at screening, at the end of the first two cycles and then every other cycle thereafter, at the end of treatment visit, and if feasible, during follow up at 6 months (±1 month) and 1 year (±1 month) after study drug discontinuation. As long as the Investigator considers that the benefits of treatment with Annamycin continue to outweigh the risks, treatment will continue every 21 days until tumor progression is observed or unacceptable toxicity occurs.

Tumor response is monitored every 6 weeks (±1 week) from Cycle 1 Day 1 during treatment, at the End of Treatment visit, and then every 3 months (±1 month) until disease progression using RECIST 1.1 criteria. Those subjects who leave the study after a maximum response is achieved and who do not start another therapy will be followed every 3 months (±1 month) for progression-free survival (PFS). If a subject receives further therapy after discontinuing from the study, they will only be followed for overall survival (OS) and if feasible, follow-up ECHO scans at 6 months (±1 month) and 1 year (±1 month) will be conducted after study drug discontinuation.

The WP1066 Portfolio Program

We have a license agreement with MD Anderson pursuant to which we have been granted a royalty-bearing, worldwide, exclusive license for the patent and technology rights related to our WP1066 Portfolio and its close analogs, molecules targeting the modulation of key oncogenic transcription factors. In 2019, the FDA granted ODD for WP1066 for the treatment of glioblastoma, which means the agency believes we have established a medically plausible basis for using the drug to treat glioblastoma.

We believe our WP1066 Portfolio (including lead drug candidates WP1066 and WP1220) we believe, represents a novel class of agents capable of hitting multiple targets, including the activated form of a key oncogenic transcription factor, STAT3. A substantial body of published research has identified STAT3 as a master regulator of a wide range of tumors and has linked the activated form, p-STAT3, with the survival and progression of these tumors. For this reason, it is believed that targeted inhibition of p-STAT3 may be an effective way to reduce or eliminate the progression of these diseases. During 2021, we have been working on developing an appropriate IV formulation for WP1066 or its analogs. As a result of these studies, we believe that the lead molecule WP1066 may be our best candidate for intravenous administration and efforts to identify and optimize the best strategy for IV delivery are currently underway. Additionally, we determined that the stability of WP1732, another molecule in the WP1066 Portfolio was less than satisfactory and, as such, in March 2021 we terminated our license for WP1732 with MD Anderson.

The high level of anticancer activity demonstrated in multiple tumors in animal models by WP1066 is potentially related to its ability to also inhibit such important key oncogenic transcription factors such as c-Myc and HIF-1α. In addition to direct anticancer effects not related to the function of the immune system, our lead drug candidate WP1066 has also been shown to boost immune response in animals, in part by inhibiting activity of TRegs, which are coopted by tumors to evade the immune system. We believe the dual effect of (1) directly inhibiting tumor growth and inducing tumor cell death and (2) separately boosting and directing the natural immune response to tumors is therapeutically promising. If additional preclinical and clinical data validate these two avenues of apparent activity, this class of drugs may be well-suited to treat a wide range of tumors, both as single agents and as critical elements of successful combination therapies targeting even some of the most difficult-to-treat cancers.

The recent oncology drug landscape has been dominated by immunotherapy, specifically including checkpoint inhibitors. In the last 5 years, checkpoint inhibitors (such as Opdivo and Keytruda) have reached over $10 billion in annual revenues. To summarize checkpoint blockade therapy, the T-Cells within an individual's own immune systems should be capable of identifying tumor cells and destroying them before they destroy the individual. Unfortunately, tumors develop the ability to prevent this natural immune response by regulating the expression of certain receptors referred to as "immune checkpoints" that then bind to T-Cells and prevent them from attacking the tumor. Immune checkpoint inhibitors are antibodies that block these receptor mechanisms and allow the T-Cells to act normally and attack the tumor.

In certain types of tumors, like melanoma, checkpoint inhibitors work well, and the results can be impressive, creating durable suppression of tumors where no other therapy had succeeded. However, despite the outstanding results in select patients, checkpoint inhibitors benefit only a limited number of patients in certain cancers, and they are essentially not effective in what are called "non-responsive" tumors like glioblastoma and pancreatic cancer, among others. As a result, companies are now focusing heavily on combination therapies, combining immune checkpoint inhibitors with chemotherapy, as well as other agents. We believe there is a need for new chemotherapeutic agents that, by their specific mechanism of action, would produce potent combination effects with immune checkpoint inhibitors, and that additionally can boost immune system response on their own. In this regard, there is early preclinical evidence that WP1066, as a single agent, may have the ability to reverse immune tolerance in brain tumor patients (Cancer Res, 67(20), 9630, 2007), and preliminary data in animal models that suggests WP1066 may have a potential for combination use with checkpoint inhibitors. We intend to pursue additional study to build on this preclinical evidence and preliminary animal model data.

Recently published research papers have presented several findings that may point to new opportunities for our WP1066 class of drugs. One such article suggested that our STAT3 inhibitor WP1066 abrogated PD-L1/2 expression in cancer cells and may be a useful agent in addition to checkpoint inhibitor immunotherapy in cancer patients (J Clin Exp Hematop, 57(1), 21-25, 2017). Other published results show that CTLA4-induced immune suppression occurs primarily via an intrinsic STAT3 pathway, suggesting that, through its inhibition of activated STAT3, WP1066 might work well in combination with this checkpoint inhibitor (Cancer Res, 77(18), 5118–28, 2017).

A separate paper presents selected key transcription factors as being responsible for the upregulation of an often-targeted checkpoint actor in tumors known as PD-L1. Some of the most important transcription factors identified were HIF-1α, c-Myc and STAT3, the very targets for which WP1066 was designed (Front Pharmacol, 2018 May 22, 9:536, doi: 10.3389/ fphar.2018.00536, eCollection 2018).

WP1066

WP1066 is our flagship Immune/Transcription Modulator. It has been the subject of over 50 peer-reviewed articles and its activity against p-STAT3 has now been validated in independent labs around the globe. This discovery was inspired by a naturally occurring compound (caffeic acid) in propolis (from honeybees). Caffeic acid has shown a natural ability to inhibit p-STAT3, which is considered a master regulator of inflammatory processes that support tumor survival and proliferation.

WP1066 has exhibited an ability to inhibit other key oncogenic transcription factors, including c-Myc and HIF-1α. A critical characteristic of WP1066 and its analogs is the ability to inhibit p-STAT3 independently of upstream cell signaling. We believe this overcomes the limitations of many other drugs designed to inhibit STAT3 activity by blocking upstream receptors.

Another important attribute of WP1066 (unlike some of our other Immune/Transcription Modulators) is its apparent ability in pre-clinical testing to cross the blood brain barrier, which we believe makes it a good candidate for potentially treating brain tumors and other malignancies of the central nervous system. WP1066 has shown significant anti-tumor activity and increased survival in a wide range of tumor cell lines and animal models.

As with other analogs in this portfolio, WP1066 also has a demonstrated in animal models the ability to boost a natural immune response to tumor activity. In animal models, WP1066 has been shown to upregulate STAT1, a transcription factor associated with immune stimulation. At the same time, it has been shown to reduce levels of Regulatory T-Cells, or TRegs, which are coopted by tumors to protect themselves from attack by the patient's natural immune system. This forms a unique dual action (directly attacking the transcription factors that support tumor development and separately boosting the natural immune response to tumors) that may make WP1066 uniquely suited to treat a wide range of tumors and may also serve as an important element in combination therapies targeting some of the most difficult cancers.

In vitro testing has shown a high level of activity for WP1066 against a wide range of solid tumors, and in vivo testing has shown significant activity against head and neck, pancreatic, stomach, and renal cancers, as well as metastatic melanoma and glioblastoma, among others. In vivo testing in mouse tumor models indicates that WP1066 inhibits tumor growth, blocks angiogenesis (a process that leads to the formation of blood vasculature needed for tumor growth) and increases survival.

Our own sponsored research and published findings from independent researchers point to the possibility that administration of WP1066 could lead to improved treatment results in many patients receiving checkpoint inhibitor therapy. Additionally, in April 2019 we announced that preclinical data supporting activity of our STAT3-inhibiting Immune/Transcription Modulators was presented by Dr. Waldemar Priebe, our co-founder and chair of our Scientific Advisory Board, at the 2019 Annual Meeting of the American Association for Cancer Research (AACR) in Atlanta, GA. The abstract (AACR Abstract: https://www.moleculin.com/inhibition-of-stat3-in-pancreatic-ductal-adenocarcinoma-and-immunotherapeutic-implications/) and the presentation included data resulting from preclinical evaluation in pancreatic cancer models of the STAT3 inhibitor WP1066. In vitro efficacy of this inhibitor was assessed using proliferation and apoptosis induction assays in a panel of patient-derived and commercially available Pancreatic Ductal Adenocarcinoma (PDAC) cell lines. WP1066 was shown to be potent and to induce apoptosis and inhibit p-STAT3 and its nuclear localization in all tested PDAC cell lines. Observed IC50 values ranged from 0.5 to 2 μM. Importantly, WP1066 shows in-vivo efficacy in preliminary experiments when tested alone or in combination with T cell immune checkpoint inhibitors.

Clinical Trials for the WP1066 Portfolio

In 2021, two trials were underway with WP1066. The first trial was a physician-sponsored Phase 1 trial of WP1066 in adult subjects with recurrent malignant glioma and brain metastasis from melanoma which the FDA allowed to proceed in December 2017. In July 2018, this trial opened for recruitment in the US. This dose-escalation Phase 1 brain tumor clinical trial via a physician-sponsored IND with MD Anderson Cancer Center has generated pharmacokinetic data for orally dosed WP1066. Those data demonstrated sufficient bioavailability of our drug via oral administration to show the presence of WP1066 in blood plasma on a dose-dependent basis. In early 2021, investigators at MD Anderson began the fourth cohort in the dose escalation phase.

In the first quarter of 2021, we were notified that the physician sponsoring the MD Anderson trial was leaving MD Anderson. MD Anderson has chosen to terminate this trial. We are actively pursuing the process to file our own IND for WP1066 so physician sponsored trials can reference our IND, although we can provide no assurance as to when, or if, this filing will be completed. Another physician-sponsored Phase 1 trial is being considered for the treatment of adult GBM with WP1066 in combination with radiation, although no assurances can be given that such trial will begin.

In July 2020 we announced that a peer-reviewed article published in Clinical Cancer Research (Clin Cancer Res June 30 2020 DOI:10.1158/1078-0432.CCR-19-4092) reported findings that WP1066, used in combination with traditional whole brain radiation therapy (WBRT) resulted in long-term survivors and enhanced median survival time relative to monotherapy in mice with implanted human brain tumors. The paper can be accessed at: https://clincancerres.aacrjournals.org/content/early/2020/06/30/1078-0432.CCR-19-4092.full-text.pdf

The study was performed by lead author Martina Ott, Ph.D., Instructor of Neurosurgery, senior author Amy Heimberger, M.D., professor of Neurosurgery, and a team of researchers at The University of Texas MD Anderson Cancer Center. In this study, C57BL/6 mice underwent intracerebral implantation of GL261 glioma cells, WBRT, and treatment with WP1066, a blood-brain barrier penetrant inhibitor of the STAT3 pathway, or the two in combination. The role of the immune system was evaluated using tumor rechallenge strategies, immune incompetent backgrounds, immunofluorescence, immune phenotyping of tumor-infiltrating immune cells (via flow cytometry), and nanostring gene expression analysis of 770 immune-related genes from immune cells, including those directly isolated from the tumor microenvironment.

The combination of WP1066 and WBRT resulted in long-term survivors and enhanced median survival time relative to monotherapy in the GL261 glioma model (combination vs. control $p<0.0001$). Immunological memory appeared to be induced, because mice were protected during subsequent tumor rechallenge. The therapeutic effect of the combination was completely lost in immune incompetent animals. Nanostring analysis and immunofluorescence revealed immunological reprogramming in the brain tumor microenvironment specifically affecting dendritic-cell antigen presentation and T cell effector functions. The study indicates that the combination of STAT3 inhibition and WBRT enhances the therapeutic effect against gliomas in the central nervous system by inducing dendritic-cell and T cell interactions in the brain tumor, which seems to be a requirement for a fully functional immune response

This study is consistent with preliminary data we announced previously. Importantly, the study indicated the potential that the combination of STAT3 inhibition with whole brain radiotherapy had the capacity to enhance the therapeutic effect against established tumors as well as developing immune memory that appears to prevent recurrence. With this preclinical data, we believe that another physician-sponsored Phase 1 trial could be considered for the treatment of GBM with WP1066 in combination with radiation, although no assurances can be given that such trial will begin.

At the 2009 annual meeting of the Society for Neuro Oncology (SNO), Emory University researchers reported encouraging activity in animals with their in vitro pediatric brain tumor models using WP1066. Based on these data, they filed and received clearance to proceed with an IND for a trial to treat children with recurrent or refractory malignant brain tumors with WP1066. This trial is being conducted at the Aflac Cancer & Blood Disorders Center at Children's Healthcare of Atlanta.

The Emory trial for pediatric brain tumors has now treated three subjects in the first two cohorts of the Phase 1 dose escalation portion of physician-sponsored clinical trial for the treatment of pediatric brain tumors with WP1066. One subject has been treated in the third cohort at the dose level of 8mg/kg. Two more subjects will be treated at this dose level. Emory University has amended its protocol to allow dosing at 16 mg/kg after these two additional subjects have been dosed, and the third cohort dosing has been deemed safe. In that trial, one of the subjects in the first cohort with DIPG showed an apparent response to the treatment with both clinical improvement and radiologic reduction of tumor size. We caution that these is preliminary data, and no conclusions should be drawn from this single event.

WP1220

An analog of WP1066, referred to as WP1220, was previously the subject of an IND (WP1220 was referred to as “MOL4239” for purposes of this IND) related to use of the molecule in the topical treatment of psoriasis. Clinical trials were commenced on WP1220 in the US but were terminated early due to limited efficacy in the topical treatment of psoriatic plaques. Notwithstanding its limitations in treating psoriasis, our pre-clinical research in multiple CTCL cell lines has suggested that WP1220 may be effective in inhibiting CTCL. Based on these data, we are pursuing discussions with various pharmaceutical companies to further development of this molecule. CTCL is a potentially deadly form of skin cancer for which there are limited treatment options.

Clinical Activity WP1220 –

In August 2019, we completed full enrollment in a proof-of-concept clinical trial in Poland to study WP1220 for the treatment of CTCL. Polish authorities approved our CTA for this use in January 2019, and the trial began enrolling subjects in March 2019. In February 2020, we announced the final data from our CTCL clinical trial of WP1220, which were published and presented by Dr. M. Sokolowska-Wojdylo in conjunction with the 4th Annual World Congress of Cutaneous Lymphomas in Barcelona, Spain on February 13, 2020. The final results supported the safety of topical WP1220 and demonstrated an improvement in the Composite Assessment of Index Lesion Severity (CAILS) score.

Mycosis Fungoides or MF, the most common variant of CTCL, is a disease with symptomatic, disfiguring skin lesions. STAT3, an oncogenic transcription factor, has been identified as a critical regulator of MF, whereby the activation of STAT3 through phosphorylation (p-STAT3) has been linked to tumor proliferation and suppression of immune responses. Preclinical testing demonstrated that WP1220, a synthetic compound, potently inhibits the activity of p-STAT3 and the growth of CTCL cell lines. This Phase 1 study was designed to demonstrate the safety and efficacy of WP1220 after topical treatment of CTCL.

Of 5 subjects enrolled, 11 lesions were assessed according to the CAILS scoring system. The only related adverse event (AE) was mild contact dermatitis in one subject that the Investigator deemed was not related to the drug. 4 of the 5 subjects improved in CAILS scores on index lesions, with one exhibiting stable disease, with a median reduction of 56% (range 25-94%). 3 of the subjects exhibited a PR. Improvement was noted within 7 days of treatment initiation and maintained 1 month after discontinuation. Of the 11 lesions, 45% exhibited a CR or a 50% or more reduction in CAILS and 55% exhibited stable disease with 100% showing a clinical benefit. Independent dermatologic review based on photographic documentation was conducted and corroborated these findings.

Although this was a small proof-of-concept clinical trial, WP1220, topically applied, had no safety issues and appeared to be effective in MF. We believe this is the first demonstration in humans suggesting that inhibition of p-STAT3 with topical therapy has efficacy in CTCL. As a result of this, we continue to actively seek third-party collaborations to begin a Phase 2a/2b trial with approximately 60 subjects.

IV Formulation for the WP1066 Portfolio

The topical application WP1220 does not appear to result in systemic exposure to the drug, which is desirable in the case of a topical drug targeting a dermatologic condition, however, WP1066 is currently administered orally with the intent of systemic uptake. Although preliminary data from physician-sponsored brain tumor trials indicate that the oral administration of WP1066 does result in detectable levels of WP1066 in plasma, we believe our opportunity for successful development of a p-STAT3 inhibitor would be expanded if we were able to develop a compound capable of intravenous (IV) administration. In 2020, we began developing IV formulation methods for WP1066 that might address its lack of solubility. We also invested in research to identify molecular analogs that may be more soluble and, therefore, easier to develop for IV administration. Although we intend to continue our work toward a viable IV formulation of WP1066, there can be no assurance that this effort will be successful.

The WP1122 Portfolio Program

WP1122 Portfolio Program Overview

We have a license agreement with MD Anderson pursuant to which we have been granted a royalty-bearing, worldwide, exclusive license for the patent and technology rights related to our WP1122 Portfolio and similar molecules focused on inhibitors of glycolysis and glycosylation. These new compounds are designed to exploit the potential uses of inhibitors of glycolysis such as 2-deoxy-D-glucose (2-DG), which we believe may provide an opportunity to stop the fuel supply of tumors by taking advantage of their high level of dependence on glucose in comparison to healthy cells. A key drawback to 2-DG is its lack of drug-like properties, including a short circulation time and poor tissue/organ distribution characteristics. Our lead Metabolism/Glycosylation Inhibitor, WP1122, is a prodrug of 2-DG that appears to improve the drug-like properties of 2-DG by increasing its circulation time and improving tissue/organ distribution. New research also points to the potential for 2-DG to be capable of enhancing the usefulness of checkpoint inhibitors. Considering that we believe 2-DG lacks sufficient drug-like properties to be practical in a clinical setting, we believe WP1122 has the opportunity to become an important drug to potentiate existing therapies.

We believe this technology has the potential to target a wide variety of solid tumors, which eventually become resistant to all treatments, and thereby provide a large and important opportunity for novel drugs. Notwithstanding this potential, we are currently focused on the use of WP1122 and related analogs for the treatment of central nervous system malignancies and especially glioblastoma multiforme. Although less prevalent than some larger categories of solid tumors, cancers of the central nervous system are particularly aggressive and resistant to treatment. The prognosis for such patients can be particularly grim and the treatment options available to their physicians are among the most limited of any cancer. The American Cancer Society has estimated 24,530 new cases of brain and other nervous system cancers will occur in the United States in 2021, resulting in 18,600 deaths. Despite the severity and poor prognosis of these tumors, there are few FDA-approved drugs on the market.

Additionally, based on independent preclinical data, we believe that this technology has the potential to impact hard to treat viruses that also rely heavily on glycolysis and glycosylation. Due to the COVID-19 pandemic, we initiated development of the WP1122 portfolio with preclinical work on WP1122 for the treatment of COVID-19.

During 2020, we announced that in vitro testing corroborated the antiviral potential of WP1122, including for the SARS-CoV-2 virus responsible for COVID-19. Subsequently, we had written communications with the FDA regarding the clinical development of WP1122 for the treatment of COVID-19. Based on guidance from the FDA, we believed that we needed to demonstrate efficacy in a COVID-19 animal model in order to proceed with an IND for COVID-19 clinical trials in the US. At that time, availability of validated COVID-19 animal models was limited. For this reason, we evaluated opportunities to pursue COVID-19 clinical development outside the US. The IND-enabling preclinical work already completed for WP1122 is mostly similar to the preclinical work we originally planned as part of developing WP1122 for cancer indications. Accordingly, we filed and subsequently received clearance for an IND to study WP1122 in GBM as described below.

An early 2021 study of 2-DG in COVID-19 subjects was conducted by the Institute of Nuclear Medicine and Allied Sciences (INMAS), a lab of Defense Research and Development Organization (DRDO), in collaboration with Dr Reddy's Laboratories (DRL), Hyderabad, India. INMAS-DRDO scientists initiated a Phase 2 clinical trial on 2-DG in COVID-19 subjects in May 2020 during the first wave of the pandemic. This was followed by a Phase 3 study and an approval in May 2021, by Drugs Controller General India (DCGI) for emergency use of 2-DG as an adjunct therapy in subjects with moderate to severe COVID-19.

As per the interim available data, the Phase 2 trial reported a median time difference of 2.5 days to achieve normalization of specific vital signs parameters in the 2-DG arm when compared to Standard of Care (SoC). Subsequently, the Phase 3 trial was pursued which showed that a higher proportion of subjects improved symptomatically and became free from supplemental oxygen dependence in the 2-DG arm (42%) when compared to the SoC arm (31%) by the end of day three of treatment. (Sahu KK, Kumar R. Role of 2-Deoxy-D-Glucose in COVID-19 disease: A potential game-changer. J Family Med Prim Care. 2021;10(10):3548-3552. Doi:10.4103/jfmpc.jfmpc_1338_21). Given that WP1122 is prodrug of 2-DG designed to improve its circulation time and tissue/organ uptake, we consider this human data regarding 2-DG to be potentially relevant to the potential for WP1122 to be useful in treating COVID-19. The MHRA had access to this and other data in approving our CTA, as discussed below, and did not require an animal testing model.

Clinical Trial for COVID-19 with WP1122

On April 6, 2021, we announced the engagement of IQVIA Biotech, a contract research organization (CRO) to manage our efforts to begin potential clinical trials of WP1122 for the treatment of COVID-19. On October 19, 2021, we announced that we received authorization from the MHRA to commence a Phase 1a clinical trial of WP1122 in the United Kingdom. Furthermore, we also announced that we received a favorable opinion from the London - Riverside Research Ethics Committee in the UK to begin the study, which is expected to be conducted at the Medicines Evaluation Unit in Manchester, United Kingdom. In early March 2022, we filed an amended protocol with both the Riverside Ethics Committee and the MHRA. The amendment updated the dilution of the oral solution to achieve full dissolution of WP1122. No risk/benefit to the study was affected because of this change. Once this amendment is approved, we plan to begin this trial in the first half of 2022. The Phase 1a study in healthy human volunteers will investigate the effects of a single ascending dose (SAD) and multiple days of ascending dosing (MAD) of WP1122 administered as an oral solution. Dose escalation will take place in sequential SAD cohorts, and MAD will start as soon as SAD has completed at least 3 dosing cohorts in which WP1122 is found to be safe and well-tolerated.

This study in healthy volunteers will explore safety and pharmacokinetics (PK), and subsequent clinical development will be in subjects infected with SARS-CoV-2 to further evaluate safety and establish a favorable risk/benefit profile. The Company expects to enroll approximately 80 healthy volunteers in the United Kingdom. The primary endpoint (SAD and MAD) for the study is safety and tolerability, which will be assessed by the frequency of adverse events (AEs), serious adverse events, treatment-emergent adverse events, and AEs of special interest. These will be presented by severity and seriousness, system organ class, preferred term and cohort. Clinically significant changes from baseline in clinical laboratory values, physical examination, vital signs, and electrocardiograms will be documented. The secondary endpoint (SAD and MAD) of the study will be the assessment of PK parameters of WP1122 and its 3 active metabolites. Total duration of study participation for each subject will be up to 4 weeks during SAD and up to 5 weeks during MAD.

Potential Clinical Trial for GBM with WP1122

On December 1, 2021, we announced that the FDA allowed our IND application to study WP1122 for the treatment of GBM to go forward. With this IND now cleared, we plan to seek a partner to conduct an externally funded Phase 1 open label, single arm, dose escalation study of the safety, pharmacokinetics and efficacy of oral WP1122 in adult subjects with GBM. Such a trial would enable parallel development of WP1122 as a cancer therapy. Consistent with our strategy of leveraging external funding for many of our clinical trials, we intend to seek opportunities for an investigator-initiated clinical trial of WP1122 in cancer patients in 2022. There is no assurance that we will be successful in finding an investigator with access to externally sourced funds.

Additionally, we will rely on external collaborations for testing other molecules in the WP1122 portfolio against other hard to treat viruses such as HIV, Dengue fever, and Zika.

Overview of The Market for Our Oncology Drugs

The American Cancer Society (https://www.cancer.org/latest-news/facts-and-figures-2022.html - as of March 2022) estimates that cancer continues to be the second most common cause of death in the US, after heart disease. A total of 1.9 million new cancer cases and 609,360 deaths from cancer are expected to occur in the US in 2022, which is about 1,670 deaths a day. These statistics do not include either basal cell or squamous cell skin cancers because US cancer registries are not required to collect information on these cancers. These numbers also do not account for the effect the COVID-19 pandemic has likely had on cancer diagnoses and deaths because they are projections based on reported cases through 2018 and deaths through 2019.

Market for Annamycin

Digestive, reproductive, breast and respiratory cancers comprise most of expected cancer diagnoses in 2022, while cancers like leukemia and brain tumors are considered “rare diseases.” Leukemia in particular, can be divided into acute, chronic and other, with acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML) comprising 26,710 of the estimated 60,650 new cases expected in the United States in 2022. The National Cancer Institute estimates that cancer-related direct medical costs in the US were $183 billion in 2015 and are projected to increase to $246 billion by 2030, a 34% increase based only on population growth and aging. However, the projection is likely an underestimate because of the growing cost of prescription medicines, with the list price for many now more than $100,000 annually.

Our lead drug candidate, Annamycin, is in a class of drugs referred to as anthracyclines, which are chemotherapy drugs designed to destroy the DNA of targeted cancer cells. The approved anthracyclines most commonly used are daunorubicin and doxorubicin and, prior to the expansion of their generic equivalents, annual revenues generated from anthracyclines have been estimated in the range of $770 million. Acute leukemia is one of a number of cancers that are treated with anthracyclines. One industry report estimates that annual drug revenues generated from the demand for AML-related therapies in the United States, United Kingdom, France, Germany, Italy and Spain were in the range of $153 million in 2016, and it is estimated that this number is increasing with the increase in approved AML treatments – estimated to rise to $1.6 billion by 2025. Of this worldwide amount, The US market is estimated to comprise the largest share.

Leukemia is a cancer of the white blood cells and acute forms of leukemia can manifest quickly and leave patients with limited treatment options. AML is the most common type of acute leukemia in adults. It occurs when a clone of leukemic progenitor white blood cells proliferates in the bone marrow, suppressing the production of normal blood cells. Currently, the only viable option for acute leukemia patients is a bone marrow transplant, also known as a hematopoietic stem cell transplant, which is successful in a significant number of patients. However, in order to qualify for a bone marrow transplant, the patient’s leukemia cells must be decreased to a sufficiently low level. This usually begins with a therapy referred to as “7+3,” which consists of combining seven injections of Cytarabine with 3 infusions of an anthracycline to induce remission (a complete response, or “CR”). This therapy had not improved since it was first used in the 1970s and we estimate that this induction therapy had a success rate of about 20% to 25%. A revision to this therapy was approved in the form of a drug called Vyxeos, which involves combining Cytarabine and an anthracycline (daunorubicin) into a single liposomal injection given 3 times. This improvement appears to have increased the level of CRs to 34% and the overall survival by 3.5 months. Unfortunately, the current clinically approved anthracyclines (including Vyxeos) are cardiotoxic (i.e., can damage the heart), which can limit the dosage amount that may be administered to patients. Additionally, the tumor cells often present de novo or develop resistance to the first-line anthracycline, through what is called “multidrug resistance,” enabling the tumor cells to purge themselves of the available anthracyclines. Consequently, in the majority of these patients there remains no effective therapy for inducing remission sufficient to enable a potentially curative bone marrow transplant and unfortunately most patients will succumb quickly to their leukemia. If a patient’s leukemia reappears before they can be prepared for a bone marrow transplant, they are considered to have “relapsed.” If a patient fails to achieve a sufficient response from the induction therapy to qualify for a bone marrow transplant, they are considered to be “refractory” (resistant to therapy). Together, this group of relapsed and refractory AML patients constitutes our primary focus for treatment with Annamycin and our intent is to pursue FDA approval for Annamycin as a second-line induction therapy for adult relapsed or refractory AML patients.

We believe that pursuing approval as a second line induction therapy for adult relapsed or refractory AML patients is the shortest path to regulatory approval, but we also believe that one of the most important potential uses of Annamycin is in the treatment of children with either AML or ALL (acute lymphoblastic leukemia, which is more common in children). Accordingly, we also intend to pursue approval for pediatric use in these conditions when practicable.

Soft tissue sarcoma is a broad term for cancers that start in soft tissues (muscle, tendons, fat, lymph and blood vessels, and nerves). These cancers can develop anywhere in the body but are found mostly in the arms, legs, chest, and abdomen.

The lungs are the most frequent site of metastasis from soft-tissue sarcomas. From several studies, it has been estimated that approximately 30% of the STS cases develop lung metastases. Effective systemic therapies for metastatic STS are currently limited; when possible, surgical removal of the lung metastases (known as pulmonary metastasectomy, PM) is the preferred treatment. Metastasectomy and/or chemotherapy are the most common treatments offered to patients with metastatic sarcoma. Pulmonary metastasectomy, either video-assisted or through a formal thoracotomy, has been shown to increase overall survival in select populations of both osseous and soft tissue sarcoma patients. The market is expected to grow as a result of factors like an increase in the patient pool.

We believe that the market size of STS with lung metastases in the seven major markets is expected to rise from $177 million in 2017 to reach $198 million by 2030. According to our estimates, the highest market size of STS with lung metastases was estimated in the United States, followed by Germany. The market of STS with lung metastases is categorized into first-line and second-line therapies. The therapies in first-line treatment involve surgery, off-label treatment, and stereotactic radiation therapy (SBRT). We estimate that around 80% of patients taking the first-line treatment due to relapse of the disease progress on to second-line treatment. Since we know of no approved or emerging therapies for treatment of relapsed/refractory patients, we believe that first-line therapies are often used again in second-line management. Other cancers metastasize to the lungs, including osteosarcoma, breast and colon cancers, for which the relapsed or refractory population is estimated to exceed 8,000 in the US. In addition, there are over 20,000 annual cases of testicular, thyroid, endometrial, renal and cervical cancers which metastasize to the lungs. Given this backdrop, we believe the best initial pathway for Annamycin is to pursue the second-line treatment of STS lung metastasis.

Based on our research, we believe that there were approximately 60,000 pancreatic cancer diagnoses and 48,000 deaths in the US last year. Incidence of pancreatic cancer in the US is expected to grow to 90,000 by 2040. While pancreatic cancer only accounts for 3.2% of all cancer diagnoses, it has the highest mortality rate of all cancers and is the third leading cause of cancer-related deaths in the US, behind lung and colon cancer. The most effective treatment for pancreatic cancer is surgery, but only 20% of cases are eligible for a surgical approach. The 80% of non-resectable pancreatic cancers are typically treated with chemotherapy and other pharmacotherapies. Global sales of drugs used for the treatment of pancreatic cancer, including Abraxane, Lynparza and Tarceva, exceeded $3 billion in 2020, though this figure includes sales for treatment of other cancers as well. Abraxane will become generic in 2022 which should impact this number. There is a tremendous amount of clinical development activity in pancreatic cancer, with 551 trials ongoing, of which 32 were late-stage.

Market for Our WP1066 (STAT3) Portfolio

Our active development program for WP1066, has potential applications (among others) in the treatment of brain tumors, another rare disease for which there are few available treatments. The leading brain tumor drug is temozolomide, a drug introduced under the brand name Temodar. In 2012, one industry source reported annual revenues of approximately $882 million for Temodar before the expiration of its patent protection, at which point generic versions of the drug began to enter the market and reduce prices.

WP1066 is our most published asset (over 50 peer reviewed articles), and we believe it is one of very few drug candidates in the market focused on the inhibition of p-STAT3, and that its mechanism of action is unique. Clinical research on WP1066 is currently focused on the treatment of adult GBM and childhood brain tumors, including DIPG. An industry recognized data source in late 2020 estimated that the incidence rate of primary malignant brain and central nervous system tumors in the US is 7.4 cases per 100,000 person-years. This translates to an incidence of approximately 20,000 cases of malignant brain cancer per year. It is estimated that more than 81,000 people were living with a diagnosis of primary malignant brain and central nervous system tumor in the United States in 2000. In Europe in 2002, 33,000 people were diagnosed with primary brain/CNS cancers, and of which 85-90% are brain tumors. Incidence in Asians is significantly lower and based on the results of several large epidemiological studies, we estimate a Japanese incidence of close to 3,000 a year. Gliomas (mainly glioblastoma and astrocytomas) account for 78% of malignant tumors.

Diffuse Interstitial Pontine Glioma (DIPG) - also called: Pontine Glioma or Brainstem Glioma – is a type of pediatric (6-9 years old) tumor that starts in the brain stem. These tumors are called gliomas because they grow from glial cells, a type of supportive cell in the brain. DIPG falls into the Glioma staging system, so they can be classified according to the four stages below based on how the cells look under the microscope. The grades are from the least severe to the most severe: Low Grade: Grade I or II means that the tumor cells are the closest to normal; and High Grade: Grade III or IV means that these are the most aggressive tumors. The main issue with DIPG is that most of these tumors are not classified by grade because biopsy or removal of the tumor is not safe because of the location of the tumor, so they are diagnosed by their appearance on MRI. Symptoms usually develop rapidly in the majority of subjects because of the fast growth of these tumors. The most common symptoms are issues related to balance and walking; eyes, chewing and swallowing, nausea and vomiting, headaches and facial weakness or drooping (usually one side). 10-20% of all pediatric gliomas are DIPG. DIPG impacts an estimated 200 to 400 children per year in the US alone. After diagnosis, median survival is usually nine months. Only 10% live for more than two years. When compared to pediatric glioblastoma, the prognosis for DIPG is the worst with less overall survival. There are no effective treatments for DIPG.

We believe there is a significant unmet need for an effective treatment for DIPG. While chemotherapy trials of over 200 drugs have not shown any impact on the disease, a DIPG subject in the first cohort of the Emory University study of WP1066 responded to treatment with both a radiologic reduction in tumor size and a clinical improvement in symptoms. While this is only an “n” of one, we believe the response is important and encouraging, especially since we believe this was a subtherapeutic dose level. In December 2020, we announced that the FDA had approved our request for a "Rare Pediatric Disease" designation for our drug candidate WP1066. The designation may entitle us to receive a transferrable Priority Review Voucher (PRV) upon approval of an NDA for one of three indications, including DIPG, medulloblastoma and atypical teratoid rhabdoid tumor. We believe that the early activity we are seeing in WP1066 is both surprising and encouraging. The approval of these three Rare Pediatric Disease designations is a reminder of just how important our efforts are to potentially help children with brain tumors. These vouchers are issued upon drug approval of the rare disease indication from the FDA and once issued, can be transferred to other drug developers. PRVs have historically had significant value and have recently been sold for up to $100 million or more.

Additionally, WP1220 which is in the WP1066 Portfolio, has shown activity in a clinical trial for the treatment of CTCL. CTCL is a neoplastic transformation of T-lymphocytes and most often occurs between the ages of 40 and 60. Unlike other forms of non-Hodgkin lymphoma, CTCL is initially manifested as skin lesions (mycosis fungoides "MF"), but later stages involve lymph nodes, circulating tumor cells in the blood, as well as viscera. MF is considered a low-grade cutaneous lymphoma which we estimate accounts for more than half of primary CTCLs. Early-stage MF (Stages I and II; ~70% of subjects) is generally treated with skin-directed treatments (topical therapy) using systemic drugs that do not have significant side effects as secondary treatments. Advanced-stage MF requires more aggressive (systemic) therapies due to more extensive involvement of tissues and organs. Treatment is based mainly on a recently published European Organization for Research and Treatment of Cancer (EORTC) guideline. A consensus guideline for clinical endpoints and response criteria to be incorporated into clinical trials was published. However due to the rarity of this disease, it has been difficult to perform randomized studies. There is currently no cure for this disease.

The incidence of CTCL is approximately 16,000 worldwide in 2020 (US + EU 48%) and estimated to be growing to 18,000 by 2026. Asia has the highest incidence (38%). Prevalence is estimated to be 42,000 in US & EU growing to 45,000 with prevalence in Japan growing to a total of 49,000 by 2026. Since this is a chronic disease, we believe introduction of a new topical therapy that is more effective and less toxic than currently available topical drugs (if that is what is shown) would be important to this market. The US market was estimated to represent $40 million in annual sales in 2020, yet consists of technologies that are as much as 40 years old. Our WP1220 proof of concept trial for the treatment of CTCL was conducted in 5 subjects, including the treatment of a total of 11 lesions and concluded with a lesion objective response rate (ORR) of 45%, no adverse events and 55% stable disease, resulting in 100% clinical benefit. 60% of the subjects responded with a PR. We believe that a significant unmet need remains for early stage (Stages IA through IIA) CTCL, and therefore, we believe a meaningful opportunity exists for WP1220.

Market for Our WP1122 Portfolio

Certain cancers depend heavily on glycolysis and glycosylation for growth and survival. Additionally, viruses depend on glycolysis and glycosylation for infectivity and replication. Glycolysis and glycosylation can be disrupted by using a glucose decoy known as 2-DG. While 2-DG has been shown to be effective in vitro and may have some activity in humans, its lack of drug-like properties limits its efficacy. Based on our preclinical testing in vitro (against cancers and viruses) and in vivo (against certain cancers only), WP1122 appears to improve the drug-like properties of 2-DG by creating a prodrug of 2-DG that reaches much higher tissue/organ concentrations than 2-DG alone. We believe WP1122 should be well suited as a treatment for highly glycolytic cancers such as GBM and pancreatic cancer.

In addition to the market for GBM described above, pancreatic cancer is a rare and difficult to treat form of cancer. Cancers of the pancreas are a very serious health issue in the United States where pancreatic cancer is the fifth leading cause of cancer deaths following breast cancer; lung cancer, colon cancer, and prostate cancer. Due to difficulties in diagnosis, the intrinsic aggressive nature of pancreatic cancers, and the sparse systemic treatment options available, only approximately 4% of patients diagnosed with pancreatic adenocarcinoma will be alive five years after diagnosis.

We believe that WP1122 may also be effective at treating COVID-19. Hundreds of drug candidates have been tested in COVID-19 since the disease became pandemic in early 2020. Many approved COVID-19 therapies, such as therapeutic antibodies and anti-the viral drugs molnupiravir and nirmatrelvir, have demonstrated activity against SARS-CoV-2, the virus which causes COVID-19. Other therapies, such as the JAK inhibitor baricitinib, act on host-based mechanisms, importantly by reducing inflammation. WP1122 is being evaluated to act by both host-based and viral mechanisms. Many experts believe that COVID-19 will eventually become endemic, and that a dynamic similar to influenza will emerge. In this scenario, we estimate that there could be approximately 4 million cases of COVID-19 in the US annually by 2027. Should WP1122 prove effective at treating COVID-19, of which there is no assurance, we expect that contract sales to governments will have an important role in the market.

Our License Agreements

Sponsored Research and License Agreements with MD Anderson

We have licensed all of our technology from MD Anderson, and we also sponsor research there as well. Under license agreements associated with Annamycin, the WP1122 Portfolio, and the WP1066 Portfolio, all described below, we are responsible for certain license, milestone and royalty payments over the course of the agreements. Annual license fees, prior to the first sale of a licensed product, can be as high as $0.1 million depending upon the anniversary. Milestone payments for the commencement of phase II and phase III clinical trials can cost as high as $0.5 million. Other milestone payments for submission of an NDA to the FDA and receipt of first marketing approval for sale of a license product can be as high as $0.6 million. Royalty payments can range in the single digits as a percent of net sales on drug products or flat fees as high as $0.6 million, depending upon certain terms and conditions. Not all of these payments are applicable to every drug. Total expenses under these agreements were $0.3 million for the years ended December 31, 2021 and 2020, respectively.

We have a sponsored research agreement with MD Anderson that currently runs until the end of December 2022. The expenses recognized under the MD Anderson agreement with regards to the sponsored research agreement were $0.7 million and $0.6 million for the year ended December 31, 2021 and 2020, respectively. In July 2021, we amended the sponsored research agreement for total payment of $0.2 million to support the continuation of the project.

Annamycin

On June 29, 2017, we entered into a patent and technology license agreement with MD Anderson licensing certain technology related to the method of preparing Liposomal Annamycin and on December 17, 2021 we entered into an amendment to this agreement to include certain technology related to the method of reconstituting Liposomal Annamycin. On December 2, 2021, we entered into a patent and technology license agreement with MD Anderson licensing certain technology related to lung targeted therapies with Annamycin. The terms and payments of which are included in the summary above. The terms of these agreements extend until the later of 20 years from the effective date of the agreements, or the expiration of the last-to-expire licensed patent. In addition, commencing on the four-year anniversary of each agreement, MD Anderson has the right to remove any jurisdiction from such agreement, upon 90 days' notice, if we have not commercialized or are not using commercially reasonable efforts actively and effectively to attempt to commercialize a licensed invention in such jurisdiction.

WP1066 Portfolio

The rights and obligations to a June 2010 Patent and Technology License Agreement entered into by and between Moleculin LLC and MD Anderson (the "2010 Agreement") have been assigned to us. Therefore, we have obtained a royalty-bearing, worldwide, exclusive license to intellectual property rights, including patent rights, related to our WP1066 drug product candidate. On February 3, 2022, we entered into a new patent and technology license agreement (the "2022 Agreement") with MD Anderson licensing certain technology related to WP1066 checkpoint inhibitors. In consideration for these agreements, we must make payments to MD Anderson including an up-front payment, milestone payments and minimum annual royalty payments for sales of products developed under the license agreement. Annual maintenance fee payments will no longer be due upon marketing approval in any country of a licensed product under the 2010 Agreement. One-time milestone payments are due upon commencement of the first Phase III study for a licensed product within the United States, Europe, China or Japan; upon submission of the first NDA for a licensed product in the United States; and upon receipt of the first marketing approval for sale of a licensed product in the United States. The term of the 2010 Agreement extends until the later of 15 years from the effective date of the agreement, or the expiration of the last-to-expire licensed patent. The term of the 2022 Agreement extends until the later of 20 years from the effective date of the agreement, or the expiration of the last-to-expire licensed patent. In addition, MD Anderson may terminate the 2022 Agreement if we fail to file for an IND for a Phase 1 study before February 2, 2025 in the United States, France, Germany, Italy, Spain, the United Kingdom or China.

WP1122 Portfolio

The rights and obligations to an April 2012 Patent and Technology License Agreement entered into by and between IntertechBio and MD Anderson (the "2012 Agreement") have been assigned to us. Therefore, we have obtained a royalty-bearing, worldwide, exclusive license to intellectual property, including patent rights, related to our WP1122 Portfolio and to our drug product candidate, WP1122. On December 3, 2021, we entered into a new patent and technology license agreement (the "2021 Agreement") with MD Anderson licensing certain technology related to WP1122 anti-viral treatments. The terms and payments of these agreements are included in the summary above. The 2012 Agreement was amended in May 2020 to provide for extension of a certain milestone requirement and allowed for us to extend such milestone upon our request and extension payment. The initial milestone required us to file an IND with the FDA for a Phase I study by February 20, 2021. We extended the deadline for this milestone to August 20, 2021 by paying an extension fee. On August 3, 2021, we filed a CTA in the United Kingdom to commence a Phase 1a clinical trial of WP1122. MD Anderson agreed that this CTA filing would further extend the deadline to file an IND with the FDA for a Phase I study until February 2022. In December 2021, we submitted an IND for the treatment of GBM with WP1122 to the FDA, thus meeting the IND filing milestone. The term of the 2012 agreement extends until the later of 15 years from the effective date of the agreement, or the expiration of the last-to-expire licensed patent. In addition, MD Anderson may terminate the 2012 agreement if we fail to commence a Phase 1 study for a licensed product prior to November 20, 2022; or if we fail to commence a Phase 2 study for licensed product prior to November 20, 2024. The term of the 2021 agreement extends until the later of 20 years from the effective date of the agreement, or the expiration of the last-to-expire licensed patent. In addition, MD Anderson may terminate the 2021 agreement if we fail to file an IND or its foreign equivalent for a Phase 1 study for a licensed product prior to December 3, 2024; or if we fail to commence a Phase 1 study for licensed product prior to December 3, 2026. We believe that the filing and clearance of a WP1122 Phase 1 clinical trial for COVID-19 in the UK and subsequent start of that trial will meet these milestone requirements.

WPD Licensing Agreement

On December 20, 2021, we amended our sublicense agreement with WPD Pharmaceuticals (WPD), originally entered into on February 19, 2019, pursuant to which we sublicensed to WPD certain intellectual property rights, including rights to Annamycin, its WP1122 portfolio, and its WP1066 portfolio, which sublicense was previously amended on March 22, 2021 (as amended, the "WPD Agreement"). WPD is affiliated with Dr. Waldemar Priebe, our founder. Under the WPD Agreement, we granted WPD a royalty-bearing, exclusive license to research, develop, manufacture, have manufactured, use, import, offer to sell and/or sell products in the field of human therapeutics under the licensed intellectual property in the countries of Poland, Estonia, Latvia, Lithuania, Belarus, Ukraine, Moldova, Romania, Armenia, Azerbaijan, Georgia, Slovakia, Czech Republic, Hungary, Uzbekistan, Kazakhstan, Greece, Austria, Russia, Netherlands, Turkey, Belgium, Switzerland, Sweden, Portugal, Norway, Denmark, Ireland, Finland, Luxembourg, Iceland (licensed territories).

Pursuant to the WPD Agreement, WPD agreed that it must use Commercially Reasonable Development Efforts (CRDE) to develop and commercialize products in the licensed territories. For purposes of the WPD Agreement, the term CRDE means the expenditure, either directly or through the guarantees of grants, by or on behalf of WPD or any of its affiliates of at least: (i) $2,500,000 during the first four (4) years (the "Initial Hurdle Date") immediately following the date of the original agreement, or February 19, 2019, on the research, development and commercialization of sublicensed products in the licensed territories; and (ii) a minimum of $2,100,000 annually for each of the five (5) years after the Initial Hurdle Date on the research and development of sublicensed products in the licensed territories. The total minimum required total CRDE is $14.0 million.

During the term of the WPD Agreement, to the extent we are required to make any payments to MD Anderson pursuant to our license agreements with MD Anderson, whether a milestone or royalty payment, as a result of the research and development or sale of a sublicensed product, WPD shall be required to advance or reimburse us for such payments. In further consideration for the rights granted by us to WPD under the WPD Agreement, WPD agreed to pay us a royalty percentage at a rate equal to the royalty rate owed MD Anderson under our license agreements with MD Anderson plus an additional royalty (the "override royalty percentage") equal to 1.0% of net sales of any sublicensed products, provided, however, if WPD spends: (i) more than $14.0 million in CRDE, the override royalty percentage will decrease to 0.75% of net sales; or (ii) more than $17.0 million in CRDE, the override royalty percentage will decrease to 0.5% of net sales.

With certain exceptions, the WPD Agreement will remain in full force and effect until the expiration of the last patent within the sublicensed patents. Notwithstanding the foregoing, we have the right, in our sole discretion, to terminate the WPD Agreement in whole, or to materially amend the agreement by removing a portion of the sublicensed subject matter, in connection with certain fundamental transactions or in connection with the granting to an unaffiliated third party of a license or sublicense to all or to a material portion of the sublicensed subject matter within all or substantially all of the licensed territories (such event, the "buyback event") by making a payment to WPD based on the percentage of licensed territories involved in the buyback event as compared to the overall world healthcare spend and the extent to which WPD has satisfied its CRDE requirements.

On December 19, 2021, we consented to allow WPD, upon a default to a third-party lender that had advanced funds to WPD (the "Lender"), to assign the WPD Agreement to the Lender, subject to certain conditions and subject to the Lender granting us the right to terminate the WPD Agreement upon any assignment as follows. If the assignment occurs, we have the right at any time during the remaining term of the WPD Agreement to terminate the agreement by paying the Lender $1.7 million (the "Termination Fee") in the form of $1.0 million in cash and the issuance to Lender of our common stock valued at the remaining balance due (based on valuing each share of common stock issued at the greater of $3.00 per share or 30% less than the five day trading average of the common stock for the five trading days prior to the date the notice of termination is delivered; provided that if the assignment occurs and if we do not exercise the above termination right within 90 days of the Assignment Date: (i) the Initial Hurdle Date will be extended for a period of 3 years; and (ii) the Termination Fee shall increase (A) $2.0 million prior to the later of March 1, 2023 or 105 days from the assignment date; (B) $2.2 million prior to the later of March 1, 2024 or one year and 105 days from the assignment date; or, (C) $2.4 million thereafter. Upon any assignment, we will pay the Lender $0.2 million to cover legal and transaction fees related to the termination.

Animal Life Sciences Licensing Agreement

On February 19, 2019, we sublicensed certain intellectual property rights, including rights to Annamycin, our WP1122 portfolio, and our WP1066 portfolio in the field of non-human animals to Animal Life Sciences, LLC (ALI) (the "ALI Agreement"). ALI is affiliated with Dr. Waldemar Priebe, our founder. Under the ALI Agreement, we granted ALI a worldwide royalty-bearing, exclusive license to research, develop, manufacture, have manufactured, use, import, offer to sell and/or sell products in the field of non-human animals under the licensed intellectual property. This license is subject to the terms in the prior agreements entered into by the Company and MD Anderson.

During the term of the ALI Agreement, to the extent we are required to make any payments to MD Anderson pursuant to our license agreements with MD Anderson, whether a milestone or royalty payment, as a result of the research and development or sale of a sublicensed product, ALI shall be required to advance or reimburse us such payments. In further consideration for the rights granted by us to ALI under the ALI Agreement, ALI agreed to pay us a royalty percentage at a rate equal to the royalty rate we owe MD Anderson under our license agreements with MD Anderson plus an additional royalty equal to 5.0% of net sales of any sublicensed products. As additional consideration, ALI issued us a 10% ownership interest in ALI.

With certain exceptions, the ALI Agreement will remain in full force and effect until the expiration of the last patent within the sublicensed patents.

Prior Sublicenses

In 2015, we entered into certain patent and technology development and license agreements with Dermin sp. z o.o. (Dermin). In connection with such agreements, certain intellectual property rights related to Annamycin, our WP1122 portfolio, and our WP1066 portfolio were licensed to Dermin and Dermin was granted a royalty-bearing, exclusive license to manufacture, have manufactured, use, import, offer to sell and/or sell products in the field of human therapeutics under the licensed intellectual property in certain countries in Europe and Asia. In July 2019, Dermin assigned its rights under the foregoing license agreements to an affiliated entity, Exploration Invest Pte Ltd. (Exploration). On July 30, 2019, we and Exploration entered into an agreement pursuant to which we issued Exploration shares of Company common stock valued at $0.5 million (based on the greater of the closing price of the common stock on the date of the agreement or the 10-day average closing price prior to the date of the agreement) in exchange for the modifying the license agreements to: (i) limit the licensed territory solely to Poland; and (ii) limit the patent rights and technology rights licensed to Exploration to the patent rights and technology rights that existed on the date the original license agreements were entered into with Dermin. In February 2022, we entered into a termination agreement with Exploration pursuant to which Exploration agreed to terminate all the above licenses for a one-time payment of $400,000. As of the date hereof, all the above licenses have been terminated.

Corporate History

We were founded in 2015 by Walter Klemp (our chairman and CEO), Dr. Don Picker (our Chief Science Officer) and Dr. Waldemar Priebe of MD Anderson (Chairman of our Scientific Advisory Board) in order to combine and consolidate the development efforts involving several oncology technologies, based on license agreements with MD Anderson. Dr. Priebe is a Professor of Medicinal Chemistry in the Department of Experimental Therapeutics, Division of Cancer Medicine, at the University of Texas MD Anderson Cancer Center. This effort began with the acquisition of the Annamycin development project from AnnaMed, Inc. followed by the acquisition of the license rights to the WP1122 Portfolio from IntertechBio Corporation. Further, on behalf of Moleculin, LLC, we entered into a co-development agreement with Houston Pharmaceuticals, Inc., which culminated with the merger of Moleculin, LLC into MBI coincident with our initial public offering allowing us to gain control of the WP1066 Portfolio.

In June 2018, we formed Moleculin Australia Pty. Ltd., a wholly owned subsidiary to oversee pre-clinical development in Australia. The Australian government provides an aggressive incentive for research and development carried out in their country. We believe having an Australian subsidiary could provide a great opportunity for quality, pre-clinical and clinical development and reduce the overall cost of our continued drug development efforts.

On January 29, 2021, we completed a one-for-six reverse stock split of our shares of common stock and proportionate reduction in the number of authorized shares of common stock from approximately 72,000,000 shares to approximately 12,000,000. The reverse stock split was effected in accordance with the authorization adopted by our stockholders at our 2020 annual meeting of stockholders.

In July 2021, we formed Moleculin Amsterdam B.V., a wholly owned subsidiary, primarily to act as our legal representative for clinical trials in Europe for Moleculin Biotech, Inc.

Competition

We operate in a highly competitive segment of the pharmaceutical market, which market is highly competitive as a whole. We face competition from numerous sources including commercial pharmaceutical and biotechnology enterprises, academic institutions, government agencies, and private and public research institutions. Many of our competitors may have significantly greater financial, product development, manufacturing and marketing resources. Additionally, many universities and private and public research institutes are active in cancer research, and some may be in direct competition with us. We may also compete with these organizations to recruit scientists and clinical development personnel. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies.

The unmet medical need for more effective cancer therapies is such that oncology drugs are one of the leading class of drugs in development. These include a wide array of products against cancer targeting many of the same indications as our drug candidates. While the introduction of newer targeted agents may result in extended overall survival, we believe that induction therapy regimens are likely to remain a cornerstone of cancer treatment in the foreseeable future.

There are a number of established therapies that may be considered competitive for the cancer indications for which we intend to develop our lead product candidate, Annamycin. A key consideration when treating AML patients is whether the patient is suitable for intensive therapy. The standard of care for the treatment of newly diagnosed AML patients who can tolerate intensive therapy is cytarabine in combination with an anthracycline (e.g., doxorubicin or daunorubicin), typically referred to as a "7+3" regimen. For some patients, primarily those less than 60 years of age, a stem cell transplant could also be considered if the induction regimen is effective in attaining a CR (Complete Response). The 7+3 regimen of cytarabine in combination with an anthracycline has been the standard of care for decades. A patient not suitable for intensive therapy may be offered the option for low-intensity therapy such as low-dose cytarabine, azacitidine or decitabine. It should be noted that, in the United States, these are not approved by the FDA for the treatment of AML patients and there remains no effective therapy for these patients or for relapsed or refractory AML, with the exception of some recently approved targeted therapies that have demonstrated a low level of activity for limited subgroups of AML patients. The initial focus for Annamycin development is in patients for whom the standard induction regimen has failed. Also, several major pharmaceutical companies and biotechnology companies are aggressively pursuing new cancer development programs for the treatment of AML.

A number of attempts have been made or are under way to provide an improved treatment for AML. Celator Pharmaceuticals reported Phase III clinical trial results for a new combined formulation of cytarabine and daunorubicin (commonly used induction therapy drugs) they call Vyxeos. This new liposome formulation provides a 5:1 ratio of cytarabine and daunorubicin in each of three injections. When compared with patients receiving 7 injections of cytarabine and 3 injections of daunorubicin (traditional 7+3 induction therapy), patients receiving Vyxeos achieved an average increase in overall survival of approximately 3.5 months (9.5 months compared with 6 months). Despite this extension of overall survival, Vyxeos did not reduce the toxic side effects of daunorubicin (including cardiotoxicity) and it failed to qualify a majority of patients for curative bone marrow transplant. With these results, Jazz Pharmaceuticals acquired Celator in 2016 and obtained FDA approval. More recently, a new drug called venetoclax, which is indicated for the treatment of chronic lymphocytic leukemia (CLL) and small lymphocytic lymphoma (SLL) in combination with certain antibody therapies, has been found to be effective for the treatment of AML.

Drugs attempting to target a subset of AML patients who present with specific gene mutations, such as one referred to as FLT3, have recently received FDA approval, but by definition serve only subsets of the AML population. Other targeted therapies are currently in clinical trials, as well as other approaches that include immunotherapy relying on other biomarkers, other attempts at improved chemotherapy and alternative approaches to radiation therapy. Other approaches to improve the effectiveness of induction therapy are in early-stage clinical trials and, although they do not appear to address the underlying problems with anthracyclines, we can provide no assurance that such improvements, if achieved, would not adversely impact the need for improved anthracyclines. A modified version of doxorubicin designed to reduce cardiotoxicity is in clinical trials for the treatment of sarcoma and, although this drug does not appear to address multidrug resistance and is not currently intended for the treatment of acute leukemia, we can provide no assurance that it will not become a competitive alternative to Annamycin. Although we are not aware of any other single agent therapies in clinical trials that would directly compete against Annamycin in the treatment of relapsed and refractory AML, we can provide no assurance that such therapies are not in development, will not receive regulatory approval and will reach market before our drug candidate Annamycin. In addition, any such competing therapy may be more effective and/or cost-effective than ours.

Soft-tissue sarcomas which have metastasized to the lungs are extremely difficult to treat. There are an estimated 13,600 new cases of soft-tissue sarcoma diagnosed each year, and of those that metastasize, approximately 70% of metastases occur to the lungs. The current standard of care consists of anthracycline therapy or newer-generation drugs such as pazopanib. However, only 20% of patients with STS lung metastases respond to these treatments. There are competitive efforts underway to develop new treatments for STS, including metastatic STS, but few specifically target STS metastases to the lungs.

Non-resectable pancreatic cancers are typically treated with chemotherapy and other pharmacotherapies, including Abraxane, Lynparza and Tarceva. While these products have been commercially successful, their success rates at treating pancreatic cancer are low and fatality rates remain high. This has led to a tremendous amount of clinical development activity in pancreatic cancer, with 551 trials ongoing, resulting in significant competition for pancreatic cancer patients among clinical trials, which could impact development timelines.

Several products have established efficacy for the treatment of SARS-CoV-2 infection and COVID-19, and the continued development of additional therapies has resulted in competition for patients in clinical trials. Products which have obtained approval, either on an emergency use basis or pursuant to full regulatory review, include antiviral antibody therapies from Lilly, Regeneron, GSK and AstraZeneca; small molecule antiviral drugs from Pfizer and Merck; and targeted anti-inflammatory drugs from Lilly and others. If proven to be effective against COVID-19, WP1122 would be expected to compete with other host-based therapies including targeted anti-inflammatory drugs.

Competition for other indications targeted for each of our drug candidates is described above.

Government Regulation

Government authorities at the federal, state and local level in the US, and in analogous levels in other countries extensively regulate, among other things, the development, testing, manufacture, quality control, safety, effectiveness, approval, labeling, packaging, storage, distribution, import, export, record-keeping, reporting, promotion, advertising, distribution, marketing and export and import of products such as those we are developing. The pharmaceutical drug product candidates that we develop must be approved by the FDA before they may be marketed and commercially distributed in the US, and by regulators in other countries before being marketed and commercially distributed there.

In the United States, the FDA regulates pharmaceutical products such as our product candidates under the Federal Food, Drug, and Cosmetic Act and implementing regulations. Pharmaceutical products are also subject to other federal, state and local statutes and regulations. Obtaining regulatory approvals and complying with post-approval requirements generally is expensive, labor-intensive and time-consuming. Failure to comply with the applicable requirements may subject an applicant to administrative or judicial enforcement action, which could include refusal to permit clinical trials, refusal to approve an application, withdrawal of an approval, issuance of a warning letter, product recall, product seizure, suspension of production or distribution, fines, refusals of government contracts, and restitution, disgorgement or civil or criminal penalties. Any agency or judicial enforcement action could have a material adverse effect on us.

Development and Approval

The process required by the FDA before a pharmaceutical product may be marketed in the US generally involves the following:

- Completion of preclinical laboratory tests, animal studies and formulation studies;
- Submission to the FDA of an Investigational New Drug application, or IND, which must become effective before human clinical trials may begin;
- Performance of adequate and well-controlled human clinical trials according to the FDA's regulations commonly referred to as good clinical practices (GCP) and any additional requirements for the protection of human research subjects and their health information, to establish the safety and efficacy of the proposed pharmaceutical product for its intended use;
- Submission to the FDA of an NDA for marketing approval that includes substantial evidence of safety and effectiveness from results of clinical trials, as well as the results of preclinical testing, detailed information about the chemistry, manufacturing and controls, and proposed labeling and packaging for the product;
- Review of the product candidate by an FDA advisory committee, if applicable;
- Satisfactory completion of an FDA inspection of the manufacturing facility or facilities where the pharmaceutical product is produced, to assess compliance with current good manufacturing practice, or cGMP, requirements, to assure that the facilities, methods and controls are adequate to preserve the pharmaceutical product's identity, strength, quality and purity;
- Potential FDA audit of the preclinical and clinical trial sites that generated the data in support of the NDA; and
- FDA review and approval of the NDA, including agreement on post-marketing commitments, if applicable.

The development and approval process, as well as post-approval requirements and restrictions, require substantial resources, attention and effort, and the prospects for approval and continued compliance are inherently uncertain.

Preclinical Testing. Before testing any compound in humans in the US, a company must generate extensive preclinical data. Preclinical testing generally includes laboratory evaluation of product chemistry and formulation, as well as toxicological and pharmacological studies in animals to assess the product's safety and activity. The preclinical work must be done in accordance with Good Laboratory Practice, or GLP, requirements, the Animal Welfare Act, and other applicable regulations. The sponsor must submit the preclinical data in an IND, together with manufacturing information, analytical data, any available clinical data or literature and a proposed clinical protocol. Unless the FDA notifies the sponsor otherwise, an IND becomes effective 30 days after receipt by the FDA, and the proposed clinical trial may begin. If it expresses concerns to the sponsor, FDA may impose a "clinical hold," which precludes beginning the study until the issues are resolved. Similarly, once a study has begun, the FDA may impose a clinical hold suspending further activity, pending resolution of agency concerns. Accordingly, we cannot be sure that submission of an IND will result in a clinical trial beginning or that, once begun, a clinical trial will not be suspended or terminated.

IND Application. Clinical trials involve the administration of the product candidate to healthy volunteers or subjects with the targeted disease under the supervision of qualified investigators, generally physicians not employed by or under the clinical trial sponsor's control. Clinical trials are conducted under protocols detailing, among other things, the objectives of the clinical trial, dosing procedures, subject selection and exclusion criteria, how the results will be analyzed and presented and the parameters to be used to monitor subject safety. Each protocol must be submitted to the FDA as part of the IND. Clinical trials must be conducted in accordance with FDA's good clinical practice, or GCP, regulations, which are intended to safeguard study subjects and support the validity of the resultant data. Further, each clinical trial must be reviewed and approved by an independent institutional review board (IRB) at, or servicing, each institution at which the clinical trial will be conducted. An IRB is charged with protecting the welfare and rights of study participants and for determining that the risks to study participants are minimized and are reasonable in relation to anticipated benefits. The IRB also approves the informed consent form that each study subject (or his or her legal representative) must sign, and is responsible for monitoring the conduct of the study until completed.

Clinical testing. Human clinical trials are typically conducted in three sequential phases that may overlap or be combined:

- Phase 1: The pharmaceutical product is initially administered to humans, usually a small group of healthy human subjects, but occasionally to subjects with the targeted disease. This latter case is usually reserved for product candidates intended for severe or life-threatening diseases (such as cancer) and/or when the product may be too inherently toxic to ethically administer to healthy volunteers. Phase 1 trials generally are intended to determine the metabolism and pharmacologic actions of the drug, the side effects associated with increasing doses, and, if possible, to gain early evidence of effectiveness. Because our product candidates are being studied for treating cancers and contain cytotoxic agents, our Phase 1 studies are conducted in late-stage cancer patients whose disease has progressed after treatment with other agents, and are focused on establishing a maximum tolerable dose (MTD).
- Phase 2: Here the product candidate is evaluated in a limited patient population to develop data regarding effectiveness, to determine dosage tolerance, optimal dosage and dosing schedule, to gather additional safety information, and to identify patient populations with specific characteristics where the pharmaceutical product may be more effective.
- Phase 3: Clinical trials are undertaken to further evaluate dosage, clinical efficacy and safety in an expanded patient population at geographically dispersed clinical trial sites. These clinical trials are intended to establish the overall risk/benefit ratio of the product and provide an adequate basis for product labeling. The studies must be well controlled and usually include a control arm for comparison. One or two Phase 3 studies are usually required by the FDA for an NDA approval, depending on the disease severity and other available treatment options. In some instances, an NDA approval may be obtained based on Phase 2 clinical data, often with the understanding that the approved drug can be sold subject to a confirmatory trial to be conducted post-approval.

Additionally, post-approval studies, also referred to as Phase 4 clinical trials, may be conducted after initial marketing approval. These studies are often used to gain additional information about use of the product for its approved indication, and may at times be required by the FDA as a condition of approval.

Clinical trials require submission of annual progress reports to the FDA, and certain events, especially safety-related information, may require making reports to the FDA, investigators, and/or the IRB, and can lead to suspension, modification, or cessation of ongoing trials. Accordingly, clinical trials may not be completed successfully within any specified period, if at all.

Concurrent with clinical trials, companies usually complete additional animal studies, develop additional information about the physical characteristics of the product candidate and finalize a process for manufacturing the product in commercial quantities in accordance with cGMP requirements.

The sponsor of a clinical trial or the sponsor's designated responsible party may be required to register certain information about the trial and disclose certain results on government or independent registry websites, such as ClinicalTrials.gov. Additionally, a manufacturer of an investigational drug for a serious disease or condition is required to make available, such as by posting on its website, its policy on evaluating and responding to requests for individual patient access to such investigational drug. This requirement applies on the earlier of the first initiation of a Phase 2 or Phase 3 trial of the investigational drug or, as applicable, 15 days after the drug receives a designation as a breakthrough therapy, fast track product, or regenerative medicine advanced therapy.

NDA Submission and Review. The results of product development, preclinical studies and clinical trials, along with descriptions of the manufacturing process, analytical tests conducted on the chemistry of the pharmaceutical product candidate, proposed labeling and other relevant information are submitted to the FDA as part of an NDA seeking approval to market the product. Under the Prescription Drug User Fee Act (PDUFA), as amended, the submission of an NDA is subject to the payment of a substantial fee, although the fee may be waived under certain circumstances, which may or may not be applicable to us or our partners for any of our product candidates. In addition, under the Pediatric Research Equity Act, as amended, an NDA or supplement to an NDA generally must contain data to assess the safety and effectiveness of the product candidate for the claimed indications in all relevant pediatric subpopulations and to support dosing and administration for each pediatric subpopulation for which the product is safe and effective. The FDA may grant deferrals for submission of data or full or partial waivers depending on the designated pathway for submission.

The FDA first examines a submitted NDA to determine if the application is sufficiently complete to be accepted for review. If not, the agency may refuse to file the NDA, informing the sponsor of inadequacies to be addressed in a resubmitted application. In this event, the NDA must be resubmitted with the additional information. The resubmitted application also is subject to review before the FDA accepts it for filing. Once an NDA is accepted for filing, the FDA begins an in-depth review of the application. Pursuant to goals established under PDUFA, the FDA aims to complete the review within 10 months of the 60-day filing date, which would be within 12 months of the date of submission, but that deadline is extended in certain circumstances, including by FDA requests for additional information or clarification.

The FDA also has programs intended to expedite the development and review of new drugs intended to treat serious or life-threatening conditions and address unmet medical needs and/or provide benefits over existing therapies. They include:

- Priority Review, under which FDA aims to complete the NDA review within eight months of the date of submission;
- Accelerated Approval, where a product may be approved on the basis of data demonstrating an effect on a surrogate endpoint that is reasonably likely to predict clinical benefit, or on a clinical endpoint that can be measured earlier than irreversible morbidity or mortality (IMM) that is reasonably likely to predict an effect on IMM or other clinical benefit;
- Fast Track, which may provide for FDA review of sections of the NDA on a rolling basis, before the complete application is submitted; and
- Breakthrough Therapy, which also provides for rolling review and other actions to expedite review of the NDA.

The availability of these programs is determined by the facts surrounding each specific product candidate, the disease or condition it is intended to treat, and the availability and characteristics of alternative treatments. Because those factors are subject to change, even if a product or application is granted designation for one (or more) of these programs, the benefits of the program may ultimately not be available. Additionally, the FDA may rescind designations for certain expedited programs (specifically, Fast Track and Breakthrough Therapy) if the agency determines the product candidate no longer meets the criteria for such programs.

The FDA review of an NDA focuses on determining, among other things, whether the proposed product candidate is safe and effective for its intended use, and whether the product candidate is being manufactured in accordance with cGMP to assure and preserve the product candidate's identity, strength, quality and purity. The FDA may refer applications for novel pharmaceutical products or pharmaceutical products which present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved and under what conditions. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions. The FDA may also determine that a risk evaluation and mitigation strategy (REMS) is necessary to assure the safe use of the product. Among other things, a REMS can include restrictive conditions under which the product may be distributed, which may have a negative impact on the product's commercial success. If the FDA concludes that a REMS is needed, the NDA sponsor must submit a proposed REMS, and the product will not be approved until FDA determines that the proposed REMS is adequate.

The FDA usually will inspect the facilities at which the product candidate is manufactured, and will not approve the product candidate unless the agency determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product within required specifications. Additionally, before approving an NDA, the FDA will typically inspect one or more clinical trial sites to assure compliance with IND study requirements and GCP. The NDA review process also includes evaluation of the proposed labeling, which is often the subject of significant back-and-forth between the sponsor and the agency.

The NDA review and approval process is lengthy and difficult, and may involve FDA requests for additional data or information, which may extend the process and/or lead the agency to refuse to approve the application. This is the case even if requested data or information are submitted, because data are not always conclusive and the FDA may interpret data differently than the sponsor does. If it decides not to approve an NDA, the FDA will issue a complete response letter, which usually describes the specific deficiencies in the NDA and may include recommended actions the applicant might take for the FDA to reconsider the application. The deficiencies may be minor, for example, requiring labeling changes, or more significant, such as requiring additional clinical trials. An applicant receiving a complete response letter may either revise and resubmit the NDA or withdraw the application.

FDA approval of an NDA may impose significant limitations that could weaken the commercial value of the product. This could take the form of a narrow indication or dosage, requiring the labeling to contain contraindications, warnings or precautions to address perceived safety issues, or mandating a REMS that significantly restricts or imposes burdens on how the product is distributed. Additionally, the FDA may require Phase 4 testing as a condition of approval. In particular, the FDA requires Phase 4 testing as a condition of accelerated approval, and may withdraw accelerated approval of a product if a sponsor fails to timely conduct such studies or if those studies fail to confirm safety or effectiveness. Such post-approval requirements can materially impact a product's commercial prospects. Post-approval modifications to a drug product, such as changes in indications, labeling or manufacturing processes or facilities, may require development and submission of additional information or data in a new or supplemental NDA, which would also require prior FDA approval.

Regulatory Exclusivities. The Orphan Drug Act provides incentives for the development of drugs intended to treat rare diseases or conditions, which generally are diseases or conditions affecting less than 200,000 individuals in the US. If a sponsor demonstrates that a drug is intended to treat a rare disease or condition, the FDA grants orphan drug designation (ODD) for the product for that use. The benefits of ODD include research and development tax credits and exemption from user fees, including the significant application fee otherwise required with submission of an NDA. A drug that is approved for an indication that is within the product's orphan drug designation is granted seven years of orphan drug exclusivity (ODE). During that period, the FDA generally may not approve any other application for product with the same active moiety for the same use, although there are exceptions, most notably when the later product is shown to be clinically superior to the product with orphan drug exclusivity. A court decision in 2021 broadened the scope of ODE, but the impact of that decision is yet to be determined.

ODD and ODE are also available from the European Union (EU). ODD in the EU is generally available for drug products intended to treat life-threatening or chronically debilitating conditions affecting not more than five in 10,000 persons in the EU when the application is made. If the orphan-designated product continues to meet the criteria for orphan designation at approval, the approval for an orphan-designated indication conveys a 10-year exclusivity period, during which the competent authorities in the EU may not accept another marketing authorization application and may not grant another marketing authorization for a similar medicinal product (i.e., a medicinal product with an identical active substance, or an active substance with the same principal molecular structural features and that acts via the same mechanisms) for the same therapeutic indication. The 10-year period can be reduced to six years if, at the end of the fifth year, it is established that the product no longer meets the criteria for the ODD, which can include if the product is sufficiently profitable not to justify market exclusivity. In the EU, ODE does not preclude granting a marketing authorization for a similar medicinal product for the same therapeutic indication, if that medicinal product is demonstrated to be safer, more effective or otherwise clinically superior, or if the company with orphan drug exclusivity is unable to supply sufficient quantities of the product.

Products that are approved to treat rare diseases that are serious or life-threatening and where the serious or life-threatening manifestations primarily affect patients under the age of 19 years of age may qualify for the Rare Pediatric Disease Priority Review Voucher (RPDPRV) program, in which the product sponsor receives upon approval a voucher for priority review of another product. The voucher can be used by the sponsor for a subsequent application that would not in its own right qualify for priority review, or it may be sold to another company for that use. In either case, a RPDPRV may have significant value. Under the current statutory sunset provisions for the RPDPRV program, after September 30, 2024, FDA may award a voucher for an approved rare pediatric disease product application only if the sponsor has rare pediatric disease designation for the drug, and that designation was granted by September 30, 2024. After September 30, 2026, FDA may not award any rare pediatric disease priority review vouchers.

We received ODD for Annamycin for the treatment of AML in 2018, and in 2020 for the treatment of soft tissue sarcomas, and Fast Track Designation for Annamycin for the treatment of relapsed or refractory AML in April 2019. We received ODD for WP1066 for the treatment of glioblastoma in 2019. If WP1066 is timely approved for the treatment of any of the following pediatric diseases, we may qualify for a Rare Pediatric Disease Priority Review Voucher: ependymoma, medulloblastoma, diffuse intrinsic pontine glioma, or atypical teratoid rhabdoid tumor, provided that related statutory sunset provisions are extended.

The federal Food, Drug and Cosmetic Act (FDCA) also provides for a grant of five-year exclusivity with approval of a product containing a new chemical entity (NCE), which generally means that the active moiety has never before been approved in any drug. During this exclusivity period, which runs from the date of the product's approval, FDA may not accept for filing any Abbreviated New Drug Application (ANDA) for a generic version of the product or any 505(b)(2) NDA (generally an NDA that relies on data that are not the sponsor's and for which the sponsor has not obtained a right of reference) for a product with the same active moiety. There are circumstances under which the follow-on application can be submitted at four years, and there are provisions that operate to preclude approval of the application for an additional period of time. Also, NCE exclusivity does not block approval of a "full" NDA (generally, an NDA in which the data are the sponsor's or for which the sponsor has obtained a right of reference). The NCE exclusivity scheme is complicated and evolving; for that reason, although we believe that some of our products will qualify for five-year NCE exclusivity, we cannot be certain that will receive such exclusivity, or that if we do, the exclusivity will effectively protect our market position.

Post-Approval Requirements

Once approved, products are subject to continuing regulation by the FDA, including, among other things, cGMP compliance, record-keeping requirements, reporting of adverse experiences with the product, providing the FDA with updated safety and efficacy information, product sampling and distribution requirements, complying with certain electronic records and signature requirements and complying with FDA promotion and advertising requirements, which include standards for direct-to-consumer advertising, prohibitions on promoting pharmaceutical products for uses or in patient populations that are not described in the pharmaceutical product's approved labeling (known as "off-label use"), industry-sponsored scientific and educational activities and promotional activities involving the internet. Although physicians may prescribe legally available pharmaceutical products for off-label uses, manufacturers may not directly or indirectly market or promote such off-label uses. If ongoing regulatory requirements are not met, or if safety or manufacturing problems occur after the product reaches the market, the FDA may at any time withdraw product approval or take actions that would limit or suspend marketing. Additionally, the FDA may require post-marketing studies or clinical trials, changes to a product's approved labeling, including the addition of new warnings and contraindications, or the implementation of other risk management measures, including distribution-related restrictions, if there are new safety information developments. Further, failure to comply with FDA requirements can have negative consequences including adverse publicity, enforcement letters from the FDA, actions by the US Department of Justice and/or US Department of Health and Human Services Office of Inspector General, mandated corrective advertising or communications with doctors, and civil or criminal penalties.

We rely and expect to continue to rely on third parties for the production of clinical and commercial quantities of our product candidates. Manufacturers of our product candidates are required to comply with applicable FDA manufacturing requirements contained in the agency's cGMP regulations and related policies. The cGMP regulations require, among other things, adhering to requirements relating to organization and training of personnel, buildings and facilities, equipment, control of components and drug product containers and closures, production and process controls, packaging and labeling controls, holding and distribution, laboratory controls, quality control and quality assurance, as well as the corresponding maintenance of records and documentation. Pharmaceutical product manufacturers and other entities involved in the manufacture and distribution of pharmaceutical products are required to register their establishments with the FDA and certain state agencies and the FDA inspects equipment, facilities, and processes used in manufacturing pharmaceutical products prior to approval. The FDA and certain state agencies also conduct periodic unannounced inspections to re-inspect equipment, facilities, and processes for compliance with cGMP and other laws. Accordingly, manufacturers must continue to expend time, money and effort in the area of production and quality control to maintain cGMP compliance. Failure to comply with applicable cGMP requirements and conditions of product approval may lead the FDA to take enforcement actions or seek sanctions, including fines, issuance of warning letters, civil penalties, injunctions, suspension of manufacturing operations, operating restrictions, withdrawal of FDA approval, seizure or recall of products, and criminal prosecution. Although we periodically monitor the FDA compliance of our third-party manufacturers, we cannot be certain that our present or future third-party manufacturers will consistently comply with cGMP and other applicable FDA regulatory requirements.

Discovery of problems with a product after approval may result in restrictions on a product, manufacturer or NDA sponsor, including withdrawal of the product from the market. In addition, changes to the manufacturing process generally require prior FDA approval before being implemented and other types of changes to the approved product, such as adding new indications and additional labeling claims, are also subject to further FDA review and approval.

Patent Term Restoration

If we receive FDA approval of our pharmaceutical product candidates, and depending upon the timing, duration and specifics of the FDA approval of the use of our pharmaceutical product candidates, some of our product candidates covered by US patents may be eligible for limited patent term restoration under the Drug Price Competition and Patent Term Restoration Act of 1984, commonly referred to as the Hatch-Waxman Amendments. The Hatch-Waxman Amendments permit a patent restoration term of up to five years as compensation for the patent term lost during product development and the FDA regulatory review process for a product the approval of which is the first permitted commercial marketing of the active pharmaceutical ingredient. However, patent term restoration cannot extend the remaining term of a patent beyond a date 14 years after the product's approval date. The patent term restoration period is generally one-half the time between the effective date of an IND and the submission date of an NDA plus the time between the submission date of an NDA and the approval of that application. Only one patent applicable to an approved pharmaceutical product is eligible for the extension and the application for the extension must be submitted prior to the expiration of the patent unless an extension is obtained. The US Patent and Trademark Office, in consultation with the FDA, reviews and renders a decision on the application for any patent term extension or restoration. In the future, we may be able to apply for extension of patent term for one or more of our currently licensed patents or any future owned patents to add patent life beyond its current expiration date, depending upon the expected length of the clinical trials and other factors involved in the filing of the relevant NDA. We cannot be certain that any of our product candidate's will qualify for patent term restoration or, if so, for how long the patent term will be extended.

Pharmaceutical Coverage, Pricing and Reimbursement

Significant uncertainty exists as to the coverage and reimbursement status of any pharmaceutical product candidates for which we may obtain regulatory approval. In the United States and in markets in other countries, sales of any products for which we receive regulatory approval for commercial sale will depend in part upon the availability of reimbursement from third-party payers. Third-party payers include government payers such as Medicare and Medicaid, managed care providers, private health insurers and other organizations. The process for determining whether a payer will provide coverage for a pharmaceutical product may be separate from the process for setting the price or reimbursement rate that the payer will pay for the pharmaceutical product. Third-party payers may limit coverage to specific pharmaceutical products on an approved list, or formulary, which might not, and frequently do not, include all the FDA-approved pharmaceutical products for a particular indication. Third-party payers are increasingly challenging the price and examining the medical necessity and cost-effectiveness of medical products and services, in addition to their safety and efficacy. A payer's decision to provide coverage for a pharmaceutical product does not imply that an adequate reimbursement rate will be approved. Adequate third-party reimbursement may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in product development. In addition, in the United States there is a growing emphasis on comparative effectiveness research, both by private payers and by government agencies. We may need to conduct expensive pharmaco-economic studies in order to demonstrate the medical necessity and cost-effectiveness of our products, in addition to the costs required to obtain the FDA approvals. Our pharmaceutical product candidates may not be considered medically necessary or cost-effective. To the extent other drugs or therapies are found to be more effective than our products, payers may elect to cover such therapies in lieu of our products and/or reimburse our products at a lower rate.

Different pricing and reimbursement schemes exist in other countries. In the European Community, governments influence the price of pharmaceutical products through their pricing and reimbursement rules and control of national healthcare systems that fund a large part of the cost of those products to consumers. Some jurisdictions operate positive and negative list systems under which products may only be marketed once a reimbursement price has been agreed upon. To obtain reimbursement or pricing approval, some of these countries may require the completion of clinical trials that compare the cost-effectiveness of a particular pharmaceutical product candidate to currently available therapies. Other member states allow companies to fix their own prices for medicines but monitor and control company profits. The downward pressure on healthcare costs in general, particularly prescription drugs, has become very intense. As a result, increasingly high barriers are being erected to the entry of new products. In addition, in some countries, cross-border imports from low-priced markets exert a commercial pressure on pricing within a country.

The marketability of any pharmaceutical product candidates for which we may receive regulatory approval for commercial sale may suffer if the government and third-party payers fail to provide adequate coverage and reimbursement. In addition, emphasis on managed care in the United States has increased and we expect this will continue to increase the pressure on pharmaceutical pricing. Coverage policies and third-party reimbursement rates may change at any time. Even if favorable coverage and reimbursement status is attained for one or more products for which we may receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

International Regulation

In addition to regulations in the United States, we are subject to a variety of foreign regulations governing clinical trials and commercial sales and distribution of our future drugs. Whether or not we obtain FDA approval for a drug, we must obtain approval of a drug by the comparable regulatory authorities of foreign countries before we can commence clinical trials or marketing of the drug in those countries. The approval process varies from country to country, and the time may be longer or shorter than that required for FDA approval. The requirements governing the conduct of clinical trials, product licensing, pricing and reimbursement vary greatly from country to country.

Under European Union regulatory systems, marketing authorizations may be submitted either under a centralized or mutual recognition procedure. The centralized procedure provides for the grant of a single marketing authorization that is valid for all European Union member states. The mutual recognition procedure provides for mutual recognition of national approval decisions. Under this procedure, the holder of a national marketing authorization may submit an application to the remaining member states. Within 90 days of receiving the applications and assessment report, each member state must decide whether to recognize approval.

In addition to regulations in Europe and the United States, we will be subject to a variety of foreign regulations governing clinical trials and commercial distribution of our future drugs.

Employees

As of December 31, 2021 our workforce consisted of twenty-one full and part-time employees and contractors devoting more than 20 hours per week, in the US and Europe. We leverage our work force with other service providers and contractors worldwide, working in a primarily virtual environment, even prior to the COVID-19 pandemic. Our workforce contained thirteen full-time employees and four part-time employees.

Access to Information

Our website is at www.moleculin.com. We make available, free of charge, on our corporate website, our annual report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), as soon as reasonably practicable after they are electronically filed with the Securities and Exchange Commission (SEC). The SEC maintains an internet site that contains reports, proxy and information statements and other information regarding issuers that file electronically with the SEC at www.sec.gov. Information contained on our website does not, and shall not be deemed to, constitute part of this Annual Report on Form 10-K. Our reference to the URL for our website is intended to be an inactive textual reference only.

ITEM 1A. RISK FACTORS

Summary of Risk Factors:

Below is a summary of the principal factors that make an investment in our company speculative or risky. This summary does not address all of the risks that we face. Additional discussion of the risks summarized in this risk factor summary, and other risks that we face, can be found below, after this summary, and should be carefully considered, together with other information in this Annual Report on Form 10-K and our other filings with the SEC before making an investment decision in our securities.

Risks Related to Regulatory Approval and the Development and Commercialization of our Drug Candidates

- We are developing our drugs to treat patients who are extremely or terminally ill, and patient deaths that occur in our clinical trials could negatively impact our business even if such outcomes are not shown to be related to our drugs.
- We are conducting important clinical trials in Poland, and studies for additional countries in which to perform preclinical studies and clinical trials and the risks associated with conducting research and clinical trials abroad could materially adversely affect our business.
- There are limited suppliers for active pharmaceutical ingredients (API) used in in our drug candidates. Problems with the third parties that manufacture the API used in our drug candidates may delay our clinical trials or subject us to liability.
- We cannot guarantee how long it will take regulatory agencies to review our applications for product candidates, and we may fail to obtain the necessary regulatory approvals to market our product candidates. If we are not able to obtain required regulatory approvals, we will not be able to commercialize our product candidates and our ability to generate revenue will be materially impaired.
- Delays in the commencement, enrollment and completion of clinical trials could result in increased costs to us and delay or limit our ability to obtain regulatory approval for any of our product candidates.
- We may expend significant resources to pursue certain product candidates for specific indications, and fail to capitalize on the potential of such product candidates for the potential treatment of other indications that may be more profitable or for which there is a greater likelihood of success.
- We may find it difficult to enroll subjects in our clinical trials, which could delay or prevent clinical trials of our product candidates.
- A portion of our clinical development plan relies on physician-sponsored trials, which we do not control and which may encounter delays for reasons outside of our control.
- If any of our drug product candidates are found to be unsafe or lack efficacy, we will not be able to obtain regulatory approval for it and our business would be harmed.
- Our product candidates may have undesirable side effects that may delay or prevent marketing approval, or, if approval is received, require them to be taken off the market, require them to include safety warnings or otherwise limit their sales.
- Even if our product candidates receive marketing authorization from the FDA, if the FDA does not find the manufacturing facilities of our future contract manufacturers acceptable for commercial production, we may not be able to commercialize any of our product candidates.
- We received ODD for Annamycin and WP1066, but even if either product candidate is approved and receives ODE, ODE may not effectively prevent approval of a competing product.
- The regulatory approval processes of the FDA and comparable foreign authorities are lengthy, time consuming and inherently unpredictable, and even if we obtain approval for a product candidate in one country or jurisdiction, we may never obtain approval for or commercialize it in any other jurisdiction, which would limit our ability to realize our full market potential.
- We have received Fast Track designation for one of our product candidates and may seek the same designation for one of more of our other product candidates. Even if we receive designation, such designation may not actually lead to a faster development or regulatory review or approval process. Fast Track designation may also be rescinded if the FDA believes the designation is no longer supported by data from our clinical development program.
- Interim or preliminary data from our clinical trials that we announce or publish from time to time may change as more patient data become available and are subject to audit and verification procedures that could result in material changes in the final data.
- We may not be able to conduct, or contract others to conduct, animal testing in the future, which could harm our research and development activities.
- We, or our third-party manufacturers, may be unable to successfully scale-up manufacturing of our product candidates in sufficient quality and quantity, which would delay or prevent us from developing our product candidates and commercializing approved products, if any.

Risks Related to Our Intellectual Property

- The composition of matter patent for Annamycin has expired, and other patents have not yet been issued, and may not be issued.
- The intellectual property rights we have licensed from MD Anderson are subject to the rights of the US government.
- We may incur substantial costs as a result of litigation or other proceedings relating to patent and other intellectual property rights.
- We may be subject to claims that our employees have wrongfully used or disclosed alleged trade secrets of their former employers.
- If we are not able to adequately prevent disclosure of trade secrets and other proprietary information, the value of our technology and products could be significantly diminished.
- If we breach any of the agreements under which we license patent rights or if we fail to meet certain development deadlines, pay certain fees including extension fees or exercise certain rights to technology, we could lose or fail to obtain license rights that are important to our business.

Risks Relating to Our Business and Financial Condition

- We will require additional funding, which may not be available to us on acceptable terms, or at all, and, if not so available, may require us to delay, limit, reduce or cease our operations.
- Because successful development of our product candidates is uncertain, we are unable to estimate the actual amount of funding we will require to complete research and development and commercialize our products under development.
- We have commenced clinical trials, have a limited operating history and we expect a number of factors to cause our operating results to fluctuate on an annual basis, which may make it difficult to predict our future performance.
- We have in the past completed related party transactions that were not conducted on an arm's length basis.
- We have never been profitable, we have no products approved for commercial sale, and to date we have not generated any revenue from product sales. As a result, our ability to reduce our losses and reach profitability is unproven, and we may never achieve or sustain profitability.
- We conduct operations through our Australia wholly owned subsidiary. If we lose our ability to operate in Australia, or if our subsidiary is unable to receive the research and development tax credit allowed by Australian regulations, our business and results of operations will suffer.
- Our financial condition would be adversely impacted if our intangible assets become impaired.
- We have no sales, marketing or distribution experience and we will have to invest significant resources to develop those capabilities or enter into acceptable third-party sales and marketing arrangements.
- We may not be successful in establishing and maintaining development and commercialization collaborations, which could adversely affect our ability to develop certain of our product candidates and our financial condition and operating results.
- We face competition from other biotechnology and pharmaceutical companies and our operating results will suffer if we fail to compete effectively.
- We will need to expand our operations and increase the size of our company, and we may experience difficulties in managing growth.
- We may not be able to manage our business effectively if we are unable to attract and retain key personnel and consultants.
- We do not expect that our insurance policies will cover all of our business exposures thus leaving us exposed to significant uninsured liabilities.
- We may incur penalties if we fail to comply with healthcare regulations.
- We may not be able to recover from any catastrophic event affecting our suppliers.
- Our business and operations would suffer in the event of third-party computer system failures, cyber-attacks on third-party systems or deficiency in our cyber security.
- The COVID-19 outbreak has delayed recruitment in our clinical trials and may continue or worsen, may affect the business of the FDA, EMA or other health authorities, which could result in delays in meetings related to our planned clinical trials and ultimately of reviews and approvals of our product candidates.
- Our ability to successfully commence and recruit subjects for a potential Phase 2 COVID-19 clinical trial of WP1122 is dependent upon our ability to locate a foreign jurisdiction for such a trial with a sufficient and certain patient population at the time of such trial.
- Our failure to comply with data protection laws and regulations could lead to government enforcement actions and significant penalties against us, and adversely impact our operating results.
- We depend on our information technology and infrastructure so compromises could materially harm our ability to conduct business or delay our financial reporting.

Risks Relating to Our Common Stock

- Our stock price has been and may continue to be volatile, which could result in substantial losses for investors.
- We are an early clinical stage biotechnology company and have incurred significant losses since our inception and we expect to incur losses for the foreseeable future. We have no products approved for commercial sale and may never achieve or maintain profitability, which could have an impact on finding additional financing.
- Shares issuable upon the exercise of outstanding options or warrants may substantially increase the number of shares available for sale in the public market and depress the price of our common stock.
- As a biotechnology company, we are at increased risk of securities class action litigation.
- If we are unable to maintain compliance with the listing requirements of The Nasdaq Capital Market, our common stock may be delisted from The Nasdaq Capital Market which could have a material adverse effect on our financial condition and could make it more difficult for you to sell your shares.
- Failure to maintain our accounting systems and controls could impair our ability to comply with the financial reporting and internal controls requirements for publicly traded companies.
- Unstable market and economic conditions may have serious adverse consequences on our business, financial condition and stock price.

General Risks

- Your ownership may be diluted if additional capital stock is issued to raise capital, to finance acquisitions or in connection with strategic transactions.
- Negative research about our business published by analysts or journalists could cause our stock price to decline. A lack of regularly published research about our business could cause trading volume or our stock price to decline.
- Claims for indemnification by our directors and officers may reduce our available funds to satisfy successful third-party claims against us and may reduce the amount of money available to us.
- We have no intention of declaring dividends in the foreseeable future.
- Certain provisions in our organizational documents could enable our board of directors to prevent or delay a change of control.
- Shareholder activism could cause material disruption to our business.

The following risks and uncertainties should be carefully considered. If any of the following occurs, our business, financial condition or operating results could be materially harmed. An investment in our securities is speculative in nature, involves a high degree of risk and should not be made by an investor who cannot bear the economic risk of its investment for an indefinite period of time and who cannot afford the loss of its entire investment.

Risks Related to Regulatory Approval and the Development and Commercialization of our Drug Candidates

We are developing our drug candidates to treat patients who are extremely or terminally ill, and severe adverse outcomes, including patient deaths, that occur in our clinical trials could negatively impact our business even if such outcomes are not shown to be related to our drugs.

It is our intention to continue to develop our drug candidates focused on rare and deadly forms of cancer. Patients suffering from these diseases are extremely sick and have a high likelihood of experiencing adverse outcomes, including death, as a result of their disease or due to other significant risks including relapse of their underlying malignancies. Many patients have already received high-dose chemotherapy and/or radiation therapy, which are associated with their own inherent risks, prior to treatment with our drug candidates.

As a result, it is likely that we will observe severe adverse outcomes during our clinical trials for our drug candidates, including patient death. If a significant number of study subject deaths were to occur, regardless of whether such deaths are attributable to one of our drugs, our ability to obtain regulatory approval and/or achieve commercial acceptance for the related drug may be adversely impacted and our business could be materially harmed.

We are conducting important clinical trials in Poland, and studies for additional countries in which to perform preclinical studies and clinical trials and the risks associated with conducting research and clinical trials abroad could materially adversely affect our business.

We have approved Clinical Trial Authorizations in Poland for two clinical trials. Additionally, we are performing studies to determine if there are additional countries in which we should hold clinical and preclinical studies. Accordingly, we expect that we will be subject to additional risks related to operating in foreign countries, including:

- differing regulatory requirements in foreign countries;
- unexpected changes in price and exchange controls and other regulatory requirements;
- increased difficulties in managing the logistics and transportation of collecting and shipping patient material;
- import and export requirements and restrictions;
- compliance with tax, employment, immigration and labor laws for employees living or traveling abroad;
- foreign taxes, including withholding of payroll taxes;
- foreign currency fluctuations, which could result in increased operating expenses, and other obligations incident to doing business in another country;
- difficulties staffing and managing foreign operations;
- potential liability under the Foreign Corrupt Practices Act of 1977 or comparable foreign regulations;
- challenges enforcing our contractual and intellectual property rights, especially in those foreign countries that do not respect and protect intellectual property rights to the same extent as the United States;
- production shortages resulting from any events affecting raw material supply or manufacturing capabilities abroad; and
- business interruptions resulting from geo-political actions, including war and terrorism.

These and other risks associated with our international operations may materially adversely affect our ability to attain or maintain profitable operations.

There are limited suppliers for active pharmaceutical ingredients (API) used in in our drug candidates. Problems with the third parties that manufacture the API used in our drug candidates may delay our clinical trials or subject us to liability.

We do not currently own or operate manufacturing facilities for clinical or commercial production of the API used in any of our product candidates. We have no experience in API manufacturing, and we lack the resources and the capability to manufacture any of the APIs used in our product candidates, on either a clinical or commercial scale. As a result, we rely on third parties to supply the API used in each of our product candidates. We expect to continue to depend on third parties to supply the API for our current and future product candidates and to supply the API in commercial quantities. We are ultimately responsible for confirming that the APIs used in our product candidates are manufactured in accordance with applicable regulations.

Reliance on third-party manufacturers entails risks to which we would not be subject if we manufactured the product candidates ourselves, including:

- the inability to negotiate manufacturing agreements with third parties under commercially reasonable terms;
- reduced control as a result of using third-party manufacturers for all aspects of manufacturing activities, including regulatory compliance and quality assurance. We do not have control over third party manufacturers' compliance with these regulations and standards, but we may ultimately be responsible for any of their failures;
- delays as a result of manufacturing problems or re-prioritization of projects at a third-party manufacturer;
- our third-party manufacturers might be unable to formulate and manufacture our product candidates in the volume and of the quality required to meet our clinical and commercial needs, if any;
- termination or non-renewal of manufacturing agreements with third parties in a manner or at a time that is costly or damaging to us;
- the possible misappropriation of our proprietary information, including our trade secrets and know-how or infringement of third-party intellectual property rights by our contract manufacturers; and
- disruptions to the operations of our third-party manufacturers or suppliers caused by conditions unrelated to our business or operations, including the bankruptcy of the manufacturer or supplier.

Any of these events could lead to preclinical study and clinical trial delays or failure to obtain regulatory approval or affect our ability to successfully commercialize future products. Some of these events could be the basis for FDA or other regulatory authority action, including clinical holds, fines, injunctions, civil penalties, license revocations, recall, seizure, total or partial suspension of production, or criminal penalties.

In addition, our product candidates involve technically complex manufacturing processes, and even slight deviations at any point in the production process may lead to production failures and may cause the production of our product candidates to be disrupted, potentially for extended periods of time. In some cases, the technical skills required to manufacture our products or product candidates may be unique or proprietary to the original contract manufacturer and we may have difficulty, or there may be contractual restrictions prohibiting us from, transferring such skills to a back-up or alternate supplier, or we may be unable to transfer such skills at all. Furthermore, a contract manufacturer may possess technology related to the manufacture of our product candidate that such contract manufacturer owns independently. This would increase our reliance on such contract manufacturer or require us to obtain a license from such contract manufacturer in order to have another contract manufacturer manufacture our product candidates.

Third-party manufacturers may not be able to comply with applicable cGMP regulations or similar regulatory requirements outside the US. Our failure, or the failure of our third-party manufacturers, to comply with applicable regulations could result in sanctions being imposed, including clinical holds, fines, injunctions, civil penalties, delays, license revocation, seizures or recalls of product candidates or products, operating restrictions and criminal prosecutions, any of which could significantly and adversely affect supplies of our product candidates.

In addition, if we are required to change contract manufacturers for any reason, we will be required to verify that the new contract manufacturer maintains facilities and procedures that comply with quality standards and with all applicable regulations. We will also need to verify, such as through a manufacturing comparability study, that any new manufacturing process will produce our product candidate according to the specifications previously submitted to the FDA or another regulatory authority. The delays associated with the verification of a new contract manufacturer could negatively affect our ability to develop product candidates or commercialize our products in a timely manner or within budget. In addition, changes in manufacturers often involve changes in manufacturing procedures and processes, which could require that we conduct bridging studies between our prior clinical supply used in our clinical trials and that of any new manufacturer. We may be unsuccessful in demonstrating the comparability of clinical supplies which could require the conduct of additional clinical trials.

Our product candidates and any products that we may develop may compete with other product candidates and products for access to manufacturing facilities. There are a limited number of manufacturers that operate under cGMP regulations and that might be capable of manufacturing for us. Any performance failure on the part of our existing or future manufacturers could delay clinical development or marketing approval. If our current contract manufacturers cannot perform as agreed, we may be required to replace such manufacturers, and it may prove very difficult and time consuming to identify potential alternative manufacturers who could manufacture our product candidates. Accordingly, we may incur added costs and delays in identifying and qualifying any such replacement.

Our current and anticipated future dependence upon others for the manufacture of our product candidates or products may adversely affect our future profit margins and our ability to commercialize any products that receive marketing approval on a timely and competitive basis.

If our third-party drug suppliers fail to achieve and maintain high manufacturing standards in compliance with cGMP regulations, we could be subject to certain product liability claims in the event such failure to comply resulted in defective products that caused injury or harm.

We cannot guarantee how long it will take regulatory agencies to review our applications for product candidates, and we may fail to obtain the necessary regulatory approvals to market our product candidates. If we are not able to obtain required regulatory approvals, we will not be able to commercialize our product candidates and our ability to generate revenue will be materially impaired.

Our business currently depends on the successful development and commercialization of our drug candidates. Our ability to generate revenue related to product sales, if ever, will depend on the successful development and regulatory approval of our drug candidates.

We currently have no products approved for sale and we cannot guarantee that we will ever have marketable products. The development of a product candidate and issues relating to its approval and marketing are subject to extensive regulation by the FDA in the United States and regulatory authorities in other countries, with regulations differing from country to country. We are not permitted to market our product candidates in the United States until we receive approval of a NDA from the FDA. We have not submitted any marketing applications for any of our product candidates.

NDAs must include extensive preclinical and clinical data and supporting information to establish the product candidate's safety and effectiveness for each desired indication. NDAs must also include significant information regarding the chemistry, manufacturing and controls for the product. Obtaining approval of a NDA is a lengthy, expensive and uncertain process, and we may not be successful in obtaining approval. The FDA review processes can take years to complete and approval is never guaranteed. If we submit a NDA to the FDA, the FDA must decide whether to accept or reject the submission for filing. We cannot be certain that any submissions will be accepted for filing and review by the FDA. Regulators in other jurisdictions have their own procedures for approval of product candidates. Even if a product is approved, the FDA may limit the indications for which the product may be marketed, require extensive warnings on the product labeling or require expensive and time-consuming clinical trials or reporting as conditions of approval. Regulatory authorities in countries outside of the United States and Europe also have requirements for approval of drug candidates with which we must comply with prior to marketing in those countries. Obtaining regulatory approval for marketing of a product candidate in one country does not ensure that we will be able to obtain regulatory approval in any other country. In addition, delays in approvals or rejections of marketing applications in the United States, Europe or other countries may be based upon many factors, including regulatory requests for additional analyses, reports, data, preclinical studies and clinical trials, regulatory questions regarding different interpretations of data and results, changes in regulatory policy during the period of product development and the emergence of new information regarding our product candidates or other products. Also, regulatory approval for any of our product candidates may be withdrawn.

If we are unable to obtain approval from the FDA, or other regulatory agencies, for any of our product candidates, or if, subsequent to approval, we are unable to successfully commercialize our product candidates, we will not be able to generate sufficient revenue to become profitable or to continue our operations.

Any statements in this report indicating that any of our drug candidates have demonstrated preliminary evidence of efficacy are our own and are not based on the FDA's or any other comparable governmental agency's assessment and do not indicate that such drug candidate will achieve favorable efficacy results in any later stage trials or that the FDA or any comparable agency will ultimately determine that such drug candidate is effective for purposes of granting marketing approval.

Delays in the commencement, enrollment and completion of clinical trials could result in increased costs to us and delay or limit our ability to obtain regulatory approval for any of our product candidates.

Delays in the commencement, enrollment and completion of clinical trials could increase our product development costs or limit the regulatory approval of our product candidates. We do not know whether any future trials or studies of our other product candidates will begin on time or will be completed on schedule, if at all. The start or end of a clinical trial is often delayed or halted due to changing regulatory requirements, manufacturing challenges, including delays or shortages in available drug product, required clinical trial administrative actions, slower than anticipated subject enrollment, changing standards of care, availability or prevalence of use of a comparative drug or required prior therapy, clinical outcomes or financial constraints. For instance, delays or difficulties in subject enrollment or difficulties in retaining trial participants can result in increased costs, longer development times or termination of a clinical trial. Clinical trials of a new product candidate require the enrollment of a sufficient number of subjects, including subjects who are suffering from the disease the product candidate is intended to treat and who meet other eligibility criteria. Rates of subject enrollment are affected by many factors, including the size of the patient population, the eligibility criteria for the clinical trial, that include the age and condition of the subjects and the stage and severity of disease, the nature of the protocol, the proximity of subjects to clinical sites and the availability of effective treatments and/or availability of investigational treatment options for the relevant disease.

A product candidate can unexpectedly fail at any stage of preclinical and clinical development. The historical failure rate for product candidates is high due to scientific feasibility, safety, efficacy, changing standards of medical care and other variables. The results from preclinical testing or early clinical trials of a product candidate may not predict the results that will be obtained in later phase clinical trials of the product candidate. We, the FDA or other applicable regulatory authorities may suspend clinical trials of a product candidate at any time for various reasons, including, but not limited to, a belief that subjects participating in such trials are being exposed to unacceptable health risks or adverse side effects, or other adverse initial experiences or findings. We may not have the financial resources to continue development of, or to enter into collaborations for, a product candidate if we experience any problems or other unforeseen events that delay or prevent regulatory approval of, or our ability to commercialize, product candidates, including:

- inability to obtain sufficient funds required for a clinical trial;
- inability to reach agreements on acceptable terms with prospective CROs and trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;
- clinical sites dropping out of a clinical trial;

  time required to add new clinical sites;

  negative or inconclusive results from our clinical trials or the clinical trials of others for product candidates similar to ours, leading to a decision or requirement to conduct additional preclinical testing or clinical trials or abandon a program;
- serious and unexpected drug-related side effects experienced by subjects in our clinical trials or by individuals using drugs similar to our product candidates;
- conditions imposed by the FDA or comparable foreign authorities regarding the scope or design of our clinical trials;
- delays in or inability to enroll research subjects in sufficient numbers or at the expected rate;
- high drop-out rates and high fail rates of research subjects;

  imposition of a clinical hold following an inspection of our clinical trial operations or trial sites by the FDA or foreign regulatory authorities;

  delays or failures in obtaining required IRB approval;

- inadequate supply or quality of product candidate components or materials or other supplies necessary for the conduct of our clinical trials;
  failure to comply with GLP, GCP, cGMP or similar foreign regulatory requirements that affect the conduct of pre-clinical and clinical studies and the manufacturing of product candidates;
- greater than anticipated clinical trial costs;
- poor effectiveness of our product candidates during clinical trials;
- requests by regulatory authorities for additional data or clinical trials;

  governmental or regulatory agency assessments of pre-clinical or clinical testing that differ from our interpretations or conclusions;

  governmental or regulatory delays, or changes in approval policies or regulations; or

  unfavorable FDA or other regulatory agency inspection and review of a clinical trial site or vendor.

We, the FDA, other regulatory authorities outside the United States, or an IRB may suspend a clinical trial at any time for various reasons, including if it appears that the clinical trial is exposing participants to unacceptable health risks or if the FDA or one or more other regulatory authorities outside the United States find deficiencies in our IND or similar application outside the United States or the conduct of the trial. If we experience delays in the completion of, or the termination of, any clinical trial of any of our product candidates, the commercial prospects of such product candidate will be harmed, and our ability to generate product revenues from such product candidate will be delayed. In addition, any delays in completing our clinical trials will increase our costs, slow down our product candidate development and approval process, and jeopardize our ability to commence product sales and generate revenues. Any of these occurrences may harm our business, financial condition, results of operations, cash flows and prospects significantly. In addition, many of the factors that cause, or lead to, a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval of our product candidates.

We may expend significant resources to pursue certain product candidates for specific indications, and fail to capitalize on the potential of such product candidates for the potential treatment of other indications that may be more profitable or for which there is a greater likelihood of success.

Because we have limited financial and managerial resources, we focus on research programs and product candidates for specific indications. Specifically, with regard to Annamycin, we are initially focusing our efforts on the treatment of AML and soft tissue sarcoma. As a result, we may forego or delay pursuit of opportunities with Annamycin or other product candidates for the treatment of other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs and product candidates for specific indications may not yield any commercially viable products. Furthermore, until such time as we are able to build a broader product candidate pipeline, if ever, any adverse developments with respect to our current product candidates would have a more significant adverse effect on our overall business than if we maintained a broader portfolio of product candidates.

We have commenced clinical trials and have never submitted an NDA, and any product candidate we advance through clinical trials may not have favorable results in later clinical trials or receive regulatory approval.

Clinical failure can occur at any stage of our clinical development. Clinical trials may produce negative or inconclusive results, and our collaborators or we may decide, or regulators may require us, to conduct additional clinical trials or nonclinical studies. In addition, data obtained from trials and studies are susceptible to varying interpretations, and regulators may not interpret our data as favorably as we do, which may delay, limit or prevent regulatory approval. Success in preclinical studies and early clinical trials does not ensure that subsequent clinical trials will generate the same or similar results or otherwise provide adequate data to demonstrate the efficacy and safety of a product candidate. A number of companies in the pharmaceutical industry, including those with greater resources and experience than us, have suffered significant setbacks in clinical trials, even after seeing promising results in earlier clinical trials. The commencement and completion of future clinical trials could be substantially delayed or prevented by several factors, including, but not limited to:

- failure to reach agreement with the FDA or other regulatory agency requirements for clinical trial design or scope of the development program;

  a limited number of, and competition for, suitable subjects with particular types of cancer and viruses for enrollment in our clinical trials;
- delays or failures in reaching acceptable clinical trial agreement terms with CROs or clinical trial sites;
  - delays or inability to attract clinical investigators for trials;
  - clinical sites dropping out of a clinical trial;
  - time required to add new clinical sites;
- failure of subjects to complete the clinical trial or inability to follow subjects adequately after treatment;

  failures by, changes in our relationship with, or other issues at, CROs, vendors and investigators responsible for pre-clinical testing and clinical trials;

  imposition of a clinical hold; and
- unforeseen safety issues.

In addition, the design of a clinical trial can determine whether its results will support approval of a product and flaws in the design of a clinical trial may not become apparent until the clinical trial is well advanced. We may be unable to design and execute a clinical trial to support regulatory approval. Further, clinical trials of potential products often reveal that it is not practical or feasible to continue development efforts.

We may find it difficult to enroll subjects in our clinical trials, which could delay or prevent clinical trials of our product candidates.

Identifying and qualifying subjects to participate in clinical trials of our product candidates is critical to our success. The timing of our clinical trials depends in part on the speed at which we can recruit subjects to participate in testing our product candidates. If subjects are unwilling to participate in our trials because of the COVID-19 pandemic and restrictions on travel or healthcare institution policies, negative publicity from adverse events in the biotechnology industries, public perception of vaccine safety issues or for other reasons, including competitive clinical trials for similar patient populations, the timeline for recruiting subjects, conducting studies and obtaining regulatory approval of potential products may be delayed. These delays could result in increased costs, delays in advancing our product development, delays in testing the effectiveness of our technology or termination of the clinical trials altogether.

We may not be able to identify, recruit and enroll a sufficient number of subjects, or those with required or desired characteristics to achieve diversity in a clinical trial, or complete our clinical trials in a timely manner. Subject enrollment is affected by a variety factors including, among others:

- severity of the disease under investigation;
- design of the trial protocol and size of the patient population required for analysis of the trial's primary endpoints;
- size of the patient population;
- eligibility criteria for the trial in question;
- perceived risks and benefits of the product candidate being tested;
- willingness or availability of subjects to participate in our clinical trials (including due to the COVID-19 pandemic);
- proximity and availability of clinical trial sites for prospective subjects;
- our ability to recruit clinical trial investigators with the appropriate competencies and experience;
- availability of competing vaccines and/or therapies and related clinical trials;
- efforts to facilitate timely enrollment in clinical trials;
- our ability to obtain and maintain subject consents;
- the risk that subjects enrolled in clinical trials will drop out of the trials before completion;
- subject referral practices of physicians; and
- ability to monitor subjects adequately during and after treatment.

We may not be able to initiate or continue clinical trials if we cannot enroll a sufficient number of eligible subjects to participate in the clinical trials required by regulatory agencies.

Even if we enroll a sufficient number of eligible subjects to initiate our clinical trials, we may be unable to maintain participation of these subjects throughout the course of the clinical trial as required by the clinical trial protocol, in which event we may be unable to use the research results from those subjects. If we have difficulty enrolling and maintaining the enrollment of a sufficient number of subjects to conduct our clinical trials as planned, we may need to delay, limit or terminate ongoing or planned clinical trials, any of which would have an adverse effect on our business.

A portion of our clinical development plan relies on physician-sponsored trials, which we do not control and which may encounter delays for reasons outside of our control.

Our drug product candidate, WP1066, has been in two physician-sponsored Phase 1 clinical trials, one for adult GBM and another for pediatric brain tumors. Our drug product candidate, Annamycin, is currently in a physician-sponsored Phase 1b/2 clinical trial in Poland for the treatment of STS lung metastases. These physician-sponsored trials are an important part of our clinical development plan. Although we provide drug product and other minor supporting activities for these clinical trials, we are not otherwise directly involved in these physician-sponsored trials. As such, we are dependent on the institutions conducting the trials to proceed with such trials on a timely basis, and we have encountered unforeseen delays in our physician-sponsored trials. For example, in the first quarter of 2021, we were notified that the physician sponsoring our WP1066 trial in adult GBM was leaving MD Anderson and MD Anderson is terminating that trial. Although other institutions have expressed an interest in sponsoring similar research on WP1066 in brain tumors, there is no assurance we will be successful in filing an IND for this trial into our name with the FDA. While we are making arrangements to continue this research in additional physician-sponsored trials, research on WP1066 in adult GBM has been delayed. We can provide no assurance that we will not encounter future delays with our physician-sponsored trials.

If any of our drug product candidates are found to be unsafe or lack efficacy, we will not be able to obtain regulatory approval for it and our business would be harmed.

In some instances, there can be significant variability in safety and/or efficacy results between different trials of the same product candidate due to numerous factors, including changes in trial protocols, differences in composition of the patient populations, adherence to the dosing regimen and other trial protocols and the rate of dropout among clinical trial participants. We do not know whether any clinical trials we or any of our potential future collaborators may conduct will demonstrate the consistent or adequate efficacy and safety that would be required to obtain regulatory approval and market any products. If we are unable to bring any of our drug candidates to market, or to acquire other products that are on the market or can be developed, our ability to create long-term stockholder value will be limited.

Our product candidates may have undesirable side effects that may delay or prevent marketing approval, or, if approval is received, require them to be taken off the market, require them to include safety warnings or otherwise limit their sales.

Significant adverse events caused by our product candidates or even competing products in development that utilize a common mechanism of action could cause us, an IRB or ethics committee, and/or regulatory authorities to interrupt, delay or halt clinical trials and could result in clinical trial challenges such as difficulties in subject recruitment, retention, and adherence, the denial of regulatory approval by the FDA or other regulatory authorities and potential product liability claims. Serious adverse events deemed to be caused by our product candidates could have a material adverse effect on the development of our product candidates and our business as a whole. Unforeseen side effects from any of our product candidates could arise either during clinical development or, if any product candidates are approved, after the approved product has been marketed. In trials, both with prior developers and with ours using Annamycin, subjects have experienced adverse events. There can be no assurance that other adverse events may not emerge related to our drug. Additional or unforeseen side effects from Annamycin or any of our other product candidates could arise either during clinical development or, if approved, after the approved product has been marketed.

The range and potential severity of possible side effects from oncology therapies such as our drug candidates are significant. If any of our drug candidates cause undesirable or unacceptable side effects in the future, this could interrupt, delay or halt clinical trials and result in the failure to obtain or suspension or termination of marketing approval from the FDA and other regulatory authorities or result in marketing approval from the FDA and other regulatory authorities only with restrictive label warnings or other limitations.

If any of our product candidates receives marketing approval and we or others later identify undesirable or unacceptable side effects caused by such products:

- regulatory authorities may require the addition of labeling statements, specific warnings, a contraindication or field alerts to physicians and pharmacies;
- we may be required to change instructions regarding the way the product is administered, conduct additional clinical trials or change the labeling of the product;
- we may be subject to limitations on how we may promote the product;
- sales of the product may decrease significantly;
- regulatory authorities may require us to take our approved product off the market;
- we may be subject to litigation or product liability claims; and
- our reputation may suffer.

Any of these events could prevent us or our potential future collaborators from achieving or maintaining market acceptance of the affected product or could substantially increase commercialization costs and expenses, which in turn could delay or prevent us from generating significant revenues from the sale of our products.

Even if our product candidates receive marketing authorization from the FDA, if the FDA does not find the manufacturing facilities of our future contract manufacturers acceptable for commercial production, we may not be able to commercialize our product candidates.

We are currently utilizing contract manufacturers for the production of the active pharmaceutical ingredients and the formulation of drug product candidates for our clinical trials. Additionally, even if our product candidates receive marketing authorization from the FDA, we do not intend to manufacture the approved pharmaceutical products. We do not currently have agreements for the commercial manufacture of Annamycin or any of our other product candidates and we may not be able to reach agreements with these or other contract manufacturers for sufficient commercial supplies of Annamycin if it is approved. Additionally, the facilities used by any contract manufacturer to manufacture any of our product candidates must be the subject of a satisfactory inspection before the FDA approves the product candidate manufactured at that facility. We are completely dependent on these third-party manufacturers for compliance with the requirements of US and non-US regulators for the manufacture of our products. If our manufacturers cannot successfully manufacture material that conform to our specifications and the FDA's cGMP requirements, and other requirements of any governmental agency whose jurisdiction to which we are subject, our product candidates will not be approved or, if already approved, may be subject to recalls or other negative actions. Reliance on third-party manufacturers entails risks to which we would not be subject if we manufactured our product candidates, including:

- the possibility that we are unable to enter into a manufacturing agreement with a third party to manufacture our product candidates;
- the possible breach of the manufacturing agreements by the third parties because of factors beyond our control; and
- the possibility of termination or nonrenewal of the agreements by the third parties before we are able to arrange for a qualified replacement third-party manufacturer.

Any of these factors could cause the delay of approval or commercialization of our product candidates, cause us to incur higher costs or prevent us from commercializing our product candidates successfully. Furthermore, if any of our product candidates are approved and contract manufacturers fail to deliver the required commercial quantities of finished product on a timely basis at commercially reasonable prices and we are unable to find one or more replacement manufacturers capable of production at a substantially equivalent cost, in substantially equivalent volumes and quality and on a timely basis, we would likely be unable to meet demand for our products and could lose potential revenue. It may take several years to establish an alternative source of supply for our product candidates and to have any such new source approved by the government agencies that regulate our products.

We received ODD for Annamycin and WP1066, but even if either product candidate is approved and receives ODE, ODE may not effectively prevent approval of a competing product.

In 2017, we received notice that the FDA granted ODD for Annamycin for the treatment of AML and in 2020 we received notice that the FDA granted ODD for Annamycin for the treatment of soft tissue sarcomas. In February 2019, we received notice that the FDA granted ODD for WP1066 for the treatment of glioblastoma.

ODD from the FDA is available for drugs targeting diseases with less than 200,000 cases per year. ODD may enable market exclusivity of 7 years from the date of approval of a NDA in the United States. During that period the FDA generally could not approve another product containing the same drug for the same designated indication. Orphan drug exclusivity will not bar approval of another product under certain circumstances, including if a subsequent product with the same active ingredient for the same indication is shown to be clinically superior to the approved product on the basis of greater efficacy or safety, or providing a major contribution to patient care, or if the company with orphan drug exclusivity is not able to meet market demand. Even if either Annamycin or WP1066 is approved and ODE is granted, we cannot know that the exclusivity will prevent approval of another product containing Annamycin and intended to treat AML or soft tissue sarcomas, or WP1066 and intended to treat glioblastoma, because any such subsequent product could be demonstrated to be clinically superior to Annamycin or WP1066.

The regulatory approval processes of the FDA and comparable foreign authorities are lengthy, time consuming and inherently unpredictable, and even if we obtain approval for a product candidate in one country or jurisdiction, we may never obtain approval for or commercialize it in any other jurisdiction, which would limit our ability to realize our full market potential.

Prior to obtaining approval to commercialize a product candidate in any jurisdiction, we and our collaborators must demonstrate with substantial evidence from well controlled clinical trials, and to the satisfaction of the FDA or comparable foreign regulatory agencies, that such product candidates are safe and effective for their intended uses. Results from nonclinical studies and clinical trials can be interpreted in different ways. Even if we believe the nonclinical or clinical data for a product candidate are promising, such data may not be sufficient to support approval by the FDA and other regulatory authorities. In order to market any products in any particular jurisdiction, we must establish and comply with numerous and varying regulatory requirements on a country-by-country basis regarding safety and efficacy. Approval by the FDA does not ensure approval by regulatory authorities in any other country or jurisdiction outside the United States. In addition, clinical trials conducted in one country may not be accepted by regulatory authorities in other countries, and regulatory approval in one country does not guarantee regulatory approval in any other country. Approval processes vary among countries and can involve additional product testing and validation, as well as additional administrative review periods. Seeking regulatory approval could result in difficulties and costs for us and require additional nonclinical studies or clinical trials, which could be costly and time consuming. Regulatory requirements can vary widely from country to country and could delay or prevent the introduction of our products in those countries. We do not have any product candidates approved for sale in any jurisdiction, including in international markets, and we do not have experience in obtaining regulatory approval. If we fail to comply with regulatory requirements in international markets or to obtain and maintain required approvals, or if regulatory approvals in international markets are delayed, our target market will be reduced and our ability to realize the full market potential of any product we develop will be unrealized.

We have received Fast Track designation for one of our product candidates and may seek the same designation for one of more of our other product candidates. Such designation may not actually lead to a faster development or regulatory review or approval process. Fast Track designation may also be rescinded if the FDA believes the designation is no longer supported by data from our clinical development program.

If a product is intended for the treatment of a serious condition and nonclinical or clinical data demonstrate the potential to address unmet medical need for this condition, a product sponsor may apply for FDA Fast Track designation. FDA granted Fast Track designation to Annamycin for STS lung metastases in March 2021. If we seek Fast Track designation for Annamycin for other indications or for another product candidate, we may not receive it from the FDA. Additionally, even if we receive Fast Track designation, Fast Track designation does not ensure that we will receive marketing approval or that approval will be granted within any particular time frame. We may not experience a faster development or regulatory review or approval process with Fast Track designation compared to conventional FDA procedures. In addition, the FDA may withdraw Fast Track designation if it believes that the designation is no longer supported by data from our clinical development program. Fast Track designation alone does not guarantee qualification for the FDA's priority review procedures.

Interim or preliminary data from our clinical trials that we announce or publish from time to time may change as more subject data become available and are subject to audit and verification procedures that could result in material changes in the final data.

We have in the past, and intend in the future, to publicly disclose preliminary data from our clinical trials, which is based on a preliminary analysis of then-available data, and the results and related findings and conclusions are subject to change following a full analyses of all data related to the particular trial. We also make assumptions, estimations, calculations and conclusions as part of our analyses of data, and we may not have received or had the opportunity to fully and carefully evaluate all data. As a result, the preliminary results that we report may differ from future results of the same trials, or different conclusions or considerations may qualify such results once additional data have been received and fully evaluated. Preliminary data also remain subject to audit and verification procedures that may result in the final data being materially different from the preliminary data we previously published. As a result, preliminary data should be viewed with caution until the final data are available. We may also disclose interim data from our clinical trials. Interim data from clinical trials that we may complete are subject to the risk that one or more of the clinical outcomes may materially change as subject enrollment continues and more subject data becomes available. Adverse differences between preliminary or interim data and final data could significantly harm our business prospects. Further, disclosure of preliminary or interim data by us could result in volatility in the price of our common stock.

In addition, others, including regulatory agencies, may not accept or agree with our assumptions, estimates, calculations, conclusions or analyses or may interpret or weigh the importance of data differently, which could impact the approvability of the particular drug candidate and our business in general. In addition, the information we choose to publicly disclose regarding a particular study or clinical trial is based on what is typically extensive information, and you or others may not agree with what we determine is the material or otherwise appropriate information to include in our disclosure, and any information we determine not to disclose may ultimately be deemed significant with respect to future decisions, conclusions, views, activities or otherwise regarding a particular drug candidate or our business. If the interim data that we report differ from actual results, or if others, including regulatory authorities, disagree with the conclusions reached, our ability to obtain approval for and commercialize our current or any our future drug candidate, our business, operating results, prospects or financial condition may be materially harmed.

We may not be able to conduct, or contract others to conduct, animal testing in the future, which could harm our research and development activities.

Certain laws and regulations relating to drug development require us to test our product candidates on animals before initiating clinical trials involving humans. Animal testing activities have been the subject of controversy and adverse publicity. Animal rights groups and other organizations and individuals have attempted to stop animal testing activities by pressing for legislation and regulation in these areas and by disrupting these activities through protests and other means. To the extent the activities of these groups are successful, our research and development activities may be interrupted or delayed.

We, or our third-party manufacturers, may be unable to successfully scale-up manufacturing of our product candidates in sufficient quality and quantity, which would delay or prevent us from developing our product candidates and commercializing approved products, if any.

In order to conduct clinical trials of our product candidates, we will need to manufacture them in large quantities. We, or any manufacturing partners, may be unable to successfully increase the manufacturing capacity for any of our product candidates in a timely or cost-effective manner, or at all. In addition, quality issues may arise during scale-up activities. If we or any manufacturing partners are unable to successfully scale up the manufacture of our product candidates in sufficient quality and quantity, the development, testing and clinical trials of that product candidate may be delayed or become infeasible, and regulatory approval or commercial launch of any resulting product may be delayed or not obtained, which could significantly harm our business. In addition, the supply chain for the manufacturing of our product candidates is complicated and can involve several parties. If we were to experience any supply chain issues, including as a result of the COVID-19 pandemic, our product supply could be seriously disrupted.

Risks Related to our Intellectual Property

The composition of matter patent for Annamycin has expired, and other patents have not yet been issued, and may not be issued.

We are pursuing additional patents with claims directed to Annamycin drug product formulations and the methods of use of Annamycin to treat relapsed or refractory AML and other conditions, and methods for its synthesis, as the composition of matter patent protection for Annamycin has expired. As a result, competitors may be able to offer and sell products so long as these competitors do not infringe any other patents that third parties or we hold, including formulation, synthesis and method of use patents. However, particularly with regard to products approved for more than one indication, method of use patents may not provide significant protection, because a competitor could obtain approval for only a non-protected use and thus come to market, where the product may legally be prescribed for the protected use, thus undermining the protection provided by the patent. Although off-label prescriptions may infringe our method of use patents, the practice is common across medical specialties and such infringement is difficult to prevent or prosecute. Off-label sales would limit our ability to generate revenue from the sale of Annamycin, if approved for commercial sale.

The intellectual property rights we have licensed from MD Anderson are subject to the rights of the US government.

We have obtained a royalty-bearing, worldwide, exclusive license to intellectual property rights, including patent rights related to our WP1066 Portfolio and WP1122 Portfolio drug product candidates from MD Anderson. Some of our licensed intellectual property rights from MD Anderson have been developed in the course of research funded by the US government. As a result, the US government may have certain rights to intellectual property embodied in our current or future products pursuant to the Bayh-Dole Act of 1980. Government rights in certain inventions developed under a government-funded program include a non-exclusive, non-transferable, irrevocable worldwide license to use inventions for any governmental purpose. In addition, the US government has the right to require us, or an assignee or exclusive licensee to such inventions, to grant licenses to any of these inventions to a third party if they determine that: (i) adequate steps have not been taken to commercialize the invention; (ii) government action is necessary to meet public health or safety needs; (iii) government action is necessary to meet requirements for public use under federal regulations; or (iv) the right to use or sell such inventions is exclusively licensed to an entity within the US and substantially manufactured outside the US without the US government's prior approval. Additionally, we may be restricted from granting exclusive licenses for the right to use or sell our inventions created pursuant to such agreements unless the licensee agrees to additional restrictions (e.g., manufacturing substantially all of the invention in the US). The US government also has the right to take title to these inventions if we fail to disclose the invention to the government and fail to file an application to register the intellectual property within specified time limits. In addition, the US government may acquire title in any country in which a patent application is not filed within specified time limits. Additionally, certain inventions are subject to transfer restrictions during the term of these agreements and for a period, thereafter, including sales of products or components, transfers to foreign subsidiaries for the purpose of the relevant agreements, and transfers to certain foreign third parties. If any of our intellectual property becomes subject to any of the rights or remedies available to the US government or third parties pursuant to the Bayh-Dole Act of 1980, this could impair the value of our intellectual property and could adversely affect our business.

We may incur substantial costs as a result of litigation or other proceedings relating to patent and other intellectual property rights.

We may from time to time seek to enforce our intellectual property rights against infringers when we determine that a successful outcome is probable and may lead to an increase in the value of the intellectual property. If we choose to enforce our patent rights against a party, then that individual or company has the right to ask the court to rule that such patents are invalid or should not be enforced. Additionally, the validity of our patents and the patents we have licensed may be challenged if a petition for post grant proceedings such as inter-partes review and post grant review is filed within the statutorily applicable time with the US Patent and Trademark Office (USPTO). These lawsuits and proceedings are expensive and would consume time and resources and divert the attention of managerial and scientific personnel even if we were successful in stopping the infringement of such patents. In addition, there is a risk that the court will decide that such patents are not valid and that we do not have the right to stop the other party from using the inventions. There is also the risk that, even if the validity of such patents is upheld, the court will refuse to stop the other party on the ground that such other party's activities do not infringe our intellectual property rights. In addition, in recent years the US Supreme Court modified some tests used by the USPTO in granting patents over the past 20 years, which may decrease the likelihood that we will be able to obtain patents and increase the likelihood of a challenge of any patents we obtain or license.

We may be subject to claims that our employees have wrongfully used or disclosed alleged trade secrets of their former employers.

As is common in the biotechnology and pharmaceutical industries, we employ individuals who were previously employed at other biotechnology or pharmaceutical companies, including our competitors or potential competitors. We may be subject to claims that these employees, or we, have used or disclosed trade secrets or other proprietary information of their former employers. Litigation may be necessary to defend against these claims. Even if we are successful in defending against these claims, litigation could result in substantial costs and be a distraction to management.

If we are not able to adequately prevent disclosure of trade secrets and other proprietary information, the value of our technology and products could be significantly diminished.

We rely on trade secrets to protect our proprietary technologies, especially where we do not believe patent protection is appropriate or obtainable. However, trade secrets are difficult to protect. We rely in part on confidentiality agreements with our employees, consultants, outside scientific collaborators, sponsored researchers and other advisors to protect our trade secrets and other proprietary information. These agreements may not effectively prevent disclosure of confidential information and may not provide an adequate remedy in the event of unauthorized disclosure of confidential information. In addition, others may independently discover our trade secrets and proprietary information. Costly and time-consuming litigation could be necessary to enforce and determine the scope of our proprietary rights, and failure to obtain or maintain trade secret protection could adversely affect our competitive business position.

If we breach any of the agreements under which we license patent rights or if we fail to meet certain development deadlines, pay certain fees including extension fees or exercise certain rights to technology, we could lose or fail to obtain license rights that are important to our business.

We license all of our technology from MD Anderson, and we must meet various payment and other obligations under our license agreements with MD Anderson. Our license agreements generally require that we meet various milestones by certain dates, each of which generally requires the payment of additional fees, including extension fees. To date, we have been able meet such milestones, pay certain fees or have been able to enter into extensions with MD Anderson related to such milestones. However, our failure to meet any financial or other obligations under our license agreements in a timely manner could result in the loss of our rights to our core technologies.

We are a party to a number of license agreements with MD Anderson under which we are granted rights to intellectual property that are critical to our business and we expect that we will need to enter into additional license agreements in the future with MD Anderson based on development work we are pursuing under a sponsored research agreement. With respect to inventions arising from our sponsored research agreement, MD Anderson has provided us with an option to negotiate a royalty-bearing, exclusive license to any invention or discovery that is conceived or reduced to practice. However, regardless of such option to negotiate, we may be unable to negotiate a license within the specified time frame or under terms that are acceptable to us. If we are unable to do so, the institution may offer the intellectual property rights to other parties, potentially blocking our ability to pursue a program based on that technology.

Risks Relating to Our Business and Our Financial Condition

We will require additional funding, which may not be available to us on acceptable terms, or at all, and, if not so available, may require us to delay, limit, reduce or cease our operations.

We have used and we intend to use our current cash resources and the proceeds from any possible future offerings, to, among other uses, advance Annamycin and WP1066 through clinical development, advancing the remainder of the existing portfolio through preclinical studies and into INDs or their equivalent, and sponsoring research at MD Anderson and HPI. Developing pharmaceutical products, including conducting preclinical studies and clinical trials, is expensive. We will require substantial additional future capital in order to complete clinical development and commercialize Annamycin and WP1066. If the FDA or its EU equivalent requires that we perform additional nonclinical studies or clinical trials, our expenses would further increase beyond what we currently expect and the anticipated timing of any potential approval of Annamycin would likely be delayed. Further, there can be no assurance that the costs we will need to incur to obtain regulatory approval of Annamycin will not increase.

Because successful development of our product candidates is uncertain, we are unable to estimate the actual amount of funding we will require to complete research and development and commercialize our products under development.

The amount and timing of our future funding requirements will depend on many factors, including but not limited to:

- whether our plan for clinical trials will be completed on a timely basis and, if completed, whether we will be able to publicly announce results from our phase I/II clinical trials in accordance with our announced milestones;
- whether the results of our clinical trials will be announced on a timely basis and, when announced, whether such results are in accordance with our expectations or our announced milestones;
- whether we are successful in obtaining the benefits of FDA's expedited development and review programs related to Annamycin or our other drug candidates;
- the progress, costs, results of and timing of our clinical trials and also of our preclinical studies;
- the outcome, costs and timing of seeking and obtaining FDA and any other regulatory approvals;
- the costs associated with securing and establishing commercialization and manufacturing capabilities;
- market acceptance of our product candidates;
- the costs of acquiring, licensing or investing in businesses, products, product candidates and technologies;
- our ability to maintain, expand and enforce the scope of our intellectual property portfolio, including the amount and timing of any payments we may be required to make, or that we may receive, in connection with the licensing, filing, prosecution, defense and enforcement of any patents or other intellectual property rights;
- our need and ability to hire additional management and scientific and medical personnel;
- the effect of competing drug candidates and new product approvals;
- our need to implement additional internal systems and infrastructure, including financial and reporting systems; and
- the economic and other terms, timing of and success of our existing licensing arrangements and any collaboration, licensing or other arrangements into which we may enter in the future.

Some of these factors are outside of our control. Our existing capital resources are not sufficient to enable us to complete the development and commercialization of Annamycin, WP1066, and WP1220, if approved, or to initiate any clinical trials or additional development work needed for any other drug candidates. Accordingly, we will need to raise additional funds in the future.

We may seek additional funding through a combination of equity offerings, debt financings, government or other third-party funding, commercialization, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements. Additional funding may not be available to us on acceptable terms or at all. In addition, the terms of any financing may adversely affect the holdings or the rights of our stockholders. In addition, the issuance of additional shares by us, or the possibility of such issuance, may cause the market price of our shares to decline.

If we are unable to obtain funding on a timely basis, we may be required to significantly curtail one or more of our research or development programs. We also could be required to seek funds through arrangements with collaborative partners or otherwise that may require us to relinquish rights to some of our technologies or product candidates or otherwise agree to terms unfavorable to us.

We have commenced clinical trials, have a limited operating history and we expect a number of factors to cause our operating results to fluctuate on an annual basis, which may make it difficult to predict our future performance.

We are a clinical stage pharmaceutical company with a limited operating history. Our operations to date have been limited to acquiring our technology portfolio, preparing several drugs for authorization to conduct clinical trials and conducting Phase 1 clinical trials. We have only recently completed our initial Phase 1 clinical trials and have yet to receive regulatory approvals for any of our drug candidates. Additionally, we have a limited amount of drug supply and the amount of drug required may depend upon subject response and the need for additional, unplanned treatments, making it difficult to predict the total amount of drug required.

Consequently, any predictions made about our future success or viability may not be as accurate as they could be if we had a longer operating history or approved products on the market. Our operating results are expected to significantly fluctuate from quarter-to-quarter or year-to-year due to a variety of factors, many of which are beyond our control. Factors relating to our business that may contribute to these fluctuations include:

- any delays in regulatory review and approval of our product candidates in clinical development, including our ability to receive approval from the FDA or the Polish authorities for our drugs in clinical trials;
- delays in the commencement, enrollment and timing of clinical trials;
- difficulties in identifying subjects suffering from our target indications;
- the success of our clinical trials through all phases of clinical development;
- potential side effects of our product candidates that could delay or prevent approval or cause an approved drug to be taken off the market;
- our ability to obtain additional funding to develop drug candidates;
- our ability to identify and develop additional drug candidates beyond Annamycin and our WP1066 and WP1122 Portfolios;
- competition from existing products or new products that continue to emerge;
- the ability of subjects or healthcare providers to obtain coverage or sufficient reimbursement for our products;
- our ability to adhere to clinical trial requirements directly or with third parties such as contract research organizations (CROs);
- our dependency on third-party manufacturers to manufacture our products and key ingredients;
- our ability to establish or maintain collaborations, licensing or other arrangements, particularly with MD Anderson;
- our ability to defend against any challenges to our intellectual property including, claims of patent infringement;
- our ability to enforce our intellectual property rights against potential competitors;
- our ability to secure additional intellectual property protection for our developing drug candidates and associated technologies;
- our ability to attract and retain key personnel to manage our business effectively; and
- potential product liability claims.

Accordingly, the results of any historical quarterly or annual periods should not be relied upon as indications of future operating performance.

Our ability to successfully commence and recruit subjects for a potential Phase 2 COVID-19 clinical trial of WP1122 is dependent upon our ability to locate a foreign jurisdiction for such a trial with a sufficient and certain patient population at the time of such trial.

In October 2021, we announced that we received authorization from the UK Medicines and Healthcare Products Regulatory Agency (MHRA) to commence a Phase 1a clinical trial of WP1122 in the United Kingdom. Furthermore, we also announced that we received a favorable opinion from the London - Riverside Research Ethics Committee in the UK to begin the study, which is expected to be conducted at the Medicines Evaluation Unit in Manchester, United Kingdom. In early March 2022, we filed an amended protocol with both the Riverside Ethics Committee and the MHRA. The amendment updated the dilution of the oral solution to achieve full dissolution of WP1122. We plan to begin this trial in the first half of 2022. This study in healthy volunteers will explore safety and pharmacokinetics. We expect to enroll approximately 80 healthy volunteers in the United Kingdom. The primary endpoint for the study is safety and tolerability, which will be assessed by the frequency of adverse events (AEs), serious adverse events, treatment-emergent adverse events, and AEs of special interest.

If the Phase 1a trial demonstrates safety and tolerability, of which there is no assurance, we intend to commence an externally funded, subsequent clinical trial in subjects infected with SARS-CoV-2 to further evaluate safety and establish a favorable risk/benefit profile. We are in the process of identifying additional countries where potential future Phase 2 COVID-19 clinical trials could occur. Our ability to successfully commence a Phase 2 COVID-19 clinical trial will depend on our ability to find a location with a sufficient and certain patient population at the time we would commence such a trial. As the level of incidence of COVID-19 in various countries has recently been volatile and unpredictable, we may not be able to commence and successfully recruit subjects for an affordable Phase 2 clinical trial on a timely basis, or at all.

We have in the past completed related party transactions that were not conducted on an arm's length basis.

Prior to our IPO, we acquired (i) the rights to the license agreement with MD Anderson covering our WP1122 Portfolio held by IntertechBio Corporation, a company affiliated with certain members of our management and board of directors, and (ii) the rights to all data related to the development of Annamycin held by AnnaMed, Inc., a company affiliated with certain members of our management and board of directors. In addition, prior to our IPO, Moleculin, LLC merged with and into our company. Moleculin, LLC was affiliated with certain members of our management and board of directors. Prior to our IPO, we, on Moleculin, LLC's behalf, entered into an agreement with HPI whereby HPI agreed to terminate its option to sublicense certain rights to the WP1066 Portfolio and entered into a co-development agreement with us. Our co-founder, Dr. Waldemar Priebe, and a member of our management are shareholders of HPI. In addition, in February 2019, we entered into sublicense agreements with WPD Pharmaceuticals, Inc., (which was materially amended in March 2021 and again in December 2021) and Animal Lifesciences, LLC. Dr. Priebe is affiliated with both WPD Pharmaceuticals, Inc. and Animal Lifesciences, LLC.

For the sublicense agreement (and the March 2021 amendment) with WPD Pharmaceuticals, Inc., since Dr. Priebe was affiliated with the entity, our board of directors received fairness opinions as to the adequacy of the consideration we received in the sublicense agreement (and the March 2021 amendment). Due to the increase in the required development efforts and the reduction in the buyback calculation in the amendment in December 2021, we did not receive a fairness opinion on that amendment. We also did not receive a fairness opinion on the transactions that occurred prior to our IPO or with Animal Lifesciences, LLC. None of the foregoing transactions were conducted on an arm's length basis. As such, it is possible that the terms were less favorable to us than in an arm's length transaction.

We have never been profitable, we have no products approved for commercial sale, and to date we have not generated any revenue from product sales. As a result, our ability to reduce our losses and reach profitability is unproven, and we may never achieve or sustain profitability.

We have never been profitable and do not expect to be profitable in the foreseeable future. We have not yet submitted any drug candidates for approval by regulatory authorities in the United States or elsewhere. For the year ended December 31, 2021, we incurred a net loss of $16.0 million. We had an accumulated deficit of $72.8 million as of December 31, 2021.

To date, we have devoted most of our financial resources to research and development, including our drug discovery research, preclinical development activities and clinical trial preparation, as well as corporate overhead. We have not generated any revenues from product sales. We expect to continue to incur losses for the foreseeable future, and we expect these losses to increase as we continue our development of, and seek regulatory approvals for Annamycin and our other drug candidates, prepare for and begin the commercialization of any approved products, and add infrastructure and personnel to support our continuing product development efforts. We anticipate that any such losses could be significant for the next several years. If Annamycin, WP1066 or any of our other drug candidates fail in clinical trials or do not gain regulatory approval, or if our drug candidates do not achieve market acceptance, we may never become profitable. As a result of the foregoing, we expect to continue to experience net losses and negative cash flows for the foreseeable future. These net losses and negative cash flows have had, and will continue to have, an adverse effect on our stockholders' equity and working capital.

We conduct operations through our Australia wholly owned subsidiary. If we lose our ability to operate in Australia, or if our subsidiary is unable to receive the research and development tax credit allowed by Australian regulations, our business and results of operations will suffer.

In June 2018, we formed a wholly owned Australian subsidiary, Moleculin Australia Pty Ltd, or (MAPL), to begin preclinical development in Australia for WP1732, an analog of WP1066. Due to the geographical distance and lack of employees currently in Australia, as well as our lack of experience operating in Australia, we may not be able to efficiently or successfully monitor, develop and commercialize our drug products in Australia, including conducting preclinical studies and clinical trials. Furthermore, we have no assurance that the results of any clinical trials that we conduct for our drug candidates in Australia will be accepted by the FDA or foreign regulatory authorities for development and commercialization approvals.

In addition, current Australian tax regulations provide for a refundable research and development tax credit equal to 43.5% of qualified expenditures. If we are ineligible or unable to receive the research and development tax credit, or if we lose our ability to operate MAPL in Australia, or the Australian government significantly reduces or eliminates the tax credit, our business and results of operations would be adversely affected. We applied for a refundable tax credit and received it in 2019 for $0.2 million. No similar activity occurred in 2020 and in March 2021 we terminated our license agreement related to WP1732. Management believes that maintaining the subsidiary allows for the possibility of future preclinical and clinical activities to be performed in Australia.

Our financial condition would be adversely impacted if our intangible assets become impaired.

As a result of the accounting for our acquisition of Moleculin, LLC and the agreement we, on Moleculin, LLC's behalf, entered into with Houston Pharmaceuticals, Inc., we have carried on our balance sheet within intangible assets in-process research and development (IPR&D) of $11.1 million as of December 31, 2021. Intangibles are evaluated quarterly and are tested for impairment at least annually or when events or changes in circumstances indicate the carrying value of each segment, and collectively our company taken as a whole, might exceed its fair value.

Intangible assets related to IPR&D are considered indefinite-lived intangible assets and are assessed for impairment annually or more frequently if impairment indicators exist. If the associated research and development effort is abandoned, the related assets will be written-off and we will record a noncash impairment loss on our statement of operations. For those compounds that reach commercialization, if any, the IPR&D assets will be amortized over their estimated useful lives.

If we determine that the value of our intangible assets is less than the amounts reflected on our balance sheet, we will be required to reflect an impairment of our intangible assets in the period in which such determination is made. An impairment of our intangible assets would result in our recognizing an expense in the amount of the impairment in the relevant period, which would also result in the reduction of our intangible assets and a corresponding reduction in our stockholders' equity in the relevant period. As the transactions discussed above were related party transactions and were not conducted on an arm's length basis, it is possible that the terms were less favorable to us than what we would have received in an arm's length transaction.

We have no sales, marketing or distribution experience and we will have to invest significant resources to develop those capabilities or enter into acceptable third-party sales and marketing arrangements.

We have no sales, marketing or distribution experience. To develop sales, distribution and marketing capabilities, we will have to invest significant amounts of financial and management resources, some of which will need to be committed prior to any confirmation that Annamycin or any of our other product candidates will be approved by the FDA. For product candidates where we decide to perform sales, marketing and distribution functions ourselves or through third parties, we could face a number of additional risks, including that we or our third-party sales collaborators may not be able to build and maintain an effective marketing or sales force. If we use third parties to market and sell our products, we may have limited or no control over their sales, marketing and distribution activities on which our future revenues may depend.

We may not be successful in establishing and maintaining development and commercialization collaborations, which could adversely affect our ability to develop certain of our product candidates and our financial condition and operating results.

Because developing pharmaceutical products, conducting clinical trials, obtaining regulatory approval, establishing manufacturing capabilities and marketing approved products are expensive, we may seek to enter into collaborations with companies that have more experience. Additionally, if any of our product candidates receives marketing approval, we may enter into sales and marketing arrangements with third parties. If we are unable to enter into arrangements on acceptable terms, if at all, we may be unable to effectively market and sell our products in our target markets. We expect to face competition in seeking appropriate collaborators. Moreover, collaboration arrangements are complex and time consuming to negotiate, document and implement and they may require substantial resources to maintain. We may not be successful in our efforts to establish and implement collaborations or other alternative arrangements for the development of our product candidates.

When we collaborate with a third party for development and commercialization of a product candidate, we can expect to relinquish some or all of the control over the future success of that product candidate to the third party. For example, we have a sublicense with WPD Pharmaceuticals. The territories covered by this sublicense agreement is primarily Poland and lesser surrounding countries, but not including any of the major European markets (UK, Germany, France, Spain and Italy).

One or more of our collaboration partners may not devote sufficient resources to the commercialization of our product candidates or may otherwise fail in their commercialization. The terms of any collaboration or other arrangement that we establish may contain provisions that are not favorable to us. In addition, any collaboration that we enter into may be unsuccessful in the development and commercialization of our product candidates. In some cases, we may be responsible for continuing preclinical and initial clinical development of a product candidate or research program under a collaboration arrangement, and the payment we receive from our collaboration partner may be insufficient to cover the cost of this development. If we are unable to reach agreements with suitable collaborators for our product candidates, we would face increased costs, we may be forced to limit the number of our product candidates we can commercially develop or the territories in which we commercialize them. As a result, we might fail to commercialize products or programs for which a suitable collaborator cannot be found. If we fail to achieve successful collaborations, our operating results and financial condition could be materially and adversely affected.

We face competition from other biotechnology and pharmaceutical companies and our operating results will suffer if we fail to compete effectively.

The biotechnology and pharmaceutical industries are intensely competitive and subject to rapid and significant technological change. We have competitors in the United States, Europe and other jurisdictions, including major multinational pharmaceutical companies, established biotechnology companies, specialty pharmaceutical and generic drug companies and universities and other research institutions. Many of our competitors have greater financial and other resources, such as larger research and development staff and more experienced marketing and manufacturing organizations than we do. Large pharmaceutical companies, in particular, have extensive experience in clinical testing, obtaining regulatory approvals, recruiting subjects and manufacturing pharmaceutical products. These companies also have significantly greater research, sales and marketing capabilities and collaborative arrangements in our target markets with leading companies and research institutions. Established pharmaceutical companies may also invest heavily to accelerate discovery and development of novel compounds or to in-license novel compounds that could make the product candidates that we develop obsolete. As a result of all of these factors, our competitors may succeed in obtaining patent protection and/or FDA approval or discovering, developing and commercializing drugs for the diseases that we are targeting before we do or may develop drugs that are deemed to be more effective or gain greater market acceptance than ours. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large, established companies. In addition, many universities and private and public research institutes may become active in our target disease areas. Our competitors may succeed in developing, acquiring or licensing on an exclusive basis, technologies and drug products that are more effective or less costly than any of our product candidates that we are currently developing or that we may develop, which could render our products obsolete or noncompetitive.

A number of attempts have been made or are under way to provide an improved treatment for AML. Drugs attempting to target a subset of AML patients who present with particular anomalies involving a gene referred to as FLT3 are currently in clinical trials. Other approaches to improve the effectiveness of induction therapy are in early-stage clinical trials and, although they do not appear to address the underlying problems with anthracyclines, we can provide no assurance that such improvements, if achieved, would not adversely impact the need for improved anthracyclines. A modified version of doxorubicin designed to reduce cardiotoxicity is in clinical trials for the treatment of sarcoma and, although this drug does not appear to address multidrug resistance and is not currently intended for the treatment of acute leukemia, we can provide no assurance that it will not become a competitive alternative to Annamycin. Although we are not aware of any other single agent therapies in clinical trials that would directly compete against Annamycin in the treatment of relapsed and refractory AML, we can provide no assurance that such therapies are not in development, will not receive regulatory approval and will reach market before our drug candidate Annamycin. In addition, any such competing therapy may be more effective and / or cost-effective than ours.

If our competitors market products that are more effective, safer or less expensive or that reach the market sooner than our future products, if any, we may not achieve commercial success. In addition, because of our limited resources, it may be difficult for us to stay abreast of the rapid changes in each technology. If we fail to stay at the forefront of technological change, we may be unable to compete effectively. Technological advances or products developed by our competitors may render our technologies or product candidates obsolete, less competitive or not economical.

We will need to expand our operations and increase the size of our company, and we may experience difficulties in managing growth.

As we advance our product candidates through preclinical studies and clinical trials, we will need to increase our product development, scientific and administrative headcount to manage these programs. In addition, to meet our obligations as a public company, we may need to increase our general and administrative capabilities. Our management, personnel, and systems currently in place may not be adequate to support this future growth. If we are unable to successfully manage this growth and increased complexity of operations, our business may be adversely affected.

We may not be able to manage our business effectively if we are unable to attract and retain key personnel and consultants.

We may not be able to attract or retain qualified management, finance, scientific and clinical personnel and consultants due to the intense competition for qualified personnel and consultants among biotechnology, pharmaceutical and other businesses. If we are not able to attract and retain necessary personnel and consultants to accomplish our business objectives, we may experience constraints that will significantly impede the achievement of our development objectives, our ability to raise additional capital and our ability to implement our business strategy.

We are highly dependent on the development, regulatory, commercialization and business development expertise of our management team, key employees, and consultants. If we lose one or more of our executive officers or key employees or consultants, our ability to implement our business strategy successfully could be seriously harmed. Any of our executive officers or key employees or consultants may terminate their employment at any time. Replacing executive officers, key employees and consultants may be difficult and may take an extended period of time because of the limited number of individuals in our industry with the breadth of skills and experience required to develop, gain regulatory approval of and commercialize products successfully. Competition to hire and retain employees and consultants from this limited pool is intense, and we may be unable to hire, train, retain or motivate these additional key personnel and consultants. Our failure to retain key personnel or consultants could materially harm our business.

In addition, we have scientific and clinical advisors and consultants who assist us in formulating our research, development, and clinical strategies. These advisors are not our employees and may have commitments to, or consulting or advisory contracts with, other entities that may limit their availability to us and typically they will not enter into non-compete agreements with us. If a conflict of interest arises between their work for us and their work for another entity, we may lose their services. In addition, our advisors may have arrangements with other companies to assist those companies in developing products or technologies that may compete with ours.

We do not expect that our insurance policies will cover all of our business exposures thus leaving us exposed to significant uninsured liabilities.

We do not carry insurance for all categories of risk that our business may encounter. There can be no assurance that we will secure adequate insurance coverage or that any such insurance coverage will be sufficient to protect our operations to significant potential liability in the future. Any significant uninsured liability may require us to pay substantial amounts, which would adversely affect our financial position and results of operations.

Additionally, we use hazardous materials, and any claims relating to improper handling, storage or disposal of these materials could be time-consuming or costly. We do not carry specific hazardous waste insurance coverage and our property and casualty, and general liability insurance policies specifically exclude coverage for damages and fines arising from hazardous waste exposure or contamination.

We may incur penalties if we fail to comply with healthcare regulations.

We are exposed to the risk of employee fraud or other illegal activity by our employees, independent contractors, consultants, commercial partners and vendors. In addition to FDA restrictions on the marketing of pharmaceutical products, several other types of state and federal laws have been applied to restrict certain marketing practices in the pharmaceutical and medical device industries in recent years, as well as consulting or other service agreements with physicians or other potential referral sources. These laws include anti-kickback statutes and false claims statutes that prohibit, among other things, knowingly and willfully offering, paying, soliciting or receiving remuneration to induce, or, in return for, purchasing, leasing, ordering or arranging for the purchase, lease or order of any healthcare item or service reimbursable under Medicare, Medicaid or other federally-financed healthcare programs, and knowingly presenting, or causing to be presented, a false claim for payment to the federal government, or knowingly making, or causing to be made, a false statement to get a false claim paid. The majority of states also have statutes or regulations similar to the federal anti-kickback law and false claims laws, which apply to items and services, reimbursed under Medicaid and other state programs, or, in several states, apply regardless of the payer. Although there are a number of statutory exemptions and regulatory safe harbors protecting certain common activities from prosecution, the exemptions and safe harbors are drawn narrowly, and any practices we adopt may not, in all cases, meet all of the criteria for safe harbor protection from anti-kickback liability. Sanctions under these federal and state laws may include civil monetary penalties, exclusion of a manufacturer's products from reimbursement under government programs, criminal fines and imprisonment. Any challenge to our business practices under these laws could have a material adverse effect on our business, financial condition and results of operations.

We may not be able to recover from any catastrophic event affecting our suppliers.

Our suppliers may not have adequate measures in place to minimize and recover from catastrophic events that may substantially destroy their capability to meet customer needs, and any measures they may put in place may not be adequate to recover production processes quickly enough to support critical timelines or market demands. These catastrophic events may include weather events such as tornadoes, earthquakes, floods or fires. In addition, these catastrophic events may render some or all of the products at the affected facilities unusable.

Our business and operations would suffer in the event of third-party computer system failures, cyber-attacks on third-party systems or deficiency in our cyber security.

We rely on information technology (IT) systems, including third-party "cloud based" service providers, to keep financial records, maintain laboratory data, clinical data, and corporate records, to communicate with staff and external parties and to operate other critical functions. This includes critical systems such as email, other communication tools, electronic document repositories and archives. If any of these third-party information technology providers are compromised due to computer viruses, unauthorized access, malware, natural disasters, fire, terrorism, war and telecommunication failures, electrical failures, cyber-attacks or cyber-intrusions over the internet, then sensitive emails or documents could be exposed or deleted. Similarly, we could incur business disruption if our access to the internet is compromised, and we are unable to connect with third-party IT providers. The risk of a security breach or disruption, particularly through cyber-attacks or cyber intrusion, including by computer hackers, foreign governments and cyber terrorists, has generally increased as the number, intensity and sophistication of attempted attacks and intrusions from around the world have increased. In addition, we rely on those third parties to safeguard important confidential personal data regarding our employees and subjects enrolled in our clinical trials. If a disruption event were to occur and cause interruptions in a third-party IT provider's operation, it could result in a disruption of our drug development programs. For example, the loss of clinical trial data from completed, ongoing or planned clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. To the extent that any disruption or security breach results in a loss of or damage to our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and development of our product candidates could be delayed or could fail.

The COVID-19 outbreak has delayed recruitment in our clinical trials and may continue or worsen, may affect the business of the FDA, EMA or other health authorities, which could result in delays in meetings related to our planned clinical trials and ultimately of reviews and approvals of our product candidates.

The COVID-19 outbreak has delayed recruitment in clinical trials and may continue or worsen. Additionally, it may delay the approvals of our product candidates due to its effect on the business of the FDA, EMA or other health authorities, which could result in delays in meetings related to planned clinical trials. The spread of COVID-19 may also slow potential enrollment of clinical trials and reduce the number of eligible subjects for our clinical trials. The COVID-19 outbreak, and mitigation measures also have had and may continue to have an adverse impact on global economic conditions which could have an adverse effect on our business and financial condition, including impairing our ability to raise capital when needed. The extent to which the COVID-19 outbreak impacts our business and operations will depend on future developments that are highly uncertain and cannot be predicted, including new information that may emerge concerning the severity of the virus and the actions to contain its impact. We have relationships with contract research organizations to conduct certain pre-clinical programs and testing and other services in Europe and those business operations are subject to potential business interruptions arising from protective measures that may be taken by the governmental or other agencies or governing bodies. In addition, certain of our collaborative relationships with research facilities and academic research institutions in the United States, Europe and in Australia may be materially and adversely impacted by protective measures taken by those institutions or federal and state agencies and governing bodies to restrict access to, or suspend operations at, such facilities. Such protective measures, including quarantines, travel restrictions and business shutdowns, may also have a material negative affect on our core operations.

Our failure to comply with data protection laws and regulations could lead to government enforcement actions and significant penalties against us, and adversely impact our operating results.

We are subject to US data protection laws and regulations (i.e., laws and regulations that address privacy and data security) at both the federal and state levels. The legislative and regulatory landscape for data protection continues to evolve, and in recent years there has been an increasing focus on privacy and data security issues. Numerous federal and state laws, including state data breach notification laws, state health information privacy laws, and federal and state consumer protection laws, govern the collection, use, and disclosure of health-related and other personal information. In addition, we may obtain health information from third parties (e.g., healthcare providers who prescribe our products) that are subject to privacy and security requirements under Health Insurance Portability and Accountability Act of 1996, or HIPAA. Although we are not directly subject to HIPAA-other than potentially with respect to providing certain employee benefits-we could be subject to criminal penalties if we knowingly obtain or disclose individually identifiable health information maintained by a HIPAA-covered entity in a manner that is not authorized or permitted by HIPAA. Finally, a data breach affecting sensitive personal information, including health information, could result in significant legal and financial exposure and reputational damages that could potentially have an adverse effect on our business.

EU Member States, Switzerland and other countries have also adopted data protection laws and regulations, which impose significant compliance obligations. For example, the collection and use of personal health data in the EU is governed by the provisions of the EU Data Protection Directive, or the Directive. The Directive and the national implementing legislation of the EU Member States impose strict obligations and restrictions on the ability to collect, analyze and transfer personal data, including health data from clinical trials and adverse event reporting. In particular, these obligations and restrictions concern the consent of the individuals to whom the personal data relates, the information provided to the individuals, notification of data processing obligations to the competent national data protection authorities and the security and confidentiality of the personal data. Data protection authorities from the different E.U. Member States may interpret the Directive and national laws differently and impose additional requirements, which add to the complexity of processing personal data in the EU.

Guidance on implementation and compliance practices are often updated or otherwise revised. For example, the EU Data Protection Directive prohibits the transfer of personal data to countries outside of the European Economic Area, or EEA, that are not considered by the European Commission to provide an adequate level of data protection. These countries include the United States.

The judgment by the Court of Justice of the EU in the Schrems case (Case C-362/14 Maximillian Schrems v. Data Protection Commissioner) determined the US-EU Safe Harbor Framework, which was relied upon by many US entities as a basis for transfer of personal data from the EU to the US, to be invalid. US entities, therefore, had only the possibility to rely on the alternate procedures for such data transfer provided in the EU Data Protection Directive.

On February 29, 2016, however, the European Commission announced an agreement with the US Department of Commerce, or DOC, to replace the invalidated Safe Harbor framework with a new EU-US "Privacy Shield". On July 12, 2016, the European Commission adopted a decision on the adequacy of the protection provided by the Privacy Shield. The Privacy Shield is intended to address the requirements set out by the Court of Justice of the EU in its Schrems judgment by imposing more stringent obligations on companies, providing stronger monitoring and enforcement by the DOC and the Federal Trade Commission, and making commitments on the part of public authorities regarding access to information. US companies have been able to certify to the DOC their compliance with the privacy principles of the Privacy Shield since August 1, 2016, and rely on the Privacy Shield certification to transfer of personal data from the EU to the US.

On September 16, 2016, the Irish privacy advocacy group Digital Rights Ireland brought an action for annulment of the European Commission decision on the adequacy of the Privacy Shield before the Court of Justice of the E.U. (Case T-670/16). Case T-670/16 is still pending. If the Court of Justice of the EU invalidates the Privacy Shield, it will no longer be possible to rely on the Privacy Shield certification to transfer personal data from the EU to entities in the US. Adherence to the Privacy Shield is not, however, mandatory. US-based companies are permitted to rely either on their adherence to the EU-US Privacy Shield or on the other authorized means and procedures to transfer personal data provided by the EU Data Protection Directive.

In addition, the EU Data Protection Regulation, intended to replace the EU Data Protection Directive entered into force on May 24, 2016 and applied from May 25, 2018. The EU Data Protection Regulation introduced new data protection requirements in the E.U. and substantial fines for breaches of the data protection rules. The EU Data Protection Regulation increased our responsibility and liability in relation to personal data that we process, and we may be required to put in place additional mechanisms to ensure compliance with those data protection rules.

Our failure to comply with these laws, or changes in the way in which these laws are implemented, could lead to government enforcement actions and significant penalties against us, and adversely impact our business.

We depend on our information technology and infrastructure so compromises could materially harm our ability to conduct business or delay our financial reporting.

We rely on the efficient and uninterrupted operation of information technology systems, including mobile technologies, to manage our operations, to process, transmit and store electronic and financial information, and to comply with regulatory, legal and tax requirements. We also depend on our information technology infrastructure for communications among our personnel, contractors, consultants, and vendors. System failures or outages could compromise our ability to perform these functions in a timely manner, which could harm our ability to conduct business or delay our financial reporting. Such failures could materially adversely affect our operating results and financial condition.

In addition, we depend on third parties to operate and support our information technology systems. These third parties vary from multi-disciplined to boutique providers, and they may or could have access to our computer networks, mobile networks, and our confidential information. Many of these third parties subcontract or outsource some of their responsibilities to other third parties. As a result, our information technology systems, including those functions that are performed by third parties who are involved with or have access to those systems, are very large and complex. Failure by any of these third-party providers to adequately deliver the contracted services, or maintain confidentiality, could have an adverse effect on our business, which in turn may materially adversely affect our operating results and financial condition. All information technology systems, despite implementation of security measures, may be vulnerable to disability, failures, or unauthorized access. If our information technology systems were to fail or be breached, such failure or breach could materially adversely affect our ability to perform critical business functions and sensitive and confidential data could be compromised.

Risks Relating to Our Common Stock

Our stock price has been and may continue to be volatile, which could result in substantial losses for investors.

Since our IPO in June 2016, our stock price has ranged from a high of $57.48 to a low of $1.23 (taking into account the one-for-six reverse stock split completed January 29, 2021), and the market price of our common stock is likely to continue to be highly volatile and could fluctuate widely in response to various factors, many of which are beyond our control. In addition, the securities markets have from time-to-time experienced significant price and volume fluctuations that are unrelated to the operating performance of particular companies. These market fluctuations may also significantly affect the market price of our common stock.

We are an early clinical stage biotechnology company and have incurred significant losses since our inception and we expect to incur losses for the foreseeable future. We have no products approved for commercial sale and may never achieve or maintain profitability, which could have an impact on finding additional financing.

Biotechnology product development is a highly speculative undertaking and involves a substantial degree of risk. We have incurred significant operating losses since inception. We expect to continue to incur significant operating losses for the foreseeable future. To become and remain profitable, we must succeed in developing and eventually commercializing products that generate significant revenue. We may never succeed in these activities and, even if we do, we may never generate revenue that is sufficient to achieve profitability. Our ability to continue our operations depends on our ability to complete equity or debt financings or generate profitable operations in the future and beyond the near term. Such financings may not be available or may not be available on reasonable terms. Our financial statements do not include any adjustments that could result from the outcome of this uncertainty. If we are unable to raise sufficient capital when needed, our business, financial condition and results of operations will be materially and adversely affected, and we will need to significantly modify our operational plans to continue as a going concern

Shares issuable upon the exercise of outstanding options or warrants may substantially increase the number of shares available for sale in the public market and depress the price of our common stock.

As of December 31, 2021, we had a material number of outstanding options and warrants to purchase shares of common stock. As of December 31, 2021, we had warrants and options outstanding to purchase an aggregate of 4,558,499 shares of common stock at an average exercise price of $8.49 per share (taking into account the reverse stock split completed January 29, 2021). To the extent any of these options or warrants are exercised and any additional options or warrants are granted and exercised, there will be further dilution to stockholders and investors. Until the options and warrants expire, these holders will have an opportunity to profit from any increase in the market price of our common stock without assuming the risks of ownership. Holders of options and warrants may convert or exercise these securities at a time when we could obtain additional capital on terms more favorable than those provided by the options or warrants. The exercise of the options and warrants will dilute the voting interest of the owners of presently outstanding shares by adding a substantial number of additional shares of our common stock.

As a biotechnology company, we are at increased risk of securities class action litigation.

Biotechnology companies have experienced greater than average stock price volatility in recent years, and our common stock price has been particularly volatile ranging from a high of $57.48 to a low of $1.23 (taking into account the one-for-six reverse stock split completed January 29, 2021). These broad market fluctuations may adversely affect the trading price or liquidity of our common stock. In the past, when the market price of a stock has been volatile, holders of that stock have sometimes instituted securities class action litigation against the issuer. If any of our stockholders were to bring such a lawsuit against us, we could incur substantial costs defending the lawsuit and the attention of management would be diverted from the operation of our business.

If we are unable to maintain compliance with the listing requirements of The Nasdaq Capital Market, our common stock may be delisted from The Nasdaq Capital Market which could have a material adverse effect on our financial condition and could make it more difficult for you to sell your shares.

Our common stock is listed on The Nasdaq Capital Market, and we are therefore subject to its continued listing requirements, including requirements with respect to the market value of publicly-held shares, market value of listed shares, minimum bid price per share, and minimum stockholder's equity, among others, and requirements relating to board and committee independence. If we fail to satisfy one or more of the requirements, we may be delisted from The Nasdaq Capital Market.

We have in the past, and we may again in the future, fail to comply with the continued listing requirements of the Nasdaq Capital Market, which would subject our common stock to being delisted. Delisting from The Nasdaq Capital Market would adversely affect our ability to raise additional financing through the public or private sale of equity securities, may significantly affect the ability of investors to trade our securities and may negatively affect the value and liquidity of our common stock. Delisting also could have other negative results, including the potential loss of employee confidence, the loss of institutional investors or interest in business development opportunities.

Failure to maintain our accounting systems and controls could impair our ability to comply with the financial reporting and internal controls requirements for publicly traded companies.

As a public company, we operate in an increasingly demanding regulatory environment, which requires us to comply with the Sarbanes-Oxley Act of 2002, and the related rules and regulations of the SEC. Company responsibilities required by the Sarbanes-Oxley Act include establishing corporate oversight and adequate internal control over financial reporting and disclosure controls and procedures. Effective internal controls are necessary for us to produce reliable financial reports and are important to help prevent financial fraud.

Because we are a smaller reporting company and a non-accelerated filer, we are not required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act. However, we must perform system and process evaluation and testing of our internal control over financial reporting to allow management to report on the effectiveness of our internal control over financial reporting in this report and future annual reports on Form 10-K, as required by Section 404 of the Sarbanes-Oxley Act. This requires that we incur substantial additional professional fees and internal costs to expand our accounting and finance functions and that we expend significant management efforts.

We have in the past, and may in the future, discover weaknesses in our system of internal financial and accounting controls and procedures that could result in a material misstatement of our financial statements. Our internal control over financial reporting will not prevent or detect all errors and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control system's objectives will be met. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud will be detected.

If we are not able to comply with the requirements of Section 404 of the Sarbanes-Oxley Act, or if we are unable to maintain proper and effective internal controls, we may not be able to produce timely and accurate financial statements. If we cannot provide reliable financial reports or prevent fraud, our business and results of operations could be harmed, and investors could lose confidence in our reported financial information.

Unstable market and economic conditions may have serious adverse consequences on our business, financial condition and stock price.

The global financial markets have recently experienced extreme volatility and disruptions, including severely diminished liquidity and credit availability, declines in consumer confidence, declines in economic growth, increases in unemployment rates and uncertainty about economic stability. The financial markets and the global economy may also be adversely affected by the current or anticipated impact of military conflict, including the conflict between Russia and Ukraine, terrorism or other geopolitical events. Sanctions imposed by the United States and other countries in response to such conflicts, including the one in Ukraine, may also adversely impact the financial markets and the global economy, and any economic countermeasures by affected countries and others could exacerbate market and economic instability. There can be no assurance that further deterioration in credit and financial markets and confidence in economic conditions will not occur. Our general business strategy may be adversely affected by any such economic downturn, volatile business environment or continued unpredictable and unstable market conditions. If the current equity and credit markets deteriorate, it may make any necessary debt or equity financing more difficult, more costly and more dilutive. Failure to secure any necessary financing in a timely manner and on favorable terms could have a material adverse effect on our growth strategy, financial performance and stock price and could require us to delay or abandon clinical development plans. In addition, there is a risk that one or more of our current service providers, manufacturers and other partners may not survive an economic downturn, which could directly affect our ability to operate.

General Risks

Your ownership may be diluted if additional capital stock is issued to raise capital, to finance acquisitions or in connection with strategic transactions.

We intend to seek to raise additional funds, finance acquisitions or develop strategic relationships by issuing equity or convertible debt securities, which would reduce the percentage ownership of our existing stockholders. Our board of directors has the authority, without action or vote of the stockholders, to issue all or any part of our authorized but unissued shares of common or preferred stock. Our certificate of incorporation authorizes us to issue up to 100,000,000 shares of common stock and 5,000,000 shares of preferred stock. Future issuances of common or preferred stock would reduce your influence over matters on which stockholders vote and would be dilutive to earnings per share. In addition, any newly issued preferred stock could have rights, preferences and privileges senior to those of the common stock. Those rights, preferences and privileges could include, among other things, the establishment of dividends that must be paid prior to declaring or paying dividends or other distributions to holders of our common stock or providing for preferential liquidation rights. These rights, preferences and privileges could negatively affect the rights of holders of our common stock, and the right to convert such preferred stock into shares of our common stock at a rate or price that would have a dilutive effect on the outstanding shares of our common stock.

Negative research about our business published by analysts or journalists could cause our stock price to decline. A lack of regularly published research about our business could cause trading volume or our stock price to decline.

The trading market for our common stock depends in part on the research and reports that analysts and journalists publish about us or our business. If analysts or journalists publish inaccurate or unfavorable research about our business, our stock price would likely decline. If we fail to meet the expectations of analysts for our operating results, or if the analysts who covers us downgrade our stock, our stock price would likely decline. If one or more of these analysts ceases coverage of us or fails to publish reports on us regularly, demand for our stock could decrease, which could cause our stock price and trading volume to decline.

Claims for indemnification by our directors and officers may reduce our available funds to satisfy successful third-party claims against us and may reduce the amount of money available to us.

Our certificate of incorporation and bylaws contain provisions that eliminate, to the maximum extent permitted by the General Corporation Law of the State of Delaware, or DGCL, the personal liability of our directors and executive officers for monetary damages for breach of their fiduciary duties as a director or officer. Our certificate of incorporation and bylaws also provide that we will indemnify our directors and executive officers and may indemnify our employees and other agents to the fullest extent permitted by the DGCL. Any claims for indemnification made by our directors or officers could impact our cash resources and our ability to fund the business.

We have no intention of declaring dividends in the foreseeable future.

The decision to pay cash dividends on our common stock rests with our board of directors and will depend on our earnings, unencumbered cash, capital requirements and financial condition. We do not anticipate declaring any dividends in the foreseeable future, as we intend to use any excess cash to fund our operations. Investors in our common stock should not expect to receive dividend income on their investment, and investors will be dependent on the appreciation of our common stock to earn a return on their investment.

Certain provisions in our organizational documents could enable our board of directors to prevent or delay a change of control.

Our organizational documents contain provisions that may have the effect of discouraging, delaying or preventing a change of control of, or unsolicited acquisition proposals, that a stockholder might consider favorable. These include provisions:

- prohibiting the stockholders from acting by written consent;
- requiring advance notice of director nominations and of business to be brought before a meeting of stockholders;
- requiring a majority vote of the outstanding shares of common stock to amend the bylaws; and
- limiting the persons who may call special stockholders' meetings.

Furthermore, our board of directors has the authority to issue shares of preferred stock in one or more series and to fix the rights and preferences of these shares without stockholder approval. Any series of preferred stock is likely to be senior to our common stock with respect to dividends, liquidation rights and, possibly, voting rights. The ability of our board of directors to issue preferred stock also could have the effect of discouraging unsolicited acquisition proposals, thus adversely affecting the market price of our common stock.

In addition, Delaware law makes it difficult for stockholders that recently have acquired a large interest in a corporation to cause the merger or acquisition of the corporation against the directors' wishes. Under Section 203 of the Delaware General Corporation Law, a Delaware corporation may not engage in any merger or other business combination with an interested stockholder for a period of three years following the date that the stockholder became an interested stockholder except in limited circumstances, including by approval of the corporation's board of directors.

Shareholder activism could cause material disruption to our business.

Publicly traded companies have increasingly become subject to campaigns by activist investors advocating corporate actions such as actions related to environment, social and governance (ESG) matters, among other issues. Responding to proxy contests and other actions by such activist investors or others in the future could be costly and time-consuming, disrupt our operations and divert the attention of our Board of Directors and senior management from the pursuit of our business strategies, which could adversely affect our results of operations and financial condition.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our corporate executive offices, laboratory and other spaces are in located in leased facilities in Houston, Texas. In March 2018, we entered into a Lease Agreement (the "Lease") which we use for corporate office space and headquarters. The term of the Lease began in August 2018 and will continue for an initial term of 66 months, which may be renewed for an additional 5 years. We are required to remit base monthly rent which will increase at an average approximate rate of 3% each year. We are also required to pay additional rent in the form of our pro-rata share of certain specified operating expenses of the landlord.

In August 2019, we entered into an Amended Lease Agreement (the "Lab Lease") for our lab space. The term of the Lab Lease began in September 2019 and will continue for an initial term of 35 months, with no further right or option to renew. We are required to remit base monthly rent which will increase at an average approximate rate of 3% each year. The Lab Lease is classified as an operating lease. In August 2019, we entered into a sublease with Houston Pharmaceuticals, Inc. (HPI), which is affiliated with Dr. Priebe. We granted HPI access to all of the Lab Lease space and HPI has agreed to pay us 50% of the rent payable under the Lab Lease less 50% of any benefits from any sublease or other lab service agreement we may receive from the Lab Lease. Although HPI has access to the space, it is the intent of the parties that they equally share the Lab Lease space for research purposes. We believe our facilities, as expanded, will be sufficient to meet our current needs and that suitable space will be available as and when needed. We do not own any real property.

ITEM 3. LEGAL PROCEEDINGS

From time to time in the ordinary course of our business, we may be involved in legal proceedings, the outcomes of which may not be determinable. The results of litigation are inherently unpredictable. Any claims against us, whether meritorious or not, could be time consuming, result in costly litigation, require significant amounts of management time and result in diversion of significant resources. We are not able to estimate an aggregate amount or range of reasonably possible losses for those legal matters for which losses are not probable and estimable, primarily for the following reasons: (i) many of the relevant legal proceedings are in preliminary stages, and until such proceedings develop further, there is often uncertainty regarding the relevant facts and circumstances at issue and potential liability; and (ii) many of these proceedings involve matters of which the outcomes are inherently difficult to predict. We have insurance policies covering potential losses where such coverage is cost effective.

We are not at this time involved in any legal proceedings that we believe could have a material effect on our business, financial condition, results of operations or cash flows.

ITEM 4. MINE SAFETY DISCLOSURE

Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market Information

Our common stock is listed on the NASDAQ Capital Market under the symbol "MBRX".

Holders

As of March 14, 2022, there were approximately 140 holders of record of our common stock. In addition, we believe that a significant number of beneficial owners of our common stock hold their shares in nominee or in "street name" accounts through brokers.

Dividends

We have never paid any dividends on our common stock. The payment of dividends in the future will be contingent upon our revenues and earnings, if any, capital requirements and general financial condition. It is the present intention of our Board of Directors to retain all earnings, if any, for use in our business operations and, accordingly, our Board of Directors does not anticipate declaring any dividends in the foreseeable future.

Recent Sales of Unregistered Securities

All information related to equity securities sold by us during the period covered by this report that were not registered under the Securities Act have been included in our Form 10-Q filings or in a Form 8-K filing. We did not issue any equity securities during the fourth quarter of 2021 that were not registered under the Securities Act.

Purchases of Equity Securities by the Issuer and Affiliated Purchasers

We did not repurchase any of our equity securities during the year ended December 31, 2021.

ITEM 6. [RESERVED]

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion should be read in conjunction with the Financial Statements and Notes thereto included in this Form 10-K. The forward-looking statements included in this discussion and elsewhere in this Form 10-K involve risks and uncertainties, including those set forth under "Cautionary Statement About Forward-Looking Statements." Actual results and experience could differ materially from the anticipated results and other expectations expressed in our forward-looking statements as a result of a number of factors, including but not limited to those discussed in this Item and in Item 1A - "Risk Factors."

Our Business

We are a clinical stage pharmaceutical company with a growing pipeline of clinical programs for the treatment of highly resistant cancers and viruses. We have three core technologies, based substantially on discoveries made at and licensed from MD Anderson Cancer Center (MD Anderson) in Houston, Texas. We have six drug candidates, three of which have now shown human activity in clinical trials.

Core Technologies

Our core technologies consist of the following: a) Annamycin, a "next generation" anthracycline designed to be different than currently approved anthracyclines by eliminating cardiotoxicity and avoiding the multidrug resistance mechanisms that can limit the efficacy of the approved products. (Annamycin has shown no cardiotoxicity in subjects treated to date in Moleculin's clinical trials); b) our WP1066 Portfolio, which includes WP1066 and WP1220, two of several Immune/Transcription Modulators in the portfolio designed to inhibit p-STAT3 (phosphorylated signal transducer and activator of transcription) among other transcription factors associated with tumor activity, while also stimulating a natural immune response to tumors by inhibiting the errant activity of Regulatory T-Cells (TRegs); and c) our WP1122 Portfolio, which contains compounds (including WP1122, WP1096, WP1097) designed to exploit the potential uses of inhibitors of glycolysis such as 2-deoxy-D-glucose (2-DG), which we believe may provide an opportunity to cut off the fuel supply of tumors by taking advantage of their high level of dependence on glucose in comparison to healthy cells.

Clinical Trials

In the US and Europe, we have completed or are currently conducting clinical trials for three of our drug candidates – Annamycin, WP1066, and WP1220. All trials are or were in the Phase 1 portion, except the WP1220 trial, which was a proof-of-concept clinical trial. During 2021, we had four active clinical trials evaluating either Annamycin or WP1066 in the US and Europe. In 2021 and early 2022, there were also three "right-to-try" (or their foreign equivalent) uses of Annamycin and WP1066. Of the four clinical trials active in 2021, two of those are internally funded trials (the difference between "internally" and "externally" funded trials is discussed in Item 1. Business above) of Annamycin. One is studying relapsed and refractory acute myeloid leukemia (AML) in Europe, and one is investigating soft tissue sarcoma metastasized to the lungs (STS lung metastases) in the US. The other two trials are externally funded studies of WP1066 in brain tumors, both in the US, one of which was terminated during the year because the Principal Investigator in that trial moved to a new institution. We successfully concluded an internally funded Phase 1 AML clinical trial in Europe in early 2022, establishing a Recommended Phase 2 Dose (RP2D) for Annamycin as a single agent. We are in the process of locking the database and beginning the completion of the Clinical Study Report (CSR) for that study.

During 2021, we filed applications or began recruiting for four clinical trials in the US and Europe. The investigational new drug (IND) application in the US for a Phase 1b/2 trial of Annamycin for the treatment of STS lung metastases was filed in late 2020 with the US Food and Drug Administration (FDA). The IND went into effect in early 2021 and this trial began recruiting subjects shortly thereafter. In 2021, we also filed and received clearance for an IND for a Phase 1 trial for WP1122 treating glioblastoma multiforme (GBM) in adults, and consistent with our strategy of leveraging external funding for many of our clinical trials, we intend to seek opportunities for an investigator-initiated clinical trial in cancer patients in 2022. We also filed in October 2021 a clinical trial application (CTA) to commence a Phase 1a clinical trial of WP1122 in the United Kingdom for the treatment of COVID-19 for which we later received the appropriate authorization to proceed. In early March 2022, we filed an amended protocol with both the Riverside Ethics Committee and Medicines and Healthcare Products Regulatory Agency (MHRA). The amendment updated the level of dilution of the oral solution to ensure that WP1122 is fully dissolved in a wider range of pharmacy environments. We believe that the risk/benefit aspect of the study was not affected by this change. Once this amendment is approved, we expect this internally funded trial to begin in the first half of 2022.

We also filed a CTA in Poland in November 2021 for a Phase 1/2 trial for the treatment of relapsed and refractory AML with a combination of Annamycin and Cytarabine (AnnAraC) for which we received Central Ethics approval in December 2021. Upon receipt of approval from the Office for Registration of Medicinal Products, Medical Devices and Biocidal Products (URPL), we plan to proceed with this trial. This trial builds on the safety and dosage data from the two successfully concluded single agent Annamycin AML Phase 1 trials in the US and Europe and is supported by preclinical animal data from our ongoing sponsored research at MD Anderson. The AnnAraC trial is expected to begin during the first half of 2022.

In addition to the trials described above, we expect that an investigator sponsored trial will be initiated in Europe in 2022 to study an alternative dosing regimen for Annamycin in the treatment of STS lung metastases. During 2022, we may also have another investigator led trial outside of the US (partially internally funded) focused on the use of WP1122 for the treatment of subjects with COVID-19. The volatility and unpredictability of COVID-19 incidence in various countries may limit our ability to recruit certain subjects and could make it infeasible for us to conduct a Phase 2 clinical trial on a timely basis, or at all. As mentioned earlier, the WP1066 brain tumor trial at MD Anderson was terminated in 2021, as the original lead physician investigator moved to another institution. We expect another externally funded Phase 1/2 investigator led trial to replace the MD Anderson trial in 2022. That trial's IND will likely reference our WP1066 GBM IND filed in early 2022, once cleared by the FDA. We expect this new trial to investigate WP1066 in combination with radiation for the treatment of adult brain tumors.

Moleculin Biotech, Inc.
Results of Operations for the Year Ended December 31, 2021 as Compared to the Year Ended December 31, 2020

The following table is data derived from the Consolidated Statement of Operations (in thousands) and the discussions that follow are in approximate amounts:

	Year ended December 31,	
	2021	2020
Revenue	$ —	$ —
Operating expenses:		
Research and development	14,418	12,757
General and administrative	8,386	6,785
Depreciation and amortization	164	200
Total operating expense	22,968	19,742
Loss from operations	(22,968)	(19,742)
Other income:		
Gain from change in fair value of warrant liability	6,728	2,346
Other income, net	40	28
Interest income, net	306	13
Net loss	$ (15,894)	$ (17,355)

Research and Development Expense

Research and development (R&D) expense was $14.4 million and $12.8 million for the years ended December 31, 2021 and 2020, respectively. The increase in R&D of $1.6 million is mainly related to an increase in the number of internally funded clinical trials and overall clinical trial activity, and costs related to manufacturing of additional drug product.

General and Administrative Expense

General and administrative (G&A) expense was $8.4 million and $6.8 million for the years ended December 31, 2021 and 2020, respectively. The increase in G&A of $1.6 million was mainly attributable to an increase in headcount, consulting & advisory fees, and an increase in our corporate insurance.

Gain from Change in Fair Value of Warrant Liability

We recorded a gain of $6.7 million during the year ended December 31, 2021 as compared to a gain of $2.3 million, during the year ended December 31, 2020, for the change in fair value on revaluation of our warrant liability associated with our warrants issued in conjunction with our stock offerings. We are required to revalue certain of the warrants at the time of each warrant exercise and at the end of each reporting period and reflect in the statement of operations a gain or loss from the change in fair value of the warrant in the period in which the change occurred. We calculated the fair value of the warrants outstanding using the Black-Scholes model. Generally, a gain results principally from a decline in our share price during the period and a loss results principally from an increase in our share price.

Net Loss

The net loss for the year ended December 31, 2021 was $15.9 million, which included non-cash gains of $6.7 million on warrants in 2021 as compared to $2.3 million in the prior year and approximately $2.4 million of stock-based compensation expense in 2021 as compared to $1.7 million in 2020.

Liquidity and Capital Resources

As of December 31, 2021, we had cash and cash equivalents of $70.9 million and prepaid expenses and other current assets of $1.6 million. We also had $1.4 million of accounts payable and $2.3 million of accrued expenses and other current liabilities. A significant portion of the accounts payable and accrued expenses are due to work performed in relation to our preclinical activities and our clinical trials. For the years ended December 31, 2021 and 2020, we used approximately $19.0 million and $17.8 million of cash in operating activities, respectively, which represents cash outlays for research and development and general and administrative expenses in such periods. The increased cash outflows in 2021 reflect the increase in preclinical and clinical activity over 2020. For the year ended December 31, 2021, net proceeds from financing activities were $74.7 million, predominately from the sale of our common stock and warrants. In 2020, approximately $22.5 million was raised predominately through the sale of shares of common stock and the exercise of warrants. Cash used in investing activities for the year ended December 31, 2021 was approximately $0.02 million.

We believe that our cash resources as of December 31, 2021, along with the additional funding received subsequent to year-end, will be sufficient to meet our projected operating requirements, which include a potential increase over our current R&D rate of expenditures, into the year 2024. Such projections are subject to changes in our internally funded preclinical and clinical activities, including unplanned preclinical and clinical activity. We anticipate incurring operating losses for the next several years as we support the preclinical and clinical activities necessary to prepare our drug candidates for successful out licensing, including our efforts to expand our technologies. These factors raise uncertainties about our ability to fund operations in future years. If we need to raise additional capital in order to continue to execute our business plan, there is no assurance that additional financing will be available when needed or that we will be able to obtain financing on terms acceptable to us. A failure to raise sufficient capital could adversely impact our ability to achieve our intended business objectives and meet our financial obligations as they become due and payable.

Stock Offerings

In February 2021, we completed an underwritten public offering of an aggregate of 14,273,684 shares of common stock at a public offering price of $4.75 per share. We granted the underwriters a 30-day option to purchase up to an additional 2,141,052 shares of common stock offered in the public offering. The offering closed on February 5, 2021 and gross proceeds of the offering were approximately $67.8 million, prior to deducting the underwriting discount and other offering expenses. On February 10, 2021, the underwriters of the public offering exercised in full their option to purchase an additional 2,141,052 shares of common stock at the public offering price of $4.75 per share, bringing total gross proceeds to approximately $78.0 million before underwriting discount.

In February 2020 we entered into subscription agreements with certain institutional investors for the sale of up to 1,250,000 shares of our common stock (taking into account the one-for-six reverse stock split completed January 29, 2021) and warrants to purchase 937,501 shares of common stock (taking into account the one-for-six reverse stock split completed January 29, 2021) at a combined public offering price of $4.80 per share and related warrant. The warrants were exercisable commencing six months from the date of issuance at a price of $6.30 per share and will expire five years from the date they are first exercisable. The offering closed on February 10, 2020 and gross proceeds of the offering were approximately $6.0 million, prior to deducting the placement agent fees and other estimated offering expenses.

Lincoln Park Equity Lines

In June 2021, we entered into a Purchase Agreement with Lincoln Park Capital Fund (Lincoln Park Agreement). Pursuant to the terms of the Purchase Agreement, Lincoln Park agreed to purchase from us up to $20.0 million of common stock (subject to certain limitations) from time to time during the term of the Purchase Agreement. Pursuant to the terms of the Purchase Agreement, at the time we signed the Purchase Agreement, we issued 107,788 shares of common stock to Lincoln Park as an initial fee for its commitment to purchase shares of our common stock under the Purchase Agreement, and have agreed to issue Lincoln Park up to an additional 53,893 shares of common stock as commitment shares pro-rata when and if Lincoln Park purchases (at our discretion) the $20.0 million aggregate commitment. As of the date of this report, there have been no issuances under the Lincoln Park Agreement.

In November 2020, we entered into a purchase agreement (the 2020 Purchase Agreement) with Lincoln Park Capital Fund, LLC (Lincoln Park). Pursuant to the terms of the 2020 Purchase Agreement, Lincoln Park agreed to purchase from us up to $22.0 million of our common stock (subject to certain limitations) from time to time during the term of the 2020 Purchase Agreement. Pursuant to the terms of the 2020 Purchase Agreement, at the time we signed the 2020 Purchase Agreement, we issued 126,699 shares of common stock to Lincoln Park as consideration for its commitment to purchase shares of our common stock under the 2020 Purchase Agreement. During the year ended December 31, 2020, pursuant to the 2020 Purchase Agreement, we sold Lincoln Park 638,203 shares of common stock, and issued a total of 133,017 commitment shares, at an average price of $4.30 per share, resulting in gross proceeds of $2.7 million. We terminated the 2020 Purchase Agreement on February 2, 2021.

ATM Agreements

In June 2021, we entered into an At Market Issuance Sales Agreement (2021 ATM Agreement) with Oppenheimer & Co. Inc. Pursuant to the terms of the 2021 ATM Agreement, we may offer and sell, from time to time through Oppenheimer shares of our common stock with an aggregate sales price of up to $50.0 million. As of the date of this report, there have been no issuances under the 2021 ATM Agreement.

In January 2021, we issued 468,684 shares for gross proceeds of $2.9 million using our 2020 ATM Agreement with Oppenheimer & Co., Inc.

In July 2020, we entered into a new At Market Issuance Sales Agreement with Oppenheimer & Co. Inc. (the 2020 ATM Agreement). Pursuant to the terms of the 2020 ATM Agreement, we were able to sell from time to time through Oppenheimer shares of our common stock with an aggregate sales price of up to $15.0 million. During the year ended December 31, 2020, pursuant to the 2020 ATM Agreement, we issued 471,405 shares of common stock at an average price of $6.11 per share, resulting in net proceeds of $2.8 million.

In addition, at December 31, 2020, we had 26,966 shares of our common stock subscribed in ATM transactions under the 2020 ATM Agreement for net proceeds, after deducting commissions and other transaction costs, of approximately $0.1 million at an average selling price of $4.96 per share. Accordingly, we have recorded a subscription receivable of $0.1 million as a reduction of stockholders' equity in our consolidated balance sheet as of December 31, 2020. We terminated the 2020 ATM Agreement on February 2, 2021.

In July 2019, we entered into an at-the-market equity agreement (the 2019 ATM Agreement) with Oppenheimer & Co. Inc. During the year ended December 31, 2021, pursuant to the 2019 ATM Agreement, we issued 1,412,017 shares of common stock at an average price of $8.68 per share, resulting in net proceeds of $11.9 million. We paid a commission to Oppenheimer equal to 3.0% of the gross proceeds from the sale of our common stock under the 2019 ATM Agreement. In the third quarter of 2020, the 2019 ATM Agreement expired and was terminated.

The following table sets forth the primary sources and uses of cash for the years indicated (in thousands):

	For the Year Ended December 31,	
	2021	2020
Net cash used in operating activities	$ (18,951)	$ (17,771)
Net cash used in investing activities	(19)	(374)
Net cash provided by financing activities	74,724	22,549
Effect of exchange rate changes on cash and cash equivalents	(24)	34
Net change in cash and cash equivalents	$ 55,730	$ 4,438

As of December 31, 2021, there was $0.3 million of cash on hand in a bank account in Australia and we know of no related limitations impacting our liquidity in Australia.

Cash used in operating activities

Net cash used in operating activities was $19.0 million for the year ended December 31, 2021 compared to $17.8 million for the year ended December 31, 2020. This increase in use of cash for operations was mainly due to payments for increased clinical trial activity, costs related to manufacturing of additional drug product, and increased consulting and advisory fees as well as an increase in our corporate insurance. These are all a reflection of the ongoing clinical and pre-clinical activity and the associated increase in G&A support for our three core drug technologies.

Cash used in investing activities

Net cash used in investing activities was $0.02 million for the year ended December 31, 2021 compared to $0.4 million for the year ended December 31, 2020. The decrease relates to mass spectrometer equipment purchased for the lab in 2020. The equipment is being used to analyze uptake, metabolism, and tissue organ distribution of anti-cancer and anti-viral agents, which is critical for determination of pharmacokinetic and pharmacodynamic parameters of the drug.

Cash provided by financing activities

Net cash provided by financing activities was $74.7 million for the year ended December 31, 2021 compared to the prior period of $22.5 million. Net cash provided by financing in 2021 consisted primarily of $74.6 million net proceeds from the issuance of common stock, and $0.1 million net proceeds from the exercise of warrants. The prior period financing activities consisted primarily of net proceeds from the issuance of common stock.

Off-Balance Sheet Transactions

We do not engage in off-balance sheet transactions.

Recent Accounting Pronouncements

We have implemented all new accounting pronouncements that are in effect and may impact our financial statements and we do not believe that there are any other new accounting pronouncements that have been issued that might have a material impact on our financial position or results of operations.

Critical Accounting Policies and Significant Judgments and Estimates

Basis of Presentation

The accompanying consolidated financial statements and related notes have been prepared in accordance with accounting principles generally accepted in the United States of America (US GAAP) for financial information, and in accordance with the rules and regulations of the United States Securities and Exchange Commission (SEC).

We believe that the following accounting policies are the most critical to aid in fully understanding and evaluating our reported financial results, and they require our most difficult, subjective or complex judgments, resulting from the need to make estimates about the effect of matters that are inherently uncertain**.**

Research and Development Costs

We record accrued expenses for estimated costs of our research and development activities conducted by third-party service providers, which include the conduct of pre-clinical and clinical trials and preparation for clinical trials and contract manufacturing activities. We record the estimated costs of research and development activities based upon the estimated amount of services provided but not yet invoiced, and we include these costs in accrued liabilities in the balance sheets and within research and development expense in the statement of operations. These costs are a significant component of our research and development expenses. We record accrued expenses for these costs based on the estimated amount of work completed and in accordance with agreements established with these third parties.

We estimate the amount of work completed through discussions with internal personnel and external service providers as to the progress or stage of completion of the services and the agreed-upon fee to be paid for such services. We make significant judgments and estimates in determining the accrued balance in each reporting period. As actual costs become known, we adjust our accrued estimates. Although we do not expect our estimates to be materially different from amounts actually incurred, our understanding of the status and timing of services performed may vary from our estimates and could result in us reporting amounts that are too high or too low in any particular period. Our accrued expenses are dependent, in part, upon the receipt of timely and accurate reporting from clinical research organizations and other third-party service providers. To date, there have been no material differences from our accrued expenses to actual expenses.

Impairment of Long-Lived Assets

We evaluate the recoverability of our property and equipment and amortizable intangible assets for possible impairment whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable or at a minimum annually during the fourth quarter of the year. Recoverability of these assets is measured by a comparison of the carrying amounts to the future undiscounted cash flows the assets are expected to generate. If such review indicates that the carrying amount of property and equipment and amortizable intangible assets is not recoverable, the carrying amount of such asset is reduced to fair value.

Acquired in-process research and development (IPR&D) assets are considered indefinite lived until the completion or abandonment of the associated research and development efforts. We evaluate the recoverability of our IPR&D assets for possible impairment annually during the fourth quarter or whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. Recoverability of IPR&D assets is measured by a comparison of the carrying amounts its fair value. If such review indicates that the carrying amount of IPR&D assets is not recoverable, the carrying amount of such asset is reduced to fair value.

Components of our Results of Operations and Financial Condition

Operating expenses

We classify our operating expenses into three categories: research and development, general and administrative and depreciation.

Research and development. Research and development expenses consist primarily of:

- costs incurred to conduct research, such as the discovery and development of our product candidates;
- costs related to production of clinical supplies, including fees paid to contract manufacturers and drug manufacturing costs;
- fees paid to clinical consultants, clinical trial sites and vendors, including clinical research organizations, in preparation for clinical trials and our IND and Orphan Drug applications with the FDA; and
- costs related to compliance with drug development regulatory requirements.

We recognize all research and development costs as they are incurred. Pre-clinical costs, contract manufacturing and other development costs incurred by third parties are expensed as the contracted work is performed.

We expect our research and development expenses to increase in the future as we advance our product candidates into and through clinical trials and pursue regulatory approval of our product candidates in the United States and Europe. The process of conducting the necessary clinical research to obtain regulatory approval is costly and time-consuming. The actual probability of success for our product candidates may be affected by a variety of factors including: the quality of our product candidates, early clinical data, investment in our clinical program, competition, manufacturing capability and commercial viability. We may never succeed in achieving regulatory approval for any of our product candidates. As a result of the uncertainties discussed above, we are unable to determine the duration and completion costs of our research and development projects or when and to what extent, if any, we will generate revenue from the commercialization and sale of our product candidates.

General and administrative

General and administrative expense consists of personnel related costs, which include salaries, as well as the costs of professional services, such as accounting and legal, facilities, information technology and other administrative expenses. We expect our general and administrative expense to increase due to the anticipated growth of our business and related infrastructure as well as accounting, insurance, investor relations and other costs associated with becoming a public company.

Depreciation. Depreciation expense consists of depreciation on our property and equipment. We depreciate our assets over their estimated useful life. We estimate leasehold improvements to have a estimated useful life over the term of the lease or the estimated useful life, whichever is shorter; computer equipment to have a 2-year life; software to have a 3-year life, machinery and equipment to have a 2 to 5 year life and furniture and office equipment to have a 2 to 7 year life.

Accounting for warrants

We issued warrants to purchase shares of common stock related to equity transactions in 2017, 2018, 2019, 2020, and 2021. We account for our warrants issued in accordance with Accounting Standards Codification (ASC) Topic 815, Derivatives and Hedging, guidance applicable to derivative instruments, which requires every derivative instrument within its scope to be recorded on the balance sheet as either an asset or liability measured at its fair value, with changes in fair value recognized in earnings for liability classified warrants. Based on this guidance, we determined that certain of our warrants to purchase shares of common stock related to equity transactions in 2017, 2018, 2019, and 2020 meet the criteria for classification as a liability. Accordingly, the warrants were classified as a warrant liability and are subject to fair value remeasurement at each transaction and balance sheet date. The fair value was estimated using the Black-Scholes option pricing model, based on the market value of the underlying common stock at the measurement date, the contractual term of the warrant, risk-free interest rates, expected dividends and expected volatility of the price of the underlying common stock.

Our financial instruments consist primarily of non-trade receivables, account payables, accrued expenses, and a warrant liability. The carrying amount of non-trade receivables, accounts payables, and accrued expenses approximates their fair value because of the short-term maturity of such.

We have categorized our assets and liabilities that are valued at fair value on a recurring basis into three-level fair value hierarchy in accordance with GAAP. Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. The fair value hierarchy gives the highest priority to quoted prices in active markets for identical assets and liabilities (Level 1) and lowest priority to unobservable inputs (Level 3).

Assets and liabilities recorded in the balance sheets at fair value are categorized based on a hierarchy of inputs as follows:

Level 1 - Unadjusted quoted prices in active markets of identical assets or liabilities.
Level 2 - Quoted prices for similar assets or liabilities in active markets or inputs that are observable for the asset or liability, either directly or indirectly through market corroboration, for substantially the full term of the financial instrument.
Level 3 - Unobservable inputs for the asset or liability.

Our financial assets and liabilities recorded at fair value on a recurring basis include the fair value of our warrant liability discussed below. The fair value of this warrant liability associated with the February 2017, February 2018, June 2018, March 2019, April 2019, and February 2020 Offerings (Offerings) are included in long-term liabilities on the accompanying financial statements as of December 31, 2021 and 2020 respectively.

We estimated the fair value of the warrant liability issued in our Offerings under ASC 820 as of their issuance date for financial reporting purposes. We used the Black-Scholes option pricing model (BSM) to determine the fair value of the warrants. The BSM model is acceptable in accordance with GAAP. The BSM requires the use of a number of assumptions including volatility of the stock price, the weighted average risk-free interest rate, and the weighted average term of the warrant.

The risk-free interest rate assumption is based upon observed interest rates on zero coupon US Treasury bonds whose maturity period is appropriate for the term of the warrants and is calculated by using the average daily historical stock prices through the day preceding the grant date.

Estimated volatility is a measure of the amount by which our stock price is expected to fluctuate each year during the expected life of the warrants. Beginning in 2020, only the volatility of our stock was used in the BSM as we now have sufficient historic data in our stock price.

Changes in the fair value during the accounting period are shown as other income or expense.

Stock-based compensation

Stock based compensation transactions are recognized as compensation expense in the statement of operations based on their fair values on the date of the grant, with the compensation expense recognized over the period in which a grantee is required to provide service in exchange for the award. We estimate the fair value of options granted using the Black-Scholes option valuation model, and the fair value of restricted stock units using the closing price of our common stock as reported on the date of grant. The Black-Scholes estimate uses assumptions regarding a number of inputs that require us to make significant estimates and judgments. Beginning in 2020, only the volatility of our stock was used in the BSM as we now have sufficient historic data in our stock price.

Income taxes

We account for income taxes using ASC 740 Income Taxes. ASC 740 Income Taxes is an asset and liability approach that requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been recognized in our financial statements or tax returns. In estimating future tax consequences, ASC 740 generally considers all expected future events other than enactments of and changes in the tax law or rates. The measurement of deferred tax assets is reduced, if necessary, by the amount of any tax benefits that, based on available evidence, are not expected to be realized. Valuation allowances are provided if, considering available evidence, it is more likely than not that the deferred tax assets will not be realized. ASC 740 clarifies the criteria that must be met prior to recognition of the financial statement benefit of a position taken in a tax return. ASC 740 provides a benefit recognition model with a two-step approach consisting of "more-likely-than-not" recognition criteria, and a measurement attribute that measures a given tax position as the largest amount of tax benefit that is greater than 50% likely of being realized upon ultimate settlement. ASC 740 also requires the recognition of liabilities created by differences between tax positions taken in a tax return and amounts recognized in the financial statements.

Recent accounting pronouncements

See Note 2 to the Notes to Consolidated Financial Statements in "Item 8 - Financial Statements and Supplementary Data" in this Annual Report for discussion regarding recent accounting pronouncements.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISKS

We are a smaller reporting company as defined by Rule 12b-2 of the Exchange Act and are not required to provide information required under this item.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The financial statements required by this item are set forth beginning in Item 15 of this report and are incorporated herein by reference.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

There have been no disagreements with our independent registered public accountants on accounting or financial disclosure matters during our two most recent fiscal years.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management has evaluated the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act), as of the end of the period covered by this Form 10-K. The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, refers to controls and procedures that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Securities and Exchange Commission's rules and forms and that such information is accumulated and communicated to our management, including our principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding disclosure.

Management concluded that our disclosure controls and procedures were effective as of December 31, 2021.

Attestation Report of the Registered Public Accounting Firm

Our independent registered public accounting firm will not be required to formally attest to the effectiveness of our internal controls over financial reporting for as long as we are a "non-accelerated filer."

Management's Report on Internal Control Over Financial Reporting

Our principal executive officer and our principal accounting and financial officer, are responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rule 13a-15(f). Management conducted an assessment of the effectiveness of our internal control over financial reporting as of December 31, 2021. In making this assessment, management used the criteria described in Internal Control-Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Our management concluded that our internal controls over financial reporting were effective as of December 31, 2021.

Changes in Internal Control Over Financial Reporting

There was no change in the Company's internal control over financial reporting identified in connection with the evaluation required by Rules 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the year ended December 31, 2021, that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting.

ITEM 9B. OTHER INFORMATION.

Our certificate of incorporation provides that the Court of Chancery of the State of Delaware shall be the sole and exclusive forum for (i) any derivative action or proceeding brought our behalf, (ii) any action asserting a claim of breach of a fiduciary duty owed by any of our directors or officers to us or our stockholders, (iii) any action asserting a claim against us arising pursuant to any provision of the Delaware General Corporation Law, or our certificate of incorporation or the bylaws, and (iv) any action asserting a claim against us governed by the internal affairs doctrine. This provision would not apply to suits brought to enforce a duty or liability created by the Exchange Act or Securities Act.

This choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and employees. Alternatively, a court could find these provisions of our certificate of incorporation to be inapplicable or unenforceable in respect of one or more of the specified types of actions or proceedings, which may require us to incur additional costs associated with resolving such matters in other jurisdictions, which could adversely affect our business and financial.

ITEM 9C. DISCLOSURE REGARDING FOREIGN JURISDICTIONS THAT PREVENT INSPECTIONS.

Not applicable.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item is incorporated by reference to our proxy statement for the 2022 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission within 120 days of the fiscal year ended December 31, 2021 and is incorporated into this Annual Report on Form 10-K by reference.

Our Board of Directors has adopted a written Code of Business Conduct and Ethics applicable to all officers, directors and employees, which is available on our website (www.moleculin.com) under "Governance Documents" within the "Corporate Governance" section. We intend to satisfy the disclosure requirement under Item 5.05 of Form 8-K regarding amendment to, or waiver from, a provision of this Code and by posting such information on the website address and location specified above.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item is incorporated by reference to our proxy statement for the 2022 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission within 120 days of the fiscal year ended December 31, 2021 and is incorporated into this Annual Report on Form 10-K by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this item is incorporated by reference to our proxy statement for the 2022 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission within 120 days of the fiscal year ended December 31, 2021 and is incorporated into this Annual Report on Form 10-K by reference.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item is incorporated by reference to our proxy statement for the 2022 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission within 120 days of the fiscal year ended December 31, 2021 and is incorporated into this Annual Report on Form 10-K by reference.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by this item is incorporated by reference to our proxy statement for the 2022 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission within 120 days of the fiscal year ended December 31, 2021 and is incorporated into this Annual Report on Form 10-K by reference.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENTS

a. Documents filed as part of this Report

1. Financial Statements

The financial statements and notes thereto which are attached hereto have been included by reference into Item 8 of this part of the annual report on Form 10-K. See the Index to Financial Statements on page below.

2. Financial Statement Schedules

All schedules are omitted because they are inapplicable or not required or the required information is shown in the financial statements or notes thereto.

3. Exhibits

EXHIBIT INDEX

Exhibit Number	Description
3.1	Amended and Restated Certificate of Incorporation of Moleculin Biotech, Inc. (incorporated by reference to exhibit 3.1 of the Form S-1/A filed March 21, 2016)
3.2	Certificate of Amendment of the Amended and Restated Certificate of Incorporation of Moleculin Biotech, Inc. (incorporated by reference to Exhibit 3.1 of the Form 8-K filed May 24, 2019)
3.3	Certificate of Amendment of the Amended and Restated Certificate of Incorporation of Moleculin Biotech, Inc. (incorporated by reference to Exhibit 3.1 of the Form 8-K filed January 29, 2021)
3.4	Amended and Restated Bylaws of Moleculin Biotech., Inc. (incorporated by reference to exhibit 3.1 of the Form 8-K filed December 17, 2021)
4.1	Form of Series A/B/C Warrant Agreement issued in February 2017 offering (incorporated by reference to Exhibit 4.1 of the Form 8-K filed February 9, 2017)
4.2	Form of Warrant Agreement issued in February 2018 offering (incorporated by reference to Exhibit 4.1 of the Form 8-K filed February 16, 2018)
4.3	Form of Warrant Agreement issued in June 2018 offering (incorporated by reference to Exhibit 4.1 of the Form 8-K filed June 21, 2018)
4.4	Form of Warrant Agreement issued in March 2019 offering (incorporated by reference to Exhibit 4.1 of the Form 8-K filed March 28, 2019)
4.5	Form of Underwriter Warrant Agreement issued in March 2019 offering (incorporated by reference to Exhibit 4.2 of the Form 8-K filed March 28, 2019)
4.6	Form of Warrant Agreement issued in April 2019 offering (incorporated by reference to Exhibit 4.1 of the Form 8-K filed April 24, 2019)
4.7	Form of Placement Agent Warrant Agreement issued in April 2019 offering (incorporated by reference to Exhibit 4.2 of the Form 8-K filed April 24, 2019)
4.8	Form of Warrant Agreement issued in February 2020 offering (incorporated by reference to Exhibit 4.1 of the Form 8-K filed February 6, 2020)
4.9	Form of Placement Agent Warrant Agreement issued in February 2020 offering (incorporated by reference to Exhibit 4.2 of the Form 8-K filed February 6, 2020)
4.10*	Description of Registrant's Securities
10.1 **	Moleculin Biotech, Inc. Amended and Restated 2015 Stock Plan (incorporated by reference to Exhibit 10.1 of the Form 8-K filed June 21, 2021)
10.2	Rights Transfer Agreement between Moleculin Biotech, Inc. and AnnaMed, Inc. (incorporated by reference to exhibit 10.2 of the Form S-1/A filed March 21, 2016)
10.3	Patent and Technology License Agreement dated June 21, 2010 by and between The Board of Regents of the University of Texas System and Moleculin, LLC (incorporated by reference to exhibit 10.3 of the Form S-1/A filed March 21, 2016)
10.4	Amendment No. 1 to the Patent and Technology License Agreement dated June 21, 2010 by and between The Board of Regents of the University of Texas System and Moleculin, LLC (incorporated by reference to exhibit 10.4 of the Form S-1/A filed March 21, 2016)
10.5	Patent and Technology License Agreement dated April 2, 2012 by and between The Board of Regents of the University of Texas System and IntertechBio Corporation (incorporated by reference to exhibit 10.5 of the Form S-1/A filed March 21, 2016)
10.6	Amendment No. 1 to the Patent and Technology License Agreement dated April 2, 2012 by and between The Board of Regents of the University of Texas System and IntertechBio Corporation (incorporated by reference to exhibit 10.6 of the Form S-1/A filed March 21, 2016)
10.7	Patent and Technology Development and License Agreement June 28, 2012 by and between Annamed, Inc. and Dermin Sp. z.o.o (incorporated by reference to exhibit 10.7 of the Form S-1/A filed April 15, 2016)
10.8	Patent and Technology Development and License Agreement dated April 15, 2011 by and between IntertechBio Corporation and Dermin Sp. z.o.o (incorporated by reference to exhibit 10.8 of the Form S-1/A filed March 21, 2016)

10.9	Patent and Technology Development and License Agreement dated October 27, 2010 by and between Moleculin, LLC and Dermin Sp. z.o.o (incorporated by reference to exhibit 10.9 of the Form S-1/A filed March 21, 2016)
10.10	Rights Transfer Agreement dated between Moleculin Biotech, Inc. and IntertechBio Corporation dated August 11, 2015 (incorporated by reference to exhibit 10.10 of the Form S-1/A filed March 21, 2016)
10.11	Agreement and Plan of Merger between Moleculin Biotech, Inc. and Moleculin, LLC (incorporated by reference to exhibit 10.11 of the Form S-1/A filed March 21, 2016)
10.12	Technology Rights and Development License Agreement to be entered into by Moleculin Biotech, Inc. and Houston Pharmaceuticals, Inc. (incorporated by reference to exhibit 10.13 of the Form S-1/A filed April 15, 2016)
10.13 **	Employment Agreement between Moleculin Biotech, Inc. and Jonathan P. Foster dated August 19, 2016 (incorporated by reference to Exhibit 10.1 of the Form 8-K filed August 25, 2016)
10.14 **	Executive Employment Agreement between Moleculin Biotech, Inc. and Walter Klemp dated October 13, 2016 (incorporated by reference to Exhibit 10.1 of the Form 8-K filed October 13, 2016)
10.15	Development Collaboration Agreement between Moleculin Biotech, Inc. and Dermin Sp. Z o. o. dated September 30, 2016 (incorporated by reference to Exhibit 10.4 of the Form 10-Q filed November 21, 2016)
10.16	Lease Agreement for 5300 Memorial (incorporated by reference to Exhibit 10.1 of the Form 10-Q filed May 14, 2018)
10.17 †	Patent And Technology License Agreement dated February 12, 2018 by and between The Board of Regents of The University Of Texas System on behalf of The University Of Texas M. D. Anderson Cancer Center and Moleculin Biotech, Inc. (incorporated by reference to Exhibit 10.2 of the Form 10-Q filed May 14, 2018)
10.18	Sublicense Agreement dated as of February 19, 2019 entered into between the Company and WPD Pharmaceuticals. (incorporated by reference to Exhibit 10.21 of the Form 10-K filed February 21, 2019)
10.19	Sublicense Agreement dated as of February 19, 2019 entered into between the Company and Animal Life Sciences, LLC (incorporated by reference to Exhibit 10.22 of the Form 10-K filed February 21, 2019)
10.20	Consulting Agreement, dated March 16, 2020, entered into between the Company and Houston Pharmaceuticals, Inc. (HPI) (incorporated by reference to Exhibit 10.24 of the Form 10-K filed March 19, 2020)
10.21	Equipment Lab Letter, dated March 16, 2020, entered into between the Company and Houston Pharmaceuticals, Inc. (HPI) (incorporated by reference to Exhibit 10.25 of the Form 10-K filed March 19, 2020)
10.22	Scientific Advisory Board Agreement, dated February 28, 2020, entered into between the Company and Waldemar Priebe, PhD (incorporated by reference to Exhibit 10.26 of the Form 10-K filed March 19, 2020)
10.23	Amended and Restated Sublicense Agreement entered into between the Company and WPD Pharmaceuticals dated December 20, 2021 (incorporated by reference to Exhibit 10.1 of the Form 8-K filed December 27, 2021)
10.24	Assignment Consent Letter by and between WPD Pharmaceuticals Sp. z o.o and LPC Enterprises, LLC and Moleculin Biotech, Inc. (incorporated by reference to Exhibit 10.2 of the Form 8-K filed December 27, 2021)
10.25	At Market Issuance Sales Agreement, dated June 25, 2021, by and among the Company and Oppenheimer & Co. Inc. (incorporated by reference to Exhibit 1.1 of the Form 8-K filed June 25, 2021)
10.26	Purchase Agreement dated June 25, 2021 by and between Moleculin Biotech, Inc. and Lincoln Park Capital Fund, LLC. (incorporated by reference to Exhibit 10.1 of the Form 8-K filed June 25, 2021)
10.27	Registration Rights Agreement dated June 25, 2021 by and between Moleculin Biotech, Inc. and Lincoln Park Capital Fund, LLC. (incorporated by reference to Exhibit 10.2 of the Form 8-K filed June 25, 2021)

10.28 +	Amendment No. 3 to Patent and Technology License Agreement between the Parties dated April 2, 2012, dated May 20, 2020, entered into between the Company and the Board of Regents of The University of Texas System, on behalf of The University of Texas M.D. Anderson Cancer Center (incorporated by reference to Exhibit 10.1 of the Form 10-Q filed August 12, 2020)
10.29 +	Amendment No. 4 to Patent and Technology License Agreement between the Parties dated April 2, 2012, dated June 15, 2021, entered into between the Company and the Board of Regents of The University of Texas System, on behalf of The University of Texas M.D. Anderson Cancer Center (incorporated by reference to Exhibit 10.4 of the Form 10-Q filed August 12, 2021)
10.30 +*	Patent And Technology License Agreement dated June 29, 2017 by and between The Board of Regents of The University Of Texas System on behalf of The University Of Texas M. D. Anderson Cancer Center and Moleculin Biotech, Inc.
10.31 +*	Amendment No. 1 to the Patent And Technology License Agreement dated June 29, 2017 by and between The Board of Regents of The University Of Texas System on behalf of The University Of Texas M. D. Anderson Cancer Center and Moleculin Biotech, Inc.
10.32 +*	Patent And Technology License Agreement dated December 2, 2021 by and between The Board of Regents of The University Of Texas System on behalf of The University Of Texas M. D. Anderson Cancer Center and Moleculin Biotech, Inc.
10.33 +*	Patent And Technology License Agreement dated December 3, 2021 by and between The Board of Regents of The University Of Texas System on behalf of The University Of Texas M. D. Anderson Cancer Center and Moleculin Biotech, Inc.
10.34 +*	Patent And Technology License Agreement dated February 3, 2022 by and between The Board of Regents of The University Of Texas System on behalf of The University Of Texas M. D. Anderson Cancer Center and Moleculin Biotech, Inc.
21*	Subsidiaries of the Registrant
23.1*	Consent of Grant Thornton, LLP
31.1*	Certification of Principal Executive Officer Pursuant to Section 302 of Sarbanes- Oxley Act of 2002
31.2*	Certification of Principal Financial Officer Pursuant to Section 302 of Sarbanes-Oxley Act of 2002
32.1*	Certification of Principal Executive Officer Pursuant to Section 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
32.2*	Certification of Principal Financial Officer Pursuant to Section 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002

101.INS *	Inline XBRL Instance Document
101.SCH *	Inline XBRL Taxonomy Extension Schema Document
101.CAL *	Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF *	Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB *	Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE *	Inline XBRL Taxonomy Extension Presentation Linkbase Document
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)

* Filed herewith.

** Denotes a management contract or compensatory plan or arrangement.

† Confidential treatment has been granted as to certain portions of this exhibit pursuant to Rule 24b-2 of the Securities Exchange Act of 1934, as amended.

\+ Pursuant to Item 601(b)(10)(iv) of Regulation S-K promulgated by the SEC, certain portions of this exhibit have been redacted. The Company hereby agrees to furnish supplementally to the SEC, upon its request, an unredacted copy of this exhibit.

ITEM 16. FORM 10-K SUMMARY

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

MOLECULIN BIOTECH, INC.

By: /s/ Walter V. Klemp
Walter V. Klemp,
Chief Executive Officer and Chairman

Date: March 24, 2022

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed by the following persons on behalf of the Registrant in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Walter V. Klemp Walter V. Klemp	Chief Executive Officer and Chairman (Principal Executive Officer)	March 24, 2022
/s/ Jonathan P. Foster Jonathan P. Foster	Executive Vice President and Chief Financial Officer (Principal Financial and Accounting Officer)	March 24, 2022
/s/ Robert George Robert George	Director	March 24, 2022
/s/ Michael Cannon Michael Cannon	Director	March 24, 2022
/s/ John Climaco John Climaco	Director	March 24, 2022
/s/ Elizabeth Cermak Elizabeth Cermak	Director	March 24, 2022
/s/ Joy Yan Joy Yan	Director	March 24, 2022

Moleculin Biotech, Inc.
Index to Consolidated Financial Statements

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
Moleculin Biotech, Inc.

Opinion on the financial statements
We have audited the accompanying consolidated balance sheets of Moleculin Biotech, Inc. (a Delaware corporation) and subsidiaries (the "Company") as of December 31, 2021 and 2020, the related consolidated statements of operations and comprehensive loss, stockholders' equity, and cash flows for each of the two years in the period ended December 31, 2021, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021 and 2020, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2021, in conformity with accounting principles generally accepted in the United States of America.

Basis for opinion
These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical audit matters
Critical audit matters are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. We determined that there are no critical audit matters.

/s/ GRANT THORNTON LLP

We have served as the Company's auditor since 2017.

Houston, Texas
March 24, 2022

Moleculin Biotech, Inc.
Consolidated Balance Sheets
(in thousands, except for share and per share data)

	December 31,	
	2021	**2020**
Assets		
Current Assets:		
Cash and cash equivalents	$ 70,903	$ 15,173
Prepaid expenses and other current assets	1,594	2,025
Total current assets	72,497	17,198
Furniture and equipment, net of accumulated depreciation of $638 and $474, respectively	338	483
Intangible assets	11,148	11,148
Operating lease right-of-use asset	107	202
Total Assets	$ 84,090	$ 29,031
Liabilities and Stockholders' Equity		
Current Liabilities:		
Accounts payable	$ 1,364	$ 1,129
Accrued expenses and other current liabilities	2,258	1,791
Total current liabilities	3,622	2,920
Operating lease liability - long-term, net of current portion	63	159
Warrant liability - long-term	1,412	8,192
Total Liabilities	5,097	11,271
Commitments and contingencies (Note 8)		
Stockholders' Equity:		
Preferred stock, $0.001 par value; 5,000,000 authorized, no shares issued and outstanding	—	—
Common stock, $0.001 par value; 100,000,000 authorized as of December 31, 2021 and December 31, 2020, 28,578,338 and 11,536,720 shares issued and outstanding at December 31, 2021 and December 31, 2020, respectively	29	69
Additional paid-in capital	151,733	74,671
Subscription receivable	—	(129)
Accumulated other comprehensive income	41	65
Accumulated deficit	(72,810)	(56,916)
Total stockholders' equity	78,993	17,760
Total liabilities and stockholders' equity	$ 84,090	$ 29,031

See accompanying notes to these consolidated financial statements.

Moleculin Biotech, Inc.
Consolidated Statements of Operations and Comprehensive Loss
(in thousands, except share and per share data)

	Year Ended December 31,	
	2021	**2020**
Revenue	$ —	$ —
Operating expenses:		
Research and development	14,418	12,757
General and administrative	8,386	6,785
Depreciation and amortization	164	200
Total operating expenses	22,968	19,742
Loss from operations	(22,968)	(19,742)
Other income:		
Gain from change in fair value of warrant liability	6,728	2,346
Other income, net	40	28
Interest income, net	306	13
Net loss	$ (15,894)	$ (17,355)
Net loss per common share - basic and diluted	$ (0.59)	$ (1.76)
Weighted average common shares outstanding, basic and diluted	26,875,927	9,845,685
Comprehensive loss:		
Net loss	$ (15,894)	$ (17,355)
Other comprehensive (loss) income:		
Foreign currency translation	(24)	34
Comprehensive loss	$ (15,918)	$ (17,321)

See accompanying notes to these consolidated financial statements.

Moleculin Biotech, Inc.
Consolidated Statements of Cash Flows
(in thousands)

	Year Ended December 31,	
	2021	**2020**
Cash flows from operating activities:		
Net loss	$ (15,894)	$ (17,355)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	164	200
Stock-based compensation	2,373	1,680
Loss from sale of fixed assets	—	6
Change in fair value of warrant liability	(6,728)	(2,346)
Operating lease, net	96	85
Changes in operating assets and liabilities:		
Prepaid expenses and other current assets	431	724
Accounts payable	235	(1,024)
Accrued expenses and other current liabilities	372	259
Net cash used in operating activities	(18,951)	(17,771)
Cash flows from investing activities:		
Purchase of fixed assets	(19)	(376)
Proceeds from sale of fixed assets	—	2
Net cash used in investing activities	(19)	(374)
Cash flows from financing activities:		
Proceeds from exercise of warrants	63	5
Payment of tax liability for vested restricted stock units	(23)	(17)
Proceeds from sale of common stock, net of issuance costs	74,684	22,561
Net cash provided by financing activities	74,724	22,549
Effect of exchange rate changes on cash and cash equivalents	(24)	34
Net change in cash and cash equivalents	55,730	4,438
Cash and cash equivalents, at beginning of year	15,173	10,735
Cash and cash equivalents, at end of year	$ 70,903	$ 15,173
Supplemental disclosures of cash flow information:		
Cash paid for interest	$ —	$ —
Cash paid for taxes	$ 15	$ 24
Non-cash investing and financing activities:		
Purchases of property and equipment in accounts payable and accrued liabilities	$ 5	$ —
Subscription receivable	$ —	$ 129

See accompanying notes to these consolidated financial statements.

Moleculin Biotech, Inc.
Consolidated Statements of Stockholders' Equity
(in thousands except for shares and per unit)

	Common Stock		Common Stock Subscribed						
	Shares	Par Value Amount	Shares	Par Value Amount	Additional Paid-In-Capital	Accumulated Deficit	Accumulated Other Comprehensive Income	Subscription Receivable	Stockholders' Equity
Balance at December 31, 2019	7,621,338	$ 46	—	$ —	$ 55,055	$ (39,561)	$ 31	$ —	$ 15,571
Issued for cash - sale of common stock in February 2020, net of issuance costs of $709	1,250,000	7	—	—	559	—	—	—	566
Issued for cash - sale of common stock pursuant to the 2019 ATM Agreement, net of issuance costs of $471	1,412,017	8	—	—	11,778	—	—	—	11,786
Issued for cash - sale of common stock pursuant to the 2020 ATM Agreement, net of issuance costs of $108	471,405	3	—	—	2,770	—	—	—	2,773
Issued for cash - sale of common stock to Lincoln Park, net of issuance costs of $575	771,220	5	—	—	2,708	—	—	—	2,713
Subscription of common stock in connection with the 2020 ATM Agreement, net of commissions	—	—	26,966	—	129	—	—	(129)	—
Warrants exercised	750	—	—	—	9	—	—	—	9
Common stock issued upon vesting of restricted stock units (net of shares withheld for payment of tax liability)	9,990	—	—	—	(17)	—	—	—	(17)
Stock based compensation					1,680				1,680
Consolidated net loss	—	—	—	—	—	(17,355)	—	—	(17,355)
Cumulative translation adjustment	—	—	—	—	—		34	—	34
Balance at December 31, 2020	11,536,720	$ 69	26,966	$ —	$ 74,671	$ (56,916)	$ 65	$ (129)	$ 17,760
Issued for cash - sale of common stock in Q1 2021, net of issuance costs of $6,159	16,883,420	18	(26,966)	—	74,537	—	—	129	74,684
Reverse stock split	14,285	(60)	—	—	60	—	—	—	—
Issuance of common stock with equity purchase agreement, net of issuance costs of $403	107,788	1	—	—	—	—	—	—	1
Issuance of common stock in connection with Consulting Agreement	5,000	—	—	—	5	—	—	—	5
Warrants exercised	10,000	1	—	—	115	—	—	—	116
Common stock issued upon vesting of restricted stock units (net of shares withheld for payment of tax liability)	21,125	—	—	—	(23)	—	—	—	(23)
Stock based compensation	—	—	—	—	2,368	—	—	—	2,368
Consolidated net loss	—	—	—	—	—	(15,894)	—	—	(15,894)
Cumulative translation adjustment	—	—	—	—	—		(24)	—	(24)
Balance at December 31, 2021	28,578,338	$ 29	—	$ —	$ 151,733	$ (72,810)	$ 41	$ —	$ 78,993

See accompanying notes to these consolidated financial statements.

Moleculin Biotech, Inc.
Notes to the Consolidated Financial Statements

1. Nature of Business

The terms "MBI" or "the Company", "we", "our" and "us" are used herein to refer to Moleculin Biotech, Inc. MBI is a clinical-stage pharmaceutical company, organized as a Delaware corporation in July 2015, with its focus on the treatment of highly resistant cancers and viruses through the development of its drug candidates, based substantially on discoveries licensed from with The University of Texas System on behalf of the MD Anderson Cancer Center, which the Company refers to as MD Anderson. MBI formed Moleculin Australia Pty. Ltd., (MAPL), a wholly owned subsidiary in June 2018, to perform certain preclinical development in Australia. This has enabled the Company to realize the benefits of certain research and development tax credits in Australia. In July 2021, MBI formed Moleculin Amsterdam B.V., a wholly owned subsidiary, primarily to act as its legal representative for clinical trials in Europe for Moleculin Biotech, Inc.

In 2019, the Company sublicensed essentially all of the rights to its technologies in 29 countries in Europe and Asia to WPD Pharmaceuticals Sp.z o.o. (WPD or WPD Pharmaceuticals) in exchange for a minimum amount of externally funded collaboration on development in Europe over a certain amount of time. This sublicense was last amended in December 2021. Also, in 2019, the Company sublicensed its technologies to Animal Life Sciences, Inc. (ALI), to enable research and commercialization for non-human use and share development data. As part of this agreement, ALI issued to the Company a 10% interest in ALI.

The Company has three core technologies, based substantially on discoveries made at and licensed from MD Anderson. Having six drug candidates, three of which have now shown human activity in clinical trials, the Company believes that success in our lead program, Annamycin, has allowed and will allow further pipeline expansion into multiple high-value oncology indications.

The Company's core technologies consist of the following: a) Annamycin; b) WP1066 Portfolio; and c) the WP1122 Portfolio. In the US and Europe, the Company has conducted, are currently, or plans in the near term to be conducting clinical trials for its drug candidates – Annamycin, WP1066, WP1220, and WP1122. All trials are or were in the Phase 1 portion except the WP1220 trial, which was a proof-of-concept clinical trial. In 2021 and early 2022, there were also three "right-to-try" (or their foreign equivalent) uses of Annamycin and WP1066. The Company plans to conduct additional trials and is in the process of obtaining the appropriate regulatory approval. The Company utilizes its own internal resources and funds to conduct some of these trials and also has trials being conducted via physician-sponsored trials which utilizes primarily external funds, usually grant funds, which are not presented in these financial statements.

The Company does not have manufacturing facilities and all manufacturing activities are contracted out to third parties. Additionally, the Company does not have a sales organization. The Company's overall strategy is to seek potential outlicensing or outsourcing opportunities with development/commercialization strategic partners who are better suited for the marketing, sales and distribution of its drugs, if approved.

2. Basis of presentation, principles of consolidation and significant accounting policies

Reverse Stock Split - On January 29, 2021, the Company filed a Certificate of Amendment to the amended and restated certificate of incorporation with the Secretary of State and the State of Delaware to effect a reverse stock split of all the issued and outstanding shares of the Company's common stock at a ratio of 1 for 6. The accompanying consolidated financial statements and notes to the consolidated financial statements gives retroactive effect to the reverse stock split for all periods presented. Certain amounts in the financial statements, the notes thereto, and elsewhere in the Form 10-K may be slightly different than previously reported due to rounding up of fractional shares as a result of the reverse stock split.

Basis of Presentation - The accompanying consolidated financial statements and related notes have been prepared in accordance with accounting principles generally accepted in the United States of America (US GAAP), and in accordance with the rules and regulations of the United States Securities and Exchange Commission (the SEC).

Principles of consolidation - The accompanying consolidated financial statements include the accounts of the Company and its wholly owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation. The Company views its operations and manages its business in one operating segment. All material long-lived assets of the Company reside in the United States. In accordance with FASB ASC Topic 280, Segment Reporting, the Company views its operations and manages its business as one segment. As a result, the financial information disclosed herein represents all of the material financial information related to its principal operating segment.

Use of Estimates - The preparation of these consolidated financial statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of expenses during the reporting period. Actual results could differ from those estimates. Management considers many factors in selecting appropriate financial accounting policies and controls, and in developing the estimates and assumptions that are used in the preparation of these financial statements. Management must apply significant judgment in this process. In addition, other factors may affect estimates, including expected business and operational changes, sensitivity and volatility associated with the assumptions used in developing estimates, and whether historical trends are expected to be representative of future trends. The estimation process often may yield a range of potentially reasonable estimates of the ultimate future outcomes and management must select an amount that falls within that range of reasonable estimates. This process may result in actual results differing materially from those estimated amounts used in the preparation of financial statements. Estimates are used in the following areas, among others: fair value estimates on intangible assets, warrants, and stock-based compensation expense, as well as accrued expenses and taxes.

Liquidity and Financial Condition - The Company is an early stage company and has not generated any revenues to date. As such, the Company is subject to all of the risks associated with early stage companies. Since inception, the Company has incurred losses and negative cash flows from operating activities. For the years ended December 31, 2021 and 2020, the Company incurred net losses of $15.9 million and $17.4 million, respectively, and had net cash flows used in operating activities of $19.0 million and $17.8 million, respectively. At December 31, 2021, the Company had an accumulated deficit of $72.8 million and cash of $70.9 million. The Company expects its cash on hand as of December 31, 2021 will be sufficient to fund the Company's operations beyond the near term. Such projections are subject to changes in the Company's internally funded preclinical and clinical activities, including unplanned preclinical and clinical activity. The Company does not expect to experience positive cash flows from operating activities in the near future and anticipates incurring operating losses for the next few years as it supports the development of its core technologies to the point of generating revenue, most likely via outlicensing, and continues to invest in research and development for additional applications of the Company's core technologies and potentially increase its pipeline of drug candidates. If the Company needs to raise additional capital in order to continue to execute its business plan, there is no assurance that additional financing will be available when needed or that management will be able to obtain financing on terms acceptable to the Company. A failure to raise sufficient capital could adversely impact the Company's ability to achieve its intended business objectives and meet its financial obligations as they become due and payable.

Cash and Cash Equivalents - Financial instruments that potentially subject the Company to a concentration of credit risk consist of cash and cash equivalents. The Company maintains cash accounts principally at one financial institution in the US, which at times, may exceed the Federal Deposit Insurance Corporation's limit. The Company has not experienced any losses from cash balances in excess of the insurance limit. The Company's management does not believe the Company is exposed to significant credit risk at this time due to the financial condition of the financial institution where its cash is held.

Prepaid Expenses and Other Current Assets - Prepaid expenses and other current assets consist of the following (in thousands):

	December 31,	
	2021	**2020**
Prepaid insurance	$ 589	$ 579
Vendor prepayments and deposits	486	1,281
Prepaid sponsored research	474	164
Non-trade receivables	23	1
Related party receivables	22	—
Total prepaid expenses and other current assets	$ 1,594	$ 2,025

Vendor prepayments at December 31, 2021 and 2020 includes zero and $1.1 million, respectively, for the expansion of Annamycin production commitments on a commercial scale delivered in 2021 for use in clinical trials.

Property and equipment - Property and equipment are recorded at cost and depreciated over their estimated useful lives using the straight-line depreciation method as follows:

	Years
Leasehold improvements	Shorter of estimated useful lives or the term of the lease
Computer equipment	2
Software	3
Machinery and equipment	2 to 5
Furniture and office equipment	2 to 7

Intangible assets - Intangible assets with finite lives are amortized using the straight-line method over their estimated period of benefit. Acquired intangible assets identified as in-process research and development (IPR&D) assets, are considered indefinite lived until the completion or abandonment of the associated research and development efforts. If the associated research and development effort is abandoned, the related IPR&D assets will be written-off and the Company will record a noncash impairment loss on its statements of operations. For those compounds that reach commercialization, the IPR&D assets will be amortized over their estimated useful lives. Intangible assets are tested for impairment on an annual basis, and between annual tests if indicators of potential impairment exist, using a fair-value-based approach. We evaluate the recoverability of intangible assets periodically and take into account events or circumstances that warrant revised estimates of useful lives or that indicate that impairment exists. No impairments of intangible assets have been identified during any of the periods presented.

Operating Lease Right-of-Use Asset - The Company determines if an arrangement is a lease at contract inception or during modifications or renewal of an existing lease. Operating lease assets represent the Company's right to use an underlying asset for the lease term and operating lease liabilities represent the Company's obligation to make lease payments arising from the lease. Operating lease assets and liabilities are recognized at the commencement date of the lease based upon the present value of lease payments over the lease term. The lease payments used to determine the Company's operating lease assets may include lease incentives, stated rent increases and escalation clauses linked to rates of inflation when determinable and are recognized in the Company's operating lease assets in the Company's consolidated balance sheet. The Company has elected the practical expedient and does not separate lease components from nonlease components for its leases. The Company's operating leases are reflected in operating lease right-of-use asset (ROU), accrued expenses and other current liabilities, and operating lease liability - long-term in the Company's consolidated balance sheets. Lease expense for minimum lease payments is recognized on a straight-line basis over the lease term. Short-term leases, defined as leases that have a lease term of 12 months or less at the commencement date, are excluded from this treatment and are recognized on a straight-line basis over the term of the lease. Refer to Note 8 - Commitments and Contingencies - Lease Obligations Payable for additional information related to the Company's operating leases.

Sublicense Arrangement - The Company has a sublicense arrangement which consists of an investment in ALI in which it does not have the ability to exercise significant influence over its operating and financial activities. Management evaluates this investment for possible impairment quarterly.

Fair Value of Financial instruments - The Company's financial instruments consist primarily of non-trade receivables, account payables, accrued expenses and a warrant liability. The carrying amount of non-trade receivables, accounts payables, and accrued expenses approximates their fair value because of the short-term maturity of such.

The Company has categorized its assets and liabilities that are valued at fair value on a recurring basis into three-level fair value hierarchy in accordance with GAAP. Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. The fair value hierarchy gives the highest priority to quoted prices in active markets for identical assets and liabilities (Level 1) and lowest priority to unobservable inputs (Level 3).

Assets and liabilities recorded in the balance sheets at fair value are categorized based on a hierarchy of inputs as follows:

Level 1 – Unadjusted quoted prices in active markets of identical assets or liabilities.
Level 2 – Quoted prices for similar assets or liabilities in active markets or inputs that are observable for the asset or liability, either directly or indirectly through market corroboration, for substantially the full term of the financial instrument.
Level 3 – Unobservable inputs for the asset or liability.

The Company's financial assets and liabilities recorded at fair value on a recurring basis include the fair value of our warrant liability discussed in Note 5.

The following table provides the financial assets and liabilities reported at fair value and measured on a recurring basis at December 31, 2021 and 2020 (in thousands):

Description	Liabilities Measured at Fair Value	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Other Unobservable Inputs (Level 3)
Fair value of warrant liability:				
December 31, 2021	$ 1,412	$ —	$ —	$ 1,412
December 31, 2020	$ 8,192	$ —	$ —	$ 8,192

The following table provides a summary of changes in fair value associated with the Level 3 liabilities for the years ended December 31, 2021 and 2020 (in thousands):

	Warrant Liability Long-Term
December 31, 2019	$ 5,818
Exercise of warrants	(4)
Issuances of warrants	4,724
Change in fair value - net	(2,346)
December 31, 2020	$ 8,192
Exercise of warrants	(52)
Change in fair value - net	(6,728)
December 31, 2021	$ 1,412

The above table of Level 3 liabilities begins with the valuation as of December 31, 2019 and adjusts the balances for changes that occurred during the years. The ending balance of the Level 3 financial instrument presented above represent our best estimates and may not be substantiated by comparison to independent markets and, in many cases, could not be realized in immediate settlement of the instruments.

Income Taxes - The Company uses the asset and liability method of accounting for income taxes. Under this method, deferred tax assets and liabilities are determined based on the differences between the financial reporting and the tax bases of reported assets and liabilities and are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse. The Company must then assess the likelihood that the resulting deferred tax assets will be realized. A valuation allowance is provided when it is more likely than not that some portion or all of a deferred tax asset will not be realized.

The Company accounts for uncertain tax positions in accordance with the provisions of ASC 740-10 which prescribes a recognition threshold and measurement attribute for financial statement disclosure of tax positions taken, or expected to be taken, on its tax return. The Company evaluates and records any uncertain tax positions based on the amount that management deems is more likely than not to be sustained upon examination and ultimate settlement with the tax authorities in the tax jurisdictions in which it operates.

Translation of Foreign Currencies - The functional currency for our foreign subsidiaries is the local currency. For our non-US subsidiaries that transact in a functional currency other than the US dollar, assets and liabilities are translated at current rates of exchange at the balance sheet date. Income and expense items are translated at the average foreign currency rates for the period. Adjustments resulting from the translation of the financial statements of our foreign operations into US dollars are excluded from the determination of net income and are recorded in accumulated other comprehensive income, a separate component of equity.

Stock-based Compensation - Stock-based compensation expense includes the estimated fair value of equity awards vested or expected to vest during the reporting period. The Company accounts for its stock-based compensation awards in accordance with FASB ASC Topic 718, Compensation—Stock Compensation (ASC 718). ASC 718 requires all stock-based payments to employees, including grants of employee stock options, restricted stock units, modifications to existing stock options, and equity classified warrants to be recognized in the consolidated statements of operations based on their fair values. The grant date fair value of stock options and equity classified warrants are calculated using the Black-Scholes option pricing model and the grant date fair value of restricted stock awards is determined using the closing price of the Company's common stock on the date of grant (or if the date of grant is not a business day, on the business day prior to the date of the grant). The awards are subject to service vesting conditions. Compensation expense related to awards to employees and directors with service-based vesting conditions is recognized on a straight-line basis based on the grant date fair value over the associated service period of the award, which is generally the vesting term, net of forfeitures which are recognized as they occur. Compensation expense related to awards to non-employees with performance-based vesting conditions is recognized based on the grant date fair value. Effective January 1, 2020, the Company began using the volatility of its own stock since it now has sufficient historic data in its stock price.

Loss Per Common Share - Basic net loss per common share is computed by dividing net loss available to common shareholders by the weighted-average number of common shares outstanding during the period. For purposes of this calculation, options to purchase common stock, restricted stock units subject to vesting and warrants to purchase common stock were considered to be common stock equivalents. Diluted net loss per common share is determined using the weighted-average number of common shares outstanding during the period, adjusted for the dilutive effect of common stock equivalents. In periods when losses are reported, the weighted-average number of common shares outstanding excludes common stock equivalents, because their inclusion would be anti-dilutive. For the years ended December 31, 2021, and 2020, approximately 4.3 million and approximately 3.6 million, respectively, of potentially dilutive shares were excluded from the computation of diluted earnings per share due to their antidilutive effect.

Research and Development Costs - Research and development costs are expensed as incurred.

Subsequent Events - The Company's management reviewed all material events through the date these consolidated financial statements were issued for subsequent event disclosure consideration as described in Note 9 and elsewhere in other notes to the financial statements.

Recent Accounting Pronouncements

In August 2020, the Financial Accounting Standards Board, or FASB, issued Accounting Standards Update, or ASU No. 2020-06, Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging - Contracts in Entity's Own Equity (Subtopic 815-40) (ASU 2020-06). ASU 2020-06 simplifies the complexity associated with applying US GAAP for certain financial instruments with characteristics of both liabilities and equity, including convertible instruments and contracts in an entity's own equity. The guidance is effective for the Company beginning on January 1, 2022 and prescribes different transition methods for the various provisions. The Company's adoption of this pronouncement effective January 1, 2022 is not expected to have a material impact on the Company's consolidated financial statements.

In May 2021, the FASB issued ASU No. 2021-04, Earnings Per Share (Topic 260), Debt - Modifications and Extinguishments (Subtopic 470-50), Compensation - Stock Compensation (Topic 718), and Derivatives and Hedging - Contracts in Entity's Own Equity (Subtopic 815-40): Issuer's Accounting for Certain Modifications or Exchanges of Freestanding Equity-Classified Written Call Options. ASU 2021-04 clarifies certain aspects of the current guidance to promote consistency among reporting of an issuer's accounting for modifications or exchanges of freestanding equity-classified written call options (for example, warrants) that remain equity classified after modification or exchange. The amendments in this update are effective for all entities for fiscal years beginning after December 15, 2021, including interim periods within those fiscal years. Early adoption is permitted for all entities, including adoption in an interim period. The Company's adoption of this pronouncement effective January 1, 2022 is not expected to have a material impact on the Company's condensed consolidated financial statements.

The Company does not believe that any other recently issued effective pronouncements, or pronouncements issued but not yet effective, if adopted, would have a material effect on the accompanying financial statements.

3. Intangible Assets

In conjunction with its acquisition of Moleculin, LLC in 2016, the Company recognized an intangible asset for acquired in-process research and development (IPR&D) related to the acquired WP1066 portfolio. As our WP1066 portfolio is currently in development, the Company's IPR&D intangible asset will not be amortized until development is complete. If the associated research and development effort is abandoned, the Company's IPR&D intangible asset will be written-off and the Company will record a noncash impairment loss on its statements of operations. For those compounds that reach commercialization, the IPR&D assets will be amortized over their estimated useful lives. IPR&D was $11.1 million as of December 31, 2021 and 2020, respectively.

4. Accrued expenses and other current liabilities

Accrued expenses and other current liabilities at December 31, 2021 and 2020 consist of the following components (in thousands):

	December 31,	
	2021	**2020**
Accrued research and development	$ 1,005	$ 907
Accrued payroll and bonuses	606	426
Accrued legal, regulatory, professional and other	442	262
Accrued liabilities due to related party	109	78
Operating lease liability - current	96	118
Total accrued expenses and other current liabilities	$ 2,258	$ 1,791

Additionally, accounts payable includes $48,000 as of December 31, 2021 and 2020, respectively, for a related party payable to HPI.

5. Warrants

Upon its issuance of warrants to purchase shares of common stock, the Company evaluates the terms of the warrant issue to determine the appropriate accounting and classification of the warrant issue pursuant to FASB ASC Topic 480, Distinguishing Liabilities from Equity, FASB ASC Topic 505, Equity, FASB ASC 815, Derivatives and Hedging, and ASC 718, Compensation - Stock Compensation. Warrants are classified as liabilities when the Company may be required to settle a warrant exercise in cash and classified as equity when the Company settles a warrant exercise in shares of its common stock.

Liability classified warrants are valued at fair value at the date of issue and at each reporting date pursuant to FASB ASC 820, Fair Value Measurement, (ASC 820) and is reflected as a warrant liability on our consolidated balance sheet with the change in the warrant liability during each reporting period is reflected as a gain (loss) from change in fair value of warrant liability in our consolidated statement of operations.

Equity classified warrants issued to non-employees in exchange for services are accounted for in accordance with ASC 718 which requires all stock-based payments be recognized in the consolidated statements of operations based on their fair value. For further information, see Note 2. Basis of presentation, principles of consolidation and significant accounting policies – Stock-based Compensation.

At December 31, 2021 and 2020, the Company has the following warrants outstanding:

	Number of Shares Under Outstanding Warrants at December 31, 2021	Number of Shares Under Outstanding Warrants at December 31, 2020	Weighted Average Exercise Price at December 31, 2021	Remaining Contractual Life at December 31, 2021 (Years)
Liability Classified Warrants (1)				
Issued February 2017	67,349	67,349	$ 8.42	0.1
Issued February 2018	378,951	378,951	16.80	1.6
Issued June 2018 (2)	123,836	123,836	12.20	1.9
Issued March 2019	263,507	263,507	6.60	2.2
Issued April 2019	875,001	875,001	10.50	2.3
Issued February 2020	1,015,001	1,025,001	6.30	3.6
	2,723,645	2,733,645	$ 9.46	
Equity Classified Warrants				
Issued May 2016 - Bonwick	—	17,970	$ 45.00	—
Issued July 2017 - Consulting (3)	25,001	25,001	15.64	0.6
Issued April 2018 - Consulting	—	16,667	18.00	—
Issued August 2019 - Consulting	25,000	25,000	9.84	0.6
Issued April 2020 - Consulting	16,667	16,667	6.84	3.3
Issued December 2020 - Consulting	8,334	8,334	4.72	4.0
Issued April 2021 - Consulting	71,500	—	3.63	4.3
Issued August 2021 - Consulting	250,000	—	3.08	9.6
	396,502	109,639	$ 4.59	
Balance outstanding	3,120,147	2,843,284	$ 8.51	

(1) If the Company subdivides (by any stock split, stock dividend, recapitalization or otherwise) its outstanding shares of its common stock into a smaller number of shares, the warrant exercise price is proportionately reduced and the number of shares under outstanding warrants is proportionately increased. Additionally, if the Company combines (by combination, reverse stock split or otherwise) its outstanding shares of common stock into a smaller number of shares, the warrant exercise price is proportionately increased and the number of shares under outstanding warrants is proportionately decreased. Also, the Company may voluntarily reduce the warrant exercise price for its warrants issued in March 2019 and February 2017 and may voluntarily extend the contractual term of its warrants issued in February 2017.

(2) Includes warrants to purchase 118,372 shares at an exercise price of $12.12, expiring December 22, 2023, and warrants to purchase 5,464 shares at an exercise price of $13.92, expiring June 21, 2023.

(3) Includes warrants to purchase 16,667 shares at an exercise price of $14.46 and warrants to purchase 8,334 shares at an exercise price of $18.00.

Liability Classified Warrants

The Company uses the Black-Scholes option pricing model (BSM) to determine the fair value of its warrants at the date of issue and outstanding at each reporting date.

The risk-free interest rate assumption is based upon observed interest rates on zero coupon US Treasury bonds linearly interpolated to obtain a maturity period commensurate with the term of the warrants.

Estimated volatility is a measure of the amount by which the Company's stock price is expected to fluctuate each year during the expected life of the warrants. Beginning in 2020, only the volatility of the Company's own stock is used in the BSM as it now has sufficient historic data in its stock price.

The assumptions used in determining the fair value of the Company’s outstanding liability classified warrants are as follows:

	Year Ended December 31,	
	2021	2020
Risk-free interest rate	0.1% to 1.1%	0.1% to 0.3%
Volatility	71.8% to 114.5%	113.7% to 127.4%
Expected life (years)	0.1 to 3.6	1.1 to 4.6
Dividend yield	—%	—%

A summary of the Company's liability classified warrant activity during the year ended December 31, 2021 and related information follows:

	Number of Shares Under Warrant	Range of Warrant Exercise Price per Share	Weighted Average Exercise Price	Weighted Average Remaining Contractual Life (Years)
Outstanding at December 31, 2020	2,733,645	6.60 to 16.80	$ 9.45	3.6
Granted	—	6.30 to 6.30	$ —	—
Exercised	(10,000)	6.60 to 6.60	$ 6.60	—
Expired	—	—	$ —	—
Outstanding at December 31, 2021	2,723,645	6.30 to 16.80	$ 9.46	2.6
Vested and Exercisable at December 31, 2021	2,723,645	6.30 to 16.80	$ 9.46	2.6

In connection with the Company's stock offering that closed in February 2020, the Company issued warrants to purchase 937,501 shares of its common stock, that are exercisable six months from the date of issuance, at a price of $6.30 per share, subject to adjustment in certain circumstances, and expire five years from the date they are first exercisable, and issued Oppenheimer & Co. Inc. a warrant (Underwriter Warrant) to purchase up to 87,500 shares of its common stock with an exercise price of $6.30 per share, subject to adjustment in certain circumstances, which expires in February 2025.

For a summary of the changes in fair value associated with our warrant liability for the years ended December 31, 2021 and 2020, see Note 2. Basis of presentation, principles of consolidation and significant accounting policies – Fair Value of Financial Instruments.

Equity Classified Warrants

In April 2021, the Company granted equity-classified warrants to purchase 71,500 shares of common stock with a five-year term and an exercise price of $3.63 vesting quarterly over five years while services are being performed. In August 2021, the Company entered into a portfolio development advisory agreement with a related party entity, associated with Dr. Waldemar Priebe, and in connection with the agreement, the Company granted equity-classified warrants to purchase 250,000 shares of common stock with a ten-year term and an exercise price of $3.08. The August 2021 warrants vest (a) 50% upon execution of the agreement, provided the advisor does not terminate the agreement prior to the end of the one-year term; and (b) 50% 60 days after the end of the one-year term, subject to the Company's Board of Directors determining that the services provided have been adequately performed. Also, both the April 2021 and August 2021 warrants vest in full if there is a change of control event, as defined in the agreement.

In December 2020, equity warrants to purchase up to 8,334 shares of common stock were issued to a consultant, with vesting contingent on certain conditions focused on executing licensing arrangements. In April 2020, equity warrants to purchase up to 16,667 shares of common stock were issued to a consultant, with vesting contingent on certain conditions focused on generating up to $10.0 million of approved research and development expenditures on the Company's drug portfolio.

At December 31, 2021 the Company had 396,502 equity classified warrants outstanding and 186,560 warrants were exercisable. At December 31, 2020, the Company had 109,639 equity classified warrants outstanding and 85,472 were exercisable.

The Company recorded stock compensation expense for the non-employee consulting agreements of $516,000 and $5,000 for the years ended December 31, 2021 and 2020, respectively. At December 31, 2021, there was $548,000 of unrecognized stock compensation expense related to the Company's equity-classified warrants.

6. Equity

Preferred Stock

Our certificate of incorporation authorizes the Company to issue these shares in one or more series, to determine the designations and the powers, preferences and relative, participating, optional or other special rights and the qualifications, limitations and restrictions thereof, including the dividend rights, conversion or exchange rights, voting rights (including the number of votes per share), redemption rights and terms, liquidation preferences, sinking fund provisions and the number of shares constituting the series. No preferred stock was issued or outstanding as of December 31, 2021.

Common Stock

February 2021 Stock Offering

In February 2021, the Company entered into an underwritten public offering for the sale by the Company of 14,273,684 shares of its common stock at a public offering price of $4.75 per share and granted the underwriters a 30-day option to purchase up to an additional 2,141,052 shares of common stock offered in the public offering, which was exercised. The Company received total proceeds of $78.0 million, prior to deducting the underwriting discount and other estimated offering expenses.

February 2020 Stock Offering

In February 2020, the Company entered into subscription agreements with certain institutional investors for the sale by the Company of 1,250,000 shares of its common stock and warrants to purchase 937,501 shares of common stock at a combined public offering price of $4.80 per share and related warrant. The Company received total proceeds of $6.0 million, net of $0.7 million in transaction expenses. See Note 5 - Warrants for equity classified warrants granted during the year ended December 31, 2020.

Lincoln Park Equity Line

In June 2021, the Company entered into a Purchase Agreement (the 2021 Purchase Agreement) with Lincoln Park Capital Fund. Pursuant to the terms of the Purchase Agreement, Lincoln Park agreed to purchase from the Company up to $20.0 million of common stock (subject to certain limitations) from time to time during the term of the Purchase Agreement. Pursuant to the terms of the Purchase Agreement, at the time the Company signed the Purchase Agreement, the Company issued 107,788 shares of common stock to Lincoln Park as an initial fee for its commitment to purchase shares of the Company's common stock under the Purchase Agreement, and has agreed to issue Lincoln Park up to an additional 53,893 shares of common stock as commitment shares pro-rata when and if Lincoln Park purchases (at our discretion) the $20.0 million aggregate commitment. The initial commitment shares issued in June 2021 were valued at $0.4 million, recorded as an addition to equity for the issuance of common stock and treated as a reduction to equity as a cost of capital to be raised under the Purchase Agreement. There have been no additional shares issued to date under this agreement.

In November 2020, the Company entered into a purchase agreement (the 2020 Purchase Agreement) and a registration rights agreement (the 2020 Registration Rights Agreement) with Lincoln Park Capital Fund, LLC (Lincoln Park). Pursuant to the terms of the 2020 Purchase Agreement, Lincoln Park agreed to purchase from the Company up to $22.0 million of the Company's common stock (subject to certain limitations) from time to time during the term of the 2020 Purchase Agreement. Pursuant to the terms of the 2020 Registration Rights Agreement, the Company filed with the SEC a registration statement to register the shares that have been or may be issued to Lincoln Park under the 2020 Purchase Agreement. Pursuant to the terms of the 2020 Purchase Agreement, at the time the Company signed the 2020 Purchase Agreement and the 2020 Registration Rights Agreement, the Company issued 126,699 shares of common stock to Lincoln Park as consideration for its commitment to purchase shares of our common stock under the 2020 Purchase Agreement and agreed to issue an additional 50,680 shares pro-rata when and if Lincoln Park purchases (at the Company's discretion) the $22.0 million aggregate commitment. The commitment shares were valued at $0.5 million, recorded as an addition to equity for the issuance of common stock and treated as a reduction to equity as a cost of capital to be raised under the Purchase Agreement. During the year ended December 31, 2020, the Company issued 771,220 shares, which included 133,017 commitment shares for net proceeds of $2.2 million. The Company terminated the 2020 Purchase Agreement on February 2, 2021.

At Market Issuance Sales Agreements (ATM)

In June 2021, the Company entered into an At Market Issuance Sales Agreement (the 2021 ATM Agreement) with Oppenheimer & Co. Inc. Pursuant to the terms of the 2021 ATM Agreement, the Company may offer and sell, from time to time through Oppenheimer shares of the Company's common stock with an aggregate sales price of up to $50.0 million. As of the date of this report, there have been no issuances under the 2021 ATM Agreement.

In January 2021 the Company issued 468,684 shares for gross proceeds of $2.9 million using the Company's 2020 At Market Agreement (the 2020 ATM Agreement) with Oppenheimer & Co., Inc. The Company terminated the 2020 ATM Agreement on February 2, 2021.

In July 2020, we entered into a new At Market Issuance Sales Agreement with Oppenheimer & Co. Inc. (the 2020 ATM Agreement). Pursuant to the terms of the 2020 ATM Agreement, the Company was able to sell from time to time through Oppenheimer shares of the Company's common stock with an aggregate sales price of up to $15.0 million. During the year ended December 31, 2020, pursuant to the 2020 ATM Agreement, the Company issued 471,405 shares of common stock at an average price of $6.11 per share, resulting in net proceeds of $2.8 million.

In addition, at December 31, 2020, we had 26,966 shares of our common stock subscribed in ATM transactions under the 2020 ATM Agreement for net proceeds, after deducting commissions and other transaction costs, of approximately $0.1 million at an average selling price of $4.96 per share. Accordingly, we have recorded a subscription receivable of $0.1 million as a reduction of stockholders' equity in our consolidated balance sheet as of December 31, 2020. The Company terminated the 2020 ATM Agreement on February 2, 2021.

In July 2019, the Company entered into an At Market Issuance Sales Agreement (the 2019 ATM Agreement) with Oppenheimer & Co. Inc. Pursuant to the terms of the 2019 ATM Agreement, the Company was able to sell from time to time through the Agent shares of the Company's common stock, with an aggregate sales price of up to $ 15 million. The Company agreed to pay a commission to the Agent of 3.0% of the gross proceeds of the sale of the Shares sold under the Agreement and reimburse the Agent for certain expenses. The Company also provided the Agent with customary indemnification rights. During the year ended December 31, 2020, pursuant to the 2019 ATM Agreement, the Company issued 1,412,017 shares of common stock at an average price of $8.68 per share, resulting in net proceeds of $11.9 million. In the third quarter of 2020, the 2019 ATM Agreement expired and was terminated.

Adoption of 2015 Stock Plan

In December 2015, the Board of Directors of the Company approved the Company's 2015 Stock Plan, which was amended in April 2016, April 2018, and June 2020. The expiration date of the plan is December 5, 2025. The awards under the 2015 Stock Plan can be in the form of stock options, stock awards, stock unit awards, or stock appreciation rights. On June 15, 2020, the stockholders approved an amendment to the 2015 Plan to, among other things, increase the number of shares of common stock authorized for issuance under the 2015 Plan by 1,000,000 shares.

Stock-based Compensation and Outstanding Awards

Under the terms of the Company's 2015 Stock Plan, as amended, and approved by its stockholders in June 2020, 1,750,001 shares of the Company's common stock are available for grant to employees, non-employee directors and consultants. The 2015 Stock Plan provides for the grant of stock options, stock awards, stock unit awards, or stock appreciation rights. As of December 31, 2021, there were 41,628 shares remaining to be issued under the 2015 Stock Plan.

Stock-based compensation expense for the years ended December 31, 2021 and 2020 is as follows (in thousands):

	Year Ended December 31,	
	2021	2020
General and administrative	$ 1,461	$ 1,347
Research and development	912	333
Total stock-based compensation	$ 2,373	$ 1,680

Each of the Company's stock-based compensation arrangements are discussed below.

Stock Options

Stock option awards are generally granted with an exercise price equal to the market price of the Company's stock at the date of grant. Stock option awards generally have a 10-year contractual term and vest over a 4-year period for employees and over a 1 to 3-year period for directors from the grant date on a straight-line basis over the requisite service period. The grant-date fair value of stock options is determined using the Black-Scholes option-pricing model. Additionally, the Company's stock options provide for full vesting of unvested outstanding options, in the event of a change of control of the Company.

The fair value of each stock option is estimated on the date of grant using the BSM model that uses the assumptions noted below. The expected term of the stock option awards was computed using the "plain vanilla" method as prescribed by the Securities and Exchange Commission Staff Accounting Bulletin 107 because the Company does not have sufficient data regarding employee exercise behavior to estimate the expected term. Beginning in 2020, the Company used the volatility of its own stock in the BSM as it now has sufficient historic data in its stock price. The risk-free rate for periods within the contractual life of the option is based on the US Treasury yield curve in effect at the time of grant.

The fair value of the option grants has been estimated, with the following weighted-average assumptions:

	Year Ended December 31,	
	2021	2020
Risk-free interest rate	0.9% to 1.4%	0.2% to 0.6%
Volatility	114.8% to 118.8%	122.5% to 128.0%
Expected life (years)	5.3 to 6.2	3.7 to 6.3
Expected dividend yield	—%	—%

Stock option activity for the year ended December 31, 2021 is as follows:

	Number of Shares	Weighted Average Grant Date Fair Value	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (years)	Aggregate Intrinsic Value
Outstanding, December 31, 2020	903,487	$ 8.19	$ 11.24	7.9	$ —
Granted	534,865	$ 3.23	$ 3.74		
Exercised	—	$ —	$ —		
Forfeited	—	$ —	$ —		
Outstanding, December 31, 2021	1,438,352	$ 6.35	$ 8.45	7.8	$ —
Exercisable, December 31, 2021	591,101	$ 9.44	$ 13.39	6.5	$ —

Options granted during 2021 and 2020 have an aggregated fair value of $1.7 million and $1.3 million, respectively, that was calculated using the Black-Scholes option-pricing model. At December 31, 2021, total compensation cost not yet recognized was $2.8 million and the weighted average period over which this amount is expected to be recognized is 2.7 years. The aggregate fair value of options vesting was $1.5 million in the years ended December 31, 2021 and 2020, respectively. Subsequent to December 31, 2021, the Company granted 21,667 options.

Restricted Stock

Restricted stock units are granted with a grant date fair value determined using the closing price of the Company's common stock on the grant date. Restricted stock units vest annually in four equal installments. Additionally, the Company's restricted stock unit agreements provide for full vesting of the restricted stock award in the event of a change of control of the Company.

Restricted stock unit activity for the year ended December 31, 2021 is as follows:

	Number of Shares	Weighted Average Grant Date Fair Value	Weighted Average Remaining Contractual Term (years)
Unvested Shares, December 31, 2020	98,482	$ 6.49	3.0
Granted	150,000	$ 3.73	
Vested	(27,923)	$ 6.65	
Unvested Shares, December 31, 2021	220,559	$ 4.59	3.0

As of December 31, 2021, total compensation cost not yet recognized was $0.8 million and the weighted average period over which this amount is expected to be recognized is 2.9 years. In June 2021, the Company granted 150,000 shares of restricted stock units with a weighted average fair value of $3.73 per share at the date of grant, which vest annually in four equal installments.

7. Income Taxes

The provision for income taxes consists of the following components (in thousands):

	Year Ended December 31,	
	2021	2020
Current expense (benefit):		
Federal	$ —	$ —
State	—	—
Foreign	—	—
Current income tax benefit	—	—
Deferred expense (benefit):		
Federal	—	—
State	—	—
Foreign	—	—
Deferred income tax expense	—	—
Total	$ —	$ —

The following summarizes activity related to the Company's valuation allowance (in thousands):

	Year Ended December 31,	
	2021	2020
Valuation allowance at beginning of period	$ 13,867	$ 9,418
Income tax benefit	4,956	4,449
Release of valuation allowance	—	—
Valuation allowance at end of period	$ 18,823	$ 13,867

A reconciliation of the income tax benefit computed using the federal statutory income tax rate to the Company's effective income tax rate is as follows (in thousands):

	Year Ended December 31,			
	2021		2020	
	Amount	Percent	Amount	Percent
Federal tax benefit at statutory rate	$ 3,338	21.0%	$ 3,645	21.0%
State tax benefit net of federal	25	0.2%	44	0.3%
Foreign rate differential	7	0.0%	6	0.0%
Stock warrant costs	1,413	8.9%	493	2.8%
Other permanent differences	(77)	(0.5)%	(63)	(0.4)%
Permanent provision to return items	344	2.2%	361	2.1%
Stock compensation change	(37)	(0.2)%	12	0.1%
Uncertain tax provision	(57)	(0.4)%	(48)	(0.3)%
Other	—	—%	(1)	—%
Increase in valuation allowance	(4,956)	(31.2)%	(4,449)	(25.6)%
Total tax (expense) benefit	$ —	—%	$ —	—%

The principal components of the Company's deferred tax assets and liabilities consist of the following (in thousands):

	Year Ended December 31,	
	2021	2020
Deferred tax assets:		
Start-up costs	$ 5,618	$ 4,158
Federal net operating loss carryforwards	10,866	7,982
State tax loss carryforwards	64	48
Foreign net operating loss carryforwards	122	126
Tax credit carryforward	991	670
ROU Liability	34	58
Deferred compensation	1,157	880
Total deferred tax assets	$ 18,852	$ 13,922
Less valuation allowance	(18,823)	(13,867)
Net deferred tax assets	$ 29	$ 55
Deferred tax liabilities:		
Fixed assets	$ (6)	$ (12)
ROU Asset	(23)	(43)
Total deferred tax liabilities	$ (29)	$ (55)
Net deferred taxes	$ —	$ —

The Company has incurred net operating losses since inception. As of December 31, 2021, the Company had total US federal operating loss carry forwards of approximately $52 million. Of this, $6.1 million will expire commencing in 2035, with the rest having no set expiration date. The value of these carryforwards depends on the Company's ability to generate taxable income. Additionally, because federal tax laws limit the time during which the net operating loss carryforwards may be applied against future taxes, if the Company fails to generate taxable income prior to the expiration dates of the carry forwards the Company may not be able to fully utilize the net operating loss carryforwards to reduce future income taxes. Under the new tax laws, net operating loss carry forwards will not expire beginning for losses generated in the 2018 tax year. However, these net operating losses will only be able to offset 80% of future taxable income. However, with the signing of the CARES Act net operating loss carryforwards created in 2018, 2019, and 2020 are able to offset 100% of future taxable income. Finally, the Company has not undertaken a detailed analysis of the application of IRC Section 382 with respect to limitations on the utilization of net operating loss carryforwards and other deferred tax assets. However, the Company believes that this matter is not material to the overall tax position within the financial statements due to the full valuation allowance against the net operating losses and the lack of utilization of the net operating losses during tax years open under statute.

The Company conducts business in various locations and, as a result, files income tax returns in the United States federal jurisdiction, in multiple state jurisdictions, and internationally as required. As of December 31, 2021, the Company had state operating losses of approximately $1.9 million which expire commencing in 2032. Since the Company is in a loss carryforward position, the Company is generally subject to examination by the US federal, state and local income tax authorities for all tax years in which a loss carryforward is available.

Management has evaluated the positive and negative evidence for the realizability of its deferred tax assets. The Company has cumulative losses and there is no assurance of future taxable income, therefore, valuation allowances have been recorded to fully offset the deferred tax asset at December 31, 2021. Management has determined that it is more likely than not that the Company will not recognize the benefits of its federal and state deferred tax assets, and as a result, a valuation allowance of $18.8 million and $13.9 million has been established at December 31, 2021 and 2020, respectively. The change in the valuation allowance for the year ended December 31, 2021 was primarily due to additional operating losses and capitalized research costs.

The Company undertakes research and development (R&D) activities that qualify for certain tax credits for US and Australian income tax purposes. The Company has a full valuation allowance against its US federal R&D tax credits. For the 2021 tax year, the potential US and Australian research and development tax credits are not expected to be significant.

The Company has a liability for unrecognized tax benefits of $0.2 million (excluding accrued interest and penalties) as of December 31, 2021. The Company's policy is to record interest and penalties related to income taxes as part of its income tax provision.

A reconciliation of the beginning and ending unrecognized tax benefits excluding interest and penalties is as follows (in thousands):

	Year Ended December 31,	
	2021	2020
Balance, beginning of year	$ 118	$ 72
Additions for tax positions related to the current year	—	—
Additions for tax positions related to prior years	57	46
Reductions due to lapse of statutes of limitations	—	—
Decreases related to settlements with tax authorities	—	—
Balance, end of year	$ 175	$ 118

The Company does not believe that its tax positions will significantly change due to any settlement and/or expiration of statutes of limitations prior to December 31, 2021 within the next year.

8. Commitments and Contingencies

In addition to the commitments and contingencies described elsewhere in these notes, see below for a discussion of the Company's commitments and contingencies for the years ended December 31, 2021, and December 31, 2020, respectively.

Lease Obligations Payable

Effective January 1, 2019, the Company adopted ASC 842, which requires recognition of a right-of use asset and a lease liability for all leases at the commencement date based on the present value of the lease payment over the lease term.

In March 2018, the Company entered into a Lease Agreement (the "Lease") which it uses for its corporate office space and headquarters. The term of the Lease began in August 2018 and will continue for an initial term of 66 months, which may be renewed for an additional 5 years. The Company is required to remit base monthly rent which will increase at an average approximate rate of 3% each year. The Company is also required to pay additional rent in the form of its pro-rata share of certain specified operating expenses of the Landlord. The leased space is located in Houston, Texas. The corporate office lease is classified as an operating lease.

In August 2019, the Company entered into an Amended Lease Agreement (the "Lab Lease") which it uses for lab space. The term of the Lease began in September 2019 and will continue for an initial term of 35 months, with no further right or option to renew. The Company is required to remit base monthly rent which will increase at an average approximate rate of 3% each year. The Lab Lease is classified as an operating lease. In August 2019, the Company entered into a sublease with a related party, Houston Pharmaceuticals, Inc. (HPI). The Company has granted HPI access to all of its Lab Lease space and HPI has agreed to pay the Company 50% of the Company's rent payable under the Lab Lease less 50% of any benefits from any sublease or other lab service agreement the Company may receive from its Lab Lease. Although HPI has access to the Company's Lab Lease space, it is the intent of the parties that they equally share the Lab Lease space for research purposes. The Company recorded approximately $42,000 in sublease income from the related party for the years ended December 31, 2021 and December 31, 2020, respectively. Sublease income is recorded as other income on the Company's consolidated statement of operations and comprehensive loss.

During the year ended December 31, 2021, the Company did not enter into any lease arrangements requiring any additional right-of-use assets or liabilities to be recorded.

The Company made an accounting policy election not to apply the recognition requirements to short-term leases. The Company recognizes the lease payments for short-term leases in profit or loss on a straight-line basis over the lease term, and variable lease payments in the period in which the obligation for those payments is incurred.

The following summarizes quantitative information about the Company's operating leases for the years ended December 31, 2021, and December 31, 2020, respectively (in thousands):

	Year Ended December 31,	
	2021	2020
Lease cost:		
Operating lease cost	$ 116	$ 116
Short-term lease cost	-	17
Variable lease cost	29	29
Total	$ 145	$ 162

Other supplemental cash flow information for operating leases is as follows (in thousands):

	Year Ended December 31,	
	2021	2020
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from operating leases	$ 138	$ 134

As of December 31, 2021, future minimum leases under ASC 842 under the Company's operating leases were as follows (in thousands):

Maturity of lease liabilities	As of December 31, 2021
2022	$ 105
2023	56
2024	10
2025	—
2026	—
2027 and thereafter	—
Total lease payments	171
Less: imputed interest	(12)
Present value of operating lease liabilities	$ 159

As of December 31, 2021, the weighted average remaining lease term for operating leases is 1.7 years, and the weighted average discount rate is 9.6%. The interest rate implicit in lease contracts is typically not readily determinable and as such, the Company uses an incremental borrowing rate based on a peer analysis using information available at the commencement date, which represents an internally developed rate that would be incurred to borrow, on a collateralized basis, over a similar term, an amount equal to the lease payments in a similar economic environment.

Licenses

MD Anderson

Under agreements associated with Annamycin, the WP1122 Portfolio and the WP1066 Portfolio all described below, the Company is responsible for certain license, milestone and royalty payments over the course of the agreements. Annual license fees can cost as high as $0.1 million depending upon the anniversary, milestone payments for the commencement of phase II and phase III clinical trials can cost as high as $0.5 million. Other milestone payments for submission of an NDA to the FDA and receipt of first marketing approval for sale of a license product can be as high as $0.6 million. Royalty payments can range in the single digits as a percent of net sales on drug products or flat fees as high as $0.6 million, depending upon certain terms and conditions. Not all of these payments are applicable to every drug. In March 2021, after a determination that the Company did not intend to pursue development of WP1732, the Company entered into a termination of the license agreement related to WP1732 dated February 12, 2018 with MD Anderson. Total expenses under these agreements were$267,000 and $255,000, respectively, for the years ended December 31, 2021 and 2020.

Annamycin

On June 29, 2017, the Company entered into a Patent and Technology License Agreement with MD Anderson licensing certain technology related to the method of preparing Liposomal Annamycin and on December 17, 2021 the Company entered into an amendment to this agreement to include certain technology related to the method of reconstituting Liposomal Annamycin. On December 2, 2021, the Company entered into a Patent and Technology License Agreement with MD Anderson licensing certain technology related to lung targeted therapies with Annamycin. The terms and payments of these agreements are included in the summary above under "Commitments and Contingencies – Licenses – MD Anderson". The terms of these agreements extend until the later of 20 years from the effective date of the agreements, or the expiration of the last-to-expire licensed patent. In addition, commencing on the four-year anniversary of each agreement, MD Anderson has the right to remove any jurisdiction from such agreement, upon 90 days' notice, if the Company has not commercialized or is not using commercially reasonable efforts actively and effectively to attempt to commercialize a licensed invention in such jurisdiction.

WP1122 Portfolio

The rights and obligations to an April 2012 Patent and Technology License Agreement entered into by and between IntertechBio and MD Anderson (the "2012 Agreement") have been assigned to MBI. Therefore, MBI has obtained a royalty-bearing, worldwide, exclusive license to intellectual property, including patent rights, related to our WP1122 Portfolio and to our drug product candidate, WP1122. On December 3, 2021, the Company entered into a new patent and technology license agreement (the "2021 Agreement") with MD Anderson licensing certain technology related to WP1122 anti-viral treatments. The 2012 Agreement was amended in May 2020 to allow for the extension of certain milestones. The initial milestone required the Company to file an IND with the FDA for a Phase I study by February 20, 2021. The Company extended the deadline for this milestone by six months by making the required extension payment, and the Company has the right to receive two additional six-month extensions in the future by making additional extension payments. On August 3, 2021, the Company filed a CTA for the application of WP1122 in the United Kingdom to commence a Phase 1a clinical trial of WP1122. MD Anderson agreed that this CTA filing would further extend the deadline to file an IND with the FDA for a Phase I study until February 2022. In December 2021, the Company submitted an IND for the treatment of GBM with WP1122 to the FDA, thus meeting the IND filing milestone. The term of the 2012 agreement extends until the later of 15 years from the effective date of the agreement, or the expiration of the last-to-expire licensed patent. In addition, MD Anderson may terminate the 2012 agreement if the Company fails to commence a Phase 1 study for a licensed product prior to November 20, 2022; or if the Company fails to commence a Phase 2 study for licensed product prior to November 20, 2024. The term of the 2021 agreement extends until the later of 20 years from the effective date of the agreement, or the expiration of the last-to-expire licensed patent. In addition, MD Anderson may terminate the 2021 agreement if the Company fails to file an IND for a Phase 1 study for a licensed product prior to December 3, 2024; or if the Company fails to commence a Phase 1 study for licensed product prior to December 3, 2026. The Company believes that the recent approval for its clinical trial application for a WP1122 Phase 1 clinical trial for COVID-19 will meet these required milestones.

WP1066 Portfolio

The rights and obligations to a June 2010 Patent and Technology License Agreement entered into by and between Moleculin LLC and MD Anderson (the "2010 Agreement") have been assigned MBI. Therefore, MBI has obtained a royalty-bearing, worldwide, exclusive license to intellectual property rights, including patent rights, related to its WP1066 drug product candidate. On February 3, 2022, the Company entered into a new patent and technology license agreement (the "2022 Agreement") with MD Anderson licensing certain technology related to WP1066 checkpoint inhibitors. In consideration for these agreements, the Company must make payments to MD Anderson including an up-front payment, milestone payments and minimum annual royalty payments for sales of products developed under the license agreement. Annual Maintenance fee payments will no longer be due upon marketing approval in any country of a licensed product under the 2010 Agreement. One-time milestone payments are due upon commencement of the first Phase III study for a licensed product within the United States, Europe, China or Japan; upon submission of the first NDA for a licensed product in the United States; and upon receipt of the first marketing approval for sale of a licensed product in the United States. The term of the 2010 Agreement extends until the later of 15 years from the effective date of the agreement, or the expiration of the last-to-expire licensed patent. The term of the 2022 Agreement extends until the later of 20 years from the effective date of the agreement, or the expiration of the last-to-expire licensed patent. In addition, MD Anderson may terminate the 2022 Agreement if the Company fails to file for an IND for a Phase 1 study before February 2, 2025 in the United States, France, Germany, Italy, Spain, the United Kingdom or China. The Company believes that to the clinical trial application in China filed prior to 2016 meets this milestone.

HPI

MBI entered into an outlicensing agreement with HPI, pursuant to which it granted certain intellectual property rights to HPI, including rights covering the potential drug candidate, WP1066 (HPI Out-Licensing Agreement). Upon payment of the option repurchase payment in 2019, the HPI Out-Licensing Agreement was terminated and MBI regained all rights to the licensed subject matter and rights to any and all development data and any regulatory submissions including any IND, NDA or ANDA related to the licensed subject matter and can end the license without any other obligation. In March 2020, the Company entered into two agreements with HPI. The first agreement, which has a term of two years, continues a prior consulting arrangement with HPI on the Company's licensed molecules and requires payments for $43,500 per quarter to HPI. The second agreement, which can be cancelled with sixty days notice by either party, allows the Company's employees access to laboratory equipment owned by HPI and this requires a payment of $15,000 per quarter to HPI. Total expenses related to HPI were $234,000 and $284,000, for the years ended December 31, 2021 and 2020, respectively.

Sponsored Research Agreements with MD Anderson

MBI has a Sponsored Laboratory Study Agreement with MD Anderson expiring December 31, 2022. In July 2021, the Company amended its Sponsored Laboratory Study Agreement with MD Anderson for total payment of $175,000 to support the continuation of the project. The expenses recognized under the MD Anderson agreement with regards to the Sponsored Laboratory Study were $697,000 and $629,000, respectively for the years ended December 31, 2021 and 2020.

Other Licenses

Dermin

In 2015, we obtained the rights and obligations for certain patent and technology development and license agreements with Dermin Sp. Zoo (Dermin). In connection with such agreements, certain intellectual property rights related to Annamycin, our WP1122 portfolio, and our WP1066 portfolio were licensed to Dermin and Dermin was granted a royalty-bearing, exclusive license to manufacture, have manufactured, use, import, offer to sell and/or sell products in the field of human therapeutics under the licensed intellectual property in certain countries in Europe and Asia. In July 2019, Dermin assigned its rights under the foregoing license agreements to an affiliated entity of Dermin, Exploration Invest Pte Ltd. (Exploration). On July 30, 2019, the Company and Exploration entered into an agreement pursuant to which the Company agreed to issue Exploration shares of Company common stock valued at $0.5 million (based on the greater of the closing price of the common stock on the date of the agreement or the 10-day average closing price prior to the date of the agreement) in exchange for the modifying the license agreements to: (i) limit the licensed territory solely to Poland; and (ii) limit the patent rights and technology rights licensed to Exploration to the patent rights and technology rights that existed on the date the original license agreements were entered into with Dermin. In August 2019, the Company issued 71,663 shares of Company common stock to Exploration to satisfy this commitment. In February 2022, the Company and Exploration entered into a license termination agreement pursuant to which the Company agreed to pay Exploration $0.4 million to terminate each of the License Agreements, and extend its confidentiality requirements until the 10-year anniversary of the license termination agreement. The Company paid $0.4 million to Exploration in February 2022 to satisfy this commitment. As such, all of the above licenses have been terminated.

WPD Pharmaceuticals

In February 2019, the Company sublicensed certain intellectual property rights, including rights to Annamycin, its WP1122 portfolio, and its WP1066 portfolio to WPD Pharmaceuticals sp. z o.o. (WPD), which sublicense was last amended on December 20, 2021 (such agreement as amended, the "WPD Agreement"). WPD is affiliated with Dr. Waldemar Priebe, one of the Company's founders and largest shareholder. Under the WPD Agreement, the Company granted WPD a royalty-bearing, exclusive license to research, develop, manufacture, have manufactured, use, import, offer to sell and/or sell products in the field of human therapeutics under the licensed intellectual property in the countries of Poland, Estonia, Latvia, Lithuania, Belarus, Ukraine, Moldova, Romania, Armenia, Azerbaijan, Georgia, Slovakia, Czech Republic, Hungary, Uzbekistan, Kazakhstan, Greece, Austria, Russia, Netherlands, Turkey, Belgium, Switzerland, Sweden, Portugal, Norway, Denmark, Ireland, Finland, Luxembourg, Iceland (licensed territories).

In consideration for entering into the WPD Agreement, WPD agreed that it must use Commercially Reasonable Development Efforts to develop and commercialize products in the licensed territories. For purposes of the WPD Agreement, the term "Commercially Reasonable Development Efforts" (CRDE) means the expenditure, either directly or through the guarantees of grants, by or on behalf of WPD or any of its affiliates of at least: (i) $2.5 million during the first four years of the agreement (or prior to February 2023) on the research, development and commercialization of products in the licensed territories; and (ii) $2.1 million annually for the five years thereafter on the research and development of products in the licensed territories. The total CRDE required by the sublicense is $14.0 million.

During the term of the WPD Agreement, to the extent the Company is required to make any payments to MD Anderson pursuant to its license agreements with MD Anderson, whether a milestone or royalty payment, as a result of the research and development or sale of a sublicensed product, WPD shall be required to advance or reimburse the Company for such payments. In further consideration for the rights granted by the Company to WPD under the WPD Agreement, WPD agreed to pay us a royalty percentage at a rate equal to the royalty rate owed MD Anderson under the Company's license agreements with MD Anderson plus an additional royalty (the "override royalty percentage") equal to 1.0% of net sales of any sublicensed products, provided, however, if WPD spends: (i) more than $14.0 million in Commercially Reasonable Development Efforts, the override royalty percentage will decrease to 0.75% of net sales; or (ii) more than $17.0 million in Commercially Reasonable Development Efforts, the override royalty percentage will decrease to 0.5% of net sales.

With certain exceptions, the WPD Agreement will remain in full force and effect until the expiration of the last patent within the sublicensed patents. Notwithstanding the foregoing, the Company has the right, in its sole discretion, to terminate the WPD Agreement in whole, or to materially amend the agreement by removing a portion of the sublicensed subject matter, in connection with certain fundamental transactions or in connection with the granting to an unaffiliated third party of a license or sublicense to all or to a material portion of the sublicensed subject matter within all or substantially all of the licensed territories (such event, the "buyback event") by making a payment to WPD based on the percentage of licensed territories involved in the buyback event as compared to the overall world healthcare spend and the extent to which WPD has satisfied its Commercially Reasonable Development Efforts requirements.

Animal Life Sciences

In February 2019, the Company sublicensed certain intellectual property rights, including rights to Annamycin, its WP1122 portfolio, and its WP1066 portfolio in the field of non-human animals to ALI (the "ALI Agreement"). ALI is affiliated with Dr. Waldemar Priebe, one of its founders and its largest shareholder. Under the ALI Agreement, the Company granted ALI a worldwide royalty-bearing, exclusive license to research, develop, manufacture, have manufactured, use, import, offer to sell and/or sell products in the field of non-human animals under the licensed intellectual property. This license is subject to the terms in the prior agreements entered into by the Company and MDA.

Employment Agreements

The Company has agreements with certain executive and other employees to provide benefits in the event of termination. The base salary and certain other benefits would aggregate approximately $0.9 million using the rate of compensation in effect at December 31, 2021.

9. Subsequent Events

In addition to the subsequent events discussed elsewhere in these notes, see below for a discussion of our subsequent events occurring after December 31, 2021.

In February 2022, the Company and Exploration Invest Pte Ltd. (Exploration) entered into a license termination agreement pursuant to which the Company agreed to pay Exploration $0.4 million to terminate certain License Agreements and extend its confidentiality requirements until the 10-year anniversary of the license termination agreement. The Company paid $0.4 million to Exploration in February 2022 to satisfy this commitment.

EXHIBIT 4.10

DESCRIPTION OF THE COMPANY'S SECURITIES

The following summary is a description of the material terms of our capital stock. This summary is not complete, and is qualified by reference to our amended and restated certificate of incorporation, as amended, and our amended and restated bylaws, which are filed as exhibits to this Annual Report on Form 10-K and are incorporated by reference herein. We encourage you to read our amended and restated certificate of incorporation, as amended, our amended and restated bylaws and the applicable provisions of the Delaware General Corporation Law for additional information.

Our amended and restated certificate of incorporation authorizes us to issue up to 100,000,000 shares of common stock, par value $0.001 per share, and 5,000,000 shares of preferred stock, $0.001 par value per share.

Common Stock

Shares of our common stock have the following rights, preferences and privileges:

Voting

Each holder of common stock is entitled to one vote for each share of common stock held on all matters submitted to a vote of stockholders. Any action at a meeting at which a quorum is present will be decided by a majority of the voting power present in person or represented by proxy, except in the case of any election of directors, which will be decided by a plurality of votes cast. There is no cumulative voting.

Dividends

Holders of our common stock are entitled to receive dividends when, as and if declared by the our board of directors out of funds legally available for payment, subject to the rights of holders, if any, of any class of stock having preference over the common stock. Any decision to pay dividends on our common stock will be at the discretion of our board of directors. Our board of directors may or may not determine to declare dividends in the future. The board's determination to issue dividends will depend upon our profitability and financial condition any contractual restrictions, restrictions imposed by applicable law and the SEC, and other factors that our board of directors deems relevant.

Liquidation Rights

In the event of a voluntary or involuntary liquidation, dissolution or winding up of the company, the holders of our common stock will be entitled to share ratably on the basis of the number of shares held in any of the assets available for distribution after we have paid in full, or provided for payment of, all of our debts and after the holders of all outstanding series of any class of stock have preference over the common stock, if any, have received their liquidation preferences in full.

Other

Our issued and outstanding shares of common stock are fully paid and nonassessable. Holders of shares of our common stock are not entitled to preemptive rights. Shares of our common stock are not convertible into shares of any other class of capital stock, nor are they subject to any redemption or sinking fund provisions.

Preferred Stock

We are authorized to issue up to 5,000,000 shares of preferred stock. Our certificate of incorporation authorizes the board to issue these shares in one or more series, to determine the designations and the powers, preferences and relative, participating, optional or other special rights and the qualifications, limitations and restrictions thereof, including the dividend rights, conversion or exchange rights, voting rights (including the number of votes per share), redemption rights and terms, liquidation preferences, sinking fund provisions and the number of shares constituting the series. Our board of directors could, without stockholder approval, issue preferred stock with voting and other rights that could adversely affect the voting power and other rights of the holders of common stock and which could have the effect of making it more difficult for a third party to acquire, or of discouraging a third party from attempting to acquire, a majority of our outstanding voting stock.

Limitations on Liability and Indemnification of Officers and Directors

Our certificate of incorporation and bylaws limit the liability of our officers and directors and provide that we will indemnify our officers and directors, in each case, to the fullest extent permitted by the Delaware General Corporation Law.

We have entered into separate indemnification agreements with each of our directors and executive officers. Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors or executive officers, we have been informed that in the opinion of the SEC such indemnification is against public policy and is therefore unenforceable.

Certificate of Incorporation and Bylaw Provisions

Our certificate of incorporation and bylaws include a number of anti-takeover provisions that may have the effect of encouraging persons considering unsolicited tender offers or other unilateral takeover proposals to negotiate with our board of directors rather than pursue non-negotiated takeover attempts. These provisions include:

Advance Notice Requirements. Our bylaws establish advance notice procedures with regard to stockholder proposals relating to the nomination of candidates for election as directors or new business to be brought before meetings of stockholders. These procedures provide that notice of stockholder proposals must be timely and given in writing to our corporate Secretary. Generally, to be timely, notice must be received at our principal executive offices not fewer than 120 calendar days prior to the first anniversary date on which our notice of meeting and related proxy statement were mailed to stockholders in connection with the previous year's annual meeting of stockholders. The notice must contain the information required by the bylaws, including information regarding the proposal and the proponent.

Special Meetings of Stockholders. Our bylaws provides that special meetings of stockholders may be called at any time by only the Chairman of the Board, the Chief Executive Officer, the President or the board of directors, or in their absence or disability, by any vice president.

No Written Consent of Stockholders. Our certificate of incorporation and bylaws provide that any action required or permitted to be taken by stockholders must be effected at a duly called annual or special meeting of stockholders and may not be effected by any consent in writing by such stockholders.

Exclusive Forum Provision. Our certificate of incorporation provides that the Court of Chancery of the State of Delaware shall be the sole and exclusive forum for (i) any derivative action or proceeding brought our behalf, (ii) any action asserting a claim of breach of a fiduciary duty owed by any of our directors or officers to us or our stockholders, (iii) any action asserting a claim against us arising pursuant to any provision of the Delaware General Corporation Law (the "DGCL"), or our certificate of incorporation or the bylaws, and (iv) any action asserting a claim against us governed by the internal affairs doctrine. This provision would not apply to suits brought to enforce a duty or liability created by the Exchange Act or Securities Act.

This choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and employees. Alternatively, a court could find these provisions of our certificate of incorporation to be inapplicable or unenforceable in respect of one or more of the specified types of actions or proceedings, which may require us to incur additional costs associated with resolving such matters in other jurisdictions, which could adversely affect our business and financial condition.

Amendment of Bylaws. Our stockholders may amend any provisions of our bylaws by obtaining the affirmative vote of the holders of a majority of each class of issued and outstanding shares of our voting securities, at a meeting called for the purpose of amending and/or restating our bylaws.

Preferred Stock. Our certificate of incorporation authorizes our board of directors to create and issue rights entitling our stockholders to purchase shares of our stock or other securities. The ability of our board to establish the rights and issue substantial amounts of preferred stock without the need for stockholder approval may delay or deter a change in control of us. See "Preferred Stock" above.

Delaware Takeover Statute

We are subject to Section 203 of the DGCL which, subject to certain exceptions, prohibits a Delaware corporation from engaging in any "business combination" (as defined below) with any interested stockholder for a period of three years following the date that such stockholder became an interested stockholder, unless: (1) prior to such date, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder; (2) on consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding for purposes of determining the voting stock outstanding those shares owned (x) by persons who are directors and also officers and (y) by employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to this plan will be tendered in a tender or exchange offer; or (3) on or subsequent to such date, the business combination is approved by the board of directors and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least 66 2/3% of the outstanding voting stock that is not owned by the interested stockholder.

Section 203 of the DGCL defines generally "business combination" to include: (1) any merger or consolidation involving the corporation and the interested stockholder; (2) any sale, transfer, pledge or other disposition of 10% or more of the assets of the corporation involving the interested stockholder; (3) subject to certain exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder; (4) any transaction involving the corporation that has the effect of increasing the proportionate share of the stock of any class or series of the corporation beneficially owned by the interested stockholder; or (5) the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation. In general, Section 203 defines an "interested stockholder" as any entity or person beneficially owning 15% or more of the outstanding voting stock of the corporation and any entity or person affiliated with or controlling or controlled by such entity or person.

Listing

Our common stock is listed on the Nasdaq Capital Market under the symbol "MBRX".

Transfer Agent

The transfer agent for our common stock is VStock Transfer, LLC.

Exhibit 10.30

Certain identified information has been excluded from this exhibit because it is both not material and is the type that the issuer treats as private or confidential. Information that was omitted has been noted in this document with a placeholder identified by the mark "[***]".

PATENT AND TECHNOLOGY LICENSE AGREEMENT

This AGREEMENT ("AGREEMENT") is made on this 29th day of June, 2017, by and between THE BOARD OF REGENTS ("BOARD") of THE UNIVERSITY OF TEXAS SYSTEM ("SYSTEM"), an agency of the State of Texas, whose address is 201 West 7th Street, Austin, Texas 78701, on behalf of THE UNIVERSITY OF TEXAS M. D. ANDERSON CANCER CENTER ("MD ANDERSON"), a member institution of SYSTEM, and Moleculin Biotech, Inc. a Delaware corporation having a principal place of business located at 2575 West Bellfort, Suite 333, Houston, Texas 77054 ("LICENSEE").

RECITALS

A. BOARD owns certain PATENT RIGHTS and TECHNOLOGY RIGHTS related to LICENSED SUBJECT MATTER developed at MD ANDERSON in cooperation with LICENSEE.

B. BOARD, through MD ANDERSON, desires to have the LICENSED SUBJECT MATTER developed in the LICENSED FIELD and used for the benefit of LICENSEE, BOARD, SYSTEM, MD ANDERSON, the inventor(s), and the public as outlined in BOARD's Intellectual Property Policy.

C. LICENSEE wishes to obtain a license from BOARD to practice LICENSED SUBJECT MATTER.

NOW, THEREFORE, in consideration of the mutual covenants and promises herein contained, the parties agree as follows:

I. EFFECTIVE DATE

1.1 This AGREEMENT is effective as of the date written above ("EFFECTIVE DATE") which is the date fully executed by all parties.

II. DEFINITIONS

As used in this AGREEMENT, the following terms have the meanings indicated:

2.1 **AFFILIATE** means any business entity more than [***] percent ([***]%) owned by LICENSEE, any business entity which owns more than [***] percent ([***]%) of LICENSEE, or any business entity that is more than [***] percent ([***]%) owned by a business entity that owns more than [***] percent ([***]%) of LICENSEE.

2.2 **ASSIGNMENT** means a writing wherein a third-party assumes in writing (a copy of which writing will be promptly provided to MD ANDERSON) all of LICENSEE's or AFFILIATE's interests, rights, duties, and obligations under the AGREEMENT and agrees to comply with all terms and conditions of the AGREEMENT as if the assignee were the original party to the AGREEMENT.

2.3 **EXCLUDED AMOUNTS** means (1) any payment received by or on behalf of LICENSEE from a SUBLICENSEE for the supply of goods and/or services (including LICENSED PRODUCTS) to such SUBLICENSEE, provided that the SUBLICENSEE is not the end user of such goods or services, and provided further that MD ANDERSON has been paid the ROYALTY RATE for NET SALES upon SALE of the LICENSED PRODUCTS to the end user; and (2) payment received by LICENSEE from a SUBLICENSEE for providing LICENSED PRODUCTS to said SUBLICENSEE for use in a clinical study or other research necessary or useful to obtain REGULATORY APPROVAL of a LICENSED PRODUCTS, provided that such payment does not exceed LICENSEE's actual cost for providing such LICENSED PRODUCTS to said SUBLICENSEE.

2.4 **LICENSED FIELD** means all fields of use.

2.5 **LICENSED PRODUCTS** means any product or service sold by LICENSEE, an AFFILIATE, or a SUBLICENSEE comprising LICENSED SUBJECT MATTER pursuant to this AGREEMENT and which is covered by a VALID CLAIM.

2.6 **LICENSED SUBJECT MATTER** means inventions and discoveries covered by PATENT RIGHTS or TECHNOLOGY RIGHTS within LICENSED FIELD.

2.7 **LICENSED TERRITORY** means worldwide.

2.8 **NEW DRUG APPLICATION** means application submitted to the United States Food and Drug Administration ("FDA") for approval to market a new drug, as more specifically defined by 21 C F R §314 et seq., or any future revisions or substitutes thereof, or an equivalent foreign filing in any jurisdiction other than the United States.

2.9 **NET SALES** [***].

2.10 **PATENT EXPENSES** all expenses incurred in searching, preparing, filing, prosecuting, defending in any post-issuance administrative proceeding, and maintaining Patent Rights.

2.11 **PATENT RIGHTS** means BOARD's rights (a) the patents and patent applications resulting from the IDR(s) listed in Exhibit I; (b) all patent applications that claim priority to any patent or patent application of identified in (a), provided that the claims of such non-provisional applications are entitled to claim priority to such applications; (c) all divisionals, continuations and continuations-in-part of the non-provisional patent applications identified in (a) and (b), above provided that the claims of such continuations-in-part are entitled to claim priority to at least one of the patent applications identified in (a) or (b), above; (d) all reissues, reexaminations, extensions, and foreign counterparts of any of the patents or patent applications identified in (a), (b) or (c), above; and (e) any patents that issue with respect to any of the patent applications listed in (a), (b), (c) or (d), above.

2.12 **PHASE III STUDY** means a human clinical trial using a Licensed Product on a sufficient number of subjects that is designed to establish that a pharmaceutical product is safe and efficacious for its intended use, and to determine warnings, precautions, and adverse reactions that are associated with such pharmaceutical product in the dosage range to be prescribed, which trial is intended to support Regulatory Approval of a Licensed Product alone or in combination with an ATAC, as described in 21 C.F.R. 312.21(c) for the United States, or a similar clinical study prescribed by the Regulatory Authorities in a foreign country.

2.13 **REGULATORY APPROVAL** means the approval by the Regulatory Authority needed for a particular national jurisdiction to market, Sell and use a Licensed Product in that national jurisdiction.

2.14 **REGULATORY AUTHORITY** means the governmental authority responsible for granting any necessary licenses or approvals for the marketing, Sale and use of a Licensed Product in a particular national jurisdiction, including without limitation, the FDA, European Medicines Agency or Koseisho (i.e. the Japanese Ministry of Health and Welfare).

2.15 **ROYALTY PERIOD** means, for a given LICENSED PRODUCT in a given jurisdiction, a period that commences with the first SALE of such LICENSED PRODUCT after receipt of REGULATORY APPROVAL in such jurisdiction and continues, on a jurisdiction-tojurisdiction and LICENSED PRODUCT-by-LICENSED PRODUCT basis, until such time as no VALID CLAIM is infringed by the use, composition, sale, manufacture, or importation of such LICENSED PRODUCT in such jurisdiction of SALE.

2.16 **ROYALTY RATE** means the rate set forth in Section 4.1(d).

2.17 **SELL, SALE or SOLD** means the transfer or disposition of a LICENSED PRODUCT for value to a party other than LICENSEE, an AFFILIATE, or a SUBLICENSEE.

2.18 **SUBLICENSE CONSIDERATION** means any and all consideration, other than royalties for NET SALES (provided that MD ANDERSON has been paid the ROYALTY RATE for such NET SALES), debt, research and development funds, and EXCLUDED AMOUNTS, as defined below, received by LICENSEE from any SUBLICENSEE as consideration for the sublicense, including, but not limited to, up-front, marketing, distribution, franchise, and option payments, license and documentation fees, and bonus and milestone payments.. Notwithstanding the foregoing, if LICENSEE receives a bona fide milestone payment from a SUBLICENSEE for achieving a MILESTONE, then for purposes of calculating SUBLICENSE CONSIDERATION, LICENSEE may deduct the amount actually paid to MD ANDERSON by LICENSEE for achieving such milestone from the amount received by LICENSEE from the SUBLICENSEE for achieving the milestone. In addition, if LICENSEE receives a payment from a SUBLICENSEE as a bona fide reimbursement for PATENT EXPENSES for PATENT RIGHTS, then for purposes of calculating SUBLICENSE CONSIDERATION, LICENSEE may deduct the amount actually paid to MD ANDERSON by LICENSEE as reimbursement for PATENT EXPENSES from the amounts received by LICENSEE from the SUBLICENSEE as reimbursement of PATENT EXPENSES. For purposes of clarification, consideration received by LICENSEE from a SUBLICENSEE for equity securities of LICENSEE shall not be considered SUBLICENSE CONSIDERATION, except that premiums paid by a SUBLICENSEE for equity securities of LICENSEE over the fair market value of such securities shall be considered SUBLICENSE CONSIDERATION.

2.19 **SUBLICENSEE** means any third party to whom LICENSEE or an AFFILIATE (or other entity granted any rights by LICENSEE under this AGREEMENT) has granted any of the rights granted to LICENSEE under this AGREEMENT, provided that the third party is not the end user of LICENSED PRODUCTS covered by such granted rights. As used herein, SUBLICENSEE shall also mean a third party to whom LICENSEE, an AFFILIATE, or a SUBLICENSEE has granted the exclusive right to distribute LICENSED PRODUCTS supplied by such LICENSEE, AFFILIATE, or SUBLICENSEE, provided that such third party is responsible for significant marketing and/or promotion of, LICENSED PRODUCTS within its exclusive territory. For clarity, an AFFILIATE of LICENSEE cannot be a SUBLICENSEE.

2.20 **TECHNOLOGY RIGHTS** means [***].

2.21 **VALID CLAIM** means a claim of (a) an issued and unexpired patent included within the PATENT RIGHTS unless the claim has been held unenforceable or invalid by the final, unreversed, and un-appealable decision of a court or other governmental body of competent jurisdiction, has been irretrievably abandoned or disclaimed, or has otherwise been finally admitted or finally determined by the relevant governmental authority to be invalid, un-patentable or unenforceable, whether through reissue, reexamination, disclaimer or otherwise, or (b) a pending patent application within the PATENT RIGHTS to the extent the claim continues to be prosecuted in good faith, provided that such patent application has not been pending for more than seven (7) years from the filing date of such application.

III. LICENSE

3.1 BOARD, through MD ANDERSON, hereby grants to LICENSEE a royalty-bearing, exclusive license under LICENSED SUBJECT MATTER to manufacture, have manufactured, use, import, offer to sell and/or sell LICENSED PRODUCTS within LICENSED TERRITORY for use within LICENSED FIELD. This grant is subject to Sections 13.2, 14.2 and 14.3 hereinbelow, the payment by LICENSEE to MD ANDERSON of all consideration as provided herein, and is further subject to the following rights retained by BOARD and MD ANDERSON to:

(a) Publish the general scientific findings from research conducted by MD ANDERSON related to LICENSED SUBJECT MATTER, subject to the terms of ARTICLE XI-Confidential Information and Publication; and

(b) Use LICENSED SUBJECT MATTER for non-commercial research, teaching, patient care, and other academically-related purposes; and

(c) Transfer LICENSED SUBJECT MATTER to academic or research institutions for non-commercial research use.

For purposes of clarification, and not by way of limitation, the rights retained by the BOARD and MD ANDERSON pursuant to this Section 3.1 do not include the right to engage in research sponsored by a commercial, for-profit entity or to conduct clinical trials sponsored by a commercial, for-profit entity.

3.2 LICENSEE may extend the license granted herein to any AFFILIATE provided that the AFFILIATE consents in writing to be bound by the applicable provisions of this AGREEMENT to the same extent as LICENSEE. LICENSEE agrees to deliver a copy of such contract to MD ANDERSON within thirty (30) calendar days following execution thereof, which copy may be redacted except to the extent necessary to verify compliance with this Section 3.2.

3.3 LICENSEE may grant sublicenses under LICENSED SUBJECT MATTER consistent with the terms of this AGREEMENT provided that LICENSEE is responsible for its SUBLICENSEES relevant to this AGREEMENT, and for diligently collecting all amounts due LICENSEE from SUBLICENSEES. If a SUBLICENSEE pursuant hereto becomes bankrupt, insolvent or is placed in the hands of a receiver or trustee, LICENSEE, to the extent allowed under applicable law and in a timely manner, agrees to use its best reasonable efforts to collect all consideration owed to LICENSEE and to have the sublicense agreement confirmed or rejected by a court of proper jurisdiction.

3.4 LICENSEE must deliver to MD ANDERSON a true and correct copy of each sublicense granted by LICENSEE to a SUBLICENSEE, and any modification or termination thereof, within thirty (30) calendar days after execution, modification, or termination, which copy may be redacted except to the extent necessary to verify compliance with the applicable terms of this AGREEMENT.

3.5 If this AGREEMENT is terminated pursuant to ARTICLE XIII-Term and Termination, BOARD and MD ANDERSON agree to accept as successors to LICENSEE, existing SUBLICENSEES in good standing at the date of termination provided that each such SUBLICENSEE consents in writing to be bound by all of the terms and conditions of this AGREEMENT.

IV. CONSIDERATION, PAYMENTS AND REPORTS

4.1 In consideration of rights granted by BOARD to LICENSEE under this AGREEMENT, LICENSEE agrees to pay MD ANDERSON the following:

(a) all reasonable out-of-pocket expenses incurred by MD ANDERSON in filing, prosecuting, defending in a patent office, and maintaining PATENT RIGHTS, and all such future expenses incurred by MD ANDERSON, for so long as, and in such countries as this AGREEMENT remains in effect. MD ANDERSON will invoice LICENSEE within thirty (30) calendar days of the EFFECTIVE DATE for the expenses incurred as of that time and on a quarterly basis thereafter. The invoice amounts will be due and payable by LICENSEE within thirty (30) calendar days of invoice; and

(b) A nonrefundable license documentation fee ("LICENSE DOCUMENTATION FEE") in the amount of $[***]. The LICENSE DOCUMENTATION FEE will not reduce the amount of any other payment provided for in this ARTICLE IV, and is due and payable within thirty (30) calendar days after the AGREEMENT has been fully executed by all parties and LICENSEE has received an invoice for the amount from MD ANDERSON. This license documentation fee is not subject to the thirty (30) day cure period set forth in Section 13.3(b); and

(c) A nonrefundable annual maintenance fee ("ANNUAL MAINTENANCE FEE") in the amount of $[***] due and payable (without invoice) within thirty (30) calendar days of each anniversary of the EFFECTIVE DATE until the first SALE and upon receipt by Licensee of an invoice from MD ANDERSON. The ANNUAL MAINTENANCE FEE will not reduce the amount of any other payment provided for in this ARTICLE IV; and

(d) Subject to Section 4.2, a running royalty equal to [***]percent ([***]%) ("ROYALTY RATE") of NET SALES of LICENSED PRODUCTS covered by a VALID CLAIM in the country of SALE during the applicable ROYALTY PERIOD, provided that, Licensee shall make no SALE prior to REGULATORY APPROVAL unless LICENSEE pays the royalty due hereunder to MD ANDERSON on account of any NET SALES arising from such SALE. For clarity, LICENSEE will not be obligated to pay any royalty for NET SALES of a particular LICENSED PRODUCT in a particular country after the expiration of the ROYALTY PERIOD for such LICENSED PRODUCT in such country; and

(e) Licensee will pay milestone fees within thirty (30) days of achieving the following Milestone Events:

Milestone Events	Milestone Fees
[***]	$[***]
[***]	$[***]
[***]	$[***]

Each of the foregoing milestone fees shall be made by LICENSEE to MD ANDERSON (without invoice) within thirty (30) calendar days of achieving the Milestone Event and shall not reduce the amount of any other payment provided for in this ARTICLE IV. For clarity, each of the foregoing milestone payments shall be paid only once regardless of the number of LICENSED PRODUCTS that achieve such milestone; and

(f) [***] percent ([***]%) of all SUBLICENSE CONSIDERATION, received by LICENSEE from any SUBLICENSEE pursuant to Section 3.3 hereinabove.

4.2 In the event that a LICENSED PRODUCT is sold in combination with one or more other functional components for which no royalty would be due hereunder if sold separately ("COMBINATION PRODUCT(S)"), then the running royalty due for NET SALES of the Combination Product will be calculated by multiplying the ROYALTY RATE by the total NET SALES received for the COMBINATION PRODUCT, and then multiplying the resulting product by the fraction, A/(A+B), where A is the average sale price of the LICENSED PRODUCT when sold by the LICENSEE separately, and B is the average sale price of all other functional component(s) included in the COMBINATION PRODUCT when sold by the LICENSEE separately. In the event either the component that is a LICENSED PRODUCT or the other functional component(s) included in the COMBINATION PRODUCT are not sold separately, then the running royalty due for NET SALES of the LICENSED PRODUCT sold as part of a COMBINATION PRODUCT will be calculated by multiplying the ROYALTY RATE by the NET SALES received for the COMBINATION PRODUCT, and then multiplying the resulting product by the fraction, F/(F+G) where F is the fair market value of the component that is a LICENSED PRODUCT, and G is the fair market value for each of the other functional component(s) included in the COMBINATION PRODUCT, such fair market values to be mutually agreed in good faith by LICENSEE and MD ANDERSON prior to sales of such COMBINATION PRODUCTS. Notwithstanding the foregoing, in no event shall the running royalty payment due to MD ANDERSON during the applicable ROYALTY PERIOD for the sale of a COMBINATION PRODUCT that is covered by a VALID CLAIM in the country of sale be less than [***] percent ([***]%) of the NET SALES of such COMBINATION PRODUCT in such country.

4.3 Unless otherwise provided, all such payments are payable within sixty (60) calendar days after March 31, June 30, September 30, and December 31 of each year during the term of this AGREEMENT, at which time LICENSEE will also deliver to MD ANDERSON a true and accurate report, giving such particulars of the business conducted by LICENSEE, its AFFILIATES and its SUBLICENSEES, if any exist, during the preceding three (3) calendar months under this AGREEMENT as necessary for MD ANDERSON to account for LICENSEE's payments hereunder. This report will include pertinent data, including, but not limited to:

(a) the accounting methodologies used to account for and calculate the items included in the report and any differences in such accounting methodologies used by LICENSEE since the previous report; and

(b) a list of each type of LICENSED PRODUCT available for sale during the three (3) preceding calendar months; and

(c) the total quantities of each type of LICENSED PRODUCT sold during such period; and

(d) the total SALES; and

(e) the calculation of NET SALES; and

(f) the royalties so computed and due MD ANDERSON; and

(g) all consideration received from each SUBLICENSEE and payments due MD ANDERSON; and

(h) all other amounts due MD ANDERSON herein.

Simultaneously with the delivery of each such report, LICENSEE agrees to pay MD ANDERSON the amount due, if any, for the period of such report. These reports are required even if no payments are due.

4.4 During the term of this AGREEMENT and for one (1) year thereafter, LICENSEE agrees to keep complete and accurate records of its, its AFFILIATES' and SUBLICENSEES' SALES and NET SALES in sufficient detail to enable the royalties and other payments due hereunder to be determined. LICENSEE agrees to permit an independent auditor engaged by MD ANDERSON and reasonably acceptable to LICENSEE, at MD ANDERSON's expense, to periodically (but no more than once per calendar year and solely with respect to records not previously examined, unless in the independent auditor's reasonable opinion review of such previously examined records is necessary to properly conduct the current examination) examine LICENSEE's books, ledgers, and records during regular business hours, with reasonable prior notice, for the purpose of and to the extent necessary to verify any report required under this AGREEMENT. If any amounts due MD ANDERSON are determined to have been underpaid in an amount equal to or greater than [***]percent ([***]%) of the total amount due during the period so examined, then LICENSEE will pay the reasonable cost of the examination plus accrued interest at the lower of (a) the then-current prime interest rate plus [***]% or (b) the highest allowable rate.

4.5 Within thirty (30) calendar days following each anniversary of the EFFECTIVE DATE, LICENSEE will deliver to MD ANDERSON a written progress report as to LICENSEE's (and any AFFILIATE'S and SUBLICENSEE'S) efforts and accomplishments during the preceding year in diligently commercializing LICENSED SUBJECT MATTER in the LICENSED TERRITORY and LICENSEE'S, AFFILIATES' and SUBLICENSEES' commercialization plans for the upcoming year.

4.6 All amounts payable hereunder by LICENSEE will be paid in United States funds without deductions for taxes, assessments, fees, or charges of any kind. Checks are to be made payable to The University of Texas M. D. Anderson Cancer Center, and sent by United States mail to [***], or by wire transfer to:

[***].

4.7 No payments due or royalties owed under this AGREEMENT will be reduced as the result of co-ownership of LICENSED SUBJECT MATTER by BOARD and another party, including, but not limited to, LICENSEE.

V. SPONSORED RESEARCH

5.1 If LICENSEE desires to sponsor research for or related to the LICENSED SUBJECT MATTER, LICENSEE will notify MD ANDERSON and the PARTIES will negotiate in good faith the terms for such sponsored research.

VI. PATENTS AND INVENTIONS

6.1 LICENSEE shall be responsible for preparing, filing, prosecuting and maintaining the patent applications and patents included within the PATENT RIGHTS and for paying all associated costs using patent counsel reasonably acceptable to MD ANDERSON. LICENSEE will directly notify and provide copies to MD ANDERSON and its selected outside patent counsel, at no cost to LICENSEE, of any official communications from United States and foreign patent offices relating to said prosecution within thirty (30) days of receipt as well as copies of communications to the various patent offices so that MD ANDERSON may be informed and apprised of the continuing prosecution of the patent applications and patents included within the PATENT RIGHTS. LICENSEE shall give MD ANDERSON at least 10 business days (to the extent practicable) to review and comment on any material communications to the various patent offices with respect to the patent applications and patents included within the PATENT RIGHTS. Additionally, LICENSEE shall direct their counsel to consult with MD ANDERSON's outside patent counsel on patent strategy related to the PATENT RIGHTS.

6.2 LICENSEE agrees to file and prosecute a U.S. or PCT patent application for inventions and discoveries described in the IDR(s) listed in Exhibit I within one (1) year of the EFFECTIVE DATE ("FILING PERIOD").

6.3 LICENSEE shall keep MD ANDERSON informed as to their plans to file and MD ANDERSON will have reasonable opportunities to comment on decisions affecting filing, prosecution and maintenance of the patent applications and patents included within the PATENT RIGHTS, including, without limitation reasonable opportunity to review the abandonment of any patent applications and patents or change of inventors on patent applications and patents included within the PATENT RIGHTS, and LICENSEE will use reasonable efforts to incorporate MD ANDERSON's reasonable suggestions regarding said prosecution. Additionally, LICENSEE will use reasonable efforts to amend any patent application to include claims reasonably requested by MD ANDERSON to protect LICENSED SUBJECT MATTER. No case will be abandoned without giving MD ANDERSON at least thirty (30) days' notice and opportunity to pursue the application. If LICENSEE notifies MD ANDERSON that it does not intend to file in any national jurisdiction, pay the cost of any application or of LICENSEE's plans to abandon an application or patent within PATENT RIGHTS, then MD ANDERSON may file or pursue such application in that national jurisdiction, if applicable, at its own expense and LICENSEE will have no further rights to such application or patent under this Agreement.

6.4 If MD ANDERSON reasonably demonstrates that it is not being reasonably informed or apprised of the continuing prosecution of patent applications and patents included within the PATENT RIGHTS or that it is not being provided with reasonable opportunities to comment as indicated in the above paragraph and LICENSEE does not resume such activities within thirty (30) days after MD ANDERSON's notice, MD ANDERSON shall be entitled to engage, at LICENSEE's reasonable expense, independent patent counsel to review and evaluate patent prosecution and filing of patents and patent applications included in PATENT RIGHTS. Henceforth MD ANDERSON and LICENSEE shall share responsibility for patent prosecution of patents and patent applications included in PATENT RIGHTS, with LICENSEE reimbursing MD ANDERSON in full for any reasonable patent expenses incurred by MD ANDERSON.

6.5 The Parties agree that they share a common legal interest to get valid enforceable patents and that MD ANDERSON and LICENSEE will keep all privileged information received from the other party pursuant to this Article VI confidential, except to the extent required by law.

VII. INFRINGEMENT BY THIRD PARTIES

7.1 LICENSEE, at its expense, shall have the first right (but no obligation) to enforce all PATENT RIGHTS against infringement by third parties and is entitled to retain recovery from such enforcement. After reimbursement of LICENSEE's reasonable legal costs and expenses related to an infringement recovery, LICENSEE shall pay MD ANDERSON [***] percent ([***]%) of any monetary recovery (whether by judgment or settlement, including recovery for lost profits, reasonable royalties, and/or enhanced or punitive damages).

7.2 If it is necessary to name Board or MD Anderson as a party in such action to enforce PATENT RIGHTS against an infringer, then LICENSEE must first obtain BOARD'S and MD ANDERSON'S prior written permission, which permission shall not be unreasonably withheld, provided that BOARD and MD ANDERSON shall have reasonable prior input on choice of counsel on any matter where such counsel represents BOARD or MD ANDERSON, and LICENSEE and such counsel agree to follow all required procedures of the Texas Attorney General regarding retention of outside counsel for state entities.

7.3 MD ANDERSON shall promptly notify LICENSEE if MD ANDERSON'S Office of Technology Commercialization becomes aware of any infringement or potential infringement of any PATENT RIGHTS. If LICENSEE does not first exercise its right under Section 7.1 within twelve (12) months of knowledge of infringement, then, BOARD or MD ANDERSON may, at its sole discretion, enforce any patent licensed hereunder on behalf of itself and LICENSEE, with MD ANDERSON retaining all recoveries from such enforcement. If Board and/or MD Anderson pursues such infringement action, Board and/or MD Anderson may, as part of the resolution thereat: grant non-exclusive license rights to the alleged infringer, notwithstanding Licensee's exclusive license rights.

7.4 In any suit or dispute involving an infringer, the parties agree to cooperate fully with each other. At the request and expense of the party bringing suit, the other party will permit access during regular business hours, to all relevant personnel, records, papers, information, samples, specimens, and the like in its possession.

VIII. PATENT MARKING

8.1 LICENSEE agrees that all packaging containing individual LICENSED PRODUCT(S), documentation therefor, and, when possible, actual LICENSED PRODUCT(S) sold by LICENSEE, AFFILIATES, and/or SUBLICENSEES will be appropriately marked with the number of any applicable patent(s) licensed hereunder in accordance with each country's patent laws, including Title 35, United States Code, to the extent such marking is necessary or required to fully preserve PATENT RIGHTS in each such country.

IX. INDEMNIFICATION AND INSURANCE

9.1 LICENSEE AGREES TO HOLD HARMLESS AND INDEMNIFY BOARD, SYSTEM, MD ANDERSON, THEIR REGENTS, OFFICERS, EMPLOYEES, STUDENTS AND AGENTS FROM AND AGAINST ANY CLAIMS, DEMANDS, OR CAUSES OF ACTION WHATSOEVER BROUGHT BY THIRD PARTIES, COSTS OF SUIT AND REASONABLE ATTORNEY'S FEES, INCLUDING WITHOUT LIMITATION, THOSE COSTS ARISING ON ACCOUNT OF ANY INJURY OR DEATH OF PERSONS OR DAMAGE TO PROPERTY (COLLECTIVELY, "LIABILITIES"') IN EACH CASE THAT ARE CAUSED BY, OR ARISING OUT OF, OR RESULTING FROM, THE EXERCISE OR PRACTICE OF THE RIGHTS GRANTED HEREUNDER BY LICENSEE, ITS OFFICERS, ITS AFFILIATES OR THEIR OFFICERS, EMPLOYEES, AGENTS OR REPRESENTATIVES EXCEPT TO THE EXTENT SUCH LIABILITIES ARISE FROM (i) THE NEGLIGENT FAILURE OF MD ANDERSON TO SUBSTANTIALLY COMPLY WITH ANY APPLICABLE GOVERNMENTAL REQUIREMENTS OR (ii) THE NEGLIGENT OR WILLFUL MISCONDUCT BY A REGENT, OFFICER, AGENT OR EMPLOYEE OF MD ANDERSON.

9.2 IN NO EVENT SHALL BOARD, SYSTEM OR MD ANDERSON BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS OR EXPECTED SAVINGS OR OTHER ECONOMIC LOSSES, OR FOR INJURY TO PERSONS OR PROPERTY) ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT OR ITS SUBJECT MATTER, REGARDLESS OF WHETHER BOARD, SYSTEM OR MD ANDERSON KNOWS OR SHOULD KNOW OF THE POSSIBILITY OF SUCH DAMAGES.

9.3 OTHER THAN FOR CLAIMS AGAINST LICENSEE FOR INDEMNIFICATION PURSUANT TO SECTION 9.1 OR FOR THE MISAPPROPRIATION OR INFRINGEMENT OF MD ANDERSON'S INTELLECTUAL PROPERTY RIGHTS, LICENSEE SHALL WILL NOT BE LIABLE TO MD ANDERSON FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS OR EXPECTED SAVINGS OR OTHER ECONOMIC LOSSES, OR FOR INJURY TO PERSONS OR PROPERTY) ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT OR ITS SUBJECT MATTER, REGARDLESS OF WHETHER LICENSEE KNOWS OR SHOULD KNOW OF THE POSSIBILITY OF SUCH DAMAGES.

9.4 Beginning at the time when any LICENSED SUBJECT MATTER is being distributed or sold (including for the purpose of obtaining regulatory approvals) by LICENSEE, an AFFILIATE, or by a SUBLICENSEE, LICENSEE shall, at its sole cost and expense, procure and maintain commercial general liability insurance in amounts not less than $[***] per incident and $[***] annual aggregate, and LICENSEE shall use reasonable efforts to have the BOARD, SYSTEM, MD ANDERSON, their Regents, officers, employees, students and agents named as additional insureds. Such commercial general liability insurance shall provide: (i) product liability coverage; (ii) broad form contractual liability coverage for LICENSEE's indemnification under this AGREEMENT; and (iii) coverage for litigation costs. The minimum amounts of insurance coverage required herein shall not be construed to create a limit of LICENSEE's liability with respect to its indemnification under this AGREEMENT.

9.5 LICENSEE shall provide MD ANDERSON with written evidence of such insurance within thirty (30) calendar days of its procurement. Additionally, LICENSEE shall provide MD ANDERSON with written notice of at least fifteen (15) calendar days prior to the cancellation, non-renewal or material change in such insurance.

9.6 LICENSEE shall maintain such commercial general liability insurance beyond the expiration or termination of this AGREEMENT during: (i) the period that any LICENSED SUBJECT MATTER developed pursuant to this AGREEMENT is being commercially distributed or sold by LICENSEE, an AFFILIATE or by a sublicensee or agent of LICENSEE; and (ii) the five (5) year period immediately after such period.

X. USE OF BOARD AND MD ANDERSON'S NAME

10.1 LICENSEE will not use the name of (or the name of any employee of) MD ANDERSON, SYSTEM or BOARD in any advertising, promotional or sales literature, on its Web site, or for the purpose of raising capital without the advance express written consent of BOARD secured through:

The University of Texas
M. D. Anderson Cancer Center
[***]

Notwithstanding the above, LICENSEE may use the name of (or name of employee of) MD ANDERSON, SYSTEM or BOARD in routine business correspondence or as needed in appropriate regulatory submissions or required by applicable law or court order without express written consent.

XI. CONFIDENTIAL INFORMATION AND PUBLICATION

11.1 MD ANDERSON and LICENSEE each agree that all information contained in documents marked "confidential" and forwarded to one by the other (i) are to be received in strict confidence, (ii) are to be used only for the purposes of this AGREEMENT, and (iii) will not be disclosed by the recipient party (except as required by law or court order), nor by the recipient party's agents or employees without the prior written consent of the disclosing party, except to the extent that the recipient party can establish by competent written proof that such information:

(a) was in the public domain at the time of disclosure; or

(b) later became part of the public domain through no act or omission of the recipient party, its employees, agents, successors or assigns; or

(c) was lawfully disclosed to the recipient party by a third party having the right to disclose it; or

(d) was already known by the recipient party at the time of disclosure; or

(e) was independently developed by the recipient party without use of the disclosing party's confidential information; or

(f) is required by law or regulation to be disclosed; provided that such recipient party gives the disclosing party reasonable prior notice of such disclosure requirement and affords the disclosing party an opportunity to obtain a protective order or other appropriate relief.

11.2 Each party's obligation of confidence hereunder will be fulfilled by using at least the same degree of care with the disclosing party's confidential information as it uses to protect its own confidential information, but always at least a reasonable degree of care. This obligation will exist while this AGREEMENT is in force and for a period of three (3) years thereafter. Notwithstanding the foregoing, LICENSEE may disclose the MD Anderson's Confidential Information only to its AFFILIATES, investors, and to existing or potential SUBLICENSEES or acquirers or merger partners ("Representatives") who have been informed of this Agreement, who need to know such Confidential Information to assist the LICENSEE as reasonably needed to conduct the development or commercialization of LICENSED PRODUCTS, provided that such Representatives are subject to obligations of confidentiality and non-use at least as strict as Licensee's obligations under this Agreement.

11.3 MD ANDERSON reserves the right to publish the general scientific findings from research conducted by MD ANDERSON related to LICENSED SUBJECT MATTER, with due regard to the protection of LICENSEE's confidential information. MD ANDERSON will submit the manuscript of any proposed publication to LICENSEE at least thirty (30) calendar days before publication, and LICENSEE shall have the right to review and comment upon the publication in order to protect LICENSEE's confidential information. Upon LICENSEE's request, MD ANDERSON shall remove LICENSEE's confidential information from the publication and publication may be delayed up to sixty (60) additional calendar days to enable LICENSEE to secure adequate intellectual property protection of LICENSED SUBJECT MATTER that would otherwise be affected by the publication.

XII. ASSIGNMENT

12.1 In case of the sale of all of LICENSEE's assets to a third party, or in connection with any transaction other than sale of all of LICENSEE's assets to a third party, this AGREEMENT may be assigned subject to the payment to MD ANDERSON of an $[***] fee for permitting such ASSIGNMENT ("ASSIGNMENT FEE") prior to the ASSIGNMENT. This fee shall be in addition to and shall not replace the LICENSE DOCUMENTATION FEE above. No ASSIGNMENT FEE shall be due if the ASSIGNMENT is to an AFFILIATE, provided that LICENSEE or the AFFILIATE pays the ASSIGNMENT FEE in the event AFFILIATE thereafter makes an ASSIGNMENT of the AGREEMENT to a third party.

XIII. TERM AND TERMINATION

13.1 Subject to Sections 13.3 and 13.4 hereinbelow, the term of this AGREEMENT is from the EFFECTIVE DATE until the later of (a) expiration of the last to expire patents issued from the PATENT RIGHTS, or (b) twenty (20) years from the EFFECTIVE DATE.

13.2 Anytime after four (4) years from the EFFECTIVE DATE, BOARD or MD ANDERSON may remove from the LICENSED TERRITORY any national political jurisdiction if LICENSEE, within ninety (90) days after receiving written notice from MD ANDERSON of the intended removal, fails provide written evidence satisfactory to MD ANDERSON that LICENSEE, an AFFILIATE, or a SUBLICENENSEE has commercialized or is using commercially reasonable efforts actively and effectively attempting to commercialize a licensed invention in such jurisdiction(s). The following definitions apply to this section: (a) "commercialized" means having SALES in such jurisdiction; and (b) "commercially reasonable effort actively and effectively attempting to commercialize" means efforts consistent with those of a similarly situated biotechnology company in its having an effective, ongoing and active research, development, manufacturing, marketing or sales program as appropriate, directed toward obtaining regulatory approval, and/or production and/or SALES, in any jurisdiction, and providing plans to MD ANDERSON to commercialize licensed inventions in the jurisdiction(s) that MD ANDERSON intends to remove, for a pharmaceutical product at a similar stage of development or commercialization with similar market potential.

13.3 Subject to any rights herein which survive termination, this AGREEMENT will earlier terminate in its entirety:

(a) upon thirty (30) calendar days written notice if LICENSEE becomes bankrupt and/or if the business of LICENSEE shall be placed in the hands of a receiver, assignee, or trustee, whether by voluntary act of LICENSEE or otherwise; or

(b) upon thirty (30) calendar days written notice from MD ANDERSON, if LICENSEE materially breaches or defaults on the payment or report obligations of ARTICLE IV (excluding the license documentation fee specified in Section 4.1(b), for which no cure period applies), or use of name obligations of ARTICLE X, unless, before the end of such thirty (30)-calendar day notice period, LICENSEE has cured the material default or breach to MD ANDERSON's reasonable satisfaction, and so notifies MD ANDERSON, stating the manner of the cure; or

(c) upon ninety (90) calendar days written notice from MD ANDERSON if LICENSEE materially breaches or defaults on any other obligation under this AGREEMENT, unless, before the end of such ninety (90) calendar-day notice period, LICENSEE has cured the material default or breach to MD ANDERSON's reasonable satisfaction and so notifies MD ANDERSON, stating the manner of the cure; or

(d) at any time by mutual written agreement between LICENSEE and MD ANDERSON upon one hundred eighty (180) calendar days written notice to all parties and subject to any terms herein which survive termination; or

(e) upon thirty (30) calendar days written notice from MD ANDERSON if Section 13.2 or 15.9 is invoked; or

(f) if LICENSEE has defaulted or been late on its payment obligations pursuant to the terms of this AGREEMENT on any two (2) occasions in a twelve (12) month period; or

(g) immediately upon written notice from MD Anderson, in the event LICENSEE fails to file within the FILING PERIOD a patent application as required by Section 6.2; or

(h) immediately, upon written notice from MD ANDERSON, if LICENSEE fails to timely pay the LICENSE DOCUMENTATION FEE specified in Section 4.1(b); or

(i) for any reason upon thirty (30) calendar days written notice from LICENSEE to MD ANDERSON, provided that LICENSEE is not in material breach of any of its obligations under this AGREEMENT.

13.4 Upon termination of this AGREEMENT:

(a) nothing herein will be construed to release either party of any obligation maturing prior to the effective date of the termination; and

(b) both parties covenant and agree to be bound by the provisions of ARTICLES IX (Indemnification and Insurance), X (Use of Board and MD ANDERSON's Name) and XI (Confidential Information and Publication) of this AGREEMENT. Notwithstanding the foregoing, the obligations of confidentiality according to Article XI shall survive early termination of this Agreement under Section 13.3 for a period of five (5) years and shall immediately expire upon expiration of this Agreement under Section 13.1.

XIV. WARRANTY: SUPERIOR-RIGHTS

14.1 BOARD represents and warrants its belief that (a) it is the co-owner (together with LICENSEE) of the entire right, title, and interest in and to LICENSED SUBJECT MATTER, (b) it has the right to grant licenses thereunder, and (c) it has not knowingly granted licenses thereunder to any other entity that would restrict rights granted hereunder except as stated herein.

14.2 LICENSEE understands that in the event that the LICENSED SUBJECT MATTER was developed under a funding agreement with the Government of the United States of America ("Government"),the Government may have certain rights relative thereto. This AGREEMENT is explicitly made subject to the Government's rights under any such agreement and any applicable law or regulation. To the extent that there is a conflict between any such agreement, applicable law or regulation and this AGREEMENT, the terms of such Government agreement, applicable law or regulation shall prevail.

14.3 LICENSEE UNDERSTANDS AND AGREES THAT BOARD AND MD ANDERSON, BY THIS AGREEMENT, MAKE NO REPRESENTATION AS TO THE OPERABILITY OR FITNESS FOR ANY USE, SAFETY, EFFICACY, APPROVABILITY BY REGULATORY AUTHORITIES, TIME AND COST OF DEVELOPMENT, PATENTABILITY, AND/OR BREADTH OF THE LICENSED SUBJECT MATTER. BOARD AND MD ANDERSON, BY THIS AGREEMENT, ALSO MAKE NO REPRESENTATION AS TO WHETHER ANY PATENT COVERED BY PATENT RIGHTS IS VALID OR AS TO WHETHER THERE ARE ANY PATENTS NOW HELD, OR WHICH WILL BE HELD, BY OTHERS OR BY BOARD OR MD ANDERSON IN THE LICENSED FIELD, NOR DO BOARD AND MD ANDERSON MAKE ANY REPRESENTATION THAT THE INVENTIONS CONTAINED IN PATENT RIGHTS DO NOT INFRINGE ANY OTHER PATENTS NOW HELD OR THAT WILL BE HELD BY OTHERS OR BY BOARD.

14.4 LICENSEE, by execution hereof, acknowledges, covenants and agrees that LICENSEE has not been induced in any way by BOARD, SYSTEM, MD ANDERSON or employees thereof to enter into this AGREEMENT, and further warrants and represents that (a) LICENSEE is entering into this AGREEMENT voluntarily; (b) LICENSEE has conducted sufficient due diligence with respect to all items and issues pertaining to this AGREEMENT; and (c) LICENSEE has adequate knowledge and expertise, or has used knowledgeable and expert consultants, to adequately conduct such due diligence, and agrees to accept all risks inherent herein.

XV. GENERAL

15.1 This AGREEMENT constitutes the entire and only agreement between the parties for LICENSED SUBJECT MATTER and all other prior negotiations, representations, agreements and understandings with respect thereto are superseded hereby. No agreements altering or supplementing the terms hereof will be made except by a written document signed by both parties.

15.2 Any notice required by this AGREEMENT must be given by prepaid, first class, certified mail, return receipt requested, and addressed in the case of MD ANDERSON to:

The University of Texas M. D. Anderson Cancer Center
Office of Technology Commercialization
[***]

or in the case of LICENSEE to:

Moleculin Biotech, Inc.
2575 West Bellfort, Suite 333
Houston, Texas 77054
ATTENTION: Walter Klemp (Chairman, Acting CEO)

or other addresses as may be given from time to time under the terms of this notice provision.

15.3 LICENSEE must comply with all applicable federal, state and local laws and regulations in connection with its activities pursuant to this AGREEMENT. LICENSEE acknowledges that the LICENSED SUBJECT MATTER is subject to U. S. export control jurisdiction. LICENSEE agrees to comply with all applicable international and national laws that apply to the LICENSED SUBJECT MATTER, including U.S. Export Administration Regulations, as well as end-user, end-use, and destination restrictions applied by the United States.

15.4 This AGREEMENT will be construed and enforced in accordance with the laws of the United States of America and of the State of Texas, without regard to its conflict of law provisions. The Texas State Courts of Harris County, Texas (or, if there is exclusive federal jurisdiction, the United States District Court for the Southern District of Texas) shall have exclusive jurisdiction and venue over any dispute arising out of this AGREEMENT, and LICENSEE consents to the jurisdiction and venue of such courts and hereby explicitly waives the rights to any other venue to which it might be entitled by cause of action, domicile or otherwise. Nothing in this AGREEMENT shall be deemed as a waiver by BOARD, SYSTEM or MD ANDERSON of its sovereign immunity.

15.5 Notwithstanding the foregoing, to the extent that Chapter 2260, Texas Government Code, as it may be amended from time to time ("Chapter 2260"), is applicable to this AGREEMENT, LICENSEE acknowledges and agrees that the dispute resolution process provided for in Chapter 2260 shall be LICENSEE's sole and exclusive process for seeking a remedy for any and all alleged breaches of the AGREEMENT by BOARD and/or MD ANDERSON or the State of Texas.

15.6 Any dispute or controversy arising out of or relating to this AGREEMENT, its construction or its actual or alleged breach will be decided by mediation. This mediation will constitute a compromise negotiation for purposes of Rule 408 of the Federal Rules of Evidence and Texas Rules of Evidence and an alternative dispute resolution procedure subject to Section 154.073 of the Texas Civil Practice and Remedies Code. If, after, the dispute is not resolved, the applicable Institutions are free to exercise all other legal and equitable rights.

15.7 Failure of BOARD or MD ANDERSON or LICENSEE to enforce a right under this AGREEMENT will not act as a waiver of right or the ability to later assert that right relative to the particular situation involved.

15.8 Headings included herein are for convenience only and will not be used to construe this AGREEMENT.

15.9 If any part of this AGREEMENT is for any reason found to be unenforceable, all other parts nevertheless will remain enforceable.

15.10 In the event that LICENSEE brings an action before any court, agency or tribunal seeking to invalidate or otherwise challenge the enforceability of or BOARD's ownership of any patent included in the PATENT RIGHTS, then MD ANDERSON may immediately terminate this AGREEMENT upon written notice to LICENSEE. Any dispute regarding the validity, enforceability or ownership of any patent included in the PATENT RIGHTS shall be litigated in the courts located in Houston, Texas, and LICENSEE agrees not to challenge personal jurisdiction in that forum. To the extent that LICENSEE unsuccessfully challenges the validity or enforceability of any patent included in the PATENT RIGHTS, LICENSEE agrees to reimburse MD ANDERSON and BOARD for all costs and fees (including attorney's fees) paid by MD ANDERSON and BOARD in defending against such challenge. LICENSEE understands and agrees that, in the event LICENSEE successfully challenges the validity or enforceability of any patent included in the PATENT RIGHTS, all payments or other consideration made or otherwise provided by LICENSEE to MD ANDERSON prior to a final, non-appealable adjudication of invalidity and/or unenforceability shall be non-refundable. The obligations of this Section shall survive the expiration or termination of this AGREEMENT.

IN WITNESS WHEREOF, the parties hereto have caused their duly authorized representatives to execute this AGREEMENT.

BOARD OF REGENTS OF THE UNIVERSITY OF TEXAS SYSTEM,
on behalf of
THE UNIVERSITY OF TEXAS M. D. ANDERSON CANCER CENTER
By /s/ [***]
[***]Executive VP, Administration
The University of Texas
M. D. Anderson Cancer Center
Date: 6/29/17

MOLECULIN BIOTECH, INC.
By /s/ Walter Klemp
Printed Name: Walter Klemp
Title: CEO
Date: June 26, 2017

Approved as to Content:

By /s/ [***]
[***]
Vice President, Strategic Industry Ventures
M. D. Anderson Cancer Center

Date: 6-26-17

EXHIBIT I

[***]

Certain identified information has been excluded from this exhibit because it is both not material and is the type that the issuer treats as private or confidential. Information that was omitted has been noted in this document with a placeholder identified by the mark "[***]".

Amendment No. 1 to
Patent and Technology License Agreement

This Amendment No. 1 to Patent and Technology License Agreement ("Amendment No. 1") is effective as of the date of the last authorized signature affixed hereto (the "Amendment No. 1 Date") and is made by and among The Board of Regents ("Board") of The University of Texas System ("System"), on behalf of The University of Texas M. D. Anderson Cancer Center ("MD Anderson"), a member institution of System, and Moleculin Biotech, Inc., a Delaware corporation having a principal place of business located at 5300 Memorial Dr., Suite 950, Houston, Texas 77007 ("Licensee"). Capitalized terms used in this Amendment No. 1 and not otherwise defined herein shall have the meanings set forth in the Original License Agreement (as defined below).

Recitals

A. Licensee and Board entered into that certain Patent and Technology License Agreement dated June 29, 2017 (the "Original License Agreement").

B. Licensee and Board desire to add technology and patent rights related to MD Anderson's Information Disclosure Report MDA20-152 to the Licensed Subject Matter of the Original Agreement.

Accordingly, in consideration of the mutual covenants contained herein, the sufficiency of which is hereby acknowledged, Licensee and Board, on behalf of MD Anderson, hereby agree to the following:

I. Amendment

1.1 Exhibit I of the Original License Agreement is deleted in its entirety and replaced with the following new Exhibit I:

EXHIBIT I

[***]

II. Consideration

2.1 In consideration of rights granted by Board to Licensee under this Amendment No. 1, Licensee agrees to pay MD Anderson each of the following:

(a) Patent Expenses: All unreimbursed Patent Expenses related to patents and patent application for subject matter described in [***] prior to or after the Effective Date for so long as the Original Agreement remains in effect. MD Anderson will invoice Licensee after this Amendment No. 1 has been fully executed by all Parties for such unreimbursed Patent Expenses incurred as of as of the Amendment No. 1 Date and on a quarterly basis thereafter as provided in the Original Agreement. The invoiced amounts will be due and payable by Licensee within thirty (30) calendar days of invoice.

(b) Amendment Fee. As a condition precedent to the inclusion of rights related to [***] as Licensed Subject Matter in the Original Agreement, a nonrefundable amendment fee in the amount of $[***] ("Amendment Fee"). This upfront licensee fee will not reduce the amount of any other payment provided for in the Original Agreement, and is due and payable not later than thirty (30) calendar days after the Amendment No. 1 Date. The obligation to timely pay the Amendment Fee is not subject to any cure period.

III. General

3.1 Licensee and Board, on behalf of MD Anderson, acknowledge and agree that, except as set forth in this Amendment No. 1, the terms and conditions of the Original License Agreement shall remain in full force and effect on a going forward basis.

IN WITNESS WHEREOF, the parties hereto have caused their duly authorized representatives to execute this Amendment No. 1.

BOARD OF REGENTS OF THE UNIVERSITY
OF TEXAS SYSTEM,
on behalf of
THE UNIVERSITY OF TEXAS M.D.
ANDERSON CANCER CENTER

By /s/ [***]
[***]
Senior Vice President,
Chief Financial Officer
The University of Texas
M. D. Anderson Cancer Center

Date: 12/17/2021

MOLECULIN BIOTECH, INC.

By /s/ Jonathan P. Foster
Printed Name:
Title: Jonathan P. Foster
EVP CFO
11-1-21

Date:

Approved as to Content:
By /s/ [***]
[***]
Senior Vice President, Research
Administration & Industry Relations
M.D. Anderson Cancer Center

Date: 12/15/2021

Exhibit 10.32

Certain identified information has been excluded from this exhibit because it is both not material and is the type that the issuer treats as private or confidential. Information that was omitted has been noted in this document with a placeholder identified by the mark "[***]".

PATENT AND TECHNOLOGY LICENSE AGREEMENT

This AGREEMENT ("AGREEMENT") is made by and between THE BOARD OF REGENTS ("BOARD") of THE UNIVERSITY OF TEXAS SYSTEM ("SYSTEM"), an agency of the State of Texas, whose address is 201 West 7th Street, Austin, Texas 78701, on behalf of THE UNIVERSITY OF TEXAS M. D. ANDERSON CANCER CENTER ("MD ANDERSON"), a member institution of SYSTEM, and MOLECULIN BIOTECH, INC. a Delaware corporation having a principal place of business located at 5300 Memorial Drive, Suite 950, Houston, Texas 77007 ("LICENSEE").

RECITALS

A. LICENSEE and BOARD previously entered into that certain Patent and Technology License effective June 29, 2017 ("2017 LICENSE").

B. BOARD owns certain PATENT RIGHTS and TECHNOLOGY RIGHTS related to LICENSED SUBJECT MATTER developed at MD ANDERSON in cooperation with LICENSEE, all as defined herein.

C. BOARD, through MD ANDERSON, desires to have the LICENSED SUBJECT MATTER developed in the LICENSED FIELD and used for the benefit of LICENSEE, BOARD, SYSTEM, MD ANDERSON, the inventor(s), and the public as outlined in BOARD's Intellectual Property Policy.

D. LICENSEE wishes to obtain a license from BOARD to practice LICENSED SUBJECT MATTER.

NOW, THEREFORE, in consideration of the mutual covenants and promises herein contained, the parties agree as follows:

I. EFFECTIVE DATE

1.1 This AGREEMENT is effective as of the date of the last authorized signature below (the "EFFECTIVE DATE").

II. DEFINITIONS

As used in this AGREEMENT, the following terms have the meanings indicated:

2.1 **ACTIVELY AND EFFECTIVELY ATTEMPTING TO COMMERCIALIZE** means efforts consistent with those of a similarly situated biotechnology company in its having an effective, ongoing and active research, development, manufacturing, marketing or sales program as appropriate for a pharmaceutical product at a similar stage of development or commercialization with similar market potential, such program directed toward obtaining REGULATORY APPROVAL of a LICENSED PRODUCT, and/or production and/or SALES, in a jurisdiction, and providing plans to MD ANDERSON to commercialize a LICENSED PRODUCT in the jurisdiction.

2.2 **AGREEMENT** has the meaning set forth in the preamble.

2.3 **AFFILIATE** means any business entity more than fifty percent (50%) owned by LICENSEE, any business entity which owns more than fifty percent (50%) of LICENSEE, or any business entity that is more than fifty percent (50%) owned by a business entity that owns more than fifty percent (50%) of LICENSEE.

2.4 **ASSIGNMENT** means a writing wherein a third-party assumes in writing (a copy of which writing will be promptly provided to MD ANDERSON) all of LICENSEE's or AFFILIATE's interests, rights, duties, and obligations under the AGREEMENT and agrees to comply with all terms and conditions of the AGREEMENT as if the assignee were the original party to the AGREEMENT.

2.5 **ASSIGNMENT FEE** has the meaning set forth in Section 12.1.

2.6 **BOARD** has the meaning set forth in the preamble.

2.7 **COMMERCIALIZED** means having SALES in a jurisdiction.

2.8 **EFFECTIVE DATE** has the meaning set forth in Section 1.1.

2.9 **EXCLUDED AMOUNTS** means (1) any payment received by or on behalf of LICENSEE from a SUBLICENSEE for the supply of goods and/or services (including LICENSED PRODUCTS) to such SUBLICENSEE, provided that the SUBLICENSEE is not the end user of such goods or services, and provided further that MD ANDERSON has been paid the ROYALTY RATE for NET SALES upon SALE of the LICENSED PRODUCTS to the end user; and (2) payment received by LICENSEE from a SUBLICENSEE for providing LICENSED PRODUCTS to said SUBLICENSEE for use in a clinical study or other research necessary or useful to obtain REGULATORY APPROVAL of a LICENSED PRODUCTS, provided that such payment does not exceed LICENSEE's actual cost for providing such LICENSED PRODUCTS to said SUBLICENSEE.

2.10 **FDA** means the United States Food and Drug Administration.

2.11 **GOVERNMENT** has the meaning set forth in Section 14.2.

2.12 **IND** means (a) an Investigational New Drug application as defined in the FFDCA (21 U.S.C. §301 et seq.), (b) a clinical trial authorization application for a product filed with a REGULATORY AUTHORITY in any other regulatory jurisdiction outside the U.S., the filing of which (in the case of (a) or (b)) is necessary to commence or conduct clinical testing of a pharmaceutical product in humans in such jurisdiction, or (c) documentation issued by a REGULATORY AUTHORITY that permits the conduct of clinical testing of a product in humans in such jurisdiction.

2.13 **INDICATION** means any use of a LICENSED PRODUCT for the treatment, prevention, cure or to delay the progression of a human disease or condition. As clarifying illustrative examples, (a) the broadening of use of a LICENSED PRODUCT for a particular disease, such as the extension of the use of a LICENSED PRODUCT from treating Stage IV metastatic melanoma to use as an adjuvant treatment for melanoma, shall not be separate INDICATIONS; (b) the use of a LICENSED PRODUCT as a first line therapy after receiving REGULATORY APPROVAL as a second line therapy for treatment of the same disease or condition shall not be deemed to be separate INDICATIONS; and (c) use of a LICENSED PRODUCT in connection with different types of cancer shall be deemed to be different INDICATIONS (e.g., uses for basal cell carcinoma, melanoma, and squamous cell carcinoma, are each a different INDICATION notwithstanding the fact that each is a type of skin cancer).

2.14 **LIABILITIES** has the meaning set forth in Section 9.1.

2.15 **LICENSE DOCUMENTATION FEE** has the meaning set forth in Section 4.1(b)

2.16 **LICENSED FIELD** means all fields of use.

2.17 **LICENSED PRODUCTS** means any product or service sold by LICENSEE, an AFFILIATE, or a SUBLICENSEE comprising LICENSED SUBJECT MATTER pursuant to this AGREEMENT and which is covered by a VALID CLAIM.

2.18 **LICENSED SUBJECT MATTER** means inventions and discoveries covered by PATENT RIGHTS or TECHNOLOGY RIGHTS within LICENSED FIELD.

2.19 **LICENSED TERRITORY** means worldwide.

2.20 **LICENSEE** has the meaning set forth in the preamble.

2.21 **MD ANDERSON** has the meaning set forth in the preamble.

2.22 **MAINTENANCE FEE** has the meaning set forth in Section 4.1(c).

2.23 **NEW DRUG APPLICATION** means application submitted to the FDA for approval to market a new drug, as more specifically defined by 21 C.F.R §314 et seq., or any future revisions or substitutes thereof, or an equivalent foreign filing in any jurisdiction other than the United States.

2.24 **NET SALES** [***].

2.25 **PATENT EXPENSES** all expenses incurred in searching, preparing, filing, prosecuting, defending in any post-issuance administrative proceeding, and maintaining PATENT RIGHTS.

2.26 **PATENT RIGHTS** means BOARD's rights (a) the patents and patent applications resulting from the IDR(s) listed in Exhibit I; (b) all patent applications that claim priority to any patent or patent application of identified in (a), provided that the claims of such non-provisional applications are entitled to claim priority to such applications; (c) all divisionals, continuations and continuations-in-part of the non-provisional patent applications identified in (a) and (b), above provided that the claims of such continuations-in-part are entitled to claim priority to at least one of the patent applications identified in (a) or (b), above; (d) all reissues, reexaminations, extensions, and foreign counterparts of any of the patents or patent applications identified in (a), (b) or (c), above; and (e) any patents that issue with respect to any of the patent applications listed in (a), (b), (c) or (d), above.

2.27 **PHASE I STUDY** means: (a) that portion of the FDA submission and approval process which provides for the first introduction into humans of a product with the purpose of determining human toxicity, metabolism, absorption, elimination and other pharmacological action, as more fully defined by the rules and regulations of the FDA, including 21 C.F.R. § 312.21(a) or any future revisions or substitutes therefor; or (b) a similar clinical trial in any national jurisdiction other than the United States. For the avoidance of doubt, the emphasis of a PHASE I STUDY is on the safety and tolerability of a product and is used to plan patient dosing in a PHASE II STUDY.

2.28 **PHASE II STUDY** means: (a) that portion of the FDA submission and approval process which provides for early controlled clinical studies conducted to obtain preliminary data on the effectiveness of a product for a particular indication, as more specifically defined by the rules and regulations of the FDA, including 21 C.F.R. § 312.21(b) or any future revisions or substitutes therefor; or (b) any clinical trial that obtains data regarding the efficacy of a product, including without limitation Phase Ib study of a product, a clinical study of a product consisting of a cohort expansion, or a combined Phase Ib/II clinical study of a product; or (c) a clinical study similar to the foregoing (a) or (b) in any jurisdiction other than the United States. For the avoidance of doubt, when the safety and tolerability of a product has been established through the conduct of a PHASE I STUDY, the next clinical trial of a product will be a PHASE II STUDY.

2.29 **PHASE III STUDY** means a human clinical trial using a Licensed Product on a sufficient number of subjects that is designed to establish that a pharmaceutical product is safe and efficacious for its intended use, and to determine warnings, precautions, and adverse reactions that are associated with such pharmaceutical product in the dosage range to be prescribed, which trial is intended to support REGULATORY APPROVAL of a LICENSED PRODUCT alone or in combination with an ATAC, as described in 21 C.F.R. 312.21(c) for the United States, or a similar clinical study prescribed by the REGULATORY AUTHORITIES in a foreign country.

2.30 **REGULATORY APPROVAL** means the approval by the REGULATORY AUTHORITY needed for a particular national jurisdiction to market, SELL and use a LICENSED PRODUCT in that national jurisdiction.

2.31 **REGULATORY AUTHORITY** means the governmental authority responsible for granting any necessary licenses or approvals for the marketing, SALE and use of a LICENSED PRODUCT in a particular national jurisdiction, including without limitation, the FDA, European Medicines Agency or Koseisho (i.e. the Japanese Ministry of Health and Welfare).

2.32 **REPRESENTATIVES** has the meaning set forth in Section 11.2.

2.33 **ROYALTY RATE** means the percentage of NET SALES of LICENSED PRODUCTS payable to MD ANDERSON as set forth in Section 4.1(d).

2.34 **SELL, SALE or SOLD** means the transfer or disposition of a LICENSED PRODUCT for value to a party other than LICENSEE, an AFFILIATE, or a SUBLICENSEE.

2.35 **SUBLICENSE AGREEMENT** means any agreement or arrangement pursuant to which LICENSEE (or a SUBLICENSEE) grants to any third party any of the license rights granted to the LICENSEE under this AGREEMENT. An ASSIGNMENT of all rights and obligations under this AGREEMENT shall not be deemed to be a SUBLICENSE AGREEMENT.

2.36 **SUBLICENSE CONSIDERATION** means any and all consideration, other than royalties for NET SALES (provided that MD ANDERSON has been paid the ROYALTY RATE for such NET SALES), debt, research and development funds, and EXCLUDED AMOUNTS, as defined below, received by LICENSEE from any SUBLICENSEE as consideration for the sublicense, including, but not limited to, up-front, marketing, distribution, franchise, and option payments, license and documentation fees, and bonus and milestone payments.. Notwithstanding the foregoing, if LICENSEE receives a bona fide milestone payment from a SUBLICENSEE for achieving a MILESTONE, then for purposes of calculating SUBLICENSE CONSIDERATION, LICENSEE may deduct the amount actually paid to MD ANDERSON by LICENSEE for achieving such milestone from the amount received by LICENSEE from the SUBLICENSEE for achieving the milestone. In addition, if LICENSEE receives a payment from a SUBLICENSEE as a bona fide reimbursement for PATENT EXPENSES for PATENT RIGHTS, then for purposes of calculating SUBLICENSE CONSIDERATION, LICENSEE may deduct the amount actually paid to MD ANDERSON by LICENSEE as reimbursement for PATENT EXPENSES from the amounts received by LICENSEE from the SUBLICENSEE as reimbursement of PATENT EXPENSES. For purposes of clarification, consideration received by LICENSEE from a SUBLICENSEE for equity securities of LICENSEE shall not be considered SUBLICENSE CONSIDERATION, except that premiums paid by a SUBLICENSEE for equity securities of LICENSEE over the fair market value of such securities shall be considered SUBLICENSE CONSIDERATION.

2.37 **SUBLICENSEE** means any third party to whom LICENSEE or an AFFILIATE (or other entity granted any rights by LICENSEE under this AGREEMENT) has granted any of the rights granted to LICENSEE under this AGREEMENT, provided that the third party is not the end user of LICENSED PRODUCTS covered by such granted rights. As used herein, SUBLICENSEE shall also mean a third party to whom LICENSEE, an AFFILIATE, or a SUBLICENSEE has granted the exclusive right to distribute LICENSED PRODUCTS supplied by such LICENSEE, AFFILIATE, or SUBLICENSEE, provided that such third party is responsible for significant marketing and/or promotion of, LICENSED PRODUCTS within its exclusive territory. For clarity, an AFFILIATE of LICENSEE cannot be a SUBLICENSEE.

2.38 **SYSTEM** has the meaning set forth in the preamble.

2.39 **TECHNOLOGY RIGHTS** means [***].

2.40 **TERM** has the meaning set forth in Section 13.1.

2.41 **VALID CLAIM** means a claim of (a) an issued and unexpired patent included within the PATENT RIGHTS unless the claim has been held unenforceable or invalid by the final, un-reversed, and un-appealable decision of a court or other governmental body of competent jurisdiction, has been irretrievably abandoned or disclaimed, or has otherwise been finally admitted or finally determined by the relevant governmental authority to be invalid, un-patentable or unenforceable, whether through reissue, reexamination, disclaimer or otherwise, or (b) a pending patent application within the PATENT RIGHTS to the extent the claim continues to be prosecuted in good faith, provided that such patent application has not been pending for more than seven (7) years from the filing date of such application.

III. LICENSE

3.1 BOARD, through MD ANDERSON, hereby grants to LICENSEE a royalty-bearing, exclusive license under LICENSED SUBJECT MATTER to manufacture, have manufactured, use, import, offer to SELL and/or SELL LICENSED PRODUCTS within LICENSED TERRITORY for use within LICENSED FIELD. This grant is subject to Sections 13.2, 14.2 and 14.3 hereinbelow, the payment by LICENSEE to MD ANDERSON of all consideration as provided herein, and is further subject to the following rights retained by BOARD and MD ANDERSON to:

(a) Publish the general scientific findings from research conducted by MD ANDERSON related to LICENSED SUBJECT MATTER, subject to the terms of ARTICLE XI–Confidential Information and Publication; and

(b) Use LICENSED SUBJECT MATTER for non-commercial research, teaching, patient care, and other academically-related purposes; and
(c) Transfer LICENSED SUBJECT MATTER to academic or research institutions for non-commercial research use.

For purposes of clarification, and not by way of limitation, the rights retained by the BOARD and MD ANDERSON pursuant to this Section 3.1 do not include the right to engage in research sponsored by a commercial, for-profit entity or to conduct clinical trials sponsored by a commercial, for-profit entity.

3.2 LICENSEE may extend the license granted herein to any AFFILIATE provided that the AFFILIATE consents in writing to be bound by the applicable provisions of this AGREEMENT to the same extent as LICENSEE. LICENSEE agrees to deliver a copy of such contract to MD ANDERSON within thirty (30) calendar days following execution thereof, which copy may be redacted except to the extent necessary to verify compliance with this Section 3.2.

3.3 LICENSEE may enter into one or more SUBLICENSE AGREEMENTS for LICENSED SUBJECT MATTER consistent with the terms of this AGREEMENT provided that LICENSEE is responsible for its SUBLICENSEES relevant to this AGREEMENT, and for diligently collecting all amounts due LICENSEE from SUBLICENSEES. If a SUBLICENSEE pursuant hereto becomes bankrupt, insolvent or is placed in the hands of a receiver or trustee, LICENSEE, to the extent allowed under applicable law and in a timely manner, agrees to use its best reasonable efforts to collect all consideration owed to LICENSEE and to have the SUBLICENSE AGREEMENT confirmed or rejected by a court of proper jurisdiction.

3.4 LICENSEE must deliver to MD ANDERSON a true and correct copy of each SUBLICENCE AGREEMNT entered into by LICENSEE, and any modification or termination thereof, within thirty (30) calendar days after execution, modification, or termination, which copy may be redacted except to the extent necessary to verify compliance with the applicable terms of this AGREEMENT.

3.5 LICENSEE, itself or through its SUBLICENSEES, shall use diligent efforts to make LICENSED PRODUCTS commercially available within the LICENSED TERRITORY. Without limiting the foregoing, LICENSEE, itself or through its SUBLICENSEES, shall maintain a bona fide, funded, ongoing and active research, development, manufacturing, regulatory, marketing or sales program (all as commercially reasonable) to make LICENSED PRODUCTS commercially available to the public as soon as commercially practicable within the LICENSED TERRITORY. If any obligation under this Section 3.5 is not fulfilled, BOARD and/or MD ANDERSON may treat such failure as a breach in accordance with Section 13.3(c).

3.6 If this AGREEMENT is terminated pursuant to ARTICLE XIII-TERM AND TERMINATION, BOARD and MD ANDERSON agree to accept as successors to LICENSEE and existing SUBLICENSEES in good standing at the date of termination provided that each such SUBLICENSEE consents in writing to be bound by all of the terms and conditions of this AGREEMENT.

IV. CONSIDERATION, PAYMENTS AND REPORTS

4.1 In consideration of rights granted by BOARD to LICENSEE under this AGREEMENT, LICENSEE agrees to pay MD ANDERSON the following:

(a) all reasonable PATENT EXPENSES for so long as, and in such countries as this AGREEMENT remains in effect. MD ANDERSON will invoice LICENSEE within thirty (30) calendar days of the EFFECTIVE DATE for the expenses incurred as of that time and on a quarterly basis thereafter. The invoice amounts will be due and payable by LICENSEE within thirty (30) calendar days of invoice; and

(b) A nonrefundable license documentation fee ("LICENSE DOCUMENTATION FEE") in the amount of [***]. The LICENSE DOCUMENTATION FEE will not reduce the amount of any other payment provided for in this ARTICLE IV, and is due and payable within thirty (30) calendar days after the AGREEMENT has been fully executed by all parties and LICENSEE has received an invoice for the amount from MD ANDERSON. This license documentation fee is not subject to the thirty (30) day cure period set forth in Section 13.3(b); and

(c) A nonrefundable maintenance fees ("MAINTENANCE FEES") as follows:

(i) if 2017 LICENSE has not terminated or expired, a biennial MAINTENANCE FEE in the amount of [***] due and payable not later than thirty (30) calendar days after the second (2nd) and every subsequent even numbered (e.g., fourth (4th), sixth (6th), and eighth (8th), etc.) anniversary of the Effective Date and Licensee's receipt of MD Anderson's invoice therefor; or

(ii) if the 2017 LICENSE is not effect in any jurisdiction, an annual MAINTENANCE FEE in the amount of [***] due and payable not later than thirty (30) calendar days after each anniversary of the Effective Date and Licensee's receipt of MD Anderson's invoice therefor.

For clarity, LICENSEE shall be obligated to pay a MAINTENANCE FEE under either Section 4.1(c)(i) or Section 4.1(c)(ii), but not both, as applicable depending on the status of the 2017 License. Any ANNUAL MAINTENANCE FEE will not reduce the amount of any other payment provided for in this ARTICLE IV; and

(d) Subject to Section 4.2, a ROYALTY RATE as follows:

(i) if the LICENSED PRODUCT is covered by a VALID CLAIM in the country of SALE at the time of SALE as follows:

ROYALTY RATE - If payment of royalty for the SALE of the LICENSED PRODUCT is also payable under the 2017 LICENSE	ROYALTY RATE - If payment of royalty for the SALE of the LICENSED PRODUCT is not also payable under the 2017 LICENSE
[***]	[***]

(ii) if the LICENSED PRODUCT is not covered by a VALID CLAIM in the country of SALE at the time of SALE as follows:

ROYALTY RATE - If payment of royalty for the SALE of the LICENSED PRODUCT is also payable under the 2017 LICENSE	ROYALTY RATE - If payment of royalty for the SALE of the LICENSED PRODUCT is not also payable under the 2017 LICENSE
[***]	[***]

For clarity, the lower ROYALTY RATE set forth in the tables above in this Section 4.1(d), shall be applied on a LICENSED PRODUCT-by-LICENSED PRODUCT basis and shall only apply to those SALES for which LICENSEE is obligated to pay, and does pay, a royalty for the sale of the same LICENSED PRODUCT under the 2017 LICENSE for the avoidance of doubt the maximum royalty rate paid by LICENSEE with respect to the sale of a LICENSED PRODUCT covered by a Valid Claim under this LICENSE is [***]% and

(e) milestone fees within thirty (30) days of achieving the following Milestone Events:

Milestone Events	Milestone Fees – if the corresponding Milestone Event of thee 2017 LICENSE is achieved with the same LICENSED PRODUCT	Milestone Fees – Otherwise
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]

Each of the foregoing milestone fees shall be made by LICENSEE to MD ANDERSON (without invoice) within thirty (30) calendar days of achieving the Milestone Event and shall not reduce the amount of any other payment provided for in this ARTICLE IV. For clarity, each of the foregoing milestone payments shall be paid only once regardless of the number of LICENSED PRODUCTS that achieve such milestone; and

(f) a percentage of all SUBLICENSE CONSIDERATION, received by LICENSEE from any SUBLICENSEE pursuant to Section 3.3 hereinabove as follows:

	Percentage of SUBLICENSE CONSIDERATION – if sublicense consideration is payable under the 2017 LICENSE for the same SUBLICENSE AGREEMENT	Percentage of SUBLICENSE CONSIDERATION – if sublicense consideration is not payable under the 2017 LICENSE for the same SUBLICENSE AGREEMENT
	[***]	[***]

4.2 In the event that a LICENSED PRODUCT is sold in combination with one or more other functional components for which no royalty would be due hereunder if sold separately ("COMBINATION PRODUCT(S)"), then the running royalty due for NET SALES of the Combination Product will be calculated by multiplying the ROYALTY RATE by the total NET SALES received for the COMBINATION PRODUCT, and then multiplying the resulting product by the fraction, A/(A+B), where A is the average sale price of the LICENSED PRODUCT when sold by the LICENSEE separately, and B is the average sale price of all other functional component(s) included in the COMBINATION PRODUCT when sold by the LICENSEE separately. In the event either the component that is a LICENSED PRODUCT or the other functional component(s) included in the COMBINATION PRODUCT are not sold separately, then the running royalty due for NET SALES of the LICENSED PRODUCT sold as part of a COMBINATION PRODUCT will be calculated by multiplying the ROYALTY RATE by the NET SALES received for the COMBINATION PRODUCT, and then multiplying the resulting product by the fraction, F/(F+G) where F is the fair market value of the component that is a LICENSED PRODUCT, and G is the fair market value for each of the other functional component(s) included in the COMBINATION PRODUCT, such fair market values to be mutually agreed in good faith by LICENSEE and MD ANDERSON prior to sales of such COMBINATION PRODUCTS. Notwithstanding the foregoing, in no event shall the ROYALTY RATE due to MD ANDERSON for the SALE of a COMBINATION PRODUCT be less than the percentage set forth as follows:

(i) If a royalty has been paid to or is concurrently due to MD ANDERSON for the SALE of such COMBINATION PRODUCT under the 2017 LICENSE, the ROYALTY RATE set forth in Section 4.1(d) for the SALE of such COMBINATION PRODUCT shall not be less than [***]%; and/or

(ii) If a royalty has not been paid to or is not due to MD ANDERSON for the SALE such COMBINATION PRODUCT under the 2017 LICENSE, the ROYALTY RATE set forth in Section 4.1(d) for the SALE of such COMBINATION PRODUCT shall not be less than [***]% if the COMBINATION PRODUCT is suitable for an INDICATION.

4.3 LICENSEE shall make no SALE prior to REGULATORY APPROVAL unless LICENSEE pays the royalty due hereunder to MD ANDERSON on account of any NET SALES arising from such SALE.

4.4 Unless otherwise provided, all such payments are payable within sixty (60) calendar days after March 31, June 30, September 30, and December 31 of each year during the TERM, at which time LICENSEE will also deliver to MD ANDERSON a true and accurate report, giving such particulars of the business conducted by LICENSEE, its AFFILIATES and its SUBLICENSEES, if any exist, during the preceding three (3) calendar months under this AGREEMENT as necessary for MD ANDERSON to account for LICENSEE's payments hereunder. This report will include pertinent data, including, but not limited to:

(a) the accounting methodologies used to account for and calculate the items included in the report and any differences in such accounting methodologies used by LICENSEE since the previous report; and
(b) a list of each type of LICENSED PRODUCT available for sale during the three (3) preceding calendar months; and
(c) the total quantities of each LICENSED PRODUCT SOLD during such period; and
(d) the total SALES; and
(e) the calculation of NET SALES; and
(f) the royalties so computed and due MD ANDERSON; and
(g) all consideration received from each SUBLICENSEE and payments due MD ANDERSON; and
(h) all other amounts due MD ANDERSON herein.

Simultaneously with the delivery of each such report, LICENSEE agrees to pay MD ANDERSON the amount due, if any, for the period of such report. These reports are required even if no payments are due.

4.5 During the TERM and for one (1) year thereafter, LICENSEE agrees to keep complete and accurate records of its, its AFFILIATES' and SUBLICENSEES' SALES and NET SALES in sufficient detail to enable the royalties and other payments due hereunder to be determined. LICENSEE agrees to permit an independent auditor engaged by MD ANDERSON and reasonably acceptable to LICENSEE, at MD ANDERSON's expense, to periodically (but no more than once per calendar year and solely with respect to records not previously examined, unless in the independent auditor's reasonable opinion review of such previously examined records is necessary to properly conduct the current examination) examine LICENSEE's books, ledgers, and records during regular business hours, with reasonable prior notice, for the purpose of and to the extent necessary to verify any report required under this AGREEMENT. If any amounts due MD ANDERSON are determined to have been underpaid in an amount equal to or greater than [***] percent ([***]%) of the total amount due during the period so examined, then LICENSEE will pay the reasonable cost of the examination plus accrued interest at the lower of (a) the then-current prime interest rate plus [***]% or (b) the highest allowable rate.

4.6 Within thirty (30) calendar days following each anniversary of the EFFECTIVE DATE, LICENSEE will deliver to MD ANDERSON a written progress report as to LICENSEE's (and any AFFILIATE's and SUBLICENSEE's) efforts and accomplishments during the preceding year in diligently commercializing LICENSED SUBJECT MATTER in the LICENSED TERRITORY and LICENSEE'S, AFFILIATES' and SUBLICENSEES' commercialization plans for the upcoming year.

4.7 All amounts payable hereunder by LICENSEE will be paid in United States funds without deductions for taxes, assessments, fees, or charges of any kind. Checks are to be made payable to The University of Texas M. D. Anderson Cancer Center, and sent by United States mail to Box 4390, Houston, Texas 77210-4390, or by wire transfer to:

[***]

4.8 No payments due or royalties owed under this AGREEMENT will be reduced as the result of co-ownership of LICENSED SUBJECT MATTER by BOARD and another party, including, but not limited to, LICENSEE.

V. SPONSORED RESEARCH

5.1 If LICENSEE desires to sponsor research for or related to the LICENSED SUBJECT MATTER, LICENSEE will notify MD ANDERSON and the PARTIES will negotiate in good faith the terms for such sponsored research.

VI. PATENTS AND INVENTIONS

6.1 LICENSEE shall be responsible for preparing, filing, prosecuting and maintaining the patent applications and patents included within the PATENT RIGHTS and for paying all associated costs using patent counsel reasonably acceptable to MD ANDERSON. LICENSEE will directly notify and provide copies to MD ANDERSON and its selected outside patent counsel, at no cost to LICENSEE, of any official communications from United States and foreign patent offices relating to said prosecution within thirty (30) days of receipt as well as copies of communications to the various patent offices so that MD ANDERSON may be informed and apprised of the continuing prosecution of the patent applications and patents included within the PATENT RIGHTS. LICENSEE shall give MD ANDERSON at least 10 business days (to the extent practicable) to review and comment on any material communications to the various patent offices with respect to the patent applications and patents included within the PATENT RIGHTS. Additionally, LICENSEE shall direct their counsel to consult with MD ANDERSON's outside patent counsel on patent strategy related to the PATENT RIGHTS.

6.2 LICENSEE shall keep MD ANDERSON informed as to their plans to file and MD ANDERSON will have reasonable opportunities to comment on decisions affecting filing, prosecution and maintenance of the patent applications and patents included within the PATENT RIGHTS, including, without limitation reasonable opportunity to review the abandonment of any patent applications and patents or change of inventors on patent applications and patents included within the PATENT RIGHTS, and LICENSEE will use reasonable efforts to incorporate MD ANDERSON's reasonable suggestions regarding said prosecution. Additionally, LICENSEE will use reasonable efforts to amend any patent application to include claims reasonably requested by MD ANDERSON to protect LICENSED SUBJECT MATTER. No case will be abandoned without giving MD ANDERSON at least thirty (30) days' notice and opportunity to pursue the application. If LICENSEE notifies MD ANDERSON that it does not intend to file in any national jurisdiction, pay the cost of any application or of LICENSEE's plans to abandon an application or patent within PATENT RIGHTS, then MD ANDERSON may file or pursue such application in that national jurisdiction, if applicable, at its own expense and LICENSEE will have no further rights to such application or patent under this AGREEMENT.

6.3 If MD ANDERSON reasonably demonstrates that it is not being reasonably informed or apprised of the continuing prosecution of patent applications and patents included within the PATENT RIGHTS or that it is not being provided with reasonable opportunities to comment as indicated in the above paragraph and LICENSEE does not resume such activities within thirty (30) days after MD ANDERSON's notice, MD ANDERSON shall be entitled to engage, at LICENSEE's reasonable expense, independent patent counsel to review and evaluate patent prosecution and filing of patents and patent applications included in PATENT RIGHTS. Henceforth MD ANDERSON and LICENSEE shall share responsibility for patent prosecution of patents and patent applications included in PATENT RIGHTS, with LICENSEE reimbursing MD ANDERSON in full for any reasonable PATENT EXPENSES incurred by MD ANDERSON.

6.4 The Parties agree that they share a common legal interest to get valid enforceable patents and that MD ANDERSON and LICENSEE will keep all privileged information received from the other party pursuant to this Article VI confidential, except to the extent required by law.

VII. INFRINGEMENT BY THIRD PARTIES

7.1 LICENSEE, at its expense, shall have the first right (but no obligation) to enforce all PATENT RIGHTS against infringement by third parties and is entitled to retain recovery from such enforcement. After reimbursement of LICENSEE's reasonable legal costs and expenses related to an infringement recovery, LICENSEE shall pay MD ANDERSON [***] of any monetary recovery (whether by judgment or settlement, including recovery for lost profits, reasonable royalties, and/or enhanced or punitive damages).

7.2 If it is necessary to name BOARD or MD ANDERSON as a party in such action to enforce PATENT RIGHTS against an infringer, then LICENSEE must first obtain BOARD'S and MD ANDERSON'S prior written permission, which permission shall not be unreasonably withheld, provided that BOARD and MD ANDERSON shall have reasonable prior input on choice of counsel on any matter where such counsel represents BOARD or MD ANDERSON, and LICENSEE and such counsel agree to follow all required procedures of the Texas Attorney General regarding retention of outside counsel for state entities.

7.4 MD ANDERSON shall promptly notify LICENSEE if MD ANDERSON'S Office of Technology Commercialization becomes aware of any infringement or potential infringement of any PATENT RIGHTS. If LICENSEE does not first exercise its right under Section 7.1 within twelve (12) months of knowledge of infringement, then, BOARD or MD ANDERSON may, at its sole discretion, enforce any patent licensed hereunder on behalf of itself and LICENSEE, with MD ANDERSON retaining all recoveries from such enforcement. If BOARD and/or MD ANDERSON pursues such infringement action, BOARD and/or MD ANDERSON may, as part of the resolution thereof, grant non-exclusive license rights to the alleged infringer, notwithstanding LICENSEE's exclusive license rights.

VIII. PATENT MARKING

8.1 LICENSEE agrees that all packaging containing individual LICENSED PRODUCT(S), documentation therefor, and, when possible, actual LICENSED PRODUCT(S) sold by LICENSEE, AFFILIATES, and/or SUBLICENSEES will be appropriately marked with the number of any applicable patent(s) licensed hereunder in accordance with each country's patent laws, including Title 35, United States Code, to the extent such marking is necessary or required to fully preserve PATENT RIGHTS in each such country.

IX. INDEMNIFICATION AND INSURANCE

9.1 LICENSEE AGREES TO HOLD HARMLESS AND INDEMNIFY BOARD, SYSTEM, MD ANDERSON, THEIR REGENTS, OFFICERS, EMPLOYEES, STUDENTS AND AGENTS FROM AND AGAINST ANY CLAIMS, DEMANDS, OR CAUSES OF ACTION WHATSOEVER BROUGHT BY THIRD PARTIES, COSTS OF SUIT AND REASONABLE ATTORNEY'S FEES, INCLUDING WITHOUT LIMITATION, THOSE COSTS ARISING ON ACCOUNT OF ANY INJURY OR DEATH OF PERSONS OR DAMAGE TO PROPERTY (COLLECTIVELY, "LIABILITIES") IN EACH CASE THAT ARE CAUSED BY, OR ARISING OUT OF, OR RESULTING FROM, THE EXERCISE OR PRACTICE OF THE RIGHTS GRANTED HEREUNDER BY LICENSEE, ITS OFFICERS, ITS AFFILIATES OR THEIR OFFICERS, EMPLOYEES, AGENTS OR REPRESENTATIVES EXCEPT TO THE EXTENT SUCH LIABILITIES ARISE FROM (i) THE NEGLIGENT FAILURE OF MD ANDERSON TO SUBSTANTIALLY COMPLY WITH ANY APPLICABLE GOVERNMENTAL REQUIREMETNS OR (ii) THE NEGLIGENT OR WILLFUL MISCONDUCT BY A REGENT, OFFICER, AGENT OR EMPLOYEE OF MD ANDERSON.

9.2 IN NO EVENT SHALL BOARD, SYSTEM OR MD ANDERSON BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS OR EXPECTED SAVINGS OR OTHER ECONOMIC LOSSES, OR FOR INJURY TO PERSONS OR PROPERTY) ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT OR ITS SUBJECT MATTER, REGARDLESS OF WHETHER BOARD, SYSTEM OR MD ANDERSON KNOWS OR SHOULD KNOW OF THE POSSIBILITY OF SUCH DAMAGES.

9.3 OTHER THAN FOR CLAIMS AGAINST LICENSEE FOR INDEMNIFICATION PURSUANT TO SECTION 9.1 OR FOR THE MISAPPROPRIATION OR INFRINGEMENT OF MD ANDERSON'S INTELLECTUAL PROPERTY RIGHTS, LICENSEE SHALL WILL NOT BE LIABLE TO MD ANDERSON FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS OR EXPECTED SAVINGS OR OTHER ECONOMIC LOSSES, OR FOR INJURY TO PERSONS OR PROPERTY) ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT OR ITS SUBJECT MATTER, REGARDLESS OF WHETHER LICENSEE KNOWS OR SHOULD KNOW OF THE POSSIBILITY OF SUCH DAMAGES.

9.4 Beginning at the time when any LICENSED SUBJECT MATTER is being distributed or sold (including for the purpose of obtaining REGULATORY APPROVALS) by LICENSEE, an AFFILIATE, or by a SUBLICENSEE, LICENSEE shall, at its sole cost and expense, procure and maintain commercial general liability insurance in amounts not less than $[***] per incident and $[***] annual aggregate, and LICENSEE shall use reasonable efforts to have the BOARD, SYSTEM, MD ANDERSON, their Regents, officers, employees, students and agents named as additional insureds. Such commercial general liability insurance shall provide: (i) product liability coverage; (ii) broad form contractual liability coverage for LICENSEE's indemnification under this AGREEMENT; and (iii) coverage for litigation costs. The minimum amounts of insurance coverage required herein shall not be construed to create a limit of LICENSEE's liability with respect to its indemnification under this AGREEMENT.

9.5 LICENSEE shall provide MD ANDERSON with written evidence of such insurance within thirty (30) calendar days of its procurement. Additionally, LICENSEE shall provide MD ANDERSON with written notice of at least fifteen (15) calendar days prior to the cancellation, non-renewal or material change in such insurance.

9.6 LICENSEE shall maintain such commercial general liability insurance beyond the expiration or termination of this AGREEMENT during: (i) the period that any LICENSED SUBJECT MATTER developed pursuant to this AGREEMENT is being commercially distributed or sold by LICENSEE, an AFFILIATE or by a SUBLICENSEE or agent of LICENSEE; and (ii) the five (5) year period immediately after such period.

X. USE OF BOARD AND MD ANDERSON'S NAME

10.1 LICENSEE will not use the name of (or the name of any employee of) MD ANDERSON, SYSTEM or BOARD in any advertising, promotional or sales literature, on its Web site, or for the purpose of raising capital without the advance express written consent of BOARD secured through:

The University of Texas
M. D. Anderson Cancer Center
[***]

Notwithstanding the above, LICENSEE may use the name of (or name of employee of) MD ANDERSON, SYSTEM or BOARD in routine business correspondence or as needed in appropriate regulatory submissions or required by applicable law or court order without express written consent.

XI. CONFIDENTIAL INFORMATION AND PUBLICATION

11.1 MD ANDERSON and LICENSEE each agree that all information contained in documents marked "confidential" and forwarded to one by the other (i) are to be received in strict confidence, (ii) are to be used only for the purposes of this AGREEMENT, and (iii) will not be disclosed by the recipient party (except as required by law or court order), nor by the recipient party's agents or employees without the prior written consent of the disclosing party, except to the extent that the recipient party can establish by competent written proof that such information:

(a) was in the public domain at the time of disclosure; or
(b) later became part of the public domain through no act or omission of the recipient party, its employees, agents, successors or assigns; or
(c) was lawfully disclosed to the recipient party by a third party having the right to disclose it; or
(d) was already known by the recipient party at the time of disclosure; or

(e) was independently developed by the recipient party without use of the disclosing party's confidential information; or

(f) is required by law or regulation to be disclosed; provided that such recipient party gives the disclosing party reasonable prior notice of such disclosure requirement and affords the disclosing party an opportunity to obtain a protective order or other appropriate relief.

11.2 Each party's obligation of confidence hereunder will be fulfilled by using at least the same degree of care with the disclosing party's confidential information as it uses to protect its own confidential information, but always at least a reasonable degree of care. This obligation will exist while this AGREEMENT is in force and for a period of three (3) years thereafter. Notwithstanding the foregoing, LICENSEE may disclose the MD ANDERSON's Confidential Information only to its AFFILIATES, investors, and to existing or potential SUBLICENSEES or acquirers or merger partners ("REPRESENTATIVES") who have been informed of this AGREEMENT, who need to know such Confidential Information to assist the LICENSEE as reasonably needed to conduct the development or commercialization of LICENSED PRODUCTS, provided that such Representatives are subject to obligations of confidentiality and non-use at least as strict as LICENSEE's obligations under this AGREEMENT.

11.3 MD ANDERSON reserves the right to publish the general scientific findings from research conducted by MD ANDERSON related to LICENSED SUBJECT MATTER, with due regard to the protection of LICENSEE's confidential information. MD ANDERSON will submit the manuscript of any proposed publication to LICENSEE at least thirty (30) calendar days before publication, and LICENSEE shall have the right to review and comment upon the publication in order to protect LICENSEE's confidential information. Upon LICENSEE's request, MD ANDERSON shall remove LICENSEE's confidential information from the publication and publication may be delayed up to sixty (60) additional calendar days to enable LICENSEE to secure adequate intellectual property protection of LICENSED SUBJECT MATTER that would otherwise be affected by the publication.

XII. ASSIGNMENT

12.1 In case of the sale of all of LICENSEE's assets to a third party, or in connection with any transaction other than sale of all of LICENSEE's assets to a third party, this AGREEMENT may be assigned subject to the payment to MD ANDERSON prior to the ASSIGNMENT of a fee for permitting such ASSIGNMENT ("ASSIGNMENT FEE") as follows:

(a) if LICENSEE has paid all fees for required for assignment of the 2010 LICENSE and the AGREEMENT is to be assigned to the same party to which LICENSEE assigned the 2017 LICENSE, the ASSIGMENT FEE due MD ANDERSON under this AGREEMENT shall be $[***];
or

(b) if Section 12.1(a) is not applicable, the ASSIGMENT FEE due MD ANDERSON under this AGREEMENT shall be $[***].

Any ASSIGNMENT FEE shall be in addition to and shall not replace the LICENSE DOCUMENTATION FEE above. No ASSIGNMENT FEE shall be due if the ASSIGNMENT is to an AFFILIATE, provided that LICENSEE or the AFFILIATE pays the ASSIGNMENT FEE in the event AFFILIATE thereafter makes an ASSIGNMENT of the AGREEMENT to a third party.

XIII. TERM AND TERMINATION

13.1 Subject to Sections 13.3 and 13.4 hereinbelow, the term of this AGREEMENT is from the EFFECTIVE DATE until the later of (a) expiration of the last to expire patents issued from the PATENT RIGHTS, or (b) twenty (20) years from the EFFECTIVE DATE ("TERM").

13.2 Any time after four (4) years from the EFFECTIVE DATE, BOARD or MD ANDERSON may remove from the LICENSED TERRITORY any national political jurisdiction if LICENSEE, within ninety (90) days after receiving written notice from MD ANDERSON of the intended removal, fails provide written evidence satisfactory to MD ANDERSON that LICENSEE, an AFFILIATE, or a SUBLICENENSEE has commercialized or is using commercially reasonable efforts actively and effectively attempting to commercialize a licensed invention in such jurisdiction(s).

13.3 Subject to any rights herein which survive termination, this AGREEMENT will earlier terminate in its entirety:

(a) upon thirty (30) calendar days written notice if LICENSEE becomes bankrupt and/or if the business of LICENSEE shall be placed in the hands of a receiver, assignee, or trustee, whether by voluntary act of LICENSEE or otherwise; or

(b) upon thirty (30) calendar days written notice from MD ANDERSON, if LICENSEE materially breaches or defaults on the payment or report obligations of ARTICLE IV (excluding the license documentation fee specified in Section 4.1(b), for which no cure period applies), or use of name obligations of ARTICLE X, unless, before the end of such thirty (30)-calendar day notice period, LICENSEE has cured the material default or breach to MD ANDERSON's reasonable satisfaction, and so notifies MD ANDERSON, stating the manner of the cure; or

(c) upon ninety (90) calendar days written notice from MD ANDERSON if LICENSEE materially breaches or defaults on any other obligation under this AGREEMENT, unless, before the end of such ninety (90) calendar-day notice period, LICENSEE has cured the material default or breach to MD ANDERSON's reasonable satisfaction and so notifies MD ANDERSON, stating the manner of the cure; or

(d) at any time by mutual written agreement between LICENSEE and MD ANDERSON upon one hundred eighty (180) calendar days written notice to all parties and subject to any terms herein which survive termination; or

(e) upon thirty (30) calendar days written notice from MD ANDERSON if the termination is pursuant to Section 13.2 or Section 15.8; or

(f) if LICENSEE has defaulted or been late on its payment obligations pursuant to the terms of this AGREEMENT on any two (2) occasions in a twelve (12) month period; or

(g) immediately, upon written notice from MD ANDERSON, if LICENSEE fails to timely pay the LICENSE DOCUMENTATION FEE specified in Section 4.1(b); or

(h) for any reason upon thirty (30) calendar days written notice from LICENSEE to MD ANDERSON, provided that LICENSEE is not in material breach of any of its obligations under this AGREEMENT.

13.4 Upon termination of this AGREEMENT:

(a) nothing herein will be construed to release either party of any obligation maturing prior to the effective date of the termination; and

(b) both parties covenant and agree to be bound by the provisions of ARTICLES IX (Indemnification and Insurance), X (USE OF BOARD AND MD ANDERSON'S NAME) and XI (CONFIDENTIAL INFORMATION AND PUBLICATION) of this AGREEMENT. Notwithstanding the foregoing, the obligations of confidentiality according to Article XI shall survive early termination of this AGREEMENT under Section 13.3 for a period of five (5) years and shall immediately expire upon expiration of this AGREEMENT under Section 13.1.

XIV. WARRANTY: SUPERIOR-RIGHTS

14.1 BOARD represents and warrants its belief that (a) it is the owner of the entire right, title, and interest in and to LICENSED SUBJECT MATTER, (b) it has the right to grant licenses thereunder, and (c) it has not knowingly granted licenses thereunder to any other entity that would restrict rights granted hereunder except as stated herein.

14.2 LICENSEE understands that in the event that the LICENSED SUBJECT MATTER was developed under a funding agreement with the Government of the United States of America ("GOVERNMENT"),the GOVERNMENT may have certain rights relative thereto. This AGREEMENT is explicitly made subject to the GOVERNMENT's rights under any such agreement and any applicable law or regulation. To the extent that there is a conflict between any such agreement, applicable law or regulation and this AGREEMENT, the terms of such GOVERNMENT agreement, applicable law or regulation shall prevail.

14.3 LICENSEE UNDERSTANDS AND AGREES THAT BOARD AND MD ANDERSON, BY THIS AGREEMENT, MAKE NO REPRESENTATION AS TO THE OPERABILITY OR FITNESS FOR ANY USE, SAFETY, EFFICACY, APPROVABILITY BY REGULATORY AUTHORITIES, TIME AND COST OF DEVELOPMENT, PATENTABILITY, AND/OR BREADTH OF THE LICENSED SUBJECT MATTER. BOARD AND MD ANDERSON, BY THIS AGREEMENT, ALSO MAKE NO REPRESENTATION AS TO WHETHER ANY PATENT COVERED BY PATENT RIGHTS IS VALID OR AS TO WHETHER THERE ARE ANY PATENTS NOW HELD, OR WHICH WILL BE HELD, BY OTHERS OR BY BOARD OR MD ANDERSON IN THE LICENSED FIELD, NOR DO BOARD AND MD ANDERSON MAKE ANY REPRESENTATION THAT THE INVENTIONS CONTAINED IN PATENT RIGHTS DO NOT INFRINGE ANY OTHER PATENTS NOW HELD OR THAT WILL BE HELD BY OTHERS OR BY BOARD.

14.4 LICENSEE, by execution hereof, acknowledges, covenants and agrees that LICENSEE has not been induced in any way by BOARD, SYSTEM, MD ANDERSON or employees thereof to enter into this AGREEMENT, and further warrants and represents that (a) LICENSEE is entering into this AGREEMENT voluntarily; (b) LICENSEE has conducted sufficient due diligence with respect to all items and issues pertaining to this AGREEMENT; and (c) LICENSEE has adequate knowledge and expertise, or has used knowledgeable and expert consultants, to adequately conduct such due diligence, and agrees to accept all risks inherent herein.

XV. GENERAL

15.1 This AGREEMENT constitutes the entire and only agreement between the parties for LICENSED SUBJECT MATTER and all other prior negotiations, representations, agreements and understandings with respect thereto are superseded hereby. No agreements altering or supplementing the terms hereof will be made except by a written document signed by both parties.

15.2 Any notice required by this Agreement shall be in writing and shall be deemed to have been sufficiently given for all purposes thereof when sent by first class mail or reputable international courier (e.g., Federal Express or UPS) and shall be evidenced by the postmark at the point of mailing or by the dated delivery receipt of the courier. All notices and any correspondence respecting this Agreement shall be transmitted as follows:

To MD Anderson, if by mail:
The University of Texas M. D. Anderson Cancer Center
Strategic Industry Ventures/Office of Technology Commercialization
[***]

To MD Anderson, if by courier:
The University of Texas
M. D. Anderson Cancer Center Strategic Industry Ventures/Office of Technology Commercialization
[***]

Contact phone number for use by courier: [***]

or in the case of LICENSEE to:

Moleculin Biotech, Inc.
5300 Memorial Drive, Suite 950
Houston, Texas 77007
ATTENTION: Jonathan Foster

or other addresses as may be given from time to time under the terms of this notice provision.

15.3 LICENSEE must comply with all applicable federal, state and local laws and regulations in connection with its activities pursuant to this AGREEMENT. LICENSEE acknowledges that the LICENSED SUBJECT MATTER is subject to U. S. export control jurisdiction. LICENSEE agrees to comply with all applicable international and national laws that apply to the LICENSED SUBJECT MATTER, including U.S. Export Administration Regulations, as well as end-user, end-use, and destination restrictions applied by the United States.

15.4 This AGREEMENT will be construed and enforced in accordance with the laws of the United States of America and of the State of Texas, without regard to its conflict of law provisions. The Texas State Courts of Harris County, Texas (or, if there is exclusive federal jurisdiction, the United States District Court for the Southern District of Texas) shall have exclusive jurisdiction and venue over any dispute arising out of this AGREEMENT, and LICENSEE consents to the jurisdiction and venue of such courts and hereby explicitly waives the rights to any other venue to which it might be entitled by cause of action, domicile or otherwise. Nothing in this AGREEMENT shall be deemed as a waiver by BOARD, SYSTEM or MD ANDERSON of its sovereign immunity.

15.5 Failure of BOARD or MD ANDERSON or LICENSEE to enforce a right under this AGREEMENT will not act as a waiver of right or the ability to later assert that right relative to the particular situation involved.

15.6 Headings included herein are for convenience only and will not be used to construe this AGREEMENT.

15.7 If any part of this AGREEMENT is for any reason found to be unenforceable, all other parts nevertheless will remain enforceable.

15.8 In the event that LICENSEE brings an action before any court, agency or tribunal seeking to invalidate or otherwise challenge the enforceability of or BOARD's ownership of any patent included in the PATENT RIGHTS, then MD ANDERSON may immediately terminate this AGREEMENT upon written notice to LICENSEE. Any dispute regarding the validity, enforceability or ownership of any patent included in the PATENT RIGHTS shall be litigated in the courts located in Houston, Texas, and LICENSEE agrees not to challenge personal jurisdiction in that forum. To the extent that LICENSEE unsuccessfully challenges the validity or enforceability of any patent included in the PATENT RIGHTS, LICENSEE agrees to reimburse MD ANDERSON and BOARD for all costs and fees (including attorney's fees) paid by MD ANDERSON and BOARD in defending against such challenge. LICENSEE understands and agrees that, in the event LICENSEE successfully challenges the validity or enforceability of any patent included in the PATENT RIGHTS, all payments or other consideration made or otherwise provided by LICENSEE to MD ANDERSON prior to a final, non-appealable adjudication of invalidity and/or unenforceability shall be non-refundable. The obligations of this Section shall survive the expiration or termination of this AGREEMENT.

IN WITNESS WHEREOF, the parties hereto have caused their duly authorized representative to execute this AGREEMENT.

BOARD OF REGENTS OF THE UNIVERSITY OF TEXAS SYSTEM,
on behalf of
THE UNIVERSITY OF TEXAS M.D.
ANDERSON CANCER CENTER

By /s/[***]
[***]

Date: 12/2/2021

Approved as to Content:
By /s/ [***]
[***]
Vice President, Strategic Industry Ventures
M.D. Anderson Cancer Center

Date: 12/2/2021

MOLECULIN BIOTECH, INC.

By /s/ Jonathan P. Foster
Printed Name: Jonathan P. Foster

Title: EVP CFO

Date: November 1, 2021

EXHIBIT I

[***]

Exhibit 10.33

Certain identified information has been excluded from this exhibit because it is both not material and is the type that the issuer treats as private or confidential. Information that was omitted has been noted in this document with a placeholder identified by the mark "[***]".

Execution version

PATENT AND TECHNOLOGY LICENSE AGREEMENT

This AGREEMENT ("AGREEMENT") is made by and between THE BOARD OF REGENTS ("BOARD") of THE UNIVERSITY OF TEXAS SYSTEM ("SYSTEM"), an agency of the State of Texas, whose address is 201 West 7th Street, Austin, Texas 78701, on behalf of THE UNIVERSITY OF TEXAS M. D. ANDERSON CANCER CENTER ("MD ANDERSON"), a member institution of SYSTEM, and MOLECULIN BIOTECH, INC. a Delaware corporation having a principal place of business located at 5300 Memorial Drive, Suite 950, Houston, Texas 77007 ("LICENSEE").

RECITALS

A. BOARD and Intech Bio Corporation ("IBC") previously entered into that certain Patent and Technology License effective April 2, 2012 ("2012 LICENSE").

B. IBC assigned the 2012 LICENSE to LICENSEE, effective November 17, 2015.

C. BOARD owns certain PATENT RIGHTS and TECHNOLOGY RIGHTS related to LICENSED SUBJECT MATTER and the technology of the 2012 LICENSE, developed at MD ANDERSON in cooperation with LICENSEE, all as defined herein.

D. BOARD, through MD ANDERSON, desires to have the LICENSED SUBJECT MATTER developed in the LICENSED FIELD and used for the benefit of LICENSEE, BOARD, SYSTEM, MD ANDERSON, the inventor(s), and the public as outlined in BOARD's Intellectual Property Policy.

E. LICENSEE wishes to obtain a license from BOARD to practice LICENSED SUBJECT MATTER.

NOW, THEREFORE, in consideration of the mutual covenants and promises herein contained, the parties agree as follows:

I. EFFECTIVE DATE

1.1 This AGREEMENT is effective as of the date of the last authorized signature below (the "EFFECTIVE DATE").

II. DEFINITIONS

As used in this AGREEMENT, the following terms have the meanings indicated:

2.1 **ACTIVELY AND EFFECTIVELY ATTEMPTING TO COMMERCIALIZE** means efforts consistent with those of a similarly situated biotechnology company in its having an effective, ongoing and active research, development, manufacturing, marketing or sales program as appropriate for a pharmaceutical product at a similar stage of development or commercialization with similar market potential, such program directed toward obtaining REGULATORY APPROVAL of a LICENSED PRODUCT, and/or production and/or SALES, in a jurisdiction, and providing plans to MD ANDERSON to commercialize a LICENSED PRODUCT in the jurisdiction.

2.2 **AGREEMENT** has the meaning set forth in the preamble.

2.3 **AFFILIATE** means any business entity more than fifty percent (50%) owned by LICENSEE, any business entity which owns more than fifty percent (50%) of LICENSEE, or any business entity that is more than fifty percent (50%) owned by a business entity that owns more than fifty percent (50%) of LICENSEE.

2.4 **ASSIGNMENT** means a writing wherein a third-party assumes in writing (a copy of which writing will be promptly provided to MD ANDERSON) all of LICENSEE's or AFFILIATE's interests, rights, duties, and obligations under the AGREEMENT and agrees to comply with all terms and conditions of the AGREEMENT as if the assignee were the original party to the AGREEMENT.

2.5 **ASSIGNMENT FEE** has the meaning set forth in Section 12.1.

2.6 **BOARD** has the meaning set forth in the preamble.

2.7 **COMMERCIALIZED** means having SALES in a jurisdiction.

2.8 **EFFECTIVE DATE** has the meaning set forth in Section 1.1.

2.9 **EXCLUDED AMOUNTS** means (1) any payment received by or on behalf of LICENSEE from a SUBLICENSEE for the supply of goods and/or services (including LICENSED PRODUCTS) to such SUBLICENSEE, provided that the SUBLICENSEE is not the end user of such goods or services, and provided further that MD ANDERSON has been paid the ROYALTY RATE for NET SALES upon SALE of the LICENSED PRODUCTS to the end user; and (2) payment received by LICENSEE from a SUBLICENSEE for providing LICENSED PRODUCTS to said SUBLICENSEE for use in a clinical study or other research necessary or useful to obtain REGULATORY APPROVAL of a LICENSED PRODUCTS, provided that such payment does not exceed LICENSEE's actual cost for providing such LICENSED PRODUCTS to said SUBLICENSEE.

2.10 **FDA** means the United States Food and Drug Administration.

2.11 **GOVERNMENT** has the meaning set forth in Section 14.2.

2.12 **IND** means (a) an Investigational New Drug application as defined in the FFDCA (21 U.S.C. §301 et seq.), (b) a clinical trial authorization application for a product filed with a REGULATORY AUTHORITY in any other regulatory jurisdiction outside the U.S., the filing of which (in the case of (a) or (b)) is necessary to commence or conduct clinical testing of a pharmaceutical product in humans in such jurisdiction, or (c) documentation issued by a REGULATORY AUTHORITY that permits the conduct of clinical testing of a product in humans in such jurisdiction.

2.13 **LIABILITIES** has the meaning set forth in Section 9.1.

2.14 **LICENSE DOCUMENTATION FEE** has the meaning set forth in Section 4.1(b)

2.15 **LICENSED FIELD** means all fields of use.

2.16 **LICENSED PRODUCTS** means any product(s) or service(s) sold by LICENSEE, an AFFILIATE, or a SUBLICENSEE comprising LICENSED SUBJECT MATTER pursuant to this AGREEMENT and which is covered by a VALID CLAIM.

2.17 **LICENSED SUBJECT MATTER** means inventions and discoveries covered by PATENT RIGHTS or TECHNOLOGY RIGHTS within LICENSED FIELD.

2.18 **LICENSED TERRITORY** means worldwide.

2.19 **LICENSEE** has the meaning set forth in the preamble.

2.20 **MD ANDERSON** has the meaning set forth in the preamble.

2.21 **MAINTENANCE FEE** has the meaning set forth in Section 4.1(c).

2.22 **MINIMUM ANNUAL ROYALTIES** has the meaning set forth in Section 4.1(e).

2.23 **NEW DRUG APPLICATION** means application submitted to the FDA for approval to market a new drug, as more specifically defined by 21 C.F.R §314 et seq., or any future revisions or substitutes thereof, or an equivalent foreign filing in any jurisdiction other than the United States.

2.24 **NET SALES** [***]

2.25 **PATENT EXPENSES** all expenses incurred in searching, preparing, filing, prosecuting, defending in any post-issuance administrative proceeding, and maintaining PATENT RIGHTS.

2.26 **PATENT RIGHTS** means BOARD's rights (a) the patents and patent applications resulting from the IDR(s) listed in Exhibit I; (b) all patent applications that claim priority to any patent or patent application of identified in (a), provided that the claims of such non-provisional applications are entitled to claim priority to such applications; (c) all divisionals, continuations and continuations-in-part of the non-provisional patent applications identified in (a) and (b), above provided that the claims of such continuations-in-part are entitled to claim priority to at least one of the patent applications identified in (a) or (b), above; (d) all reissues, reexaminations, extensions, and foreign counterparts of any of the patents or patent applications identified in (a), (b) or (c), above; and (e) any patents that issue with respect to any of the patent applications listed in (a), (b), (c) or (d), above.

2.27 **PHASE I STUDY** means: (a) that portion of the FDA submission and approval process which provides for the first introduction into humans of a product with the purpose of determining human toxicity, metabolism, absorption, elimination and other pharmacological action, as more fully defined by the rules and regulations of the FDA, including 21 C.F.R. § 312.21(a) or any future revisions or substitutes therefor; or (b) a similar clinical trial in any national jurisdiction other than the United States. For the avoidance of doubt, the emphasis of a PHASE I STUDY is on the safety and tolerability of a product and is used to plan patient dosing in a PHASE II STUDY.

2.28 **PHASE II STUDY** means: (a) that portion of the FDA submission and approval process which provides for early controlled clinical studies conducted to obtain preliminary data on the effectiveness of a product for a particular indication, as more specifically defined by the rules and regulations of the FDA, including 21 C.F.R. § 312.21(b) or any future revisions or substitutes therefor; or (b) any clinical trial that obtains data regarding the efficacy of a product, including without limitation Phase Ib study of a product, a clinical study of a product consisting of a cohort expansion, or a combined Phase Ib/II clinical study of a product; or (c) a clinical study similar to the foregoing (a) or (b) in any jurisdiction other than the United States. For the avoidance of doubt, when the safety and tolerability of a product has been established through the conduct of a PHASE I STUDY, the next clinical trial of a product will be a PHASE II STUDY.

2.29 **PHASE III STUDY** means a human clinical trial using a Licensed Product on a sufficient number of subjects that is designed to establish that a pharmaceutical product is safe and efficacious for its intended use, and to determine warnings, precautions, and adverse reactions that are associated with such pharmaceutical product in the dosage range to be prescribed, which trial is intended to support REGULATORY APPROVAL of a LICENSED PRODUCT alone or in combination with an ATAC, as described in 21 C.F.R. 312.21(c) for the United States, or a similar clinical study prescribed by the REGULATORY AUTHORITIES in a foreign country.

2.30 **REGULATORY APPROVAL** means the approval by the REGULATORY AUTHORITY needed for a particular national jurisdiction to market, SELL and use a LICENSED PRODUCT in that national jurisdiction.

2.31 **REGULATORY AUTHORITY** means the governmental authority responsible for granting any necessary licenses or approvals for the marketing, SALE and use of a LICENSED PRODUCT in a particular national jurisdiction, including without limitation, the FDA, European Medicines Agency or Koseisho (i.e. the Japanese Ministry of Health and Welfare).

2.32 **REPRESENTATIVES** has the meaning set forth in Section 11.2.

2.33 **ROYALTY RATE** means the percentage of NET SALES of LICENSED PRODUCTS payable to MD ANDERSON as set forth in Section 4.1(d).

2.34 **SELL, SALE or SOLD** means the transfer or disposition of a LICENSED PRODUCT for value to a party other than LICENSEE, an AFFILIATE, or a SUBLICENSEE.

2.35 **SUBLICENSE AGREEMENT** means any agreement or arrangement pursuant to which LICENSEE (or a SUBLICENSEE) grants to any third party any of the license rights granted to the LICENSEE under this AGREEMENT. An ASSIGNMENT of all rights and obligations under this AGREEMENT shall not be deemed to be a SUBLICENSE AGREEMENT.

2.36 **SUBLICENSE CONSIDERATION** means any and all consideration, other than royalties for NET SALES (provided that MD ANDERSON has been paid the ROYALTY RATE for such NET SALES), debt, research and development funds, and EXCLUDED AMOUNTS, as defined below, received by LICENSEE from any SUBLICENSEE as consideration for the sublicense, including, but not limited to, up-front, marketing, distribution, franchise, and option payments, license and documentation fees, and bonus and milestone payments.. Notwithstanding the foregoing, if LICENSEE receives a bona fide milestone payment from a SUBLICENSEE for achieving a MILESTONE, then for purposes of calculating SUBLICENSE CONSIDERATION, LICENSEE may deduct the amount actually paid to MD ANDERSON by LICENSEE for achieving such milestone from the amount received by LICENSEE from the SUBLICENSEE for achieving the milestone. In addition, if LICENSEE receives a payment from a SUBLICENSEE as a bona fide reimbursement for PATENT EXPENSES for PATENT RIGHTS, then for purposes of calculating SUBLICENSE CONSIDERATION, LICENSEE may deduct the amount actually paid to MD ANDERSON by LICENSEE as reimbursement for PATENT EXPENSES from the amounts received by LICENSEE from the SUBLICENSEE as reimbursement of PATENT EXPENSES. For purposes of clarification, consideration received by LICENSEE from a SUBLICENSEE for equity securities of LICENSEE shall not be considered SUBLICENSE CONSIDERATION, except that premiums paid by a SUBLICENSEE for equity securities of LICENSEE over the fair market value of such securities shall be considered SUBLICENSE CONSIDERATION.

2.37 **SUBLICENSEE** means any third party to whom LICENSEE or an AFFILIATE (or other entity granted any rights by LICENSEE under this AGREEMENT) has granted any of the rights granted to LICENSEE under this AGREEMENT, provided that the third party is not the end user of LICENSED PRODUCTS covered by such granted rights. As used herein, SUBLICENSEE shall also mean a third party to whom LICENSEE, an AFFILIATE, or a SUBLICENSEE has granted the exclusive right to distribute LICENSED PRODUCTS supplied by such LICENSEE, AFFILIATE, or SUBLICENSEE, provided that such third party is responsible for significant marketing and/or promotion of, LICENSED PRODUCTS within its exclusive territory. For clarity, an AFFILIATE of LICENSEE cannot be a SUBLICENSEE.

2.38 **SYSTEM** has the meaning set forth in the preamble.

2.39 **TECHNOLOGY RIGHTS** means [***]

2.40 **TERM** has the meaning set forth in Section 13.1.

2.41 **VALID CLAIM** means a claim of (a) an issued and unexpired patent included within the PATENT RIGHTS unless the claim has been held unenforceable or invalid by the final, unreversed, and un-appealable decision of a court or other governmental body of competent jurisdiction, has been irretrievably abandoned or disclaimed, or has otherwise been finally admitted or finally determined by the relevant governmental authority to be invalid, un-patentable or unenforceable, whether through reissue, reexamination, disclaimer or otherwise, or (b) a pending patent application within the PATENT RIGHTS to the extent the claim continues to be prosecuted in good faith, provided that such patent application has not been pending for more than seven (7) years from the filing date of such application.

III. LICENSE

3.1 BOARD, through MD ANDERSON, hereby grants to LICENSEE a royalty-bearing, exclusive license under LICENSED SUBJECT MATTER to manufacture, have manufactured, use, import, offer to SELL and/or SELL LICENSED PRODUCTS within LICENSED TERRITORY for use within LICENSED FIELD. This grant is subject to Sections 13.2, 14.2 and 14.3 hereinbelow, the payment by LICENSEE to MD ANDERSON of all consideration as provided herein, and is further subject to the following rights retained by BOARD and MD ANDERSON to:

(a) Publish the general scientific findings from research conducted by MD ANDERSON related to LICENSED SUBJECT MATTER, subject to the terms of ARTICLE XIConfidential Information and Publication; and

(b) Use LICENSED SUBJECT MATTER for non-commercial research, teaching, patient care, and other academically-related purposes; and

(c) Transfer LICENSED SUBJECT MATTER to academic or research institutions for non-commercial research use.

For purposes of clarification, and not by way of limitation, the rights retained by the BOARD and MD ANDERSON pursuant to this Section 3.1 do not include the right to engage in research sponsored by a commercial, for-profit entity or to conduct clinical trials sponsored by a commercial, for-profit entity.

3.2 LICENSEE may extend the license granted herein to any AFFILIATE provided that the AFFILIATE consents in writing to be bound by the applicable provisions of this AGREEMENT to the same extent as LICENSEE. LICENSEE agrees to deliver a copy of such contract to MD ANDERSON within thirty (30) calendar days following execution thereof, which copy may be redacted except to the extent necessary to verify compliance with this Section 3.2.

3.3 LICENSEE may enter into one or more SUBLICENSE AGREEMENTS for LICENSED SUBJECT MATTER consistent with the terms of this AGREEMENT provided that LICENSEE is responsible for its SUBLICENSEES relevant to this AGREEMENT, and for diligently collecting all amounts due LICENSEE from SUBLICENSEES. If a SUBLICENSEE pursuant hereto becomes bankrupt, insolvent or is placed in the hands of a receiver or trustee, LICENSEE, to the extent allowed under applicable law and in a timely manner, agrees to use its best reasonable efforts to collect all consideration owed to LICENSEE and to have the SUBLICENSE AGREEMENT confirmed or rejected by a court of proper jurisdiction.

3.4 LICENSEE must deliver to MD ANDERSON a true and correct copy of each SUBLICENCE AGREEMNT entered into by LICENSEE, and any modification or termination thereof, within thirty (30) calendar days after execution, modification, or termination, which copy may be redacted except to the extent necessary to verify compliance with the applicable terms of this AGREEMENT.

3.5 LICENSEE, itself or through its SUBLICENSEES, shall use diligent efforts to make LICENSED PRODUCTS commercially available within the LICENSED TERRITORY. Without limiting the foregoing, LICENSEE, itself or through its SUBLICENSEES, shall achieve the following Diligence Milestone Events set forth in the table immediately below by the deadline indicated:

Diligence Milestone Event	Deadline
File for IND for PHASE I STUDY for a LICENSED PRODUCT in any jurisdiction	The date that is the third (3rd) anniversary of the EFFECTIVE DATE
Commence a PHASE I STUDY for at least one (1) indication	The date that is the fifth (5th) anniversary of the EFFECTIVE DATE

If the any obligation under this Section 3.5 is not fulfilled, BOARD and/or MD ANDERSON may treat such failure as a breach in accordance with Section 13.3(c).

If this AGREEMENT is terminated pursuant to ARTICLE XIII-TERM AND TERMINATION, BOARD and MD ANDERSON agree to accept as successors to LICENSEE, existing SUBLICENSEES in good standing at the date of termination provided that each such SUBLICENSEE consents in writing to be bound by all of the terms and conditions of this AGREEMENT.

IV. CONSIDERATION, PAYMENTS AND REPORTS

4.1 In consideration of rights granted by BOARD to LICENSEE under this AGREEMENT, LICENSEE agrees to pay MD ANDERSON the following:

(a) all reasonable PATENT EXPENSES for so long as, and in such countries as this AGREEMENT remains in effect. MD ANDERSON will invoice LICENSEE within thirty (30) calendar days of the EFFECTIVE DATE for the expenses incurred as of that time and on a quarterly basis thereafter. The invoice amounts will be due and payable by LICENSEE within thirty (30) calendar days of invoice; and

(b) A nonrefundable license documentation fee ("LICENSE DOCUMENTATION FEE") in the amount of [***]. The LICENSE DOCUMENTATION FEE will not reduce the amount of any other payment provided for in this ARTICLE IV, and is due and payable within thirty (30) calendar days after the AGREEMENT has been fully executed by all parties and LICENSEE has received an invoice for the amount from MD ANDERSON. This LICENSE DOCUMENTATION FEE is not subject to the thirty (30) day cure period set forth in Section 13.3(b); and

(c) Until the first SALE, nonrefundable maintenance fees ("MAINTENANCE FEES") as set forth in the table below:

Annual Maintenance Fees	Anniversay of Effective Date of this Agreement	If 2012 License is still active as of the Effective Date of this Agreement	If 2012 License is no longer active as of the Effective Date of this Agreement
	1st	[***]	[***]
	2nd	[***]	[***]
	3rd	[***]	[***]
	4th	[***]	[***]
	5th	[***]	[***]
	6th	[***]	[***]

For clarity, LICENSEE shall be obligated to pay a MAINTENANCE FEE under either Section 4.1(c)(i) or Section 4.1(c)(ii), but not both, as applicable depending on the status of the 2012 LICENSE. Any ANNUAL MAINTENANCE FEE will not reduce the amount of any other payment provided for in this ARTICLE IV; and

(d) A ROYALTY RATE as follows:

(i) if the LICENSED PRODUCT is covered by a VALID CLAIM in the country of SALE at the time of SALE as follows:

ROYALTY RATE – If payment of royalty for the SALE of the LICENSED PRODUCT is also payable under the 2012 LICENSE	ROYALTY RATE – If payment of royalty for the SALE of the LICENSED PRODUCT is not also payable under the 2012 LICENSE
[***]%	[***]%

(ii) if the LICENSED PRODUCT is not covered by a VALID CLAIM in the country of SALE at the time of SALE as follows:

ROYALTY RATE – If payment of royalty for the SALE of the LICENSED PRODUCT is also payable under the 2012 LICENSE	ROYALTY RATE – If payment of royalty for the SALE of the LICENSED PRODUCT is not also payable under the 2012 LICENSE
[***]%	[***]%

For clarity, the lower Royalty Rate set forth in the tables above in this Section 4.1(d), shall be applied on a LICENSED PRODUCT-by-LICENSED PRODUCT basis and shall only apply to those SALES for which LICENSEE is obligated to pay, and does pay, a royalty for the sale of the same LICENSED PRODUCT under the 2012 LICENSE; and

(e) After the first SALE, minimum annual royalties ("MINIMUM ANNUAL ROYALTIES") according to the following schedule:

(i) subject to Section 4.1(e)(iv), [***] due and payable not later than thirty (30) calendar days after the first (1st) anniversary of the first SALE and Licensee's receipt of MD Anderson's invoice therefor; and

(ii) subject to Section 4.1(e)(iv), [***] due and payable not later than thirty (30) calendar days after the second (2nd) anniversary of the first SALE and Licensee's receipt of MD Anderson's invoice therefor; and

(iii) subject to Section 4.1(e)(iv), [***] due and payable not later than thirty (30) calendar days after the third (3rd) anniversary of the first SALE and each subsequent anniversary of the first SALE and Licensee's receipt of MD Anderson's invoice therefor;

(iv) if the 2012 LICENSE has not expired or has not been terminated as of the applicable anniversary of the first SALE set forth in Sections 4.1(e)(i)-(iii); then the applicable MINIMUM ANNUAL ROYALTY payment shall be waived.

In the event that there is less than a twelve (12) month period between the first SALE and the first anniversary of the Effective Date which follows the first SALE, then Licensee shall pay the following:

(i) the MAINTENANCE FEE due for that year multiplied by the fraction A/C, where A is the number of months between the anniversary of the EFFECTIVE DATE preceding the first SALE and the first SALE, and C is twelve (12); and

(ii) the MINIMUM ANNUAL ROYALTIES multiplied by the fraction B/C, where B is the number of months between the first SALE and the first anniversary of the EFFECTIVE DATE which follows the first SALE, C is twelve (12), and A + B = twelve (12).

Amounts accrued under Section 4.1(d) and paid to MD ANDERSON during the one year period preceding an anniversary of the EFFECTIVE DATE shall be credited against the MINIMUM ANNUAL ROYALTIES due on that anniversary date.

(f) milestone fees within thirty (30) days of achieving the following Milestone Events:

Milestone Events	Milestone Fees - if the corresponding Milestone Event of the 2012 LICENSE is achieved with the same LICENSED PRODUCT	Milestone Fees - Otherwise
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]

Each of the foregoing milestone fees shall be made by LICENSEE to MD ANDERSON (without invoice) within thirty (30) calendar days of achieving the Milestone Event and shall not reduce the amount of any other payment provided for in this ARTICLE IV. For clarity, each of the foregoing milestone payments shall be paid only once regardless of the number of LICENSED PRODUCTS that achieve such milestone; and

(g) a percentage of all SUBLICENSE CONSIDERATION, received by LICENSEE from any SUBLICENSEE pursuant to Section 3.3 hereinabove as follows:

Execution Date of SUBLICENSE AGREEMENT	Percentage of SUBLICENSE CONSIDERATION - if sublicense consideration is payable under the 2012 LICENSE for the same SUBLICENSE AGREEMENT	Percentage of SUBLICENSE CONSIDERATION - if sublicense consideration is not payable under the 2012 LICENSE for the same SUBLICENSE AGREEMENT
[***]	[***]%	[***]%
[***]	[***]%	[***]%

4.2 LICENSEE shall make no SALE prior to REGULATORY APPROVAL unless LICENSEE pays the royalty due hereunder to MD ANDERSON on account of any NET SALES arising from such SALE.

4.3 Unless otherwise provided, all such payments are payable within sixty (60) calendar days after March 31, June 30, September 30, and December 31 of each year during the term of this AGREEMENT, at which time LICENSEE will also deliver to MD ANDERSON a true and accurate report, giving such particulars of the business conducted by LICENSEE, its AFFILIATES and its SUBLICENSEES, if any exist, during the preceding three (3) calendar months under this AGREEMENT as necessary for MD ANDERSON to account for LICENSEE's payments hereunder. This report will include pertinent data, including, but not limited to:

(a) the accounting methodologies used to account for and calculate the items included in the report and any differences in such accounting methodologies used by LICENSEE since the previous report; and

(b) a list of each LICENSED PRODUCT available for sale during the three (3) preceding calendar months; and

(c) the total quantities of each LICENSED PRODUCT SOLD during such period; and

(d) the total SALES; and

(e) the calculation of NET SALES; and

(f) the royalties so computed and due MD ANDERSON; and

(g) all consideration received from each SUBLICENSEE and payments due MD ANDERSON; and

(h) all other amounts due MD ANDERSON herein.

Simultaneously with the delivery of each such report, LICENSEE agrees to pay MD ANDERSON the amount due, if any, for the period of such report. These reports are required even if no payments are due.

4.4 During the term of this AGREEMENT and for one (1) year thereafter, LICENSEE agrees to keep complete and accurate records of its, its AFFILIATES' and SUBLICENSEES' SALES and NET SALES in sufficient detail to enable the royalties and other payments due hereunder to be determined. LICENSEE agrees to permit an independent auditor engaged by MD ANDERSON and reasonably acceptable to LICENSEE, at MD ANDERSON's expense, to periodically (but no more than once per calendar year and solely with respect to records not previously examined, unless in the independent auditor's reasonable opinion review of such previously examined records is necessary to properly conduct the current examination) examine LICENSEE's books, ledgers, and records during regular business hours, with reasonable prior notice, for the purpose of and to the extent necessary to verify any report required under this AGREEMENT. If any amounts due MD ANDERSON are determined to have been underpaid in an amount equal to or greater than [***]percent ([***]%) of the total amount due during the period so examined, then LICENSEE will pay the reasonable cost of the examination plus accrued interest at the lower of (a) the thencurrent prime interest rate plus [***]% or (b) the highest allowable rate.

4.5 Within thirty (30) calendar days following each anniversary of the EFFECTIVE DATE, LICENSEE will deliver to MD ANDERSON a written progress report as to LICENSEE's (and any AFFILIATE's and SUBLICENSEE's) efforts and accomplishments during the preceding year in diligently commercializing LICENSED SUBJECT MATTER in the LICENSED TERRITORY and LICENSEE'S, AFFILIATES' and SUBLICENSEES' commercialization plans for the upcoming year.

4.6 All amounts payable hereunder by LICENSEE will be paid in United States funds without deductions for taxes, assessments, fees, or charges of any kind. Checks are to be made payable to The University of Texas M. D. Anderson Cancer Center, and sent by United States mail to [***], or by wire transfer to:

[***].

4.7 No payments due or royalties owed under this AGREEMENT will be reduced as the result of co-ownership of LICENSED SUBJECT MATTER by BOARD and another party, including, but not limited to, LICENSEE.

V. SPONSORED RESEARCH

5.1 If LICENSEE desires to sponsor research for or related to the LICENSED SUBJECT MATTER, LICENSEE will notify MD ANDERSON and the PARTIES will negotiate in good faith the terms for such sponsored research.

VI. PATENTS AND INVENTIONS

6.1 If after consultation with LICENSEE both parties agree that a new patent application should be filed for LICENSED SUBJECT MATTER, MD ANDERSON will prepare and file appropriate patent applications, and Licensee will pay the related Patent Expenses. If LICENSEE notifies MD ANDERSON that it does not intend to pay any portion of the PATENT EXPENSES for a patent application or patent, or if LICENSEE fails to promptly confirm its intent to pay any portion of the PATENT EXPENSES for a patent application or patent upon inquiry from MD ANDERSON, or if LICENSEE is in arrears or otherwise in default or late on any payments due under Section 3.1, or if LICENSEE fails to timely make any payments for ANTICIPATED COSTS when due under Section 6.5, then MD ANDERSON may, in its sole discretion, elect to file, not file, continue prosecution or maintenance, or abandon such patent application or patent at its own expense without further notice to LICENSEE. In the event LICENSEE fails to pay or provides written notice of its intent not to pay any portion of PA TENT EXPENSES for a patent application and/or patent under PATENT RIGHTS, then LICENSEE's rights to such patent application and/or patent under PATENT RIGHTS shall terminate in their entirety. If at any time LICENSEE wishes to cease paying PATENT EXPENSES for a particular patent application and/or patent under PATENT RIGHTS, LICENSEE must give MD ANDERSON at least ninety (90) calendar days prior written notice and LICENSEE shall continue to be obligated to pay for the PATENT EXPENSES which reasonably accrue with respect thereto during said notice period. Thereafter, said particular PA TENT RIGHT, patent application, or patent shall no longer be included in the PATENT RIGHTS and LICENSEE shall have no further rights thereto. MD ANDERSON shall not be obligated to file, prosecute or maintain any patent or patent application if LICENSEE is in arrears or otherwise in default or late with respect to any PATENT EXPENSES or other payments or obligations hereunder.

6.2 LICENSEE shall cooperate with MD ANDERSON regarding any patent prosecution or patent maintenance matters or deadlines, including the timely provision of accurate information regarding its entity size status, and any changes thereto, in accordance with the regulations of the U.S. Patent and Trademark Office.

6.3 MD ANDERSON will provide LICENSEE with a copy of any applications for which LICENSEE has paid the cost of filing, as well as copies of any documents received or filed during prosecution thereof The parties agree that they share a common legal interest to get valid enforceable patents and that LICENSEE will keep all privileged information received pursuant to this Section confidential.

6.4 If LICENSEE is more than thirty (30) calendar days in arrears on any payment or obligation due under this AGREEMENT, BOARD, MD ANDERSON, and the counsel prosecuting licensed patents and patent applications shall have no obligation to confer or otherwise communicate with, or provide any information to, LICENSEE under this Article V of this AGREEMENT unless and until LICENSEE is no longer in arrears on all payments and obligations under this AGREEMENT.

6.5 Notwithstanding Section 4.1(a), prior to instructing patent counsel to respond or take action with respect to a patent or patent application directed to PATENT RIGHTS and/or prior to incurring costs with respect thereto, MD ANDERSON shall have the right, at its election and in its sole discretion, to require upfront, advance payment from Licensee of the anticipated PATENT EXPENSES for any patent or patent application directed to PATENT RIGHTS ("ANTICIPATED COSTS") as follows: MD ANDERSON shall provide a reasonable estimate of the ANTICIPATED COSTS to LICENSEE and shall specify a due date for the advance payment of such ANTICIPATED COSTS. With respect to such due date, MD ANDERSON may require LICENSEE to make such advance payment for ANTICIPATED COSTS at any time up to two (2) months prior to the date MD ANDERSON has chosen for the legal work to be completed, provided that such due date for payment is at least fifteen (15) calendar days after the estimate is provided to LICENSEE. Unless otherwise agreed in writing, such estimate may be sent by email to [***] and [***] or in accordance with the Notice provisions in Section 15.2. In the event the payment for ANTICIPATED COSTS actually made by LICENSEE to MD ANDERSON exceeds the actual costs, any unused balance will be credited towards future patent expenses, or, upon written request, returned to LICENSEE. In the event the actual costs incurred by MD ANDERSON exceed the estimate of ANTICIPATED COSTS, MD ANDERSON shall invoice LICENSEE for the excess costs. Within thirty (30) calendar days of receiving an invoice from MD ANDERSON for such costs incurred in excess of the reasonable estimate of ANTICIPATED COSTS, LICENSEE shall reimburse MD ANDERSON for such excess amount.

VII. INFRINGEMENT BY THIRD PARTIES

7.1 LICENSEE, at its expense, shall have the first right (but no obligation) to enforce all PA TENT RIGHTS against infringement by third parties and is entitled to retain recovery from such enforcement. After reimbursement of LICENSEE's reasonable legal costs and expenses related to such recovery incurred by LICENSEE, LICENSEE agrees to pay MD ANDERSON either: (a) the applicable royalty detailed in Section 4.1(d) for any monetary recovery that is for sales of LICENSED PRODUCTS lost due to the infringement and [***] percent ([***]%) of related punitive damages received by LICENSEE; or (b) [***] percent ([***]%) of reasonable royalties awarded and received by LICENSEE, and [***] percent ([***]%) of related punitive damages received by LICENSEE in any monetary recovery in which the award is for reasonable royalties.

7.2 If it is necessary to name BOARD or MD ANDERSON as a party in such action to enforce PATENT RIGHTS against an infringer, then LICENSEE must first obtain BOARD'S and MD ANDERSON'S prior written permission, which permission shall not be unreasonably withheld, provided that BOARD and MD ANDERSON shall have reasonable prior input on choice of counsel on any matter where such counsel represents BOARD or MD ANDERSON, and LICENSEE and such counsel agree to follow all required procedures of the Texas Attorney General regarding retention of outside counsel for state entities.

7.4 MD ANDERSON shall promptly notify LICENSEE if MD ANDERSON'S Office of Technology Commercialization becomes aware of any infringement or potential infringement of any PATENT RIGHTS. If LICENSEE does not first exercise its right under Section 7.1 within twelve (12) months of knowledge of infringement, then, BOARD or MD ANDERSON may, at its sole discretion, enforce any patent licensed hereunder on behalf of itself and LICENSEE, with MD ANDERSON retaining all recoveries from such enforcement. If BOARD and/or MD ANDERSON pursues such infringement action, BOARD and/or MD ANDERSON may, as part of the resolution thereof, grant non-exclusive license rights to the alleged infringer, notwithstanding LICENSEE's exclusive license rights.

VIII. PATENT MARKING

8.1 LICENSEE agrees that all packaging containing individual LICENSED PRODUCT(S), documentation therefor, and, when possible, actual LICENSED PRODUCT(S) sold by LICENSEE, AFFILIATES, and/or SUBLICENSEES will be appropriately marked with the number of any applicable patent(s) licensed hereunder in accordance with each country's patent laws, including Title 35, United States Code, to the extent such marking is necessary or required to fully preserve PATENT RIGHTS in each such country.

IX. INDEMNIFICATION AND INSURANCE

9.1 LICENSEE AGREES TO HOLD HARMLESS AND INDEMNIFY BOARD, SYSTEM, MD ANDERSON, THEIR REGENTS, OFFICERS, EMPLOYEES, STUDENTS AND AGENTS FROM AND AGAINST ANY CLAIMS, DEMANDS, OR CAUSES OF ACTION WHATSOEVER BROUGHT BY THIRD PARTIES, COSTS OF SUIT AND REASONABLE ATTORNEY'S FEES, INCLUDING WITHOUT LIMITATION, THOSE COSTS ARISING ON ACCOUNT OF ANY INJURY OR DEATH OF PERSONS OR DAMAGE TO PROPERTY (COLLECTIVELY, "LIABILITIES") IN EACH CASE THAT ARE CAUSED BY, OR ARISING OUT OF, OR RESULTING FROM, THE EXERCISE OR PRACTICE OF THE RIGHTS GRANTED HEREUNDER BY LICENSEE, ITS OFFICERS, ITS AFFILIATES OR THEIR OFFICERS, EMPLOYEES, AGENTS OR REPRESENTATIVES EXCEPT TO THE EXTENT SUCH LIABILITIES ARISE FROM (i) THE NEGLIGENT FAILURE OF MD ANDERSON TO SUBSTANTIALLY COMPLY WITH ANY APPLICABLE GOVERNMENTAL REQUIREMETNS OR (ii) THE NEGLIGENT OR WILLFUL MISCONDUCT BY A REGENT, OFFICER, AGENT OR EMPLOYEE OF MD ANDERSON.

9.2 IN NO EVENT SHALL BOARD, SYSTEM OR MD ANDERSON BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS OR EXPECTED SAVINGS OR OTHER ECONOMIC LOSSES, OR FOR INJURY TO PERSONS OR PROPERTY) ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT OR ITS SUBJECT MATTER, REGARDLESS OF WHETHER BOARD, SYSTEM OR MD ANDERSON KNOWS OR SHOULD KNOW OF THE POSSIBILITY OF SUCH DAMAGES.

9.3 OTHER THAN FOR CLAIMS AGAINST LICENSEE FOR INDEMNIFICATION PURSUANT TO SECTION 9.1 OR FOR THE MISAPPROPRIATION OR INFRINGEMENT OF MD ANDERSON'S INTELLECTUAL PROPERTY RIGHTS, LICENSEE SHALL WILL NOT BE LIABLE TO MD ANDERSON FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS OR EXPECTED SAVINGS OR OTHER ECONOMIC LOSSES, OR FOR INJURY TO PERSONS OR PROPERTY) ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT OR ITS SUBJECT MATTER, REGARDLESS OF WHETHER LICENSEE KNOWS OR SHOULD KNOW OF THE POSSIBILITY OF SUCH DAMAGES.

9.4 Beginning at the time when any LICENSED SUBJECT MATTER is being distributed or sold (including for the purpose of obtaining REGULATORY APPROVALS) by LICENSEE, an AFFILIATE, or by a SUBLICENSEE, LICENSEE shall, at its sole cost and expense, procure and maintain commercial general liability insurance in amounts not less than $[***] per incident and $[***] annual aggregate, and LICENSEE shall use reasonable efforts to have the BOARD, SYSTEM, MD ANDERSON, their Regents, officers, employees, students and agents named as additional insureds. Such commercial general liability insurance shall provide: (i) product liability coverage; (ii) broad form contractual liability coverage for LICENSEE's indemnification under this AGREEMENT; and (iii) coverage for litigation costs. The minimum amounts of insurance coverage required herein shall not be construed to create a limit of LICENSEE's liability with respect to its indemnification under this AGREEMENT.

9.5 LICENSEE shall provide MD ANDERSON with written evidence of such insurance within thirty (30) calendar days of its procurement. Additionally, LICENSEE shall provide MD ANDERSON with written notice of at least fifteen (15) calendar days prior to the cancellation, non-renewal or material change in such insurance.

9.6 LICENSEE shall maintain such commercial general liability insurance beyond the expiration or termination of this AGREEMENT during: (i) the period that any LICENSED SUBJECT MATTER developed pursuant to this AGREEMENT is being commercially distributed or sold by LICENSEE, an AFFILIATE or by a SUBLICENSEE or agent of LICENSEE; and (ii) the five (5) year period immediately after such period.

X. USE OF BOARD AND MD ANDERSON'S NAME

10.1 LICENSEE will not use the name of (or the name of any employee of) MD ANDERSON, SYSTEM or BOARD in any advertising, promotional or sales literature, on its Web site, or for the purpose of raising capital without the advance express written consent of BOARD secured through:

The University of Texas
M. D. Anderson Cancer Center
[***]

Notwithstanding the above, LICENSEE may use the name of (or name of employee of) MD ANDERSON, SYSTEM or BOARD in routine business correspondence or as needed in appropriate regulatory submissions or required by applicable law or court order without express written consent.

XI. CONFIDENTIAL INFORMATION AND PUBLICATION

11.1 MD ANDERSON and LICENSEE each agree that all information contained in documents marked "confidential" and forwarded to one by the other (i) are to be received in strict confidence, (ii) are to be used only for the purposes of this AGREEMENT, and (iii) will not be disclosed by the recipient party (except as required by law or court order), nor by the recipient party's agents or employees without the prior written consent of the disclosing party, except to the extent that the recipient party can establish by competent written proof that such information:

(a) was in the public domain at the time of disclosure; or

(b) later became part of the public domain through no act or omission of the recipient party, its employees, agents, successors or assigns; or

(c) was lawfully disclosed to the recipient party by a third party having the right to disclose it; or

(d) was already known by the recipient party at the time of disclosure; or

(e) was independently developed by the recipient party without use of the disclosing party's confidential information; or

(f) is required by law or regulation to be disclosed; provided that such recipient party gives the disclosing party reasonable prior notice of such disclosure requirement and affords the disclosing party an opportunity to obtain a protective order or other appropriate relief.

11.2 Each party's obligation of confidence hereunder will be fulfilled by using at least the same degree of care with the disclosing party's confidential information as it uses to protect its own confidential information, but always at least a reasonable degree of care. This obligation will exist while this AGREEMENT is in force and for a period of three (3) years thereafter. Notwithstanding the foregoing, LICENSEE may disclose the MD ANDERSON's Confidential Information only to its AFFILIATES, investors, and to existing or potential SUBLICENSEES or acquirers or merger partners ("REPRESENTATIVES") who have been informed of this AGREEMENT, who need to know such Confidential Information to assist the LICENSEE as reasonably needed to conduct the development or commercialization of LICENSED PRODUCTS, provided that such Representatives are subject to obligations of confidentiality and non-use at least as strict as LICENSEE's obligations under this AGREEMENT.

11.3 MD ANDERSON reserves the right to publish the general scientific findings from research conducted by MD ANDERSON related to LICENSED SUBJECT MATTER, with due regard to the protection of LICENSEE's confidential information. MD ANDERSON will submit the manuscript of any proposed publication to LICENSEE at least thirty (30) calendar days before publication, and LICENSEE shall have the right to review and comment upon the publication in order to protect LICENSEE's confidential information. Upon LICENSEE's request, MD ANDERSON shall remove LICENSEE's confidential information from the publication and publication may be delayed up to sixty (60) additional calendar days to enable LICENSEE to secure adequate intellectual property protection of LICENSED SUBJECT MATTER that would otherwise be affected by the publication.

XII. ASSIGNMENT

12.1 In case of the sale of all of LICENSEE's assets to a third party, or in connection with any transaction other than sale of all of LICENSEE's assets to a third party, this AGREEMENT may be assigned subject to the payment to MD ANDERSON prior to the ASSIGNMENT of a fee for permitting such ASSIGNMENT ("ASSIGNMENT FEE") as follows:

(a) if LICENSEE has paid all fees for required for assignment of the 2012 LICENSE and the AGREEMENT is to be assigned to the same party to which LICENSEE assigned the 2012 LICENSE, the ASSIGMENT FEE due MD ANDERSON under this AGREEMENT shall be $[***]; or

(b) if Section 12.1(a) is not applicable, the ASSIGMENT FEE due MD ANDERSON under this AGREEMENT shall be $[***].

Any ASSIGNMENT FEE shall be in addition to and shall not replace the LICENSE DOCUMENTATION FEE above. No ASSIGNMENT FEE shall be due if the ASSIGNMENT is to an AFFILIATE, provided that LICENSEE or the AFFILIATE pays the ASSIGNMENT FEE in the event AFFILIATE thereafter makes an ASSIGNMENT of the AGREEMENT to a third party.

XIII. TERM AND TERMINATION

13.1 Subject to Sections 13.3 and 13.4 hereinbelow, the term of this AGREEMENT is from the EFFECTIVE DATE until the later of (a) expiration of the last to expire patents issued from the PATENT RIGHTS, or (b) twenty (20) years from the EFFECTIVE DATE ("TERM").

13.2 Reserved

13.3 Subject to any rights herein which survive termination, this AGREEMENT will earlier terminate in its entirety:

(a) upon thirty (30) calendar days written notice if LICENSEE becomes bankrupt and/or if the business of LICENSEE shall be placed in the hands of a receiver, assignee, or trustee, whether by voluntary act of LICENSEE or otherwise; or

(b) upon thirty (30) calendar days written notice from MD ANDERSON, if LICENSEE materially breaches or defaults on the payment or report obligations of ARTICLE IV (excluding the license documentation fee specified in Section 4.1(b), for which no cure period applies), or use of name obligations of ARTICLE X, unless, before the end of such thirty (30)-calendar day notice period, LICENSEE has cured the material default or breach to MD ANDERSON's reasonable satisfaction, and so notifies MD ANDERSON, stating the manner of the cure; or

(c) upon ninety (90) calendar days written notice from MD ANDERSON if LICENSEE materially breaches or defaults on any other obligation under this AGREEMENT, unless, before the end of such ninety (90) calendar-day notice period, LICENSEE has cured the material default or breach to MD ANDERSON's reasonable satisfaction and so notifies MD ANDERSON, stating the manner of the cure; or

(d) at any time by mutual written agreement between LICENSEE and MD ANDERSON upon one hundred eighty (180) calendar days written notice to all parties and subject to any terms herein which survive termination; or

(e) upon thirty (30) calendar days written notice from MD ANDERSON if the termination is pursuant to Section 13.2 or Section 15.8; or

(f) if LICENSEE has defaulted or been late on its payment obligations pursuant to the terms of this AGREEMENT on any two (2) occasions in a twelve (12) month period; or

(g) immediately, upon written notice from MD ANDERSON, if LICENSEE fails to timely pay the LICENSE DOCUMENTATION FEE specified in Section 4.1(b); or

(h) for any reason upon thirty (30) calendar days written notice from LICENSEE to MD ANDERSON, provided that LICENSEE is not in material breach of any of its obligations under this AGREEMENT.

13.4 Upon termination of this AGREEMENT:

(a) nothing herein will be construed to release either party of any obligation maturing prior to the effective date of the termination; and

(b) both parties covenant and agree to be bound by the provisions of ARTICLES IX (Indemnification and Insurance), X (USE OF BOARD AND MD ANDERSON'S NAME) and XI (CONFIDENTIAL INFORMATION AND PUBLICATION) of this AGREEMENT. Notwithstanding the foregoing, the obligations of confidentiality according to Article XI shall survive early termination of this AGREEMENT under Section 13.3 for a period of five (5) years and shall immediately expire upon expiration of this AGREEMENT under Section 13.1.

XIV. WARRANTY: SUPERIOR-RIGHTS

14.1 BOARD represents and warrants its belief that (a) it is the co-owner (together with LICENSEE) of the entire right, title, and interest in and to LICENSED SUBJECT MATTER, (b) it has the right to grant licenses thereunder, and (c) it has not knowingly granted licenses thereunder to any other entity that would restrict rights granted hereunder except as stated herein.

14.2 LICENSEE understands that in the event that the LICENSED SUBJECT MATTER was developed under a funding agreement with the Government of the United States of America ("GOVERNMENT"),the GOVERNMENT may have certain rights relative thereto. This AGREEMENT is explicitly made subject to the GOVERNMENT's rights under any such agreement and any applicable law or regulation To the extent that there is a conflict between any such agreement, applicable law or regulation and this AGREEMENT, the terms of such GOVERNMENT agreement, applicable law or regulation shall prevail.

14.3 LICENSEE UNDERSTANDS AND AGREES THAT BOARD AND MD ANDERSON, BY THIS AGREEMENT, MAKE NO REPRESENTATION AS TO THE OPERABILITY OR FITNESS FOR ANY USE, SAFETY, EFFICACY, APPROVABILITY BY REGULATORY AUTHORITIES, TIME AND COST OF DEVELOPMENT, PATENTABILITY, AND/OR BREADTH OF THE LICENSED SUBJECT MATTER. BOARD AND MD ANDERSON, BY THIS AGREEMENT, ALSO MAKE NO REPRESENTATION AS TO WHETHER ANY PATENT COVERED BY PATENT RIGHTS IS VALID OR AS TO WHETHER THERE ARE ANY PATENTS NOW HELD, OR WHICH WILL BE HELD, BY OTHERS OR BY BOARD OR MD ANDERSON IN THE LICENSED FIELD, NOR DO BOARD AND MD ANDERSON MAKE ANY REPRESENTATION THAT THE INVENTIONS CONTAINED IN PATENT RIGHTS DO NOT INFRINGE ANY OTHER PATENTS NOW HELD OR THAT WILL BE HELD BY OTHERS OR BY BOARD.

14.4 LICENSEE, by execution hereof, acknowledges, covenants and agrees that LICENSEE has not been induced in any way by BOARD, SYSTEM, MD ANDERSON or employees thereof to enter into this AGREEMENT, and further warrants and represents that (a) LICENSEE is entering into this AGREEMENT voluntarily; (b) LICENSEE has conducted sufficient due diligence with respect to all items and issues pertaining to this AGREEMENT; and (c) LICENSEE has adequate knowledge and expertise, or has used knowledgeable and expert consultants, to adequately conduct such due diligence, and agrees to accept all risks inherent herein.

XV. GENERAL

15.1 This AGREEMENT constitutes the entire and only agreement between the parties for LICENSED SUBJECT MATTER and all other prior negotiations, representations, agreements and understandings with respect thereto are superseded hereby. No agreements altering or supplementing the terms hereof will be made except by a written document signed by both parties.

15.2 Any notice required by this Agreement shall be in writing and shall be deemed to have been sufficiently given for all purposes thereof when sent by first class mail or reputable international courier (e.g., Federal Express or UPS) and shall be evidenced by the postmark at the point of mailing or by the dated delivery receipt of the courier. All notices and any correspondence respecting this Agreement shall be transmitted as follows:

To MD Anderson, if by mail:
The University of Texas M. D. Anderson Cancer Center
Strategic Industry Ventures/Office of Technology Commercialization
[***]

To MD Anderson, if by courier:
The University of Texas M. D. Anderson Cancer Center
Strategic Industry Ventures/Office of Technology Commercialization
[***]

Contact phone number for use by courier: [***]

or in the case of LICENSEE to:

Moleculin Biotech, Inc.
5300 Memorial Drive, Suite 950
Houston, Texas 77007
ATTENTION: Jonathan Foster

or other addresses as may be given from time to time under the terms of this notice provision.

15.3 LICENSEE must comply with all applicable federal, state and local laws and regulations in connection with its activities pursuant to this AGREEMENT. LICENSEE acknowledges that the LICENSED SUBJECT MATTER is subject to U. S. export control jurisdiction. LICENSEE agrees to comply with all applicable international and national laws that apply to the LICENSED SUBJECT MATTER, including U.S. Export Administration Regulations, as well as end-user, end-use, and destination restrictions applied by the United States.

15.4 This AGREEMENT will be construed and enforced in accordance with the laws of the United States of America and of the State of Texas, without regard to its conflict of law provisions. The Texas State Courts of Harris County, Texas (or, if there is exclusive federal jurisdiction, the United States District Court for the Southern District of Texas) shall have exclusive jurisdiction and venue over any dispute arising out of this AGREEMENT, and LICENSEE consents to the jurisdiction and venue of such courts and hereby explicitly waives the rights to any other venue to which it might be entitled by cause of action, domicile or otherwise. Nothing in this AGREEMENT shall be deemed as a waiver by BOARD, SYSTEM or MD ANDERSON of its sovereign immunity.

15.5 Failure of BOARD or MD ANDERSON or LICENSEE to enforce a right under this AGREEMENT will not act as a waiver of right or the ability to later assert that right relative to the particular situation involved.

15.6 Headings included herein are for convenience only and will not be used to construe this AGREEMENT.

15.7 If any part of this AGREEMENT is for any reason found to be unenforceable, all other parts nevertheless will remain enforceable.

15.8 In the event that LICENSEE brings an action before any court, agency or tribunal seeking to invalidate or otherwise challenge the enforceability of or BOARD's ownership of any patent included in the PATENT RIGHTS, then MD ANDERSON may immediately terminate this AGREEMENT upon written notice to LICENSEE. Any dispute regarding the validity, enforceability or ownership of any patent included in the PATENT RIGHTS shall be litigated in the courts located in Houston, Texas, and LICENSEE agrees not to challenge personal jurisdiction in that forum. To the extent that LICENSEE unsuccessfully challenges the validity or enforceability of any patent included in the PATENT RIGHTS, LICENSEE agrees to reimburse MD ANDERSON and BOARD for all costs and fees (including attorney's fees) paid by MD ANDERSON and BOARD in defending against such challenge. LICENSEE understands and agrees that, in the event LICENSEE successfully challenges the validity or enforceability of any patent included in the PA TENT RIGHTS, all payments or other consideration made or otherwise provided by LICENSEE to MD ANDERSON prior to a final, non-appealable adjudication of invalidity and/or unenforceability shall be non-refundable. The obligations of this Section shall survive the expiration or termination of this AGREEMENT.

IN WITNESS WHEREOF, the parties hereto have caused their duly authorized representatives to execute this AGREEMENT.

BOARD OF REGENTS OF THE UNIVERSITY OF TEXAS SYSTEM, on behalf of THE UNIVERSITY OF TEXAS M. D. ANDERSON CANCER CENTER

By /s/ [***]

Date: 12/3/2021

MOLECULIN BIOTECH, INC.

By /s/ Jonathan P. Foster

Printed Name: Jonathan P. Foster

Title: EVP CFO

Date: 11-1-21

Approved as to Content:

By /s/ [***]
[***]
Vice President, Strategic Industry Ventures
M.D. Anderson Cancer Center

Date: 12/3/2021

EXHIBIT I

[***]

Exhibit 10.34

Certain identified information has been excluded from this exhibit because it is both not material and is the type that the issuer treats as private or confidential. Information that was omitted has been noted in this document with a placeholder identified by the mark "[***]".

Execution Copy

PATENT AND TECHNOLOGY LICENSE AGREEMENT

This AGREEMENT ("AGREEMENT") is made by and between THE BOARD OF REGENTS ("BOARD") of THE UNIVERSITY OF TEXAS SYSTEM ("SYSTEM"), an agency of the State of Texas, whose address is 201 West 7th Street, Austin, Texas 78701, on behalf of THE UNIVERSITY OF TEXAS M. D. ANDERSON CANCER CENTER ("MD ANDERSON"), a member institution of SYSTEM, and MOLECULIN BIOTECH, INC. a Delaware corporation having a principal place of business located at 5300 Memorial Drive - Suite 950, Houston, Texas 77007 ("LICENSEE").

RECITALS

A. LICENSEE and BOARD previously entered into that certain Patent and Technology License effective June 21, 2010 ("2010 LICENSE").

B. BOARD owns certain PATENT RIGHTS and TECHNOLOGY RIGHTS related to LICENSED SUBJECT MATTER developed at MD ANDERSON in cooperation with LICENSEE, all as defined herein.

C. BOARD, through MD ANDERSON, desires to have the LICENSED SUBJECT MATTER developed in the LICENSED FIELD and used for the benefit of LICENSEE, BOARD, SYSTEM, MD ANDERSON, the inventor(s), and the public as outlined in BOARD's Intellectual Property Policy.

D. LICENSEE wishes to obtain a license from BOARD to practice LICENSED SUBJECT MATTER.

NOW, THEREFORE, in consideration of the mutual covenants and promises herein contained, the parties agree as follows:

I. EFFECTIVE DATE

1.1 This AGREEMENT is effective as of the date of the last authorized signature below (the "EFFECTIVE DATE").

II. DEFINITIONS

As used in this AGREEMENT, the following terms have the meanings indicated:

2.1 **ACTIVELY AND EFFECTIVELY ATTEMPTING TO COMMERCIALIZE** means efforts consistent with those of a similarly situated biotechnology company in its having an effective, ongoing and active research, development, manufacturing, marketing or sales program as appropriate for a pharmaceutical product at a similar stage of development or commercialization with similar market potential, such program directed toward obtaining REGULATORY APPROVAL of a LICENSED PRODUCT, and/or production and/or SALES, in a jurisdiction, and providing plans to MD ANDERSON to commercialize a LICENSED PRODUCT in the jurisdiction.

2.2 **AGREEMENT** has the meaning set forth in the preamble.

2.3 **AFFILIATE** means any business entity more than fifty percent (50%) owned by LICENSEE, any business entity which owns more than fifty percent (50%) of LICENSEE, or any business entity that is more than fifty percent (50%) owned by a business entity that owns more than fifty percent (50%) of LICENSEE.

2.4 **ANNUAL MAINTENANCE FEE** has the meaning set forth in Section 4.1(c).

2.5 **ANTICIPATED COSTS** has the meaning set forth in Section 6.5.

2.6 **ASSIGNMENT** means a writing wherein a third-party assumes in writing (a copy of which writing will be promptly provided to MD ANDERSON) all of LICENSEE's or AFFILIATE's interests, rights, duties, and obligations under the AGREEMENT and agrees to comply with all terms and conditions of the AGREEMENT as if the assignee were the original party to the AGREEMENT.

2.7 **ASSIGNMENT FEE** has the meaning set forth in Section 12.1.

2.8 **BOARD** has the meaning set forth in the preamble.

2.9 **COMMERCIALIZED** means having SALES in a jurisdiction.

2.10 **EFFECTIVE DATE** has the meaning set forth in Section 1.1.

2.11 **EXCLUDED AMOUNTS** means (1) any payment received by or on behalf of LICENSEE from a SUBLICENSEE for the supply of goods and/or services (including LICENSED PRODUCTS) to such SUBLICENSEE, provided that the SUBLICENSEE is not the end user of such goods or services, and provided further that MD ANDERSON has been paid the ROYALTY RATE for NET SALES upon SALE of the LICENSED PRODUCTS to the end user; and (2) payment received by LICENSEE from a SUBLICENSEE for providing LICENSED PRODUCTS to said SUBLICENSEE for use in a clinical study or other research necessary or useful to obtain MARKETING APPROVAL of a LICENSED PRODUCTS, provided that such payment does not exceed LICENSEE's actual cost for providing such LICENSED PRODUCTS to said SUBLICENSEE.

2.12 **FDA** means the United States Food and Drug Administration.

2.13 **GOVERNMENT** has the meaning set forth in Section 14.2.

2.14 **IND** means (a) an Investigational New Drug application as defined in the FFDCA (21 U.S.C. §301 et seq.), (b) a clinical trial authorization application for a product filed with a REGULATORY AUTHORITY in any other regulatory jurisdiction outside the U.S., the filing of which (in the case of (a) or (b)) is necessary to commence or conduct clinical testing of a pharmaceutical product in humans in such jurisdiction, or (c) documentation issued by a REGULATORY AUTHORITY that permits the conduct of clinical testing of a product in humans in such jurisdiction.

2.15 **INDICATION** means any use of a LICENSED PRODUCT for the treatment, prevention, cure or to delay the progression of a human disease or condition. As clarifying illustrative examples, (a) the broadening of use of a LICENSED PRODUCT for a particular disease, such as the extension of the use of a LICENSED PRODUCT from treating Stage IV metastatic melanoma to use as an adjuvant treatment for melanoma, shall not be separate INDICATIONS; (b) the use of a LICENSED PRODUCT as a first line therapy after receiving MARKETING APPROVAL as a second line therapy for treatment of the same disease or condition shall not be deemed to be separate INDICATIONS; and (c) use of a LICENSED PRODUCT in connection with different types of cancer shall be deemed to be different INDICATIONS (e.g., uses for basal cell carcinoma, melanoma, and squamous cell carcinoma, are each a different INDICATION notwithstanding the fact that each is a type of skin cancer).

2.16 **LIABILITIES** has the meaning set forth in Section 9.1.

2.17 **LICENSE DOCUMENTATION FEE** has the meaning set forth in Section 4.1(b)

2.18 **LICENSED FIELD** means all fields of use.

2.19 **LICENSED PRODUCTS** means any product or service sold by LICENSEE, an AFFILIATE, or a SUBLICENSEE comprising LICENSED SUBJECT MATTER pursuant to this AGREEMENT and which is covered by a VALID CLAIM.

2.20 **LICENSED SUBJECT MATTER** means inventions and discoveries covered by PATENT RIGHTS or TECHNOLOGY RIGHTS within LICENSED FIELD.

2.21 **LICENSED TERRITORY** means worldwide.

2.22 **LICENSEE** has the meaning set forth in the preamble.

2.23 **MD ANDERSON** has the meaning set forth in the preamble.

2.24 **MARKETING APPROVAL** means the approval by the REGULATORY AUTHORITY needed for a particular national jurisdiction to market, and SELL a LICENSED PRODUCT in that national jurisdiction.

2.25 **NEW DRUG APPLICATION** means application submitted to the FDA for approval to market a new drug, as more specifically defined by 21 C.F.R §314 et seq., or any future revisions or substitutes thereof, or an equivalent foreign filing in any jurisdiction other than the United States.

2.26 **NET SALES** [***]

2.27 **PATENT EXPENSES** all expenses incurred in searching, preparing, filing, prosecuting, defending in any post-issuance administrative proceeding, and maintaining PATENT RIGHTS.

2.28 **PATENT RIGHTS** means BOARD's rights (a) the patents and patent applications resulting from the IDR(s) listed in Exhibit I; (b) all patent applications that claim priority to any patent or patent application of identified in (a), provided that the claims of such non-provisional applications are entitled to claim priority to such applications; (c) all divisionals, continuations and continuations-in-part of the non-provisional patent applications identified in (a) and (b), above provided that the claims of such continuations-in-part are entitled to claim priority to at least one of the patent applications identified in (a) or (b), above; (d) all reissues, reexaminations, extensions, and foreign counterparts of any of the patents or patent applications identified in (a), (b) or (c), above; and (e) any patents that issue with respect to any of the patent applications listed in (a), (b), (c) or (d), above.

2.29 **PHASE I STUDY** means: (a) that portion of the FDA submission and approval process which provides for the first introduction into humans of a product with the purpose of determining human toxicity, metabolism, absorption, elimination and other pharmacological action, as more fully defined by the rules and regulations of the FDA, including 21 C.F.R. § 312.21(a) or any future revisions or substitutes therefor; or (b) a similar clinical trial in any national jurisdiction other than the United States. For the avoidance of doubt, the emphasis of a PHASE I STUDY is on the safety and tolerability of a product and is used to plan patient dosing in a PHASE II STUDY.

2.30 **PHASE II STUDY** means: (a) that portion of the FDA submission and approval process which provides for early controlled clinical studies conducted to obtain preliminary data on the effectiveness of a product for a particular indication, as more specifically defined by the rules and regulations of the FDA, including 21 C.F.R. § 312.21(b) or any future revisions or substitutes therefor; or (b) any clinical trial that obtains data regarding the efficacy of a product, including without limitation Phase Ib study of a product, a clinical study of a product consisting of a cohort expansion, or a combined Phase Ib/II clinical study of a product; or (c) a clinical study similar to the foregoing (a) or (b) in any jurisdiction other than the United States. For the avoidance of doubt, when the safety and tolerability of a product has been established through the conduct of a PHASE I STUDY, the next clinical trial of a product will be a PHASE II STUDY.

2.31 **PHASE III STUDY** means a human clinical trial using a Licensed Product on a sufficient number of subjects that is designed to establish that a pharmaceutical product is safe and efficacious for its intended use, and to determine warnings, precautions, and adverse reactions that are associated with such pharmaceutical product in the dosage range to be prescribed, which trial is intended to support MARKETING APPROVAL of a LICENSED PRODUCT alone or in combination with an ATAC, as described in 21 C.F.R. 312.21(c) for the United States, or a similar clinical study prescribed by the REGULATORY AUTHORITIES in a foreign country.

2.32 **REGULATORY AUTHORITY** means the governmental authority responsible for granting any necessary licenses or approvals for the marketing, SALE and use of a LICENSED PRODUCT in a particular national jurisdiction, including without limitation, the FDA, European Medicines Agency or Koseisho (i.e. the Japanese Ministry of Health and Welfare).

2.33 **REPRESENTATIVES** has the meaning set forth in Section 11.2.

2.34 **ROYALTY RATE** means the percentage of NET SALES of LICENSED PRODUCTS payable to MD ANDERSON as set forth in Section 4.1(d).

2.35 **SELL, SALE or SOLD** means the transfer or disposition of a LICENSED PRODUCT for value to a party other than LICENSEE, an AFFILIATE, or a SUBLICENSEE.

2.36 **SUBLICENSE AGREEMENT** means any agreement or arrangement pursuant to which LICENSEE (or a SUBLICENSEE) grants to any third party any of the license rights granted to the LICENSEE under this AGREEMENT. An ASSIGNMENT of all rights and obligations under this AGREEMENT shall not be deemed to be a SUBLICENSE AGREEMENT.

2.37 **SUBLICENSE CONSIDERATION** means any and all consideration, other than royalties for NET SALES (provided that MD ANDERSON has been paid the ROYALTY RATE for such NET SALES), debt, research and development funds, and EXCLUDED AMOUNTS, as defined below, received by LICENSEE from any SUBLICENSEE as consideration for the sublicense, including, but not limited to, up-front, marketing, distribution, franchise, and option payments, license and documentation fees, and bonus and milestone payments.. Notwithstanding the foregoing, if LICENSEE receives a bona fide milestone payment from a SUBLICENSEE for achieving a MILESTONE, then for purposes of calculating SUBLICENSE CONSIDERATION, LICENSEE may deduct the amount actually paid to MD ANDERSON by LICENSEE for achieving such milestone from the amount received by LICENSEE from the SUBLICENSEE for achieving the milestone. In addition, if LICENSEE receives a payment from a SUBLICENSEE as a bona fide reimbursement for PATENT EXPENSES for PATENT RIGHTS, then for purposes of calculating SUBLICENSE CONSIDERATION, LICENSEE may deduct the amount actually paid to MD ANDERSON by LICENSEE as reimbursement for PATENT EXPENSES from the amounts received by LICENSEE from the SUBLICENSEE as reimbursement of PATENT EXPENSES. For purposes of clarification, consideration received by LICENSEE from a SUBLICENSEE for equity securities of LICENSEE shall not be considered SUBLICENSE CONSIDERATION, except that premiums paid by a SUBLICENSEE for equity securities of LICENSEE over the fair market value of such securities shall be considered SUBLICENSE CONSIDERATION.

2.38 **SUBLICENSEE** means any third party to whom LICENSEE or an AFFILIATE (or other entity granted any rights by LICENSEE under this AGREEMENT) has granted any of the rights granted to LICENSEE under this AGREEMENT, provided that the third party is not the end user of LICENSED PRODUCTS covered by such granted rights. As used herein, SUBLICENSEE shall also mean a third party to whom LICENSEE, an AFFILIATE, or a SUBLICENSEE has granted the exclusive right to distribute LICENSED PRODUCTS supplied by such LICENSEE, AFFILIATE, or SUBLICENSEE, provided that such third party is responsible for significant marketing and/or promotion of, LICENSED PRODUCTS within its exclusive territory. For clarity, an AFFILIATE of LICENSEE cannot be a SUBLICENSEE.

2.39 **SYSTEM** has the meaning set forth in the preamble.

2.40 **TECHNOLOGY RIGHTS** means [***].

2.41 **TERM** has the meaning set forth in Section 13.1.

2.42 **VALID CLAIM** means a claim of (a) an issued and unexpired patent included within the PATENT RIGHTS unless the claim has been held unenforceable or invalid by the final, unreversed, and un-appealable decision of a court or other governmental body of competent jurisdiction, has been irretrievably abandoned or disclaimed, or has otherwise been finally admitted or finally determined by the relevant governmental authority to be invalid, un-patentable or unenforceable, whether through reissue, reexamination, disclaimer or otherwise, or (b) a pending patent application within the PATENT RIGHTS to the extent the claim continues to be prosecuted in good faith, provided that such patent application has not been pending for more than seven (7) years from the filing date of such application.

III. LICENSE

3.1 BOARD, through MD ANDERSON, hereby grants to LICENSEE a royalty-bearing, exclusive license under LICENSED SUBJECT MATTER to manufacture, have manufactured, use, import, offer to SELL and/or SELL LICENSED PRODUCTS within LICENSED TERRITORY for use within LICENSED FIELD. This grant is subject to Sections 13.2, 14.2 and 14.3 hereinbelow, the payment by LICENSEE to MD ANDERSON of all consideration as provided herein, and is further subject to the following rights retained by BOARD and MD ANDERSON to:

(a) Publish the general scientific findings from research conducted by MD ANDERSON related to LICENSED SUBJECT MATTER, subject to the terms of ARTICLE XIConfidential Information and Publication; and

(b) Use LICENSED SUBJECT MATTER for non-commercial research, teaching, patient care, and other academically-related purposes; and

(c) Transfer LICENSED SUBJECT MATTER to academic or research institutions for non-commercial research use.

For purposes of clarification, and not by way of limitation, the rights retained by the BOARD and MD ANDERSON pursuant to this Section 3.1 do not include the right to engage in research sponsored by a commercial, for-profit entity or to conduct clinical trials sponsored by a commercial, for-profit entity.

3.2 LICENSEE may extend the license granted herein to any AFFILIATE provided that the AFFILIATE consents in writing to be bound by the applicable provisions of this AGREEMENT to the same extent as LICENSEE. LICENSEE agrees to deliver a copy of such contract to MD ANDERSON within thirty (30) calendar days following execution thereof, which copy may be redacted except to the extent necessary to verify compliance with this Section 3.2.

3.3 LICENSEE may enter into one or more SUBLICENSE AGREEMENTS for LICENSED SUBJECT MATTER consistent with the terms of this AGREEMENT provided that LICENSEE is responsible for its SUBLICENSEES relevant to this AGREEMENT, and for diligently collecting all amounts due LICENSEE from SUBLICENSEES. If a SUBLICENSEE pursuant hereto becomes bankrupt, insolvent or is placed in the hands of a receiver or trustee, LICENSEE, to the extent allowed under applicable law and in a timely manner, agrees to use its best reasonable efforts to collect all consideration owed to LICENSEE and to have the SUBLICENSE AGREEMENT confirmed or rejected by a court of proper jurisdiction.

3.4 LICENSEE must deliver to MD ANDERSON a true and correct copy of each SUBLICENCE AGREEMNT entered into by LICENSEE, and any modification or termination thereof, within thirty (30) calendar days after execution, modification, or termination, which copy may be redacted except to the extent necessary to verify compliance with the applicable terms of this AGREEMENT.

3.5 LICENSEE, itself or through its SUBLICENSEES, shall use diligent efforts to make LICENSED PRODUCTS commercially available within the LICENSED TERRITORY. Without limiting the foregoing, LICENSEE, itself or through its SUBLICENSEES, shall:

(a) maintain a bona fide, funded, ongoing and active research, development, manufacturing, regulatory, marketing or sales program (all as commercially reasonable) to make LICENSED PRODUCTS commercially available to the public as soon as commercially practicable within the LICENSED TERRITORY, and

(b) achieve the following Diligence Milestone Event set forth m the table immediately below by the deadline indicated:

Diligence Milestone Event	**Deadline**
1. File for IND for PHASE I STUDY in the United States, France, Germany, Italy, Spain, the United Kingdom, or China	On or before the date that is the third (3rd) anniversary of the EFFECTIVE DATE

If any obligation under Sections 3.5(a) and 3.5(b) are not fulfilled, BOARD and/or MD ANDERSON may treat such failure as a breach in accordance with Section 13.3(c).

3.5 If this AGREEMENT is terminated pursuant to ARTICLE XIII-Term and Termination, BOARD and MD ANDERSON agree to accept as successors to LICENSEE, existing SUBLICENSEES in good standing at the date of termination provided that each such SUBLICENSEE consents in writing to be bound by all of the terms and conditions of this AGREEMENT.

IV. CONSIDERATION, PAYMENTS AND REPORTS

4.1 In consideration of rights granted by BOARD to LICENSEE under this AGREEMENT, LICENSEE agrees to pay MD ANDERSON the following:

(a) all reasonable PATENT EXPENSES incurred by MD ANDERSON in filing, prosecuting, defending in a patent office, and maintaining PATENT RIGHTS, and all such future expenses incurred by MD ANDERSON, for so long as, and in such countries as this AGREEMENT remains in effect. MD ANDERSON will invoice LICENSEE within thirty (30) calendar days of the EFFECTIVE DATE for the expenses incurred as of that time and on a quarterly basis thereafter. The invoice amounts will be due and payable by LICENSEE within thirty (30) calendar days of invoice; and

(b) A nonrefundable license documentation fee ("LICENSE DOCUMENTATION FEE") in the amount of [***]. The LICENSE DOCUMENTATION FEE will not reduce the amount of any other payment provided for in this ARTICLE IV, and is due and payable within thirty (30) calendar days after the AGREEMENT has been fully executed by all parties and LICENSEE has received an invoice for the amount from MD ANDERSON. This LICENSE DOCUMENTATION FEE is not subject to the thirty (30) day cure period set forth in Section 13.3(b); and

(c) A nonrefundable annual maintenance fee ("ANNUAL MAINTENANCE FEE") as follows:

(i) if 2010 LICENSE has not terminated or expired, the amount of ANNUAL MAINTENANCE FEE shall be:

Anniversary of the EFFECTIVE DATE	Amount of ANNUAL MAINTENANCE FEE if 2010 LICENSE is in effect
1st	[***]
2nd	[***]
3rd	[***]
4th	[***]
5th	[***]
6th and each of every even subsequent anniversary (*i.e.*, 8th, 10th, 12th, *etc.*) of the EFFECTIVE DATE	[***]

or

(ii) if the 2010 LICENSE is not effect in any jurisdiction, the amount of ANNUAL MAINTENANCE FEE shall be:

Anniversary of the EFFECTIVE DATE	Amount of ANNUAL MAINTENANCE FEE if 2010 LICENSE is in effect
1st	[***]
2nd and each of all subsequent anniversaries of the EFFECTIVE DATE	[***]

Any ANNUAL MAINTENANCE FEE under Section 4.1(c)(i) or 4.1(c)(ii) is due and payable (without invoice) within thirty (30) calendar days of each respective anniversary of the EFFECTIVE DATE until the first SALE and upon receipt by LICENSEE of an invoice from MD ANDERSON. For clarity, LICENSEE shall be obligated to pay an ANNUAL MAINTENANCE FEE under either Section 4.1(c)(i) or Section 4.1(c)(ii), but not both, as applicable depending on the status of the 2010 License. Any ANNUAL MAINTENANCE FEE will not reduce the amount of any other payment provided for in this ARTICLE IV; and

(d) Subject to Section 4.2, a ROYALTY RATE as follows:

(i) if the LICENSED PRODUCT is covered by a VALID CLAIM in the country of SALE at the time of SALE as follows:

Type of LICENSED PRODUCT	ROYALTY RATE – If payment of royalty for the SALE of the LICENSED PRODUCT is also payable under the 2010 LICENSE	ROYALTY RATE – If payment of royalty for the SALE of the LICENSED PRODUCT is not also payable under the 2010 LICENSE
[***]	[***]	[***]
[***]	[***]	[***]

(ii) if the LICENSED PRODUCT is not covered by a VALID CLAIM in the country of SALE at the time of SALE as follows:

Type of LICENSED PRODUCT	ROYALTY RATE – If payment of royalty for the SALE of the LICENSED PRODUCT is also payable under the 2010 LICENSE	ROYALTY RATE – If payment of royalty for the SALE of the LICENSED PRODUCT is not also payable under the 2010 LICENSE
[***]	[***]	[***]
[***]	[***]	[***]

For clarity, the lower ROYALTY RATE set forth in the tables above in this Section 4.1(d), shall be applied on a LICENSED PRODUCT-by-LICENSED PRODUCT basis and shall only apply to those SALES for which LICENSEE is obligated to pay, and does pay, a royalty for the sale of the same LICENSED PRODUCT under the 2010 LICENSE; and

(e) milestone fees within thirty (30) days of achieving the following Milestone Events:

Milestone Events	Milestone Fees - if the corresponding Milestone Event of the 2010 LICENSE is achieved with the same LICENSED PRODUCT	Milestone Fees - Otherwise
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]

Each of the foregoing milestone fees shall be made by LICENSEE to MD ANDERSON (without invoice) within thirty (30) calendar days of achieving the Milestone Event and shall not reduce the amount of any other payment provided for in this ARTICLE IV. For clarity, each of the foregoing milestone payments shall be paid only once regardless of the number of LICENSED PRODUCTS that achieve such milestone; and

(e) a percentage of all SUBLICENSE CONSIDERATION, received by LICENSEE from any SUBLICENSEE pursuant to Section 3.3 hereinabove as follows:

Execution Date of SUBLICENSE AGREEMENT	Percentage of SUBLICENSE CONSIDERATION - if sublicense consideration is payable under the 2010 LICENSE for the same SUBLICENSE AGREEMENT	Percentage of SUBLICENSE CONSIDERATION - if sublicense consideration is not payable under the 2010 LICENSE for the same SUBLICENSE AGREEMENT
[***]	[***]	[***]
[***]	[***]	[***]

4.2 In the event that a LICENSED PRODUCT is sold in combination with one or more other functional components for which no royalty would be due hereunder if sold separately ("COMBINATION PRODUCT(S)"), then the running royalty due for NET SALES of the COMBINATION PRODUCT will be calculated by multiplying the ROYALTY RATE by the total NET SALES received for the COMBINATION PRODUCT, and then multiplying the resulting product by the fraction, A/(A+B), where A is the average sale price of the LICENSED PRODUCT when sold by the LICENSEE separately, and B is the average sale price of all other functional component(s) included in the COMBINATION PRODUCT when sold by the LICENSEE separately. In the event either the component that is a LICENSED PRODUCT or the other functional component(s) included in the COMBINATION PRODUCT are not sold separately, then the running royalty due for NET SALES of the LICENSED PRODUCT sold as part of a COMBINATION PRODUCT will be calculated by multiplying the ROYALTY RATE by the NET SALES received for the COMBINATION PRODUCT, and then multiplying the resulting product by the fraction, F/(F+G) where F is the fair market value of the component that is a LICENSED PRODUCT, and G is the fair market value for each of the other functional component(s) included in the COMBINATION PRODUCT, such fair market values to be mutually agreed in good faith by LICENSEE and MD ANDERSON prior to sales of such COMBINATION PRODUCTS. Notwithstanding the foregoing, in no event shall the ROYALTY RATE due to MD ANDERSON for the SALE of a COMBINATION PRODUCT be less than the percentage set forth as follows:

(i) If a royalty has been paid to or is concurrently due to MD ANDERSON for the SALE of such COMBINATION PRODUCT under the 2010 LICENSE, the ROYALTY RATE set forth in Section 4.1(d) for the SALE of such COMBINATION PRODUCT shall not be less than [***]%; and/or

(ii) If a royalty has not been paid to or is not due to MD ANDERSON for the SALE such COMBINATION PRODUCT under the 2010 LICENSE, the ROYALTY RATE set forth in Section 4.1(d) for the SALE of such COMBINATION PRODUCT shall not be less than [***]% if the COMBINATION PRODUCT has received MARKETING APPROVAL for a dermatological INDICATION and shall not be less than [***]% if the COMBINATION PRODUCT that has received MARKETING APPROVAL for any INDICATION other than a dermatological INDICATION.

4.3 LICENSEE shall make no SALE prior to MARKETING APPROVAL unless LICENSEE pays the royalty due hereunder to MD ANDERSON on account of any NET SALES arising from such SALE.

4.4 Unless otherwise provided, all such payments are payable within sixty (60) calendar days after March 31, June 30, September 30, and December 31 of each year during the TERM, at which time LICENSEE will also deliver to MD ANDERSON a true and accurate report, giving such particulars of the business conducted by LICENSEE, its AFFILIATES and its SUBLICENSEES, if any exist, during the preceding three (3) calendar months under this AGREEMENT as necessary for MD ANDERSON to account for LICENSEE's payments hereunder. This report will include pertinent data, including, but not limited to:

(a) the accounting methodologies used to account for and calculate the items included in the report and any differences in such accounting methodologies used by LICENSEE since the previous report; and

(b) a list of each LICENSED PRODUCT available for sale during the three (3) preceding calendar months; and

(c) the total quantities of each LICENSED PRODUCT SOLD during such period; and

(d) the total SALES; and

(e) the calculation of NET SALES; and

(f) the royalties so computed and due MD ANDERSON; and

(g) all consideration received from each SUBLICENSEE and payments due MD ANDERSON; and

(h) all other amounts due MD ANDERSON herein.

Simultaneously with the delivery of each such report, LICENSEE agrees to pay MD ANDERSON the amount due, if any, for the period of such report. These reports are required even if no payments are due.

4.5 During TERM and for one (1) year thereafter, LICENSEE agrees to keep complete and accurate records of its, its AFFILIATES' and SUBLICENSEES' SALES and NET SALES in sufficient detail to enable the royalties and other payments due hereunder to be determined. LICENSEE agrees to permit an independent auditor engaged by MD ANDERSON and reasonably acceptable to LICENSEE, at MD ANDERSON's expense, to periodically (but no more than once per calendar year and solely with respect to records not previously examined, unless in the independent auditor's reasonable opinion review of such previously examined records is necessary to properly conduct the current examination) examine LICENSEE's books, ledgers, and records during regular business hours, with reasonable prior notice, for the purpose of and to the extent necessary to verify any report required under this AGREEMENT. If any amounts due MD ANDERSON are determined to have been underpaid in an amount equal to or greater than [***]percent ([***]%) of the total amount due during the period so examined, then LICENSEE will pay the reasonable cost of the examination plus accrued interest at the lower of (a) the then-current prime interest rate plus [***]% or (b) the highest allowable rate.

4.6 Within thirty (30) calendar days following each anniversary of the EFFECTIVE DATE, LICENSEE will deliver to MD ANDERSON a written progress report as to LICENSEE's (and any AFFILIATE's and SUBLICENSEE's) efforts and accomplishments during the preceding year in diligently commercializing LICENSED SUBJECT MATTER in the LICENSED TERRITORY and LICENSEE'S, AFFILIATES' and SUBLICENSEES' commercialization plans for the upcoming year.

4.7 All amounts payable hereunder by LICENSEE will be paid in United States funds without deductions for taxes, assessments, fees, or charges of any kind. Checks are to be made payable to The University of Texas M. D. Anderson Cancer Center, and sent by United States mail to [***], or by wire transfer to:

[***]

4.8 No payments due or royalties owed under this AGREEMENT will be reduced as the result of co-ownership of LICENSED SUBJECT MATTER by BOARD and another party, including, but not limited to, LICENSEE.

V. SPONSORED RESEARCH

5.1 If LICENSEE desires to sponsor research for or related to the LICENSED SUBJECT MATTER, LICENSEE will notify MD ANDERSON and the PARTIES will negotiate in good faith the terms for such sponsored research.

VI. PATENTS AND INVENTIONS

6.1 If after consultation with LICENSEE both parties agree that a new patent application should be filed for LICENSED SUBJECT MATTER, MD ANDERSON will prepare and file appropriate patent applications, and Licensee will pay the related Patent Expenses. If LICENSEE notifies MD ANDERSON that it does not intend to pay any portion of the PATENT EXPENSES for a patent application or patent, or if LICENSEE fails to promptly confirm its intent to pay any portion of the PA TENT EXPENSES for a patent application or patent upon inquiry from MD ANDERSON, or if LICENSEE is in arrears or otherwise in default or late on any payments due under Section 3.1, or if LICENSEE fails to timely make any payments for ANTICIPATED COSTS when due under Section 4.5, then MD ANDERSON may, in its sole discretion, elect to file, not file, continue prosecution or maintenance, or abandon such patent application or patent at its own expense without further notice to LICENSEE. In the event LICENSEE fails to pay or provides written notice of its intent not to pay any portion of PATENT EXPENSES for a patent application and/or patent under PATENT RIGHTS, then LICENSEE's rights to such patent application and/or patent under PATENT RIGHTS shall terminate in their entirety. If at any time LICENSEE wishes to cease paying PATENT EXPENSES for a particular patent application and/or patent under PA TENT RIGHTS, LICENSEE must give MD ANDERSON at least ninety (90) calendar days prior written notice and LICENSEE shall continue to be obligated to pay for the PATENT EXPENSES which reasonably accrue with respect thereto during said notice period. Thereafter, said particular PATENT RIGHT, patent application, or patent shall no longer be included in the PATENT RIGHTS and LICENSEE shall have no further rights thereto. MD ANDERSON shall not be obligated to file, prosecute or maintain any patent or patent application if LICENSEE is in arrears or otherwise in default or late with respect to any PATENT EXPENSES or other payments or obligations hereunder.

6.2 LICENSEE shall cooperate with MD ANDERSON regarding any patent prosecution or patent maintenance matters or deadlines, including the timely provision of accurate information regarding its entity size status, and any changes thereto, in accordance with the regulations of the U.S. Patent and Trademark Office.

6.3 MD ANDERSON will provide LICENSEE with a copy of any applications for which LICENSEE has paid the cost of filing, as well as copies of any documents received or filed during prosecution thereof. The parties agree that they share a common legal interest to get valid enforceable patents and that LICENSEE will keep all privileged information received pursuant to this Section confidential.

6.4 If LICENSEE is more than thirty (30) calendar days in arrears on any payment or obligation due under this AGREEMENT, BOARD, MD ANDERSON, and the counsel prosecuting licensed patents and patent applications shall have no obligation to confer or otherwise communicate with, or provide any information to, LICENSEE under this Article V of this AGREEMENT unless and until LICENSEE is no longer in arrears on all payments and obligations under this AGREEMENT.

6.5 Notwithstanding Section 4.1(a), prior to instructing patent counsel to respond or take action with respect to a patent or patent application directed to PATENT RIGHTS and/or prior to incurring costs with respect thereto, MD ANDERSON shall have the right, at its election and in its sole discretion, to require upfront, advance payment from Licensee of the anticipated PATENT EXPENSES for any patent or patent application directed to PATENT RIGHTS ("ANTICIPATED COSTS") as follows: MD ANDERSON shall provide a reasonable estimate of the ANTICIPATED COSTS to LICENSEE and shall specify a due date for the advance payment of such ANTICIPATED COSTS. With respect to such due date, MD ANDERSON may require LICENSEE to make such advance payment for ANTICIPATED COSTS at any time up to two (2) months prior to the date MD ANDERSON has chosen for the legal work to be completed, provided that such due date for payment is at least fifteen (15) calendar days after the estimate is provided to LICENSEE. Unless otherwise agreed in writing, such estimate may be sent by email to [***] or in accordance with the Notice provisions in Section 15.2. In the event the payment for ANTICIPATED COSTS actually made by LICENSEE to MD ANDERSON exceeds the actual costs, any unused balance will be credited towards future patent expenses, or, upon written request, returned to LICENSEE. In the event the actual costs incurred by MD ANDERSON exceed the estimate of ANTICIPATED COSTS, MD ANDERSON shall invoice LICENSEE for the excess costs. Within thirty (30) calendar days of receiving an invoice from MD ANDERSON for such costs incurred in excess of the reasonable estimate of ANTICIPATED COSTS, LICENSEE shall reimburse MD ANDERSON for such excess amount.

VII. INFRINGEMENT BY THIRD PARTIES

7.1 LICENSEE, at its expense, shall have the first right (but no obligation) to enforce all PATENT RIGHTS against infringement by third parties and is entitled to retain recovery from such enforcement. After reimbursement of LICENSEE's reasonable legal costs and expenses related to such recovery incurred by LICENSEE, LICENSEE agrees to pay MD ANDERSON either: (a) the applicable royalty detailed in Section 4.1(d) for any monetary recovery that is for sales of LICENSED PRODUCTS lost due to the infringement and [***]percent ([***]%) of related punitive damages received by LICENSEE; or (b) [***]percent ([***]%) of reasonable royalties awarded and received by LICENSEE, and fifty percent ([***]%) of related punitive damages received by LICENSEE in any monetary recovery in which the award is for reasonable royalties.

7.2 If it is necessary to name BOARD or MD ANDERSON as a party in such action to enforce PA TENT RIGHTS against an infringer, then LICENSEE must first obtain BOARD'S and MD ANDERSON'S prior written permission, which permission shall not be unreasonably withheld, provided that BOARD and MD ANDERSON shall have reasonable prior input on choice of counsel on any matter where such counsel represents BOARD or MD ANDERSON, and LICENSEE and such counsel agree to follow all required procedures of the Texas Attorney General regarding retention of outside counsel for state entities.

7.3 MD ANDERSON shall promptly notify LICENSEE if MD ANDERSON'S Office of Technology Commercialization becomes aware of any infringement or potential infringement of any PATENT RIGHTS. If LICENSEE does not first exercise its right under Section 7.1 within twelve (12) months of knowledge of infringement, then, BOARD or MD ANDERSON may, at its sole discretion, enforce any patent licensed hereunder on behalf of itself and LICENSEE, with MD ANDERSON retaining all recoveries from such enforcement. If BOARD and/or MD ANDERSON pursues such infringement action, BOARD and/or MD ANDERSON may, as part of the resolution thereof, grant non-exclusive license rights to the alleged infringer, notwithstanding LICENSEE's exclusive license rights.

VIII. PATENT MARKING

8.1 LICENSEE agrees that all packaging containing individual LICENSED PRODUCT(S), documentation therefor, and, when possible, actual LICENSED PRODUCT(S) sold by LICENSEE, AFFILIATES, and/or SUBLICENSEES will be appropriately marked with the number of any applicable patent(s) licensed hereunder in accordance with each country's patent laws, including Title 35, United States Code, to the extent such marking is necessary or required to fully preserve PATENT RIGHTS in each such country.

IX. INDEMNIFICATION AND INSURANCE

9.1 LICENSEE AGREES TO HOLD HARMLESS AND INDEMNIFY BOARD, SYSTEM, MD ANDERSON, THEIR REGENTS, OFFICERS, EMPLOYEES, STUDENTS AND AGENTS FROM AND AGAINST ANY CLAIMS, DEMANDS, OR CAUSES OF ACTION WHATSOEVER BROUGHT BY THIRD PARTIES, COSTS OF SUIT AND REASONABLE ATTORNEY'S FEES, INCLUDING WITHOUT LIMITATION, THOSE COSTS ARISING ON ACCOUNT OF ANY INJURY OR DEATH OF PERSONS OR DAMAGE TO PROPERTY (COLLECTIVELY, "LIABILITIES") IN EACH CASE THAT ARE CAUSED BY, OR ARISING OUT OF, OR RESULTING FROM, THE EXERCISE OR PRACTICE OF THE RIGHTS GRANTED HEREUNDER BY LICENSEE, ITS OFFICERS, ITS AFFILIATES OR THEIR OFFICERS, EMPLOYEES, AGENTS OR REPRESENTATIVES EXCEPT TO THE EXTENT SUCH LIABILITIES ARISE FROM (i) THE NEGLIGENT FAILURE OF MD ANDERSON TO SUBSTANTIALLY COMPLY WITH ANY APPLICABLE GOVERNMENTAL REQUIREMETNS OR (ii) THE NEGLIGENT OR WILLFUL MISCONDUCT BY A REGENT, OFFICER, AGENT OR EMPLOYEE OF MD ANDERSON.

9.2 IN NO EVENT SHALL BOARD, SYSTEM OR MD ANDERSON BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS OR EXPECTED SAVINGS OR OTHER ECONOMIC LOSSES, OR FOR INJURY TO PERSONS OR PROPERTY) ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT OR ITS SUBJECT MATTER, REGARDLESS OF WHETHER BOARD, SYSTEM OR MD ANDERSON KNOWS OR SHOULD KNOW OF THE POSSIBILITY OF SUCH DAMAGES.

9.3 OTHER THAN FOR CLAIMS AGAINST LICENSEE FOR INDEMNIFICATION PURSUANT TO SECTION 9.1 OR FOR THE MISAPPROPRIATION OR INFRINGEMENT OF MD ANDERSON'S INTELLECTUAL PROPERTY RIGHTS, LICENSEE SHALL WILL NOT BE LIABLE TO MD ANDERSON FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS OR EXPECTED SAVINGS OR OTHER ECONOMIC LOSSES, OR FOR INJURY TO PERSONS OR PROPERTY) ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT OR ITS SUBJECT MATTER, REGARDLESS OF WHETHER LICENSEE KNOWS OR SHOULD KNOW OF THE POSSIBILITY OF SUCH DAMAGES.

9.4 Beginning at the time when any LICENSED SUBJECT MATTER is being distributed or sold (including for the purpose of obtaining MARKETING APPROVALS) by LICENSEE, an AFFILIATE, or by a SUBLICENSEE, LICENSEE shall, at its sole cost and expense, procure and maintain commercial general liability insurance in amounts not less than $[***] per incident and $[***] annual aggregate, and LICENSEE shall use reasonable efforts to have the BOARD, SYSTEM, MD ANDERSON, their Regents, officers, employees, students and agents named as additional insureds. Such commercial general liability insurance shall provide: (i) product liability coverage; (ii) broad form contractual liability coverage for LICENSEE's indemnification under this AGREEMENT; and (iii) coverage for litigation costs. The minimum amounts of insurance coverage required herein shall not be construed to create a limit of LICENSEE's liability with respect to its indemnification under this AGREEMENT.

9.5 LICENSEE shall provide MD ANDERSON with written evidence of such insurance within thirty (30) calendar days of its procurement. Additionally, LICENSEE shall provide MD ANDERSON with written notice of at least fifteen (15) calendar days prior to the cancellation, non-renewal or material change in such insurance.

9.6 LICENSEE shall maintain such commercial general liability insurance beyond the expiration or termination of this AGREEMENT during: (i) the period that any LICENSED SUBJECT MATTER developed pursuant to this AGREEMENT is being commercially distributed or sold by LICENSEE, an AFFILIATE or by a SUBLICENSEE or agent of LICENSEE; and (ii) the five (5) year period immediately after such period.

X. USE OF BOARD AND MD ANDERSON'S NAME

10.1 LICENSEE will not use the name of (or the name of any employee of) MD ANDERSON, SYSTEM or BOARD in any advertising, promotional or sales literature, on its Web site, or for the purpose of raising capital without the advance express written consent of BOARD secured through:

The University of Texas
M. D. Anderson Cancer Center
[***]

Notwithstanding the above, LICENSEE may use the name of (or name of employee of) MD ANDERSON, SYSTEM or BOARD in routine business correspondence or as needed in appropriate regulatory submissions or required by applicable law or court order without express written consent.

XI. CONFIDENTIAL INFORMATION AND PUBLICATION

11.1 MD ANDERSON and LICENSEE each agree that all information contained in documents marked "confidential" and forwarded to one by the other (i) are to be received in strict confidence, (ii) are to be used only for the purposes of this AGREEMENT, and (iii) will not be disclosed by the recipient party (except as required by law or court order), nor by the recipient party's agents or employees without the prior written consent of the disclosing party, except to the extent that the recipient party can establish by competent written proof that such information:

(a) was in the public domain at the time of disclosure; or

(b) later became part of the public domain through no act or omission of the recipient party, its employees, agents, successors or assigns; or

(c) was lawfully disclosed to the recipient party by a third party having the right to disclose it; or

(d) was already known by the recipient party at the time of disclosure; or

(e) was independently developed by the recipient party without use of the disclosing party's confidential information; or

(f) is required by law or regulation to be disclosed; provided that such recipient party gives the disclosing party reasonable prior notice of such disclosure requirement and affords the disclosing party an opportunity to obtain a protective order or other appropriate relief.

11.2 Each party's obligation of confidence hereunder will be fulfilled by using at least the same degree of care with the disclosing party's confidential information as it uses to protect its own confidential information, but always at least a reasonable degree of care. This obligation will exist while this AGREEMENT is in force and for a period of three (3) years thereafter. Notwithstanding the foregoing, LICENSEE may disclose the MD ANDERSON's Confidential Information only to its AFFILIATES, investors, and to existing or potential SUBLICENSEES or acquirers or merger partners ("REPRESENTATIVES") who have been informed of this AGREEMENT, who need to know such Confidential Information to assist the LICENSEE as reasonably needed to conduct the development or commercialization of LICENSED PRODUCTS, provided that such Representatives are subject to obligations of confidentiality and non-use at least as strict as LICENSEE's obligations under this AGREEMENT.

11.3 MD ANDERSON reserves the right to publish the general scientific findings from research conducted by MD ANDERSON related to LICENSED SUBJECT MATTER, with due regard to the protection of LICENSEE's confidential information. MD ANDERSON will submit the manuscript of any proposed publication to LICENSEE at least thirty (30) calendar days before publication, and LICENSEE shall have the right to review and comment upon the publication in order to protect LICENSEE's confidential information. Upon LICENSEE's request, MD ANDERSON shall remove LICENSEE's confidential information from the publication and publication may be delayed up to sixty (60) additional calendar days to enable LICENSEE to secure adequate intellectual property protection of LICENSED SUBJECT MATTER that would otherwise be affected by the publication.

XII. ASSIGNMENT

12.1 In case of the sale of all of LICENSEE's assets to a third party, or in connection with any transaction other than sale of all of LICENSEE's assets to a third party, this AGREEMENT may be assigned subject to the payment to MD ANDERSON prior to the ASSIGNMENT of a fee for permitting such ASSIGNMENT ("ASSIGNMENT FEE") as follows:

(a) if LICENSEE has paid all fees for required for assignment of the 2010 LICENSE and the AGREEMENT is to be assigned to the same party to which LICENSEE assigned the 2010 LICENSE, the ASSIGMENT FEE due MD ANDERSON under this AGREEMENT shall be $[***]; or

(b) if Section 12.1(a) is not applicable, the ASSIGMENT FEE due MD ANDERSON under this AGREEMENT shall be $[***].

Any ASSIGNMENT FEE shall be in addition to and shall not replace the LICENSE DOCUMENTATION FEE above. No ASSIGNMENT FEE shall be due if the ASSIGNMENT is to an AFFILIATE, provided that LICENSEE or the AFFILIATE pays the ASSIGNMENT FEE in the event AFFILIATE thereafter makes an ASSIGNMENT of the AGREEMENT to a third party.

XIII. TERM AND TERMINATION

13.1 Subject to Sections 13.3 and 13.4 hereinbelow, the term of this AGREEMENT is from the EFFECTIVE DATE until the later of (a) expiration of the last to expire patents issued from the PATENT RIGHTS, or (b) twenty (20) years from the EFFECTIVE DATE ("TERM").

13.2 Reserved

13.3 Subject to any rights herein which survive termination, this AGREEMENT will earlier terminate in its entirety:

(a) upon thirty (30) calendar days written notice if LICENSEE becomes bankrupt and/or if the business of LICENSEE shall be placed in the hands of a receiver, assignee, or trustee, whether by voluntary act of LICENSEE or otherwise; or

(b) upon thirty (30) calendar days written notice from MD ANDERSON, if LICENSEE materially breaches or defaults on the payment or report obligations of ARTICLE IV (excluding the license documentation fee specified in Section 4.1(b), for which no cure period applies), or use of name obligations of ARTICLE X, unless, before the end of such thirty (30)-calendar day notice period, LICENSEE has cured the material default or breach to MD ANDERSON's reasonable satisfaction, and so notifies MD ANDERSON, stating the manner of the cure; or

(c) upon ninety (90) calendar days written notice from MD ANDERSON if LICENSEE materially breaches or defaults on any other obligation under this AGREEMENT, unless, before the end of such ninety (90) calendar-day notice period, LICENSEE has cured the material default or breach to MD ANDERSON's reasonable satisfaction and so notifies MD ANDERSON, stating the manner of the cure; or

(d) at any time by mutual written agreement between LICENSEE and MD ANDERSON upon one hundred eighty (180) calendar days written notice to all parties and subject to any terms herein which survive termination; or

(e) upon thirty (30) calendar days written notice from MD ANDERSON if the termination is pursuant to Section 13.2 or Section 15.8; or

(f) if LICENSEE has defaulted or been late on its payment obligations pursuant to the terms of this AGREEMENT on any two (2) occasions in a twelve (12) month period; or

(g) immediately, upon written notice from MD ANDERSON, if LICENSEE fails to timely pay the LICENSE DOCUMENTATION FEE specified in Section 4.1(b); or

(h) for any reason upon thirty (30) calendar days written notice from LICENSEE to MD ANDERSON, provided that LICENSEE is not in material breach of any of its obligations under this AGREEMENT.

13.4 Upon termination of this AGREEMENT:

(a) nothing herein will be construed to release either party of any obligation maturing prior to the effective date of the termination; and

(b) both parties covenant and agree to be bound by the provisions of ARTICLES IX (Indemnification and Insurance), X (USE OF BOARD AND MD ANDERSON'S NAME) and XI (CONFIDENTIAL INFORMATION AND PUBLICATION) of this AGREEMENT. Notwithstanding the foregoing, the obligations of confidentiality according to Article XI shall survive early termination of this AGREEMENT under Section 13.3 for a period of five (5) years and shall immediately expire upon expiration of this AGREEMENT under Section 13.1.

XIV. WARRANTY: SUPERIOR-RIGHTS

14.1 BOARD represents and warrants its belief that (a) it is the owner of the entire right, title, and interest in and to LICENSED SUBJECT MATTER, (b) it has the right to grant licenses thereunder, and (c) it has not knowingly granted licenses thereunder to any other entity that would restrict rights granted hereunder except as stated herein.

14.2 LICENSEE understands that in the event that the LICENSED SUBJECT MATTER was developed under a funding agreement with the Government of the United States of America ("GOVERNMENT"),the GOVERNMENT may have certain rights relative thereto. This AGREEMENT is explicitly made subject to the GOVERNMENT's rights under any such agreement and any applicable law or regulation. To the extent that there is a conflict between any such agreement, applicable law or regulation and this AGREEMENT, the terms of such GOVERNMENT agreement, applicable law or regulation shall prevail.

14.3 LICENSEE UNDERSTANDS AND AGREES THAT BOARD AND MD ANDERSON, BY THIS AGREEMENT, MAKE NO REPRESENTATION AS TO THE OPERABILITY OR FITNESS FOR ANY USE, SAFETY, EFFICACY, APPROVABILITY BY REGULATORY AUTHORITIES, TIME AND COST OF DEVELOPMENT, PATENTABILITY, AND/OR BREADTH OF THE LICENSED SUBJECT MATTER. BOARD AND MD ANDERSON, BY THIS AGREEMENT, ALSO MAKE NO REPRESENTATION AS TO WHETHER ANY PATENT COVERED BY PATENT RIGHTS IS VALID OR AS TO WHETHER THERE ARE ANY PATENTS NOW HELD, OR WHICH WILL BE HELD, BY OTHERS OR BY BOARD OR MD ANDERSON IN THE LICENSED FIELD, NOR DO BOARD AND MD ANDERSON MAKE ANY REPRESENTATION THAT THE INVENTIONS CONTAINED IN PATENT RIGHTS DO NOT INFRINGE ANY OTHER PATENTS NOW HELD OR THAT WILL BE HELD BY OTHERS OR BY BOARD.

14.4 LICENSEE, by execution hereof, acknowledges, covenants and agrees that LICENSEE has not been induced in any way by BOARD, SYSTEM, MD ANDERSON or employees thereof to enter into this AGREEMENT, and further warrants and represents that (a) LICENSEE is entering into this AGREEMENT voluntarily; (b) LICENSEE has conducted sufficient due diligence with respect to all items and issues pertaining to this AGREEMENT; and (c) LICENSEE has adequate knowledge and expertise, or has used knowledgeable and expert consultants, to adequately conduct such due diligence, and agrees to accept all risks inherent herein.

XV. GENERAL

15.1 This AGREEMENT constitutes the entire and only agreement between the parties for LICENSED SUBJECT MATTER and all other prior negotiations, representations, agreements and understandings with respect thereto are superseded hereby. No agreements altering or supplementing the terms hereof will be made except by a written document signed by both parties.

15.2 Any notice required by this Agreement shall be in writing and shall be deemed to have been sufficiently given for all purposes thereof when sent by first class mail or reputable international courier (e.g., Federal Express or UPS) and shall be evidenced by the postmark at the point of mailing or by the dated delivery receipt of the courier. All notices and any correspondence respecting this Agreement shall be transmitted as follows:

To MD Anderson, if by mail:
The University of Texas M. D. Anderson Cancer Center
Strategic Industry Ventures/Office of Technology Commercialization
[***]

To MD Anderson, if by courier:
The University of Texas M. D. Anderson Cancer Center
Strategic Industry Ventures/Office of Technology Commercialization
[***]

Contact phone number for use by courier: [***]

or in the case of LICENSEE to:

Moleculin Biotech, Inc.
5300 Memorial Drive - Suite 950
Houston, Texas 77007
ATTENTION: Jonathan Foster

or other addresses as may be given from time to time under the terms of this notice provision.

15.3 LICENSEE must comply with all applicable federal, state and local laws and regulations in connection with its activities pursuant to this AGREEMENT. LICENSEE acknowledges that the LICENSED SUBJECT MATTER is subject to U. S. export control jurisdiction. LICENSEE agrees to comply with all applicable international and national laws that apply to the LICENSED SUBJECT MATTER, including U.S. Export Administration Regulations, as well as end-user, end-use, and destination restrictions applied by the United States.

15.4 This AGREEMENT will be construed and enforced in accordance with the laws of the United States of America and of the State of Texas, without regard to its conflict of law provisions. The Texas State Courts of Harris County, Texas (or, if there is exclusive federal jurisdiction, the United States District Court for the Southern District of Texas) shall have exclusive jurisdiction and venue over any dispute arising out of this AGREEMENT, and LICENSEE consents to the jurisdiction and venue of such courts and hereby explicitly waives the rights to any other venue to which it might be entitled by cause of action, domicile or otherwise. Nothing in this AGREEMENT shall be deemed as a waiver by BOARD, SYSTEM or MD ANDERSON of its sovereign immunity.

15.5 Failure of BOARD or MD ANDERSON or LICENSEE to enforce a right under this AGREEMENT will not act as a waiver of right or the ability to later assert that right relative to the particular situation involved.

15.6 Headings included herein are for convenience only and will not be used to construe this AGREEMENT.

15.7 If any part of this AGREEMENT is for any reason found to be unenforceable, all other parts nevertheless will remain enforceable.

15.8 In the event that LICENSEE brings an action before any court, agency or tribunal seeking to invalidate or otherwise challenge the enforceability of or BOARD's ownership of any patent included in the PATENT RIGHTS, then MD ANDERSON may immediately terminate this AGREEMENT upon written notice to LICENSEE. Any dispute regarding the validity, enforceability or ownership of any patent included in the PATENT RIGHTS shall be litigated in the courts located in Houston, Texas, and LICENSEE agrees not to challenge personal jurisdiction in that forum. To the extent that LICENSEE unsuccessfully challenges the validity or enforceability of any patent included in the PATENT RIGHTS, LICENSEE agrees to reimburse MD ANDERSON and BOARD for all costs and fees (including attorney's fees) paid by MD ANDERSON and BOARD in defending against such challenge. LICENSEE understands and agrees that, in the event LICENSEE successfully challenges the validity or enforceability of any patent included in the PATENT RIGHTS, all payments or other consideration made or otherwise provided by LICENSEE to MD ANDERSON prior to a final, non-appealable adjudication of invalidity and/or unenforceability shall be non-refundable. The obligations of this Section shall survive the expiration or termination of this AGREEMENT.

IN WITNESS WHEREOF, the parties hereto have caused their duly authorized representatives to execute this AGREEMENT.

BOARD OF REGENTS OF THE UNIVERSITY OF TEXAS SYSTEM, on behalf of THE UNIVERSITY OF TEXAS M. D. ANDERSON CANCER CENTER

By /s/ [***]

Date: 2/3/2022

MOLECULIN BIOTECH, INC.

By /s/ Jonathan P. Foster

Printed Name: Jonathan P. Foster

Title: EVP & CFO

Date: 1-21-22

Approved as to Content:

By /s/ [***]
[***]
Vice President, Strategic Industry Ventures
M.D. Anderson Cancer Center

Date: 2/3/2022

EXHIBIT I

[***]

Exhibit 21

List of Subsidiaries

Name	Jurisdiction	Ownership
Moleculin Australia Pty. Ltd.	Australia	100%
Moleculin Amsterdam B.V.	Amsterdam	100%

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We have issued our report dated March 24, 2022, with respect to the consolidated financial statements included in the Annual Report of Moleculin Biotech, Inc. on Form10-K for the year ended December 31, 2021. We consent to the incorporation by reference of said report in the Registration Statements of Moleculin Biotech, Inc. on Forms S-1 (File No. 333-224243, File No. 333-226146 and File No. 333-227845), on Forms S-3 (File No. 333-219434, File No. 333-252676, File No. 333-235686 and File No. 333-256627) and on Forms S-8 (File No. 333-212619, File No. 333-225867 and File No. 333-248240).

/s/ GRANT THORNTON LLP
Houston, Texas
March 24, 2022

Exhibit 31.1

OFFICER'S CERTIFICATION PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Walter V. Klemp, certify that:

1. I have reviewed this Annual Report on Form 10-K of Moleculin Biotech, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

    c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

    d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

March 24, 2022

By: /s/ Walter V. Klemp
Walter V. Klemp
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

OFFICER'S CERTIFICATION PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Jonathan P. Foster, certify that:

1. I have reviewed this Annual Report on Form 10-K of Moleculin Biotech, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

    c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

    d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

March 24, 2022

By: /s/ Jonathan P. Foster
Jonathan P. Foster
Chief Financial Officer
(Principal Financial Officer and Principal Accounting Officer)

Exhibit 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report on Form 10-K for the fiscal year ended December 31, 2021 of Moleculin Biotech, Inc. (the "Company") as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Walter V. Klemp, Chief Executive Officer of the Company, hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

- The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C 78m or 78o(d)); and

- The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 24, 2022

By: /s/ Walter V. Klemp
Walter V. Klemp
Chief Executive Officer
(Principal Executive Officer)

A signed original of this written statement required by Section 906 has been provided to Moleculin Biotech, Inc. and will be retained by Moleculin Biotech, Inc. and furnished to the Securities and Exchange Commission or its staff upon request.

Exhibit 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report on Form 10-K for the fiscal year ended December 31, 2021 of Moleculin Biotech, Inc. (the "Company") as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Jonathan P. Foster, Chief Financial Officer of the Company, hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

- The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C 78m or 78o(d)); and

- The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 24, 2022

By: /s/ Jonathan P. Foster
Jonathan P. Foster
Chief Financial Officer
(Principal Financial Officer and Principal Accounting Officer)

A signed original of this written statement required by Section 906 has been provided to Moleculin Biotech, Inc. and will be retained by Moleculin Biotech, Inc. and furnished to the Securities and Exchange Commission or its staff upon request.