Table of Contents

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

FORM 10-K

(Mark One)

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2022

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to
Commission file number 001-39011

EXICURE, INC.

(Exact name of registrant as specified in its charter)

Delaware	**81-5333008**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**

2430 N. Halsted St.
Chicago, IL 60614
(Address of principal executive offices and Zip Code)
(847) 673-1700
(Registrant's telephone number, including area code)

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

Common Stock, par value $0.0001 per share	**XCUR**	**The Nasdaq Stock Market LLC**
(Title of each class)	**(Trading symbol(s))**	**(Name of each exchange on which registered)**

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 period that 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 (§232.405 of this chapter) 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, smaller reporting company, or an emerging growth 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.

Large accelerated filer	¨	Accelerated filer	¨
Non-accelerated filer	x	Smaller reporting company	☒
		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 U.S.C. 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 Exchange Act). Yes ☐ No ☒

The aggregate market value of the registrant's common stock held by non-affiliates of the registrant as of June 30, 2022 was approximately $8.9 million, based on a closing price of $2.16 per share of the registrant's common stock as reported on The Nasdaq Capital Market. For purposes of this computation, all officers, directors, and 10% beneficial owners of the registrant are deemed to be affiliates. Such determination should not be deemed to be an admission that such officers, directors or 10% beneficial owners are, in fact, affiliates of the registrant.

As of March 23, 2023, the registrant had 8,366,715 shares of common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement for the 2023 Annual Meeting of Stockholders, to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Form 10-K, are incorporated by reference in Part III, Items 10-14 of this Form 10-K.

EXICURE, INC.

ANNUAL REPORT ON FORM 10-K

TABLE OF CONTENTS

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K, including the sections titled “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” contains express or implied “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. All statements other than statements of historical fact contained in this Annual Report on Form 10-K are forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as “may,” “could,” “will,” “would,” “should,” “expect,” “plan,”, “anticipate,” “believe,” “estimate,” “intend,” “predict,” “seek,” “contemplate,” “project,” “continue,” “potential,” “ongoing” or the negative of these terms or other comparable terminology. Forward-looking statements also include the assumptions underlying or relating to such statements.

Although we believe that the expectations reflected in the forward-looking statements contained herein are reasonable, such expectations or any of the forward-looking statements may prove to be incorrect and actual results could differ materially from those projected or assumed in the forward-looking statements. Our future financial condition and results of operations, as well as any forward-looking statements, are subject to inherent risks and uncertainties, including, but not limited to, the risk factors described in the “Risk Factor Summary” below and set forth in Part I, Item 1A “Risk Factors” below and for the reasons described elsewhere in this Annual Report on Form 10-K. All forward-looking statements and reasons why results may differ included in this report are made as of the date hereof and we do not intend to update any forward-looking statements except as required by law. These forward-looking statements include, but are not limited to, statements concerning the following:

- substantial uncertainties regarding our exploration of strategic alternatives to maximize stockholder value, including whether we are able to identify potential partners and consummate transactions, in a timely manner or at all, whether we would be able to obtain sufficient funding to complete this process and whether any such transactions would generate value for stockholders;
- our ability to generate any meaningful value from sales, out-licensing or other transactions involving our historical assets;
- our ability to raise the substantial additional capital that is needed within the next few months to fund our operations and our pursuit of strategic alternatives, particularly given our current lack of a revenue source or committed financing and the substantial doubt about our ability to continue as a going concern;
- our ability to remain listed on The Nasdaq Capital Market, including the ability to maintain minimum stockholders’ equity and stock price, and comply with applicable governance requirements, for continued listing on The Nasdaq Capital Market;
- any strategic plan or alternative that we may identify and pursue may involve unexpected costs, liabilities and/or delays and may not deliver anticipated benefits to our stockholders;
- our estimates of expenses, use of cash, timing of future cash needs, ongoing losses and capital requirements, including our expectations relating to our needs for additional financing and the timing thereof may prove to be inaccurate;
- uncertainty about reaction from investors and potential business partners to our recent change of control and board composition and the future direction of the Company, and the ability of our controlling stockholder and new board members to earn the confidence of investors and potential partners despite limited experience with U.S. public companies, and how these factors may impact our ability to obtain funding and execute any strategic alternatives that we may identify;
- potential turnover of senior management in the near term, and any inability to attract and retain qualified management and other key personnel, could create significant continuity risk and impair our ability to raise capital and execute on our exploration of strategic alternatives;

- our ability to comply with all applicable laws, which may be particularly challenging given the recent turnover in our board, potential turnover in management, significant reductions in force, limited resources and the potential to enter into new business areas with which we have no past experience;
- our ability to obtain and maintain intellectual property protection for our technologies and our ability to operate our business without infringing the intellectual property rights of others;
- the impact of worsening macroeconomic conditions, including rising global inflation, actions taken by central banks to counter inflation, capital market and bank instability, exchange rate fluctuations, supply chain disruptions and energy and fuel prices;
- the impact of government laws and regulations as well as developments relating to our competitors or our industry; and
- other factors that may impact our financial results and condition and our ongoing strategic efforts.

These statements relate to future events or our future operational or financial performance, and involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by these forward-looking statements. Factors that may cause actual results to differ materially from current expectations include, among other things, those listed in Part I, Item 1A of this Annual Report on Form 10-K under the section titled “Risk Factors” and elsewhere in this Annual Report on Form 10-K.

Any forward-looking statement in this Annual Report on Form 10-K reflects our current view with respect to future events and is subject to these and other risks, uncertainties and assumptions relating to our business, results of operations, industry and future growth. Given these uncertainties, you should not place undue reliance on these forward-looking statements. No forward-looking statement is a guarantee of future performance. You should read this Annual Report on Form 10-K and the documents that we reference herein and have filed with the SEC as exhibits thereto completely and with the understanding that our actual future results may be materially different from any future results expressed or implied by these forward-looking statements. Except as required by law, we assume no, and specifically decline any, obligation to update or revise these forward-looking statements for any reason, even if new information becomes available in the future.

This Annual Report on Form 10-K also contains or may contain estimates, projections and other information concerning our industry, our business and the markets for certain therapeutics, including data regarding the estimated size of those markets, their projected growth rates and the incidence of certain medical conditions. Information that is based on estimates, forecasts, projections or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances reflected in this information. Unless otherwise expressly stated, we obtained these industry, business, market and other data from reports, research surveys, studies and similar data prepared by third parties, industry, medical and general publications, government data and similar sources. In some cases, we do not expressly refer to the sources from which these data are derived.

Except where the context otherwise requires, in this Annual Report on Form 10-K, the “Company,” “Exicure,” “we,” “us” and “our” refers to Exicure, Inc., a Delaware corporation, and, where appropriate, our subsidiary.

TRADEMARKS

All trademarks, service marks and trade names appearing in this Annual Report on Form 10-K are the property of their respective holders. Use or display by us of other parties' trademarks, trade dress, or products in this prospectus is not intended to, and does not, imply a relationship with, or endorsements or sponsorship of, us by the trademark or trade dress owners.

PART I

Unless otherwise stated or the context otherwise indicates, references to "Exicure," the "Company," "we," "our," "us," or similar terms refer to Exicure, Inc. and our wholly-owned subsidiary, Exicure Operating Company. Exicure Operating Company, which we refer to as "Exicure OpCo," holds all material assets and conducts all business activities and operations of the Company.

Item 1. Business.

Overview

Historically, we have been an early-stage biotechnology company focused on developing nucleic acid therapies targeting ribonucleic acid against validated targets. In September 2022, we announced a significant reduction in force, suspension of preclinical activities and halting of all research and development, and that we were exploring strategic alternatives to maximize stockholder value. With respect to our historical assets, this includes continuing to explore out-licensing opportunities for cavrotolimod, our clinical-stage asset in immuno-oncology, as well as for our preclinical candidate associated with the SCN9A program for neuropathic pain.

While the foregoing efforts with respect to our historical assets are continuing, we do not expect they will generate significant value for stockholders, at least in the near term. Therefore, we are engaging in a broader exploration of strategic alternatives. This effort involves exploring growth through transactions with potential partners that see opportunity in joining an existing, publicly-traded organization. We are exploring transactions both within our historical biotechnology and life science industry, as well as in other industries unrelated to our historical operations.

Because we currently have no source of revenue or committed financing, we will require substantial additional funding within the next few months in order to continue operations and our exploration of strategic alternatives and consummate any transactions that we may identify.

Restructuring

On September 26, 2022, we announced our commitment to a plan to wind down our existing preclinical programs, including the development of our SCN9A program, to suspend all of our research and development ("R&D") activities, including suspension of all partnered programs, and to implement a reduction in force whereby we reduced approximately 66% of our then-existing workforce, as well as other cost-cutting measures (collectively, the "Plan"). The purpose of the Plan was to decrease expenses, thereby, extending our cash runway, and enable us to maintain a streamlined organization to support key corporate functions.

Change of Control

On February 24, 2023, following the satisfaction of closing conditions, including the approval by our stockholders at a Special Meeting of Stockholders held on December 15, 2022, we closed our private placement (the "Private Placement") to CBI USA, Inc. ("CBI USA"). Exicure received gross proceeds of approximately $5.4 million in connection with the close of the Private Placement (or net proceeds of approximately $4.6 million after transaction expenses) and expects to use the net proceeds for general working capital purposes as we pursue strategic alternatives as well as for the payout for warrant put rights that were exercised as a result of the change of control.

Following the closing of the Private Placement, CBI USA is the beneficial owner of approximately 50.4% of the Company's outstanding shares, resulting in a "change of control" of Exicure under the applicable rules of Nasdaq. At closing, CBI USA designated three members to the Company's board of directors effective as of February 24, 2023. Additional directors were subsequently appointed by the board, and our board of directors currently includes 6 members, only one of which (Matthias Schroff, our Chief Executive Officer) was a director prior to the closing of the Private Placement. We are currently relying on Nasdaq's "controlled company" exemption from the requirements that a majority of our board be independent and that we have an independent compensation committee and an independent nominating committee or function.

Current Focus

The Company currently expects to focus its efforts on the following:

- continue to implement its previously announced restructuring plan and efforts to maximize stockholder value that can be derived from historical biotechnology assets. The Company expects to evaluate on an ongoing basis whether the resources dedicated to these activities are sustainable and commensurate with the potential value that can be derived from them.
- explore growth through transactions with potential partners that see opportunity in joining an existing, publicly-traded organization. The board of directors will consider any promising transactions that it believes can create value for stockholders. We are exploring transactions both within our historical biotechnology and life science industry and in other industries unrelated to our historical operations. The Company expects these efforts may be focused in Asia where CBI USA's affiliates have relationships and business connections, although domestic transactions are also being considered. Transactions that may be explored could include reverse mergers or share exchanges, as well as acquisitions of other businesses or investments. There can be no assurance that any agreement, arrangement or understanding with respect to such a transaction will be reached, or the potential structure or financial and other terms of any agreement, arrangement or understanding that may be reached.
- seek additional financing for the Company as needed to support these activities. Without a current source of revenue or committed financing, the Company believes that it will be necessary to obtain substantial additional financing in the next few months in order to provide sufficient runway to continue operating and pursue these activities. There can be no assurance that such financing, or financing in sufficient amounts or on acceptable terms, will be received.

Our Proprietary Technology: Spherical Nucleic Acids

Prior to the restructuring announced in September 2022 (as discussed above), our historical therapeutic discovery and development efforts were supported by our proprietary Spherical Nucleic Acid, or SNA, technology. SNAs are nanoscale constructs consisting of densely packed synthetic nucleic acid molecules that are radially arranged in three dimensions. We refer to these synthetic nucleic acid molecules in our SNAs as oligonucleotides and the radial orientation of the oligonucleotides without lipid or polymer encapsulation as our "inside out" or "3-D" approach. Our SNAs, unlike many other nucleic acid therapeutics, do not require lipid or polymer encapsulation or complexation in order to be delivered. Encapsulation is the process of confining the nucleic acids inside the cavities of larger structures, typically liposomes, whereas complexation is the process of creating an assembly of nucleic acids bound together with other molecules, typically lipids or polymers.

This arrangement of oligonucleotides allows our proprietary SNAs to enter cells through class A scavenger receptors. Class A scavenger receptors are commonly found on the surface of cells throughout the body, which we believe provides a ubiquitous mechanism of cellular entry for the local administration of our SNA therapeutic candidates. This mechanism of cellular entry is different from many other nucleic acid therapeutics that typically bind to receptors found only in the liver.

Neurology

During 2022, we continued to investigate the utility of our SNA technology for the treatment of neurological conditions in pain, Huntington's disease and Angelman syndrome.

SCN9A, for the Treatment of Chronic Pain

As previously disclosed on our Current Report on Form 8-K dated September 27, 2022, for the SCN9A program targeting SCN9A, a gene that encodes the NaV1.7 channel, for neuropathic pain, we developed several potential candidates that had shown promising activity in preclinical studies with a significant level of knockdown of the SCN9A mRNA transcript. Unfortunately, results from a non-human primate study did not meet desired target engagement levels. Additional preclinical studies would be required to understand these findings, likely delaying the

timing of IND-enabling work. As a result, as discussed above, we suspended further preclinical activities for the SCN9A program as we continue to assess strategic alternatives for all our assets, including our platform technology, with the goal of maximizing stockholder value.

Huntington's disease and Angelman syndrome

In July 2021 we signed a collaboration agreement with Ipsen to develop SNA-based treatments in neuroscience, targeting Huntington's disease and Angelman syndrome. This partnership combines our differentiated SNA platform for hard-to-drug targets requiring deep brain penetration and persistence with Ipsen's expertise in neuroscience and rare diseases.

On December 12, 2022 (the "Ipsen Termination Agreement Effective Date"), the Company and Ipsen entered into a Mutual Termination Agreement (the "Ipsen Termination Agreement"), pursuant to which the parties mutually agreed to terminate the Ipsen Collaboration Agreement. Following such termination, the parties will jointly own R&D Term IP (as defined in the Ipsen Collaboration Agreement) and Patents Covering the R&D Term IP (as defined in the Ipsen Collaboration Agreement), with each party owning an equal, undivided interest in and to such R&D Term IP and patents. As a result of the termination of the Ipsen Collaboration Agreement, the Company regained the ability to independently develop medicines targeting Angelman syndrome and Huntington's disease while Ipsen retains the right to re-enter into the collaboration with the Company in Huntington's Disease and Angelman's Syndrome.

Dermatology, Hair loss disorders

In November 2019, we signed a collaboration agreement with Allergan to develop SNA-based treatments for hair loss disorders. This collaboration was a combination of our knowledge of nucleic acid therapeutics and dermatology with Allergan's expertise in medical aesthetics. On May 8, 2020, Allergan was acquired by AbbVie.

On December 13, 2022 (the "AbbVie Termination Agreement Effective Date"), the Company and Allergan entered into a letter agreement (the "AbbVie Termination Agreement"), pursuant to which the parties mutually agreed to terminate the AbbVie Collaboration Agreement. Following such termination, the Company transferred to Allergan all data, information, and reports made or generated by the Company in the course of performing activities under the Development Plan (as defined in the AbbVie Collaboration Agreement), and granted to Allergan all rights to transfer, publish, present, or otherwise publicly disclose any Collaboration Technology (as defined in the AbbVie Collaboration Agreement) and data made or generated by the Company in the course of performing activities under the Development Plan. As a result of the termination of the AbbVie Collaboration Agreement, the Company regained the ability to independently develop medicines targeting hair loss disorders.

Immuno-oncology, *cavrotolimod (AST-008)*

Cavrotolimod (AST-008) is a toll-like receptor 9, or TLR9, agonist designed for immuno-oncology applications utilizing our SNA technology. TLR9 agonists bind to and activate TLR9. We believe cavrotolimod (AST-008) may be used for anti-infective and immuno-oncology applications with the latter in combination with checkpoint inhibitors.

On December 10, 2021, in connection with an announcement to implement strategic measures to reduce cash burn and prioritize our pipeline focus, we announced the wind-down of our cavrotolimod (AST-008) program. We discontinued further enrollment of the then ongoing Phase 1b/2 clinical trial in patients with solid tumors. We are currently pursuing various strategic alternatives to maximize shareholder value of cavrotolimod, including pursuit of out-licensing activities.

Our Intellectual Property

Proprietary Protection

We have built our intellectual property portfolio relating to our historical therapeutic candidates and our SNA technology platform. Our policy has been to seek to protect our proprietary position by, among other methods, filing

and licensing U.S. and certain foreign patent applications related to our proprietary technology, inventions and improvements that are important to the development and implementation of our business. We also rely on trade secrets, know-how, and technological innovation to develop and maintain our proprietary position. We cannot be sure that patents will be granted with respect to any of our owned or licensed pending patent applications or with respect to any patent applications filed or licensed by us in the future, nor can we be sure that any of our existing owned or licensed patents or any patents that may be granted or licensed to us in the future will be commercially useful in protecting our technology.

Patent Rights

Our patent portfolio includes pending patent applications and issued patents in the United States and in foreign countries. As of December 31, 2022, our patent portfolio consists of over 80 issued patents and patent applications and over 40 pending patent applications. Our general practice is to seek patent protection in major markets worldwide, including the U.S., Canada, China, Japan, Australia, certain members of the European Union, among others. The majority of the issued patents and allowed patent applications are licensed from Northwestern (as described below). Among the pending patent applications, we license 5 from Northwestern, we exclusively own 32, we jointly own 1 with Seven Score Pharmaceuticals, LLC (which was assigned from Dermelix), and we jointly own 4 with Northwestern.

Our license from Northwestern is for royalty bearing worldwide exclusive rights to the use of SNAs for therapeutic applications. Pursuant to the license, we are allowed to manufacture, use, offer for sale, sell and import products covered by the licensed patent rights.

Our SCN9A patent portfolio includes one international patent application filed under the Patent Cooperation Treaty, or PCT, relating to modified oligonucleotides that reduce SCN9A mRNA and NaV1.7 channel activity in cells. The application broadly describes oligonucleotides that span select lengths of the SCN9A mRNA where we observed high target knockdown, and the use of such compounds to treat a wide range of pain conditions and related symptomatology. Any patents that may issue from this application would expire by 2042. The expiration date does not take into consideration any potential patent term adjustment that may be applied by the U.S. Patent Office upon issuance of the patent, any terminal disclaimers that may be filed in the future or any regulatory extensions that may be obtained. In September 2022, we ceased all research and development activities, including those related to the development of our SCN9A program. As a result, we may elect to no longer pursue this application further and may elect to abandon it.

Our cavrotolimod (AST-008) patent portfolio includes 38 issued and 17 pending U.S. nonprovisional and foreign patent applications. Foreign jurisdictions where we are seeking patent protection for our cavrotolimod (AST-008) patent portfolio include Canada, China, Japan, Australia, the European Union, India, South Korea and Mexico. Each of these applications is a composition of matter and/or method of use type application. The claims of these applications are directed to certain nanoscale constructs, liposomal particles, and multivalent nanostructures, and their methods of use for treating cancer and other disorders, with or without additional therapeutic agents such as checkpoint inhibitors. Any patents that may issue from these applications would expire between 2034 and 2041. The expiration dates do not take into consideration any potential patent term adjustment that may be applied by the U.S. Patent Office upon issuance of the patent, any terminal disclaimers that may be filed in the future or any regulatory extensions that may be obtained. We discontinued further enrollment of our prior Phase 1b/2 clinical trial of cavrotolimod (AST-008) in patients with solid tumors. As a result, we may elect to abandon or let lapse some or all of these patents and applications.

Northwestern University License Agreements

We have licensed the SNA technology from Northwestern University under two separate license agreements, or the Northwestern University License Agreements. The Restated License Agreement was assigned to us on December 12, 2011 by our former parent, AuraSense LLC, in the field of the use of nanoparticles, nanotechnology, microtechnology or nanomaterial-based constructs as therapeutics or accompanying therapeutics as a means of delivery, but expressly excluding diagnostics. The license was restated in all material aspects in August 2015. We entered into the Co-owned Technology License with Northwestern in February 2016, in which we obtained

exclusive license as to Northwestern's rights in certain SNA technology we jointly own with Northwestern. The Northwestern University License Agreements provide to us the exclusive, worldwide right to make, have made, use, modify, sell, offer for sale and import any product or process that is covered by any claim in the licensed Northwestern patents and patent applications. We have the right to sublicense these rights to third parties. The Northwestern University License Agreements require us to use commercially reasonable efforts, consistent with demand in the marketplace, regulatory procedures and industry conditions and development timelines, to research, develop, market and manufacture the licensed products.

Our rights under the Northwestern University License Agreements are subject to a variety of material limitations. First, the license specifically excludes use of the licensed patent rights to perform qualitative or quantitative *in vitro* analysis, testing, or measurement as well as detection of a variety of combinations of biodiagnostics field subsets and targets. Second, the license specifically prohibits us from using the licensed patent rights with regard to diagnostics, including without limitation, theradiagnostics. Third, though the license is otherwise exclusive in the assigned field, Northwestern retains the right to use the licensed patent rights for research, teaching, and other educational purposes, including the right to distribute and publish materials related to the licensed patent rights. Fourth, the license is subject to the rights of the U.S. government under any and all applicable laws including substantially manufacturing all licensed products in the U.S. unless such requirement is waived by the U.S. government. Fifth, other than in certain circumstances, the Northwestern University License Agreements are non-transferable without the consent of Northwestern. Under the terms of the Northwestern University License Agreements, depending on the circumstances, either we or Northwestern can sue to enforce the patent rights against third party infringers.

In order to secure the assignment of the Northwestern ASLLC license in the field, we assumed the obligation to pay Northwestern an annual license fee, which may be credited against any royalties based on sales of licensed products that are due to Northwestern in the same year, and to reimburse Northwestern for expenses associated with the prosecution and maintenance of the licensed patent rights. In addition, we assumed the obligation to pay Northwestern royalties at a low single-digit percentage of any net revenue generated by our sale or transfer of any licensed product. In the event we grant a sublicense under the licensed patent rights, we also assumed the obligation to pay Northwestern, on a quarterly basis, a percentage of all sublicense payments we receive, and the greater of a mid-teen percentage of all sublicensee royalties or a low single-digit percent of any net revenue generated by a sublicensee's sale or transfer of any licensed product.

We may terminate the Northwestern University License Agreements at any time by providing 90 days written notice to Northwestern. Northwestern may terminate the agreements or, alternatively, convert our exclusive rights to non-exclusive rights if we fail to comply with certain prescribed timelines for research, development, marketing and manufacturing milestones for the licensed products. Northwestern may also terminate the agreements if we sue, or do not terminate all agreements with a sublicensee who sues Northwestern, in a matter not arising from the agreements themselves. Either party may terminate the agreements in the event of a material breach by the other that remains uncured for a period of 30 days after the non-breaching party provides notice to the breaching party. The agreements will automatically terminate if we reach specified thresholds of financial distress. In the event of termination, all rights immediately revert to Northwestern. The agreements will automatically expire upon the expiration of the last to expire patent rights. In the event of expiration, the license automatically becomes a non-exclusive, irrevocable, fully-paid license to use or sublicense the use of know-how to make and sell products in each country where the license had previously been in effect.

Manufacturing and Supply

We do not currently own or operate manufacturing facilities for the production of preclinical, clinical or commercial quantities of any of our therapeutic candidates. Historically, we have contracted with two therapeutic substance and two drug product manufacturers for the supply of SNAs. In connection with the restructuring in September 2022 (discussed above), we no longer have preclinical supply needs to support our current business operations.

Competition

In our historical operations, we faced competition at the technology and therapeutic indication levels from both large and small biotechnology companies, academic institutions, government agencies and public and private research institutions. Many of our competitors had significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials, obtaining regulatory approvals and marketing approved products than we do. These competitors also competed with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs.

Government Regulation and Product Approval

Governmental authorities in the U.S., at the federal, state and local level, and other countries extensively regulate, among other things, the research, development, testing, manufacture, labeling, packaging, promotion, storage, advertising, distribution, marketing, sales, and export and import of products such as those we historically were developing. Therapeutic candidates must be approved by the FDA through the NDA process before they may be legally marketed in the U.S. and are subject to similar requirements in other countries prior to marketing in those countries. The process of obtaining regulatory approvals and the subsequent compliance with applicable federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources. Although we are no longer pursuing clinical or preclinical development activities or R&D, any third parties interested in licensing or acquiring our assets would need to comply with such regulations. If we are able to consummate any such transaction, it is possible that our ability to realize value therefrom could be dependent on the counterparty’s ability to obtain necessary approvals.

Sales and Marketing

We currently do not have marketing, sales and distribution capabilities.

Employees

As of December 31, 2022, we had 13 full time employees which were engaged in finance, legal, human resources, business development and general management activities, as well as winding down research and development programs. We have no collective bargaining agreement with our employees and we have not experienced any work stoppages. We consider our relations with our employees to be good.

Corporate Information

We were originally incorporated in the State of Delaware on February 6, 2017 under the name “Max-1 Acquisition Corporation.” Prior to the Merger (as defined below), Max-1 was a “shell” company registered under the Securities Exchange Act of 1934, as amended, or the Exchange Act, with no specific business plan or purpose until it began operating the business of Exicure Operating Company (Exicure OpCo) through a transaction on September 26, 2017, or the Merger. Exicure OpCo was originally formed as a limited liability company under the name AuraSense Therapeutics, LLC in the State of Delaware in June 2011 and was a clinical-stage biotechnology company developing gene regulatory and immuno-oncology therapeutics based on its proprietary SNA technology. AuraSense Therapeutics, LLC was subsequently converted into AuraSense Therapeutics, Inc., a Delaware corporation, on July 9, 2015, and changed its name on the same date to Exicure, Inc. Immediately after giving effect to the Merger and the initial closing of a private placement transaction on September 26, 2017, the business of Exicure OpCo became our business.

Our corporate headquarters are located at 2430 N. Halsted St., Chicago, Illinois 60614, and our telephone number is (847) 673-1700.

Available Information

We are subject to the informational requirements of the Exchange Act, and, accordingly, file Annual Reports 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 Exchange Act, with the Securities and Exchange Commission,

or SEC. In addition, the SEC maintains a web site (http://www.sec.gov) that contains material regarding issuers that file electronically, such as ourselves, with the SEC.

We maintain a website at www.exicuretx.com, to which we regularly post copies of our press releases as well as additional information about us. Our filings with the SEC will be available free of charge through the website as soon as reasonably practicable after being electronically filed with or furnished to the SEC. Information contained in our website is not a part of, nor incorporated by reference into, this Annual Report on Form 10-K or our other filings with the SEC.

Item 1A. Risk Factors.

In addition to other information contained in this Annual Report on Form 10-K, the following risks should be considered in evaluating our business and future prospects and an investment in our common stock. The risks and uncertainties described below are not the only ones we face. If any of the following risks and uncertainties develops into actual events, our business, financial condition, results of operations and cash flows could be materially adversely affected. In that case, the price of our common stock could decline and you may lose all or part of your investment.

Risks Related to Our Business

Our exploration of strategic alternatives may not be successful.

Given the Company's current focus to explore growth through strategic transactions with potential partners, the Company's ability to execute its current business plan depends on its ability to obtain additional funding via a strategic transaction or a series of strategic transactions, or to obtain funding to support such a transaction. We currently have no source of revenues or committed financing, and our financial resources are limited to our cash and cash equivalents. With respect to our efforts to maximize value from historical assets, while those efforts are continuing, based on the interest we have received to date we do not think it is likely they will generate significant value, at least in the near term.

The Company plans to continue actively pursuing strategic alternatives, however, there can be no assurance that the Company will have sufficient resources or obtain additional financing necessary to complete this effort. Even if we do have such resources or can obtain financing, we may not be able to consummate such a transaction in a timely manner or at all or in a manner that would not adversely impact our business. The accompanying financial statements do not include any adjustments that might result from the outcome of this uncertainty. Strategic transactions are complex and time-consuming to identify, evaluate, negotiate and consummate in compliance with applicable laws and Nasdaq requirements. Our board and management do not have meaningful experience executing this type of endeavor in the U.S. public markets. Even if we are successful in entering into a strategic transaction, the terms and conditions of that transaction may restrict us from entering into future agreements with other potential collaborators. Additionally, such strategic transactions may not be favorable to investors nor deliver any anticipated benefits by the time of business integration.

We need to obtain substantial funding in the near term in order to continue operations and our exploration of strategic alternatives.

We require significant capital resources in order to continue to operate our business and conduct our exploration of strategic alternatives, and our limited liquidity could materially and adversely affect our business operations. Because we have no current source of revenue or committed financing, our current available cash and cash equivalents provide us with limited liquidity. We believe that our existing cash and cash equivalents could allow us to fund our business operations into early in the fourth quarter of 2023; however, it is very difficult to project our current monthly cash burn rate given the transitional status of the Company and this estimate may prove inaccurate and we may expend our limited resources sooner. Any such required additional capital may not be available on reasonable terms, if at all, due to a variety of factors, including uncertainty about the future direction of the Company and investor reaction to our new controlling stockholder and board composition, as well as broader conditions in the economy and capital markets, including recent volatility caused by inflation, questions about bank stability and other factors. The Company has already engaged in significant cost reductions, so our ability to further cut costs and extend our operating runway is limited. Without sufficient additional capital funding in the near term, we may be required, among other things, to seek bankruptcy protection.

Our status as a "controlled company" could make our Common Stock less attractive to some investors or otherwise harm the trading price of our Common Stock.

More than 50% of our voting power is held by CBI USA. As a result, we are a "controlled company" under the corporate governance rules for Nasdaq-listed companies and may elect not to comply with certain Nasdaq corporate

governance requirements with respect to board independence and compensation and nominating committee functions. We are relying on these exceptions. Following the closing of the Private Placement, our board includes 6 members, 5 of whom are affiliated or associated with CBI USA or were otherwise delegated by CBI USA. Investors may be hesitant to invest in the Company absent compliance with these governance requirements. In addition, should the interest or interests of our controlling stockholder differ from those of other stockholders, the other stockholders may not have the same protections afforded to stockholders of companies that are subject to all of the corporate governance rules for Nasdaq-listed companies. Our status as a controlled company could make our Common Stock less attractive to some investors, including but not limited to potential strategic partners, or otherwise harm our stock price.

Additionally, it is possible we could pursue strategic or financing transactions with our controlling stockholder or its affiliates. The interests of the controlling stockholder and other stockholders would diverge in this case, and the lack of an independent board to evaluate such a transaction could adversely impact other stockholders. These conflicts of interest (or the perception that they could occur) might adversely affect our business and prospects for obtaining financing or completing a strategic transaction.

For so long as CBI USA owns a majority of our Common Stock, it will have sufficient votes to elect all of our directors and to approve any other corporate action requiring the affirmative vote of holders of a majority of the outstanding shares of our Common Stock. Our control by a single stockholder, and our reliance on the Nasdaq controlled company exemptions, could deter investment in the Company and adversely impact our stock price and ability to obtain financing. These impacts may be more pronounced in the near term as investors assess the direction of the Company under the control of CBI USA and the actions of the new board. Potential partners considering engaging in a strategic transaction with the Company could have similar concerns. Given our urgent need for additional funding and/or to complete a strategic transaction, it is imperative that our controlling stockholder and our board earn the confidence of investors and potential partners in the near term and there is no assurance this will occur

Our controlling stockholder, and new members of our board, have limited experience controlling or governing a public company operating in the United States.

Our controlling stockholder has not previously controlled a U.S. public company. In addition, the majority of our board is made of up Korean citizens, and none of the new members of the board have experience serving as directors or management of a U.S. publicly traded company. This could make it difficult to ensure that the Company complies with all applicable laws and stock exchange requirements, maintains adequate internal and disclosure controls and appropriately assesses and manages risk. This concern is exacerbated by the limited resources the Company has following recent reductions in force, and if there are further reductions in force or members of management leave the Company, it may be very difficult to manage this risk. The transitional state of the Company and ongoing exploration of strategic alternatives also exacerbates the challenging environment in this respect. If the board of directors does not successfully or efficiently manage their new roles and responsibilities, including the significant regulatory oversight and reporting obligations under the federal securities laws and the continuous scrutiny of investors, our prospects may be adversely impacted. In addition, against this backdrop, it may be difficult to earn the confidence of prospective investors or strategic partners, threatening our ability to obtain much needed financing and hindering our exploration of strategic alternatives.

Turnover of senior management, and any inability to attract and retain qualified management and other key personnel, could impair our ability to implement our business plan.

As we continue our exploration of strategic alternatives, and potentially pursue transactions involving new business lines or industries, we expect significant turnover in senior management, including in the near term. Departures of members of our senior management team, coupled with the recent turnover in our board, will create significant continuity risks and challenges to our ability to operate our business, assess and manage risks and comply with applicable laws. If key members of our senior management team depart, which we believe is likely in the near term, it will be important that we attract and retain qualified managers promptly and develop and implement an effective succession plan. We expect to face significant competition in attracting experienced executives and other key personnel, and there can be no assurance that we will be able to do so. In addition, there are significant

uncertainties as to how our controlled company status, transitional state of operations, financial condition and related matters will impact our ability to attract the necessary personnel and manage these succession risks. Depending on the circumstances of any management departures, it is also possible that we will be required to pay significant severance, adversely impacting our financial condition. Our urgent need to raise capital and engage with potential partners in strategic transactions magnify these risks. If we are unable to adequately address these concerns in the near term, and earn the confidence of potential investors and/or business partners, our prospects and financial condition would be adversely impacted.

Our consolidated financial statements have been prepared assuming that we will continue as a going concern.

Our ability to continue as a going concern will require us to obtain additional funding. Based on our current operating plans and existing working capital at December 31, 2022, our current liquidity is not sufficient to fund operations over the next twelve months from the date of the issuance of the accompanying consolidated financial statements. As a result, there is substantial doubt about our ability to continue as a going concern. Substantial additional financing will be needed by us to fund our operations and exploration of strategic alternatives in the near term. Although we currently estimate that available funds could be sufficient into early in the fourth quarter of 2023, we have based these estimates on assumptions that may prove to be wrong, and we could spend our available financial resources much faster than we currently expect. It is very difficult to project our current monthly cash burn rate given the transitional status of the Company as we explore strategic alternatives. The perception of our ability to continue as a going concern may make it more difficult for us to obtain financing for the continuation of our operations and could result in the loss of confidence by investors and employees. If we are unable to raise capital when needed or on acceptable terms, we will be unable to continue operations and may need to seek bankruptcy protection in the near term.

Our common stock may be delisted from The Nasdaq Capital Market which could negatively impact the price of our common stock, liquidity and our ability to access the capital markets.

Our common stock is currently listed on The Nasdaq Capital Market under the symbol “XCUR.” As previously disclosed, the Company has received numerous deficiency notes with respect to various Nasdaq listing requirements in the past year. These related to:

- Compliance with Nasdaq’s minimum bid price rule due to the Company’s stock trading below $1.00 for a sustained period of time. The Company effected a one-for-thirty reverse stock split on June 29, 2022 in order to attempt to raise the stock price. As of March 23, 2023, the Company’s stock price closed at $0.9761.
- Compliance with Nasdaq’s rule requiring stockholders’ equity of at least $2,500,000 based on the Company’s balance sheet as of June 30, 2022. The Company believes it is in compliance with this requirement based on its December 31, 2022 balance sheet, but there can be no assurance it will remain in compliance.
- Compliance with Nasdaq’s corporate governance requirements with respect to board and committee composition due to (i) the lack of a majority independent board, (ii) the lack of an audit committee comprised of three independent directors and (iii) the lack of a compensation committee comprised of at least two independent directors. With respect to the majority independence and the audit committee requirements, Nasdaq informed the Company that it was not entitled to a cure period and must submit a plan to regain compliance no later than April 10, 2023. Following the closing of the Private Placement, the Company qualifies for Nasdaq’s controlled company exemptions from the requirements to have a majority independent board and independent compensation committee. The Company still must have an audit committee comprised of three independent directors.

Even if the Company regains compliance with Nasdaq’s listing requirements and addresses the outstanding deficiency notices to Nasdaq’s satisfaction, there can be no assurance that the Company will remain in compliance with Nasdaq’s requirements and will not be delisted.

If Nasdaq delists our securities from trading on its exchange for failure to meet the listing standards, we and our stockholders could face significant negative consequences including:

- limited availability of market quotations and liquidity for our securities;
- a determination that the common stock is a "penny stock" which would require brokers trading in the common stock to adhere to more stringent rules, possibly resulting in a reduced level of trading activity in the secondary trading market for shares of common stock;
- a limited amount of analyst coverage, if any; and
- a decreased ability to issue additional securities or obtain additional financing in the future.

Delisting from The Nasdaq Capital Market could also result in other negative consequences, including the potential loss of institutional investor interest and make obtaining new financing much more challenging. In addition, fewer strategic opportunities may be available, particularly from counterparties that are interested in combining with a listed company.

We have a history of losses. We expect to continue to incur significant losses for the foreseeable future and may never achieve or maintain profitability, which could result in a decline in the market value of our common stock.

Since our inception in June 2011, we have devoted our resources to the development of SNA technology, and are currently exploring out-licensing opportunities and strategic alternatives to maximize stockholder value. We have had significant operating losses since our inception. As of December 31, 2022, we have generated an accumulated deficit of $191.5 million. For the years ended December 31, 2022 and 2021, our net loss was $2.6 million and $64.1 million, respectively. Substantially all of our losses have resulted from expenses incurred in connection with our research programs and from general and administrative costs associated with our operations.

We have not generated, and do not expect to generate, any product revenue for the foreseeable future and currently have no source of revenue or committed financing, and we expect to continue to incur significant operating losses for the foreseeable future. The amount of future losses is uncertain. Our future financial performance and condition are substantially dependent on the results of our ongoing exploration of strategic alternatives, and we cannot predict whether we will be successful.

We are pursuing asset out-licenses, asset sales and similar strategic transactions with respect to our historical assets. There can be no assurance that we will be successful in executing such a strategic transaction.

We continue to seek strategic alternatives for our therapeutic portfolios, with the goal of maximizing stockholder value of these assets. These strategic alternatives may include a variety of different business arrangements, such as the sale of certain of our assets, out-licensing, strategic partnerships, joint ventures, restructurings, divestitures, investments and other alternatives. We may not be able to identify or consummate a suitable transaction as a result of this review, or any transactions that we are able to identify and consummate may not provide material benefits to our stockholders. Based on the interest in these assets that we have seen to date, we do not currently expect any such transaction to provide significant value, at least in the near term.

Our business could be adversely affected by the effects of health epidemics, including the global COVID-19 pandemic, in regions where we or third parties on which we rely have business operations.

Our business and operations could be adversely affected by the effects of health epidemics, including the ongoing COVID-19 pandemic, on our business activities performed by us or by third parties with whom we conduct business. Such effects could be more pronounced in regions where we have concentrations of business operations.

The spread of COVID-19, which continues to cause broad global impact, may materially affect us economically. The trading price for our shares as well as the trading prices of other biopharmaceutical companies, as well as the broader equity and debt markets overall, have been highly volatile as a result of the COVID-19 pandemic and the resulting impact on U.S. economic activities. Although the potential economic impact brought by, and the

duration or subsequent reoccurrence of, the COVID-19 pandemic may be difficult to assess or predict, a widespread and prolonged pandemic could continue to result in significant disruption of global financial markets, reducing our ability to access capital, which could in the future negatively affect our liquidity. In addition, even after the COVID-19 pandemic has subsided, a recession or market correction that has occurred or may occur in the future because of the COVID-19 could materially affect our business and the value of our common stock. These conditions could challenge our ability to raise needed capital and our ability to identify and consummate strategic transactions to create value for stockholders.

The global outbreak of COVID-19 continues to rapidly evolve. The extent to which the COVID-19 pandemic or a similar pandemic will impact our business will depend on future developments, which are highly uncertain and cannot be predicted with confidence, such as the ultimate geographic spread of the disease, the duration and severity of the outbreak, the possibility of additional periods of increases or spikes in the number of COVID-19 cases, the introduction and spread of new variants of the virus, limitations on our ability to conduct our business in the ordinary course, any reopening plans and additional closures, travel restrictions and social distancing in the United States and other countries, business closures or business disruptions for us, and the effectiveness of actions taken in the United States and other countries to contain and treat the disease, including, without limitation, the effectiveness and timing of vaccination initiatives in the United States and worldwide. The ultimate impact of the COVID-19 pandemic or a similar health pandemic is highly uncertain and subject to change; we continue to monitor the COVID-19 situation closely.

Our internal computer systems, or those of contractors or consultants, may fail or suffer security breaches, which could result in a material disruption of our therapeutic development programs.

Despite the implementation of security measures, our internal computer systems and those of our contractors and consultants are vulnerable to damage from computer viruses, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. Such events could cause interruptions of our operations. For instance, theft or other exposure of data may interfere with our ability to protect our intellectual property, trade secrets, and other information critical to our operations. We can provide no assurances that certain sensitive and proprietary information relating to one or more of our therapeutic candidates has not been, or will not in the future be, compromised. Although we have invested resources to enhance the security of our computer systems, there can be no assurances we will not experience additional unauthorized intrusions into our computer systems, or those of our contractors and consultants, that we will successfully detect future unauthorized intrusions in a timely manner, or that future unauthorized intrusions will not result in material adverse effects on our financial condition, reputation, or business prospects. Payments related to the elimination of ransomware may materially affect our financial condition and results of operations.

Certain data breaches must also be reported to affected individuals and the government, and in some cases to the media, under provisions of HIPAA, as amended by HITECH, other U.S. federal and state law, and requirements of non-U.S. jurisdictions, including the European Union Data Protection Directive. Financial penalties may also apply in some data breaches where noncompliance with the applicable law is identified.

To the extent that any disruption or security breach were to result in a loss of, or damage to, our data, or inappropriate disclosure of confidential or proprietary information, we could incur liability and the development of our therapeutic candidates could be delayed.

Our information technology systems could face serious disruptions that could adversely affect our business.

Our information technology and other internal infrastructure systems, including corporate firewalls, servers, documents storage systems, backup systems, leased lines and connection to the Internet, face the risk of systemic failure that could disrupt our operations. A significant disruption in the availability of our information technology and other internal infrastructure systems could cause interruptions and delays in our operations.

Our business and operations could suffer in the event of system failures or unauthorized or inappropriate use of or access to our information technology systems.

We are increasingly dependent on our information technology systems and infrastructure for our business. We collect, store and transmit sensitive information including intellectual property, proprietary business information and personal information in connection with business operations. The secure maintenance of this information is critical to our operations and business strategy. Some of this information could be an attractive target of criminal attack or unauthorized access and use by third parties with a wide range of motives and expertise, including organized criminal groups, "hacktivists," patient groups, disgruntled current or former employees and others. Cyber-attacks are of ever-increasing levels of sophistication, and despite our security measures, our information technology systems and infrastructure may be vulnerable to such attacks or may be breached, including due to employee error or malfeasance.

The pervasiveness of cybersecurity incidents in general and the risks of cyber-crime are complex and continue to evolve. Although we are making significant efforts to maintain the security and integrity of our information systems and are exploring various measures to manage the risk of a security breach or disruption, there can be no assurance that our security efforts and measures will be effective or that attempted security breaches or disruptions would not be successful or damaging. Despite the implementation of security measures, our internal computer systems and those of our employees, contractors and consultants are vulnerable to damage or interruption from computer viruses, unauthorized or inappropriate access or use, natural disasters, pandemics (including COVID-19), terrorism, war, and telecommunication and electrical failures. Such events could cause interruption of our operations. For example, the loss or compromise of preclinical data for our therapeutic candidates could result in delays in our regulatory filings and development efforts, as well as delays in the commercialization of our products, and significantly increase our costs. To the extent that any disruption, security breach or unauthorized or inappropriate use or access to our systems were to result in a loss of or damage to our data, or inappropriate disclosure of confidential or proprietary information, including but not limited to patient, employee or vendor information, we could incur notification obligations to affected individuals and government agencies, liability, including potential lawsuits from patients, collaborators, employees, stockholders or other third parties and liability under foreign, federal and state laws that protect the privacy and security of personal information, and the development and potential commercialization of our therapeutic candidates could be delayed. Existing insurance arrangements may not provide protection for the costs that may arise from such loss or damage. Any long-term disruption in our ability to access our information technology systems could have a material adverse effect on our operations, our business, results of operations and stock price.

Increasing scrutiny and changing expectations from customers, regulators, investors, and other stakeholders with respect to our environmental, social and governance practices may impose additional costs on us or expose us to new or additional risks.

Companies are facing increasing scrutiny from customers, regulators, investors, and other stakeholders related to their environmental, social and governance practices. Investor advocacy groups, investment funds and influential investors are also increasingly focused on these practices, especially as they relate to the environment, health and safety, supply chain management, diversity and human rights. Failure to adapt to or comply with regulatory requirements or investor or stakeholder expectations and standards could negatively impact our reputation and the price of our ordinary shares.

Any of the factors mentioned above, or the perception that we or our suppliers, or contract manufacturers or collaborators have not responded appropriately to the growing concern for such issues, regardless of whether we are legally required to do so, may damage our reputation and have a material adverse effect on our business, financial condition, results of operations cash flows and/or ordinary share price.

Natural disasters or other unexpected events may disrupt our operations, adversely affect our results of operations and financial condition, and may not be covered by insurance.

The occurrence of one or more unexpected events, including fires, tornadoes, tsunamis, hurricanes, earthquakes, floods, and other forms of severe hazards in the United States or in other countries in which we or our suppliers or manufacturers operate or are located could adversely affect our operations and financial performance. These types of unexpected events could result in physical damage to and complete or partial closure of one or more of the manufacturing facilities operated by our contract manufacturers, or the temporary or long-term disruption in the supply of products, and/or disruption of our ability to deliver products to customers. Further, the long-term effects of climate change on general economic conditions and the pharmaceutical manufacturing and distribution industry in particular are unclear, and changes in the supply, demand or available sources of energy and the regulatory and other costs associated with energy production and delivery may affect the availability or cost of goods and services, including natural resources, necessary to run our businesses. Existing insurance arrangements may not provide protection for the costs that may arise from such events, particularly if such events are catastrophic in nature or occur in combination. Any long-term disruption in our ability to service our customers from one or more distribution centers or outsourcing facilities could have a material adverse effect on our operations, our business, results of operations and stock price.

Our current operations are concentrated in one location and any events affecting this location may have material adverse consequences.

Our current operations are located in our facilities situated in Chicago, Illinois. Any unplanned event, such as flood, fire, explosion, earthquake, extreme weather condition, medical epidemics, power shortage, telecommunication failure or other natural or man-made accidents or incidents that result in us being unable to fully utilize the facilities, may have a material adverse effect on our ability to operate our business, particularly on a daily basis, and have significant negative consequences on our financial and operating conditions. Loss of access to these facilities may result in increased costs, delays in the development of our therapeutic candidates or interruption of our business operations. As part of our risk management policy, we maintain insurance coverage at levels that we believe are appropriate for our business. However, in the event of an accident or incident at these facilities, we cannot assure you that the amounts of insurance will be sufficient to satisfy any damages and losses. If our facilities are unable to operate because of an accident or incident or for any other reason, even for a short period of time, any or all of our research and development programs may be harmed. Any business interruption may have a material adverse effect on our business, financial position, results of operations and prospects.

The investment of our cash, cash equivalents and fixed income marketable securities is subject to risks which may cause losses and affect the liquidity of these investments.

As of December 31, 2022, we had $9.8 million in cash, cash equivalents, and restricted cash. We invest our excess cash in U.S. government or U.S. government agency securities, floating rate and variable rate demand notes of U.S. and foreign corporations, and commercial paper. These investments are subject to general credit, liquidity, market and interest rate risks, including potential future impacts from economic, capital market or bank instability. We may from time to time have balances in bank accounts that are in excess of insured deposit limits, and could be subject to risks of bank failures. We may realize losses in the fair value of these investments, an inability to access cash in these investments for a potentially meaningful period, or a complete loss of these investments, which would have a negative effect on our financial statements.

In addition, should our investments cease paying or reduce the amount of interest paid to us, our interest income would suffer. The market risks associated with our investment portfolio may have an adverse effect on our results of operations, liquidity and financial condition.

If we fail to maintain proper and effective internal controls, our ability to produce accurate financial statements on a timely basis could be impaired.

We are subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, the Sarbanes-Oxley Act of 2002, or Sarbanes-Oxley Act, and the rules and regulations of The Nasdaq Capital Market. Pursuant to

Section 404 of the Sarbanes-Oxley Act, or Section 404, we are required to perform system and process evaluation and testing of our internal control over financial reporting to allow our management to report on the effectiveness of our internal control over financial reporting. However, while we remain a non-accelerated filer or an emerging growth company, we will not be required to include an attestation report on internal control over financial reporting issued by our independent registered public accounting firm.

During the evaluation and testing process, if we identify one or more material weaknesses in our internal control over financial reporting, we will be unable to assert that our internal control over financial reporting is effective. Further, we 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. Moreover, our internal controls 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. Moreover, we are aware that the remote working arrangements implemented in connection with the COVID-19 pandemic potentially present new areas of risk, and we continue to carefully monitor any impact to our internal controls and procedures.

Our limited resources and recent reductions in force, as well as the turnover in our board of directors and the potential for future management changes, present significant continuity risk and could impact our ability to maintain effective internal control over financial reporting.

If we are unable to assert that our internal control over financial reporting is effective, investors could lose confidence in the reliability of our financial statements, the market price of our stock could decline and we could be subject to sanctions or investigations by The Nasdaq Capital Market, the SEC or other regulatory authorities.

Risks Related to Intellectual Property

We currently license patent rights from Northwestern University. If Northwestern University does not properly or successfully obtain, maintain or enforce the patents underlying such licenses, or if they retain or license to others any competing rights, our competitive position and business prospects may be adversely affected.

We rely on intellectual property rights licensed from third parties to protect our technology. We are a party to a number of licenses that give us rights to third-party intellectual property that is necessary or useful for our business. In particular, we have a license from Northwestern University, which provides us the exclusive worldwide right under certain patents and patent applications owned by Northwestern University to exploit therapeutics and processes using nanoparticles, nanotechnology, microtechnology and nanomaterial-based constructs as therapeutics or accompanying therapeutics as a means of administration. To the extent we are successful in selling, licensing or otherwise generating value from our historical assets, it would depend significantly on the value of the rights licenses from Northwestern. We may also license additional third-party intellectual property in the future. Our success will depend in part on the ability of our licensors to obtain, maintain and enforce patent protection for our licensed intellectual property, and in particular, for those patents to which we have secured exclusive rights. Our licensors may not successfully prosecute the patent applications licensed to us. Even if patents issue or are granted, our licensors may fail to maintain these patents, may determine not to pursue litigation against other companies that are infringing these patents, or may pursue litigation less aggressively than we would. Further, we may not obtain exclusive rights, which would allow for third parties to develop competing therapeutics. Without protection for, or exclusive rights to, the intellectual property we license, other companies might be able to offer substantially identical therapeutics for sale, which could adversely affect our competitive business position and harm our business prospects.

We or our licensors, or any current or future strategic partners, may become subject to third-party claims or litigation alleging infringement of patents or other proprietary rights or seeking to invalidate patents or other proprietary rights, and we may need to resort to litigation to protect or enforce our patents or other proprietary

rights, all of which could be costly, time consuming, delay or prevent the development and commercialization of our therapeutic candidates, or put our patents and other proprietary rights at risk.

We or our licensors, or any current or future strategic partners, may be subject to third-party claims for infringement or misappropriation of patent or other proprietary rights. We are generally obligated under our license agreements to indemnify and hold harmless our licensors for damages arising from intellectual property infringement by us. If we or our licensors, or any current or future strategic partners, are found to infringe a third-party patent or other intellectual property rights, we could be required to pay damages, potentially including treble damages, if we are found to have willfully infringed. In addition, we or our licensors, or any current or future strategic partners, may choose to seek, or be required to seek, a license from a third-party, which may not be available on acceptable terms, if at all. Even if a license can be obtained on acceptable terms, the rights may be non-exclusive, which could give our competitors access to the same technology or intellectual property rights licensed to us. If we fail to obtain a required license, we or any current or future collaborator may be unable to effectively market therapeutic candidates based on our technology, which could limit our ability to generate revenue or achieve profitability and possibly prevent us from generating revenue sufficient to sustain our operations. In addition, we may find it necessary to pursue claims or initiate lawsuits to protect or enforce our patent or other intellectual property rights. The cost to us in defending or initiating any litigation or other proceeding relating to patent or other proprietary rights, even if resolved in our favor, could be substantial, and litigation would divert our management's attention. Some of our competitors may be able to sustain the costs of complex patent litigation more effectively than we can because they have substantially greater resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could delay our research and development efforts and limit our ability to continue our operations.

If we were to initiate legal proceedings against a third-party to enforce a patent covering one of our therapeutics or our technology, the defendant could counterclaim that our patent is invalid or unenforceable. In patent litigation in the U.S., defendant counterclaims alleging invalidity or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, for example, lack of novelty, obviousness or non-enablement. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld relevant information from the USPTO, or made a misleading statement, during prosecution. The outcome following legal assertions of invalidity and unenforceability during patent litigation is unpredictable. With respect to the validity question, for example, we cannot be certain that there is no invalidating prior art, of which we and the patent examiner were unaware during prosecution. If a defendant were to prevail on a legal assertion of invalidity or unenforceability, we would lose at least part, and perhaps all, of the patent protection on one or more of our therapeutics or certain aspects of our technology. Such a loss of patent protection could have a material adverse impact on our business. Patents and other intellectual property rights also will not protect our technology if competitors design around our protected technology without legally infringing our patents or other intellectual property rights.

It is also possible that we have failed to identify relevant third-party patents or applications. For example, U.S. applications filed before November 29, 2000 and certain U.S. applications filed after that date that will not be filed outside the U.S. remain confidential until patents issue. Patent applications in the U.S. and elsewhere are published approximately 18 months after the earliest filing for which priority is claimed, with such earliest filing date being commonly referred to as the priority date. Therefore, patent applications covering our therapeutics or technology could have been filed by others without our knowledge. Additionally, pending patent applications which have been published can, subject to certain limitations, be later amended in a manner that could cover our SNA technology, our therapeutics or the use of our therapeutics. Third-party intellectual property right holders may also actively bring infringement claims against us. We cannot guarantee that we will be able to successfully settle or otherwise resolve such infringement claims. If we are unable to successfully settle future claims on terms acceptable to us, we may be required to engage in or continue costly, unpredictable and time-consuming litigation and may be prevented from or experience substantial delays in marketing our therapeutics. If we fail in any such dispute, in addition to being forced to pay damages, we may be temporarily or permanently prohibited from commercializing any of our therapeutic candidates that are held to be infringing. We might, if possible, also be forced to redesign therapeutic candidates so that we no longer infringe the third-party intellectual property rights. Any of these events, even if we

were ultimately to prevail, could require us to divert substantial financial and management resources that we would otherwise be able to devote to our business.

We may be subject to claims challenging the inventorship or ownership of our patents and other intellectual property.

We may also be subject to claims that former employees or other third parties have an ownership interest in our patents or other intellectual property. Litigation may be necessary to defend against these and other claims challenging inventorship or ownership. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights. Such an outcome could have a material adverse effect on our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and distraction to management and other employees.

If we fail to comply with our obligations under any license, collaboration or other agreements, we may be required to pay damages and could lose intellectual property rights that are necessary for developing and protecting our therapeutic candidates or we could lose certain rights to grant sublicenses.

Our current licenses impose, and any future licenses we enter into are likely to impose, various development, commercialization, funding, milestone, royalty, diligence, sublicensing, insurance, patent prosecution and enforcement, and other obligations on us. If we breach any of these obligations, or use the intellectual property licensed to us in an unauthorized manner, we may be required to pay damages and the licensor may have the right to terminate the license, which could result in us being unable to develop, manufacture and sell therapeutics that are covered by the licensed technology or could enable a competitor to gain access to the licensed technology. Moreover, our licensors may own or control intellectual property that has not been licensed to us and, as a result, we may be subject to claims, regardless of their merit, that we are infringing or otherwise violating the licensor's rights in such unlicensed intellectual property. In addition, while we cannot currently determine the amount of the royalty obligations we would be required to pay on sales of future therapeutics, if any, the amounts may be significant. The amount of our future royalty obligations will depend on the technology and intellectual property we use in therapeutics that we successfully develop and commercialize, if any. Therefore, even if we successfully develop and commercialize therapeutics, we may be unable to achieve or maintain profitability.

Risks Related to Government Regulation

We face potential liability related to the privacy and security of health information we obtain from clinical trials sponsored by us.

Most healthcare providers, including research institutions from which we have obtained patient health information, are subject to privacy and security regulations promulgated under HIPAA, as amended by the HITECH. We are not currently classified as a covered entity or business associate under HIPAA and thus are not directly subject to its requirements or penalties. However, any person may be prosecuted under HIPAA's criminal provisions either directly or under aiding-and-abetting or conspiracy principles. Consequently, depending on the facts and circumstances, we could face substantial penalties if we receive or use individually identifiable health information from a HIPAA-covered healthcare provider or research institution or business associate that has not satisfied HIPAA's requirements for disclosure of individually identifiable health information. In addition, we may maintain sensitive personally identifiable information, including health information, that we received throughout the clinical trial process, in the course of our research collaborations, and directly from individuals (or their healthcare providers) who enrolled in our patient assistance programs. As such, we may be subject to state laws requiring notification of affected individuals and state regulators in the event of a breach of personal information, which is a broader class of information than the health information protected by HIPAA.

If we or our contractors or consultants fail to comply with applicable federal, state or local regulatory requirements, we could be subject to a range of regulatory actions. Any threatened or actual government enforcement action could also generate adverse publicity and require that we devote substantial resources that could

otherwise be used in other aspects of our business. Increasing use of social media could give rise to liability, breaches of data security or reputational damage.

We are subject to European data protection laws, including the European Union's General Data Protection Regulation 2016/679, or GDPR. If we fail to comply with existing or future data protection regulations, our business, financial condition, results of operations and prospects may be materially adversely affected.

By virtue of our prior clinical trial activities in the United Kingdom and Europe, we are subject to European data protection laws, including the GDPR. The GDPR which came into effect on May 25, 2018, establishes new requirements applicable to the processing of personal data (i.e., data which identifies an individual or from which an individual is identifiable), affords new data protection rights to individuals (e.g., the right to erasure of personal data) and imposes penalties for serious breaches of up to 4% annual worldwide turnover or €20 million, whichever is greater. Individuals (e.g., study subjects) also have a right to compensation for financial or non-financial losses (e.g., distress). There may be circumstances under which a failure to comply with the GDPR, or the exercise of individual rights under the GDPR, would limit our ability to utilize clinical trial data collected on certain subjects. The GDPR imposes additional responsibility and liability in relation to our processing of personal data. This may be onerous and we may be unsuccessful in implementing all measures required by data protection authorities or courts in interpretation of the GDPR, which may materially adversely affect our business, financial condition, results of operations and prospects.

Risks Related to Ownership of Our Common Stock

The market price of our common stock has been, and is likely to continue to be, highly volatile, and you may not be able to resell your shares at or above the price you paid for them.

Our stock price will continue to be volatile. As a result of this volatility, investors may not be able to sell their common stock at or above the price paid for the shares. The market price for our common stock may be influenced by a variety of factors, including the other risks described in this section titled "Risk Factors" and the following:

- our ability or inability to raise additional capital and the terms on which we raise it;
- the development, execution and announcement of any proposed strategic alternative;
- investors may react negatively to our controlled company status and the influence of our controlling stockholder or our reconstituted board and/or our uncertain business strategy;
- strategic decisions by us or our competitors, such as acquisitions, divestitures, spin-offs, joint ventures, strategic investments or changes in business strategy;
- we are unable to achieve the perceived benefits of our Company as rapidly or to the extent anticipated by financial or industry analysts; and
- changes in general economic, industry, political and market conditions, including, but not limited to, the ongoing impact of the COVID-19 pandemic.

In addition, the stock markets in general, and the markets for pharmaceutical and biotechnology stocks in particular, have experienced extreme volatility that has been often unrelated to the operating performance of the issuer. These broad market and industry factors, such as those related to the COVID-19 pandemic and Russia's invasion of Ukraine and retaliatory actions taken by the United States, NATO and others, may seriously harm the market price of our common stock, regardless of our operating performance.

Raising additional funds by issuing securities may cause dilution to existing stockholders and raising funds through lending and licensing arrangements may restrict our operations or require us to relinquish proprietary rights.

Until such time, if ever, as we can generate substantial revenues, we expect to attempt to finance our cash needs through a combination of equity offerings and debt financings. As discussed elsewhere, it may be very challenging to obtain equity or debt financing given the current transitional state of the Company. However, to the extent that we raise additional capital through the issuance of shares or other securities convertible into shares, our stockholders will be diluted. Future issuances of our common stock or other equity securities, or the perception that such sales may occur, could adversely affect the prevailing market price of our common stock and impair our ability to raise capital through future offerings of equity or equity-linked securities.

We are an "emerging growth company" and we cannot be certain if the reduced reporting requirements applicable to emerging growth companies will make our common stock less attractive to investors.

We are an "emerging growth company" as defined in the JOBS Act. For as long as we continue to be an emerging growth company, we may take advantage of exemptions from various reporting requirements that are applicable to other public companies that are not emerging growth companies, including (1) not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, (2) reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements and (3) exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. In addition, as an emerging growth company, we are only required to provide two years of audited financial statements and two years of selected financial data. We expect to lose emerging growth company status at the end of this year. Even after we no longer qualify as an emerging growth company, we may still qualify as a "smaller reporting company" and/or "non-accelerated filer" which would allow us to take advantage of many of the same exemptions from disclosure requirements including not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act and reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements. We cannot predict if investors will find our common stock less attractive because we may rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our share price may be more volatile.

Anti-takeover provisions in our charter documents and under the General Corporation Law of the State of Delaware could make an acquisition of us more difficult and may prevent attempts by our stockholders to replace or remove our management.

Provisions in our amended and restated certificate of incorporation and our bylaws may delay or prevent an acquisition of us or a change in our management. These provisions include a classified board of directors, a prohibition on actions by written consent of our stockholders, and the ability of the Board of Directors of the Company, or the Board, to issue preferred stock without stockholder approval. In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, or DGCL, which prohibits stockholders owning in excess of 15% of the outstanding combined organization voting stock from merging or combining with the combined organization. Although we believe these provisions collectively will provide for an opportunity to receive higher bids by requiring potential acquirers to negotiate with our Board, they would apply even if the offer may be considered beneficial by some stockholders. In addition, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove then-current management by making it more difficult for stockholders to replace members of the Board, which is responsible for appointing the members of management.

Our amended and restated certificate of incorporation designates the Court of Chancery of the State of Delaware as the sole and exclusive forum for certain types of actions and proceedings that may be initiated by our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers, employees or agents.

Our amended and restated certificate of incorporation provides that, unless we consent in writing to an alternative forum, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for any of the following types of actions or proceedings under Delaware statutory or common law: derivative action or proceeding brought on our behalf, any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers, employees or agents to us or our stockholders, any action asserting a claim arising pursuant to any provision of the DGCL, our amended and restated certificate of incorporation or our amended and restated bylaws or any action asserting a claim that is governed by the internal affairs doctrine, in each case subject to the Court of Chancery having personal jurisdiction over the indispensable parties named as defendants therein. This provision would not apply to suits brought to enforce a duty or liability created by the Securities Exchange Act of 1934, as amended, or any other claims for which a court or forum other than the Court of Chancery has exclusive jurisdiction or for which the Court of Chancery does not have subject matter jurisdiction. Furthermore, Section 22 of the Securities Act of 1933, as amended, or the Securities Act, creates concurrent jurisdiction for federal and state courts over all Securities Act actions. Accordingly, both state and federal courts have jurisdiction to entertain such claims. Our amended and restated certificate of incorporation also provides that any person purchasing or otherwise acquiring any interest in any shares of our common stock shall be deemed to have notice of and to have consented to this provision of our amended and restated certificate of incorporation.

This choice of forum provision may limit our stockholders' ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers, employees or agents, which may discourage such lawsuits against us and our directors, officers, employees and agents even though an action, if successful, might benefit our stockholders. Stockholders who do bring a claim in the Court of Chancery could face additional litigation costs in pursuing any such claim, particularly if they do not reside in or near Delaware. The Court of Chancery may also reach different judgments or results than would other courts, including courts where a stockholder considering an action may be located or would otherwise choose to bring the action, and such judgments or results may be more favorable to us than to our stockholders. If a court were to find this exclusive forum provision in our amended and restated certificate of incorporation to be inapplicable or unenforceable in any action, we may incur further significant additional costs associated with resolving the dispute in other jurisdictions, all of which could have a material adverse effect on our business, financial condition or results of operations.

Our ability to use our net operating loss carryforwards and certain other tax attributes may be limited.

We have incurred substantial losses during our history and do not expect to become profitable in the near future and we may never achieve profitability. Our net operating loss, or NOL, carryforwards generated in tax years beginning on or before December 31, 2017, are only permitted to be carried forward for 20 years under applicable U.S. tax law. Under the Tax Cuts and Jobs Act, as modified by the CARES Act, our federal NOLs generated in tax years beginning after December 31, 2017, may be carried forward indefinitely, but the deductibility of such federal NOLs is be limited to 80% of taxable income. In addition, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, and corresponding provisions of state law, if a corporation undergoes an "ownership change," generally defined as a greater than 50% change (by value) in its equity ownership over a three-year period, the corporation's ability to use its pre-change NOL, and other pre-change tax attributes (such as research tax credits) to offset its post-change income or taxes may be limited. We have experienced ownership changes in the past. We completed a review of our changes in ownership through December 31, 2022 and determined that we experienced an "ownership change" within the meaning of Section 382(g) during the fourth quarter of 2022. This ownership change has and will continue to subject our net operating loss carryforwards to an annual limitation, which will significantly restrict our ability to use them to offset our taxable income in periods following the ownership change.

We determined that at the date of the 2022 ownership change, we had a net unrealized built-in loss ("NUBIL"). The NUBIL was determined based on the difference between the fair market value of our assets and their tax basis at the ownership change date. Because of the NUBIL, certain deductions recognized during the five-year period

beginning on the date of the IRC Section 382 ownership change (the "recognition period") are subject to the same limitation as the net operating loss carryforwards or certain other deductions.

In addition, we may experience ownership changes in the future as a result of subsequent shifts in our stock ownership, some of which are outside of our control. As a result, if we earn net taxable income, our ability to use our pre-change NOL carryforwards to offset U.S. federal taxable income may be subject to limitations, which could potentially result in increased future tax liability to us. In addition, at the state level, there may be periods during which the use of NOLs is suspended or otherwise limited, which could accelerate or permanently increase state taxes owed.

General Risk Factors

FINRA sales practice requirements may limit a stockholder's ability to buy and sell our stock due to our low stock price.

The Financial Industry Regulatory Authority, or FINRA, has adopted rules requiring that, in recommending an investment to a customer, a broker-dealer must have reasonable grounds for believing that the investment is suitable for that customer. Prior to recommending speculative or low-priced securities to their non-institutional customers, broker-dealers must make reasonable efforts to obtain information about the customer's financial status, tax status, investment objectives and other information. Under interpretations of these rules, FINRA has indicated its belief that there is a high probability that speculative or low-priced securities will not be suitable for at least some customers. If these FINRA requirements are applicable to us or our securities, which we believe they are, they may make it more difficult for broker-dealers to recommend that at least some of their customers buy our common stock, which may limit the ability of our stockholders to buy and sell our common stock and could have an adverse effect on the market for and price of our common stock.

If securities or industry analysts do not publish research or reports about our business, or if they issue an adverse or misleading opinion regarding our stock, our stock price and trading volume could decline.

The trading market for our common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. Our research coverage by securities and industry analysts is currently limited. In addition, because we did not become a reporting company by conducting an underwritten initial public offering of our common stock, security analysts of brokerage firms may not provide wider coverage of our Company. In addition, investment banks may be less likely to agree to underwrite secondary offerings on our behalf than they might if we became a public reporting company by means of an underwritten initial public offering, because they may be less familiar with our Company as a result of more limited coverage by analysts and the media, and because we became public at an early stage in our development. The failure to receive wider research coverage or support in the market for our shares will have an adverse effect on our ability to develop a liquid market for our common stock and the trading price for our stock would be negatively impacted.

In the event we obtain wider securities or industry analyst coverage, if any of the analysts who cover us issue an adverse or misleading opinion regarding us, our business model, our intellectual property or our stock performance, or if our target studies and operating results fail to meet the expectations of analysts, our stock price would likely decline. If one or more of these analysts cease coverage of us or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Our corporate headquarters are located in Chicago, Illinois, where we lease approximately 30,000 square feet of office and laboratory space (the "Chicago Lease"). The Chicago Lease commenced on July 1, 2020, and expires on July 1, 2030. Under the lease agreement, we are given an option to extend the lease term for two additional successive periods of five years each.

We believe that this space is sufficient to meet our needs for the foreseeable future and that any additional or alternative space we may require will be available in the future on commercially reasonable terms.

Item 3. Legal Proceedings.

On December 13, 2021, Mark Colwell filed a putative securities class action lawsuit against the Company, David A. Giljohann and Brian C. Bock in the United States District Court for the Northern District of Illinois, captioned Colwell v. Exicure, Inc. et al., Case No. 1:21-cv-0663. On February 4, 2021, plaintiff filed an amended putative securities class action complaint. The amended complaint alleges that Dr. Giljohann and Mr. Bock made materially false and/or misleading statements related to the Company's clinical programs purportedly causing losses to investors who acquired Company securities between January 7, 2021 and December 10, 2021. The amended complaint does not quantify any alleged damages but, in addition to attorneys' fees and costs, plaintiff seeks to recover damages on behalf of himself and others who acquired the Company's stock during the putative class period at allegedly inflated prices and purportedly suffered financial harm as a result. On March 20, 2023, the Court issued an Order appointing James Mathew as Lead Plaintiff, and Bleichmar Fonti & Auld LLP as Lead Counsel for the purported class. The parties are required to submit, within two weeks of that Order, a schedule to the Court governing the filing of a further amended complaint and the timing of defendants' answer or response.

On March 1, 2022, Kapil Puri filed a shareholder derivative lawsuit on behalf of the Company in the United States District Court for the Northern District of Illinois, against Dr. Giljohann and Mr. Bock, Jeffrey L. Cleland, Elizabeth Garofalo, Bosun Hau, Bali Muralidhar, Andrew Sassine, Matthias Schroff, James Sulat and Timothy Walbert, captioned Puri v. Giljohann, et al., Case No. 1:22-cv-01083. On March 8, 2022, Yixin Sim filed a similar shareholder derivative lawsuit in the same court against the same individuals, captioned Sim v. Giljohann, et al., Case No. 1:22-cv-01217. On April 25,2022, Stourbridge Investments LLC filed a similar shareholder derivative lawsuit against the same individuals in the United States District Court for the District of Delaware, captioned Stourbridge Investments LLC v. Exicure, Inc. et al., Case No. 1:22-cv-00526. Based on similar factual allegations presented in the Colwell complaint, described above, the Puri, Sim, and Stourbridge complaints (collectively, the "Derivative Complaints") allege that the defendants caused the Company to issue false and/or misleading statements in the proxy statement for its 2021 Annual Meeting of Stockholders regarding risk oversight, code of conduct, clinical program and compensation matters, among other things, in violation of federal securities law, and committed breaches of fiduciary duties. The Derivative Complaints also assert that Dr. Giljohann and Mr. Bock are liable for contribution under the federal securities laws. The Puri and Stourbridge complaints further assert state law claims for unjust enrichment, and the Puri complaint additionally asserts state law claims for abuse of control, gross mismanagement and corporate waste. The plaintiffs do not quantify any alleged damages in the Derivative Complaints, but seek restitution for damages to the Company, attorneys' fees, costs, and expenses, as well as an order directing that certain proposals for strengthening board oversight be put to a vote of the Company's shareholders.

All of the Derivative Cases have been stayed pending a decision on any motion to dismiss that may be filed in the Colwell case. In addition, the Stourbridge case has been administratively closed pending the decision on motion to dismiss that may be filed in the Colwell case.

We may also be a party to litigation and subject to claims incident to the ordinary course of business. Although the results of litigation and claims cannot be predicted with certainty, we currently believe that the final outcome of these ordinary course matters will not have a material adverse effect on our business. Regardless of the outcome, litigation can have an adverse impact on us because of defense and settlement costs, diversion of management resources and other factors.

Item 4. Mine Safety Disclosures.

Not applicable.

PART II

Item 5. Market For Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases.

Market Information

Our common stock was approved for listing on the Nasdaq Capital Market under the symbol "XCUR" and began trading on July 31, 2019.

On March 23, 2023, the last reported sale price of our common stock on the Nasdaq Capital Market was $0.9761 per share.

Holders of Record

As of March 23, 2023, we had 8,366,715 shares of common stock outstanding held by 66 stockholders of record, one of which is Cede & Co., a nominee for Depository Trust Company, or DTC. All of the shares of common stock held by brokerage firms, banks and other financial institutions as nominees for beneficial owners are deposited into participant accounts at DTC, and are considered to be held of record by Cede & Co. as one stockholder.

Dividend Policy

We currently intend to retain future earnings, if any, for use in the operation of our business and to fund future growth. We have never declared or paid cash dividends on our common stock and we do not intend to pay any cash dividends on our common stock for the foreseeable future. Any future determination related to our dividend policy will be made at the discretion of our board of directors in light of conditions then-existing, including factors such as our results of operations, financial condition and requirements, business conditions and covenants under any applicable contractual arrangements.

Securities Authorized for Issuance under Equity Compensation Plans

Information about our equity compensation plans is incorporated herein by reference to Part III, Item 12 of this Annual Report**.**

Unregistered Sales of Equity Securities and Use of Proceeds

None.

Item 6. RESERVED.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and the related notes and other financial information included elsewhere in this Annual Report on Form 10-K. Some of the information contained in this discussion and analysis or set forth elsewhere in this Annual Report on Form 10-K, including information with respect to our plans and strategy for our business, includes forward-looking statements that involve risks and uncertainties as described under the heading "Cautionary Note Regarding Forward-Looking Statements" elsewhere in this Annual Report on Form 10-K. You should review the disclosure under the heading "Risk Factors" in this Annual Report on Form 10-K for a discussion of important factors that could cause actual results to differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

In addition, this section discusses 2022 and 2021 items and year-to-year comparisons between 2022 and 2021. Discussions of 2020 items and year-to-year comparisons between 2021 and 2020 are not included in this Annual Report and can be found in "Management's Discussion and Analysis of Financial Condition and Results of Operations" in Part II, Item 7 of our Annual Report on Form 10-K for the year ended December 31, 2021, filed with the SEC on March 25, 2022.

Overview

Historically, we have been an early-stage biotechnology company focused on developing nucleic acid therapies targeting ribonucleic acid against validated targets. In September 2022, we announced a significant reduction in force, suspension of preclinical activities and halting of all research and development, and that we were exploring strategic alternatives to maximize stockholder value. With respect to our historical assets, this includes continuing to explore out-licensing opportunities for cavrotolimod, our clinical-stage asset in immuno-oncology, as well as for our preclinical candidate associated with the SCN9A program for neuropathic pain.

While the foregoing efforts are continuing, we do not expect they will generate significant value for stockholders, at least in the near term. Therefore, we are engaging in a broader exploration of strategic alternatives. This effort involves exploring growth through transactions with potential partners that see opportunity in joining an existing, publicly-traded organization. We are exploring transactions both within our historical biotechnology and life science industry and in other industries unrelated to our historical operations.

Because we currently have no source of revenue or committed financing, we will require substantial additional funding within the next few months in order to continue our exploration of strategic alternatives and consummate any transactions that we may identify.

Operating, financing, and cash flow considerations

Since our inception in 2011, we have primarily funded our operations through sales of our securities, loans and collaborations. As of December 31, 2022, our cash, cash equivalents, and restricted cash were $9.8 million. Subsequent to December 31, 2022, we raised gross proceeds of $5.4 million on the closing of the Private Placement (or net proceeds of approximately $4.6 million after transaction expenses) and expect to use the net proceeds for general working capital purposes as we pursue strategic alternatives as well as for the payout for warrant put rights that were exercised as a result of the change of control.

Our current liquidity is not sufficient to fund operations over the next twelve months from the date of the issuance of the accompanying consolidated financial statements. As a result, there is substantial doubt about our ability to continue as a going concern. Substantial additional financing will be needed by us within the next few months to fund our operations and ongoing exploration of strategic alternatives and pursue any alternatives that we identify. If we are unable to raise capital, the Company could seek bankruptcy protection in the near term, which may result in the Company's stockholders receiving no or very little value in respect of their shares of the Company's common stock.

We expect to seek financing through a combination of equity offerings, and debt financings. However, it may be difficult to obtain financing given the Company's current condition and uncertainty over its future direction.

Therefore, we may be unable to raise capital when needed or on favorable terms. Our failure to raise capital or enter into such other arrangements as and when needed would have a negative impact on our financial condition and our ability to continue operations.

Recent Developments

Restructuring

On September 26, 2022, we announced our commitment to a plan to wind down our existing preclinical programs, including the development of our SCN9A program, to suspend all of our research and development ("R&D") activities, including suspension of all partnered programs, and to implement a reduction in force whereby we reduced approximately 66% of our then-existing workforce, as well as other cost-cutting measures (collectively, the "Plan"). The purpose of the Plan was to decrease expenses, thereby, extending our cash runway, and enable us to maintain a streamlined organization to support key corporate functions.

Change of Control

On February 24, 2023, following the satisfaction of closing conditions, including the approval by our stockholders at a Special Meeting of Stockholders held on December 15, 2022, we closed our private placement (the "Private Placement") to CBI USA. Exicure received gross proceeds of approximately $5.4 million in connection with the close of the Private Placement (or net proceeds of approximately $4.6 million after transaction expenses) and expects to use the net proceeds for general working capital purposes as we pursue strategic alternatives as well as for the payout for warrant put rights that were exercised as a result of the change of control.

Following the closing of the Private Placement, CBI USA is the beneficial owner of approximately 50.4% of the Company's outstanding shares, resulting in a "change of control" of Exicure under the applicable rules of Nasdaq. At closing, CBI USA designated three members to the Company's board of directors effective as of February 24, 2023. Additional directors were subsequently appointed by the board, and our board of directors currently includes 6 members, only one of which (Matthias Schroff, our Chief Executive Officer) was a director prior to the closing of the Private Placement. We are currently relying on Nasdaq's "controlled company" exception to the requirements that a majority of our board be independent and that we have an independent compensation committee and independent nominating committee or function.

Termination of Collaboration Agreements

On December 12, 2022 (the "Ipsen Termination Agreement Effective Date"), the Company and Ipsen entered into a Mutual Termination Agreement (the "Ipsen Termination Agreement"), pursuant to which the parties mutually agreed to terminate the Ipsen Collaboration Agreement. Following such termination, the parties will jointly own R&D Term IP (as defined in the Ipsen Collaboration Agreement) and Patents Covering the R&D Term IP (as defined in the Ipsen Collaboration Agreement), with each party owning an equal, undivided interest in and to such R&D Term IP and patents. As a result of the termination of the Ipsen Collaboration Agreement, the Company regained the ability to independently develop medicines targeting Angelman syndrome and Huntington's disease while Ipsen retains the right to re-enter into the collaboration with the Company in Huntington's Disease and Angelman's Syndrome.

On December 13, 2022 (the "AbbVie Termination Agreement Effective Date"), the Company and Allergan entered into a letter agreement (the "AbbVie Termination Agreement"), pursuant to which the parties mutually agreed to terminate the AbbVie Collaboration Agreement. Following such termination, the Company transferred to Allergan all data, information, and reports made or generated by the Company in the course of performing activities under the Development Plan (as defined in the AbbVie Collaboration Agreement), and granted to Allergan all rights to transfer, publish, present, or otherwise publicly disclose any Collaboration Technology (as defined in the AbbVie Collaboration Agreement) and data made or generated by the Company in the course of performing activities under the Development Plan. As a result of the termination of the AbbVie Collaboration Agreement, the Company regained the ability to independently develop medicines targeting hair loss disorders.

Nasdaq Listing Requirements Deficiency Notices

As previously disclosed, the Company has received numerous deficiency notes with respect to various Nasdaq listing requirements in the past year. These related to:

- Compliance with Nasdaq's minimum bid price rule due to the Company's stock trading below $1.00 for a sustained period of time. The Company effected a one-for-thirty reverse stock split on June 29, 2022 in order to attempt to raise the stock price. As of March 23, 2023, the Company's stock price closed at $0.9761.
- Compliance with Nasdaq's rule requiring stockholders' equity of at least $2,500,000 based on the Company's balance sheet as of June 30, 2022. The Company believes it is in compliance with this requirement based on its December 31, 2022 balance sheet, but there can be no assurance it will remain in compliance.
- Compliance with Nasdaq's corporate governance requirements with respect to board and committee composition due to (i) the lack of a majority independent board, (ii) the lack of an audit committee comprised of three independent directors and (iii) the lack of a compensation committee comprised of at least two independent directors. With respect to the majority independence and the audit committee requirements, Nasdaq informed the Company that it was not entitled to a cure period and must submit a plan to regain compliance no later than April 10, 2023. Following the closing of the Private Placement, the Company qualifies for Nasdaq's controlled company exemptions from the requirements to have a majority independent board and independent compensation committee. The Company still must have an audit committee comprised of three independent directors, which it believes it currently does following the additional board appointments after the closing of the Private Placement, and intends to reply to Nasdaq promptly.

Even if the Company regains compliance with Nasdaq's listing requirements and addresses the outstanding deficiency notices to Nasdaq's satisfaction, there can be no assurance that the Company will remain in compliance with Nasdaq's requirements and will not be delisted.

Basis of Presentation

The audited financial statements of Exicure, Inc. for the fiscal years ended December 31, 2022 and 2021, contained herein, include a summary of our significant accounting policies and should be read in conjunction with the discussion below.

Segment Reporting

We view our operations and manage our business as one segment, which for the periods presented was the discovery, research and development of treatments based on our SNA technology.

Critical Accounting Policies and Estimates

Our management's discussion and analysis of financial condition and results of operations is based on our financial statements, which have been prepared in accordance with GAAP. The preparation of these financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements, as well as the revenue and expenses incurred during the reported periods. We base our estimates on historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not apparent from other sources. Changes in estimates are reflected in reported results for the period in which they become known. Actual results may differ from these estimates under different assumptions or conditions.

Our significant judgments and estimates are detailed below, and our significant accounting policies are more fully described in Note 2 of the accompanying consolidated financial statements.

Revenue recognition

Revenue allocated to performance obligations relating to provision of research and development activities is recognized as the performance obligations are satisfied using an input method to measure progress, based on an estimate of the percentage of completion of the project based on the actual hours incurred on the project as a percentage of the total expected project hours. The determination of the percentage of completion requires management to estimate the total expected project hours. A detailed estimate of the total expected project hours is re-assessed every reporting period based on the latest project plan and discussions with project teams. If a change in facts or circumstances occurs, the estimate will be adjusted and the revenue will be recognized based on the revised estimate. The difference between the cumulative revenue recognized based on the previous estimate and the revenue recognized based on the revised estimate would be recognized as an adjustment to revenue in the period in which the change in estimate occurs. Determining the estimate of total project hours requires significant judgment and may have a significant impact on the amount and timing of revenue recognition. For example, revenue recognized under the AbbVie Collaboration Agreement for the year ended December 31, 2021 was $(2.8) million due primarily to the cumulative catchup adjustment (reduction) of revenue recorded in connection with a change in estimate that occurred during the third quarter of 2021 (see Note 3 to the accompanying consolidated financial statements).

Recent accounting pronouncements not yet adopted

Refer to Note 2 of the accompanying consolidated financial statements for a description of recent accounting pronouncements not yet adopted.

Components of Statements of Operations

Revenue

For the year ended December 31, 2022, the Company's revenue was generated from its collaborations with Ipsen and AbbVie, which were terminated in the fourth quarter. Following the termination of the AbbVie and Ipsen agreements in the fourth quarter of 2022, as discussed above, we have no current source of revenue. We have never generated any commercial product revenue and do not expect to generate any product revenue.

Research and development expense

Research and development expense consists of costs associated with our research activities, including basic research on our SNA platform, discovery and development of novel SNAs as prospective therapeutic candidates, preclinical and clinical development activities for SNAs we have nominated for clinical development as well as maintaining and protecting our intellectual property. Our research and development expenses in the periods presented include:

- employee-related expenses, including salaries, bonuses, benefits and equity-based compensation expense;
- early research and development expenses incurred under arrangements with third parties, such as contract research organizations, contract manufacturing organizations, and consultants;
- preclinical and clinical development expenses with third parties such as contract research organizations, contract manufacturing organizations, and consultants;
- costs of maintaining and protecting our intellectual property portfolio, including legal advisory fees, license fees, sublicense fees, patent maintenance and other similar fees;
- laboratory materials and supplies;
- facilities, depreciation and other allocated expenses, which include direct and allocated expenses for rent and maintenance of facilities, depreciation of leasehold improvements and equipment and laboratory and other supplies.

We expense research and development costs as they are incurred. A significant portion of our research and development costs were not tracked by project as they benefit multiple projects or our technology. As previously announced, we halted all research and development activities in 2022.

General and administrative expense

General and administrative expense consists primarily of salaries and related benefits, including equity-based compensation, related to our executive, finance, legal, business development and support functions. Other general and administrative expenses include travel expenses, professional fees for auditing, tax and legal services and allocated facility-related costs not otherwise included in research and development expenses.

Dividend income

Dividend income consists of income earned on our money market funds that are recorded as cash equivalents on our consolidated balance sheets.

Interest income

Interest income consists of income earned on our available for sale securities that are recorded as short-term investments on our consolidated balance sheets, as well as income earned on our cash balances.

Interest expense

Interest expense includes amounts pursuant to the MidCap Credit Agreement (as defined below). All outstanding indebtedness and other obligations under the MidCap Credit Agreement (as defined below) was repaid in full on March 15, 2022.

Other expense, net

Other expense, net mostly consists of gains and losses on foreign currency transactions and gains and losses on the sale of capital assets.

Results of Operations

Comparison of the Year Ended December 31, 2022 and 2021

The following table summarizes the results of our operations for the years ended December 31, 2022 and 2021:

(dollars in thousands)	Year Ended December 31, 2022	2021	Change	
Revenue:				
Collaboration revenue	$ 28,826	$ (483)	$ 29,309	6,068 %
Total revenue	28,826	(483)	29,309	6,068 %
Operating expenses:				
Research and development expense	19,767	48,979	(29,212)	(60)%
General and administrative expense	10,890	13,087	(2,197)	(17)%
Total operating expenses	30,657	62,066	(31,409)	(51)%
Operating loss	(1,831)	(62,549)	60,718	(97)%
Other (expense) income, net:				
Dividend income	78	8	70	875 %
Interest income	15	141	(126)	(89)%
Interest expense	(595)	(1,691)	1,096	(65)%
Other expense, net	(40)	(11)	(29)	264 %
Total other expense, net	(542)	(1,553)	1,011	(65)%
Net loss before provision for income taxes	(2,373)	(64,102)	61,729	(96)%
Provision for income taxes	209	—	209	n/m
Net loss	$ (2,582)	$ (64,102)	$ 61,520	(96)%

Revenue

The following table summarizes our revenue earned during the periods indicated:

(dollars in thousands)	Year Ended December 31, 2022	2021	Change	
Collaboration revenue:				
AbbVie Collaboration Agreement	$ 11,135	$ (2,792)	$ 13,927	499 %
Ipsen Collaboration Agreement	17,691	2,309	15,382	666 %
Total collaboration revenue	$ 28,826	$ (483)	$ 29,309	6,068 %
Total revenue	$ 28,826	$ (483)	$ 29,309	6,068 %

Collaboration revenue was $28.8 million during the year ended December 31, 2022, reflecting an increase of $29.3 million, or 6,068%, from collaboration revenue of $(0.5) million for the year ended December 31, 2021. The increase in collaboration revenue of $29.3 million is due to the recognition of the remaining deferred revenue related to the AbbVie Collaboration Agreement of $13.9 million and the Ipsen Collaboration Agreement of $15.4 million in connection with the terminations of those collaboration agreements in December 2022. This revenue resulted from an accounting adjustment, did not reflect any new cash proceeds to the Company and will not recur. Following these terminations, we currently have no source of revenues.

Refer to Note 3, *Collaborative Research and License Agreements*, of the accompanying consolidated financial statements for more information regarding revenue recognition for the AbbVie Collaboration Agreement and Ipsen Collaboration Agreement.

Our ability to generate revenues in the future is dependent on our ability to successfully explore and execute strategic alternatives. Therefore, there is substantial uncertainty as to how, when or if we might be able to generate revenues in the future.

Research and development expense

The following table summarizes our research and development expenses incurred during the periods indicated:

(dollars in thousands)	Year Ended December 31, 2022	2021	Change	
Employee-related expense	$ 6,661	$ 12,362	$ (5,701)	(46)%
Platform and discovery-related expense	6,177	13,650	(7,473)	(55)%
Facilities, depreciation, and other expenses	4,119	4,068	51	1 %
Clinical development programs expense	2,810	18,899	(16,089)	(85)%
Total research and development expense	$ 19,767	$ 48,979	$ (29,212)	(60)%
Full time employees	5	37	(32)	

Research and development expense was $19.8 million for the year ended December 31, 2022, reflecting a decrease of $29.2 million, or 60%, from research and development expense of $49.0 million for the year ended December 31, 2021. The decrease in research and development expense for the year ended December 31, 2022 of $29.2 million reflects fewer clinical, preclinical, and discovery program activities and a reduction in headcount resulting from the restructuring activities that were announced in December 2021 and September 2022. More specifically, the decrease in research and development expense for the year ended December 31, 2022 of $29.2 million was due to a decrease in costs related to our clinical development programs of $16.1 million, lower platform and discovery-related expense of $7.5 million, and lower employee-related expenses of $5.7 million.

The decrease in clinical development programs expense for the year ended December 31, 2022 of $16.1 million was primarily due to lower manufacturing and toxicology study costs in connection with IND-enabling and Phase 1 clinical trial preparation activities for the XCUR-FXN program, which we indefinitely suspended in December 2021. In addition, lower clinical trial costs in connection with our Phase 1b/2 clinical trial for cavrotolimod (AST-008), which we began to wind down in December 2021, contributed to the decrease in clinical development program expense as compared to the prior-year period.

The decrease in platform and discovery-related expense for the year ended December 31, 2022 of $7.5 million was mostly due to lower costs for materials, reagents, and supplies in connection with a reduction in headcount and fewer discovery and preclinical program activities, the absence of the license fee paid to Northwestern University of $3.0 million in the prior year period in connection with the receipt of the upfront payment of $20.0 million from Ipsen, and lower intellectual property costs, as compared to the prior-year period.

The decrease in employee-related expense for the year ended December 31, 2022 of $5.7 million was due to lower compensation and related costs in connection with a lower headcount during the period resulting from the restructuring activities that were announced in December 2021 and September 2022, partially offset by retention award expense.

General and administrative expense

(dollars in thousands)	Year Ended December 31, 2022	2021	Change	
General and administrative expense	$ 10,890	$ 13,087	$ (2,197)	(17)%
Full time employees	8	9	(1)	

General and administrative expense was $10.9 million for the year ended December 31, 2022, representing a decrease of $2.2 million, or 17%, from $13.1 million for the year ended December 31, 2021. The decrease for the year ended December 31, 2022 is mostly due to lower compensation and related costs in connection with a lower headcount during the period resulting from the restructuring activities that were announced in December 2021, as well as lower costs for accounting, director fees, and investor relations. These lower costs in the current year period were partially offset by higher retention award expense, as well as higher consultant and advisory costs.

Interest expense

The decrease in interest expense of $1.1 million for the year ended December 31, 2022 is in connection with the repayment in full of all outstanding indebtedness and other obligations under the MidCap Credit Agreement (as defined below) on March 15, 2022.

Provision for income taxes

The effective tax rate for the year ended December 31, 2022 of (8.8)% is attributable to the fact that the Company is subject to the IRC Section 174 regulations requiring companies to capitalize certain research and experimental expenditures and IRC Section 382 loss limitation rules on our ability to utilize net operating losses to offset the capitalization requirement. The effective income tax rate for the year ended December 31, 2021 was 0% because the Company generated tax losses and provided a full valuation allowance against its deferred tax assets to an amount that is more likely than not to be realized.

We completed a review of our changes in ownership through December 31, 2022 and determined that we experienced an "ownership change" within the meaning of Section 382(g) during the fourth quarter of 2022. This ownership change has and will continue to subject our net operating loss carryforwards to an annual limitation, which will significantly restrict our ability to use them to offset our taxable income in periods following the ownership change. In general, the annual use limitation equals the aggregate value of our stock at the time of the ownership change multiplied by a specified tax-exempt interest rate.

Liquidity and Capital Resources

As of December 31, 2022, our cash, cash equivalents, and restricted cash were $9.8 million. We have no current source of revenues or committed financing. Subsequent to December 31, 2022, we received gross proceeds of approximately $5.4 million in connection with the close of the Private Placement (or net proceeds of approximately $4.6 million after transaction expenses) and expect to use the net proceeds for general working capital purposes as we pursue strategic alternatives as well as for the payout for warrant put rights that were exercised as a result of the change of control.

Our current liquidity is not sufficient to fund operations over the next twelve months from the date of the issuance of the accompanying consolidated financial statements. As a result, there is substantial doubt about our ability to continue as a going concern.

We believe that our existing cash and cash equivalents (including the proceeds received in February 2023 in connection with the closing of the Private Placement) could enable us to fund our operating expenses into the beginning of the fourth quarter of 2023. However, this estimate is based on assumptions about how we can limit spending that may prove to be wrong and it is very difficult to project our current cash burn rate given the transitional status of the Company as we explore strategic alternatives and this estimate may prove inaccurate and we may expend our limited resources sooner. Depending on the direction of our review of strategic alternatives, we

may use our available resources sooner than we currently expect. The Company has already engaged in significant cost reductions, so our ability to further cut costs and extend our operating runway is limited. As a result, substantial additional financing will be needed by us within the next few months to pay our expenses, fund our ongoing exploration of strategic alternatives and pursue any alternatives that we identify. If we are unable to raise sufficient capital, the Company could seek bankruptcy protection in the near term, which may result in the Company's stockholders receiving no or very little value in respect of their shares of the Company's common stock.

We expect to seek financing through a combination of equity offerings and debt financings. However, it may be difficult to obtain financing given the Company's current financial condition and lack of sources of revenues and uncertainty over its future direction. Traditional capital markets sources of funding may not be available to us in these circumstances. Therefore, we may be unable to raise capital at all, when needed or on favorable terms.

To the extent that we do raise additional capital, the ownership interest of our stockholders may be materially diluted, and the terms of such securities could include liquidation or other preferences that adversely affect the rights of our stockholders. Debt financing and preferred equity financing, if available, may involve agreements that include restrictive covenants that limit our ability to take specified actions that otherwise might be in our best interests. Further, the global financial markets have experienced significant disruptions over the past couple years due to the COVID-19 pandemic, the ongoing conflict between Russia and Ukraine, worsening global macroeconomic conditions, including actions taken by central banks to counter inflation, volatility in the capital markets, instability in the banking industry and related market uncertainty, may impact our ability to obtain additional financing when needed on favorable terms or at all.

Private Placements

In May 2022, we entered into a securities purchase agreement with certain accredited investors, pursuant to which we issued and sold 867,369 shares of common stock, par value $0.0001 per share, at a purchase price of $5.81 per share for net proceeds of approximately $4.9 million.

In September 2022, we entered into a securities purchase agreement with CBI USA with respect to the Private Placement, which subsequently closed in February 2023.

MidCap Facility

On March 15, 2022, we repaid in full all outstanding indebtedness and other obligations under our Credit and Security Agreement, dated as of September 25, 2020, as amended on October 21, 2020, July 30, 2021, September 30, 2021, and December 10, 2021, with MidCap Financial Trust, as agent, and the lenders party thereto from time to time, or the MidCap Credit Agreement, and the other Financing Documents (as defined in the MidCap Credit Agreement), including but not limited to the outstanding principal balance of $7.5 million and an exit fee of approximately $0.5 million, and terminated all obligations thereunder (other than with respect to any obligations that are expressly specified to survive the termination).

Cash Flows

The following table shows a summary of our cash flows for the years ended December 31, 2022 and 2021:

	Years Ended December 31,	
(in thousands)	**2022**	**2021**
Net cash used in operating activities	$ (35,658)	$ (34,819)
Net cash provided by investing activities	4,696	43,085
Net cash (used in) provided by financing activities	(3,105)	1,116
Net (decrease) increase in cash, cash equivalents, and restricted cash	$ (34,067)	$ 9,382

Operating activities

Net cash used in operating activities was $35.7 million and $34.8 million for the years ended December 31, 2022 and 2021, respectively. The slight increase in cash used in operating activities for the year ended December 31, 2022 of $0.8 million was primarily due to the absence of the prior-year period receipt of the upfront payment of $20.0 million from Ipsen in connection with the Ipsen Collaboration Agreement (net of $3.0 million license fee paid to Northwestern as a result) and the prepayment of the premium for directors and officers run-off insurance policy coverage in the fourth quarter of 2022 in anticipation of the Private Placement closing, mostly offset by lower cash used for working capital.

Investing activities

Net cash provided by investing activities was $4.7 million and $43.1 million for the years ended December 31, 2022 and 2021, respectively. The decrease in cash provided by investing activities of $38.4 million was primarily due to a decrease in proceeds from the maturity, net of purchases, of available-for-sale securities.

Financing activities

Net cash used in financing activities of $3.1 million for year ended December 31, 2022 is primarily due to the repayment in full of all outstanding indebtedness and other obligations under the MidCap Credit Agreement, partially offset by net proceeds of approximately $4.9 million received in connection with the May 2022 private placement transaction.

Net cash provided by financing activities of $1.1 million for the year ended December 31, 2021 is primarily due to the net proceeds we received of $10.4 million in connection with the sale of common stock and warrants in a registered direct offering in December 2021, as well as proceeds received from the exercise of stock options and the issuance of common stock in connection with our employee stock purchase plan, mostly offset by the prepayment of $10 million of the outstanding principal balance associated with our MidCap Credit Agreement in December 2021.

Going Concern

In accordance with Accounting Standards Codification 205-40, *Going Concern*, we have evaluated whether there are conditions and events, considered in the aggregate, that raise substantial doubt about our ability to continue as a going concern within one year after the date that the consolidated financial statements are issued. In the absence of a significant source of recurring revenue, our continued viability is dependent on our ability to continue to raise additional capital to finance our operations. As discussed above, there are substantial uncertainties about our ability to raise such financing.

Contractual Obligations and Commitments

Chicago Lease

In February 2020, we entered into a new lease signed in February 2020 to secure approximately 30,000 square feet of office and laboratory space at 2430 N. Halsted St., Chicago, Illinois, or the Chicago Lease. The Chicago Lease commenced on July 1, 2020, which is when the premises leased thereunder were ready for occupancy, and expires 10 years from July 1, 2020 with an option to renew for two additional successive periods of five years each.

The initial annual base rent during the original term of the Chicago Lease is approximately $1.1 million for the first 12-month period of the original term, payable in monthly installments beginning on the lease commencement. Base rent thereafter is subject to annual increases of 3%, for an aggregate amount of $12.8 million over the initial term. We must also pay our proportionate share of certain operating expenses and taxes for each calendar year during the term. During the first 12 months, the base rent and our proportionate share of operating expenses and taxes are subject to certain abatements.

In connection with the Chicago Lease, we will maintain a letter of credit for the benefit of the landlord in an initial amount of $1.2 million, which amount is subject to reduction over time, which is secured by a restricted certificate of deposit account and presented within other noncurrent assets on our consolidated balance sheet at

December 31, 2022.

Warrants

Following the closing of the Private Placement, a holder of warrants to purchase 526,151 shares of common stock at a price of $8.1031 per share that were acquired in the December 2021 registered-direct offering transaction exercised their put option within 30 days of the closing of the Private Placement (February 24, 2023), to receive a cash payout for the outstanding warrants in the amount of the Black-Scholes value of each warrant as prescribed in the warrant agreement (or $0.8 million in the aggregate). This obligation remains outstanding as of the date of the filing of this Annual Report of Form 10-K.

Other

We also have obligations to make future payments to Northwestern that become due and payable on the achievement of certain commercial milestones. Based on the terminations of our collaborations with Ipsen and AbbVie, we currently do not anticipate any such milestone payments becoming due.

JOBS Act

We are an emerging growth company, as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. Under the JOBS Act, an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. Thus, an emerging growth company can delay the adoption of certain accounting standards until those standards would otherwise apply to private companies. We have irrevocably elected not to avail ourselves of this extended transition period and, as a result, we will adopt new or revised accounting standards on the relevant dates on which adoption of such standards is required for other public companies.

In addition, as an emerging growth company, we will not be required to provide an auditor’s attestation report on our internal control over financial reporting in future annual reports on Form 10-K as otherwise required by Section 404(b) of the Sarbanes-Oxley Act.

Item 7A. RESERVED

Item 8. Financial Statements and Supplementary Data.

EXICURE, INC.
INDEX TO FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors
Exicure, Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Exicure, Inc. and subsidiary (the Company) as of December 31, 2022 and 2021, the related consolidated statements of operations, comprehensive loss, changes in stockholders' equity, and cash flows for each of the years in the two-year period ended December 31, 2022, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2022 and 2021, and the results of its operations and its cash flows for each of the years in the two-year period ended December 31, 2022, in conformity with U.S. generally accepted accounting principles.

Going Concern

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the consolidated financial statements, the Company has incurred significant expenses and negative cash flows since inception and its current liquidity is not sufficient to fund operations over the next twelve months, which raise substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 1. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated 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 consolidated 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 consolidated 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 consolidated 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 consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

(signed) KPMG LLP

We have served as the Company's auditor since 2014.

Chicago, Illinois
March 27, 2023

EXICURE, INC.

CONSOLIDATED BALANCE SHEETS
(in thousands, except share and per share data)

	December 31, 2022	December 31, 2021
ASSETS		
Current assets:		
Cash and cash equivalents	$ 8,577	$ 34,644
Short-term investments	—	4,497
Prepaid expenses and other assets	1,474	4,525
Total current assets	10,051	43,666
Property and equipment, net	2,530	3,927
Right-of-use asset	7,257	7,950
Other noncurrent assets	3,490	9,325
Total assets	$ 23,328	$ 64,868
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Current portion of long-term debt	$ —	$ 6,873
Accounts payable	361	3,413
Accrued expenses and other current liabilities	1,278	6,464
Deferred revenue, current	—	17,317
Total current liabilities	1,639	34,067
Deferred revenue, noncurrent	—	11,509
Lease liability, noncurrent	6,767	7,404
Other noncurrent liabilities	—	656
Total liabilities	$ 8,406	$ 53,636
Stockholders' equity:		
Preferred stock, $0.0001 par value per share; 10,000,000 shares authorized, no shares issued and outstanding, December 31, 2022 and December 31, 2021	—	—
Common stock, $0.0001 par value per share; 200,000,000 shares authorized, 4,965,901 issued and outstanding, December 31, 2022; 3,626,073 issued and outstanding, December 31, 2021	—	—
Additional paid-in capital	187,571	181,301
Accumulated other comprehensive loss	—	(2)
Accumulated deficit	(172,649)	(170,067)
Total stockholders' equity	14,922	11,232
Total liabilities and stockholders' equity	$ 23,328	$ 64,868

See Accompanying Notes to Consolidated Financial Statements.

EXICURE, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands, except share and per share data)

	Year Ended December 31,	
	2022	2021
Revenue:		
Collaboration revenue	$ 28,826	$ (483)
Total revenue	28,826	(483)
Operating expenses:		
Research and development expense	19,767	48,979
General and administrative expense	10,890	13,087
Total operating expenses	30,657	62,066
Operating loss	(1,831)	(62,549)
Other (expense) income, net:		
Dividend income	78	8
Interest income	15	141
Interest expense	(595)	(1,691)
Other expense, net	(40)	(11)
Total other expense, net	(542)	(1,553)
Net loss before provision for income taxes	(2,373)	(64,102)
Provision for income taxes	209	—
Net loss	$ (2,582)	$ (64,102)
Basic and diluted loss per common share	$ (0.56)	$ (21.70)
Weighted-average basic and diluted common shares outstanding	4,619,471	2,953,901

See Accompanying Notes to Consolidated Financial Statements.

EXICURE, INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(in thousands, except share and per share data)

	Year Ended December 31,	
	2022	2021
Net loss	$ (2,582)	$ (64,102
Other comprehensive (loss) income, net of taxes		
Unrealized (losses) gains on available for sale securities, net of tax	2	(85
Other comprehensive (loss) income	2	(85
Comprehensive loss	$ (2,580)	$ (64,187

See Accompanying Notes to Consolidated Financial Statements.

EXICURE, INC.

CONSOLIDATED STATEMENTS OF CHANGES IN STOCKHOLDERS' EQUITY
(in thousands, except shares)

	Common Stock					
	Shares	$	Additional Paid-in-Capital	Accumulated Deficit	Accumulated Other Comprehensive Income (Loss)	Total Stockholders' Equity
Balance at December 31, 2020	**2,921,684**	**$ —**	**$ 167,388**	**$ (105,965)**	**$ 83**	**$ 61,506**
Exercise of options	11,408	—	546	—	—	546
Equity-based compensation	—	—	2,939	—	—	2,939
Vesting of restricted stock units and related repurchases	807	—	(14)	—	—	(14)
Issuance of common stock-ESPP	6,306	—	209	—	—	209
Issuance of common stock and warrants, net	685,868	—	10,233	—	—	10,233
Other comprehensive loss, net	—	—	—	—	(85)	(85)
Net loss	—	—	—	(64,102)	—	(64,102)
Balance at December 31, 2021	**3,626,073**	**$ —**	**$ 181,301**	**$ (170,067)**	**$ (2)**	**$ 11,232**
Exercise of options	124	—	—	—	—	—
Equity-based compensation	—	—	1,369	—	—	1,369
Vesting of restricted stock units and related repurchases	3,818	—	(4)	—	—	(4)
Issuance of common stock-ESPP	1,851	—	5	—	—	5
Issuance of common stock and warrants, net	1,334,035	—	4,900	—	—	4,900
Other comprehensive income, net	—	—	—	—	2	2
Net loss	—	—	—	(2,582)	—	(2,582)
Balance at December 31, 2022	**4,965,901**	**$ —**	**$ 187,571**	**$ (172,649)**	**$ —**	**$ 14,922**

See Accompanying Notes to Consolidated Financial Statements.

EXICURE, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)

	Year Ended December 31,	
	2022	2021
Cash flows from operating activities:		
Net loss	$ (2,582)	$ (64,102)
Adjustments to reconcile net loss to cash used in operating activities:		
Depreciation and amortization	1,163	1,123
Amortization of right-of-use asset	693	656
Equity-based compensation	1,369	2,939
Amortization of long-term debt issuance costs and fees	477	284
Amortization of investments	(2)	184
Other	39	7
Change in fair value of warrant liabilities	—	(15)
Changes in operating assets and liabilities:		
Accounts receivable	—	11
Prepaid expenses and other current assets	3,051	(295)
Other noncurrent assets	(2,165)	68
Accounts payable	(3,052)	1,582
Accrued expenses	(5,186)	2,811
Deferred revenue	(28,826)	20,483
Other liabilities	(637)	(555)
Net cash used in operating activities	(35,658)	(34,819)
Cash flows from investing activities:		
Purchase of available for sale securities	(1,499)	(6,497)
Proceeds from sale or maturity of available for sale securities	6,000	50,550
Capital expenditures	(10)	(968)
Proceeds from sale of capital assets	205	—
Net cash provided by investing activities	4,696	43,085
Cash flows from financing activities:		
Proceeds from common stock offering	5,040	11,478
Payment of common stock financing costs	(154)	(1,111)
Payment of long-term debt fees and issuance costs	(506)	—
Repayment of long-term debt	(7,500)	(10,000)
Proceeds from issuance of employee stock purchase plan	5	209
Proceeds from exercise of common stock warrants	14	8
Proceeds from exercise of common stock options	—	546
Payments for minimum statutory tax withholding related to net share settlement of equity awards	(4)	(14)
Net cash (used in) provided by financing activities	(3,105)	1,116
Net (decrease) increase in cash, cash equivalents, and restricted cash	(34,067)	9,382
Cash, cash equivalents, and restricted cash - beginning of period	43,844	34,462
Cash, cash equivalents, and restricted cash - end of period	$ 9,777	$ 43,844

EXICURE, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)

	Year Ended December 31,	
	2022	2021
Supplemental disclosure of cash flow information		
Non-cash investing activities:		
Capital expenditures (accounts payable and accrued expenses)	—	9
Non-cash financing activities:		
Common stock issuance costs (accounts payable and accrued expenses)	—	142

The following table provides a reconciliation of cash, cash equivalents, and restricted cash reported within the consolidated balance sheets that sum to the total of the amounts shown in the consolidated statements of cash flows:

	Year Ended December 31,	
	2022	2021
Cash and cash equivalents	$ 8,577	$ 34,644
Restricted cash included in other noncurrent assets	1,200	9,200
Total cash, cash equivalents, and restricted cash shown in the consolidated statements of cash flows	$ 9,777	$ 43,844

See Accompanying Notes to Consolidated Financial Statements.

EXICURE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(in thousands, except share and per share data)

1. Description of Business and Basis of Presentation

Description of Business

Exicure, Inc. has historically been an early-stage biotechnology company focused on developing nucleic acid therapies targeting ribonucleic acid against validated targets. In September 2022, the Company announced a significant reduction in force, suspension of preclinical activities and halting of all research and development, and that the Company was exploring strategic alternatives to maximize stockholder value. With respect to the Company's historical assets, this includes continuing to explore out-licensing opportunities for cavrotolimod, the Company's clinical-stage asset in immuno-oncology, as well as for the Company's preclinical candidate associated with the SCN9A program for neuropathic pain.

While the foregoing efforts are continuing, the Company does not expect they will generate significant value for stockholders, at least in the near term. Therefore, the Company is engaging in a broader exploration of strategic alternatives. This effort involves exploring growth through transactions with potential partners that see opportunity in joining an existing, publicly-traded organization. The Company is exploring transactions both within its historical biotechnology and life science industry and in other industries unrelated to its historical operations.

Throughout these consolidated financial statements, the terms the "Company," and "Exicure" refer to Exicure, Inc. and where appropriate, its wholly owned subsidiary, Exicure Operating Company. Exicure Operating Company holds all material assets and conducts all business activities and operations of Exicure, Inc.

Basis of Presentation

The accompanying consolidated financial statements as of December 31, 2022 and 2021, and for the years then ended, have been presented in conformity with generally accepted accounting principles in the United States ("GAAP").

Principles of Consolidation

The accompanying consolidated financial statements include the accounts of Exicure, Inc. and its wholly owned subsidiary, Exicure Operating Company. All intercompany transactions and accounts are eliminated in consolidation.

Reverse Stock Split

The Company effected a reverse stock split of its Common Stock at a ratio of 1-for-30 as of 5:00 p.m. Eastern Time on June 29, 2022. No fractional shares were issued in connection with the reverse stock split. Stockholders of record who would otherwise be entitled to receive a fractional share received a cash payment in lieu thereof. All information presented in the accompanying consolidated financial statements, unless otherwise indicated herein, assumes a 1-for-30 reverse stock split of the Company's outstanding shares of Common Stock, and unless otherwise indicated, all such amounts and corresponding conversion price or exercise price data set forth herein have been adjusted to give effect to such assumed reverse stock split.

EXICURE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(in thousands, except share and per share data)

Going Concern

At each reporting period, the Company evaluates whether there are conditions or events that raise substantial doubt about the Company's ability to continue as a going concern for a period of one year after the date that the financial statements are issued. The Company is required to make certain additional disclosures if it concludes substantial doubt exists and it is not alleviated by the Company's plans or when its plans alleviate substantial doubt about the Company's ability to continue as a going concern.

The accompanying financial statements have been prepared assuming that the Company will continue as a going concern for a period of one year after the date that the financial statements are issued. As of December 31, 2022, the Company has generated an accumulated deficit of $191,486 since inception and expects to incur significant expenses and negative cash flows for the foreseeable future. As of December 31, 2022, the Company's cash, cash equivalents, and restricted cash were $9,777. Management believes that given the Company's current cash position, operating plans and forecasted negative cash flows from operating activities over the next twelve months, there is substantial doubt about the Company's ability to continue as a going concern within one year after the date these financial statements are issued. The Company has no committed sources of additional capital at this time and substantial additional financing will be needed by the Company to fund its operations.

Management believes that existing cash and cash equivalents could enable the Company to fund its operating expenses into the beginning of the fourth quarter of 2023. However, this estimate is based on assumptions about how the Company can limit spending that may prove to be wrong. It is very difficult to project the Company's current cash burn rate given the transitional status of the Company and this estimate may prove inaccurate. Depending on the direction of the Company's review of strategic alternatives, the Company may use available resources sooner than management currently expects. The Company has already engaged in significant cost reductions, so our ability to further cut costs and extend the Company's operating runway is limited. As a result, substantial additional financing will be needed by the Company within the next few months to pay expenses, fund the ongoing exploration of strategic alternatives and pursue any alternatives that may be identified. There can be no assurance that such additional financing will be available and, if available, can be obtained on acceptable terms.

The accompanying consolidated financial statements have been prepared as though the Company will continue as a going concern, which contemplates the realization of assets and satisfaction of liabilities in the normal course of business. The financial statements do not include any adjustments relating to the recoverability and classification of recorded asset amounts or the amounts and classification of liabilities that might be necessary should the Company be unable to continue as a going concern.

Use of Estimates

The preparation of the financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Management bases its estimates on certain assumptions which it believes are reasonable in the circumstances and while actual results could differ from those estimates, management does not believe that any change in those assumptions in the near term would have a significant effect on the Company's financial position, results of operations or cash flows. Actual results in future periods could differ from those estimates.

EXICURE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(in thousands, except share and per share data)

2. Significant Accounting Policies

Cash, cash equivalents, and short-term investments

The Company considers all highly liquid investments with original maturities of three months or less to be cash equivalents. The Company's short-term investments have initial maturities of greater than three months from date of purchase. The Company classifies its marketable debt security investments as "available-for-sale" and carries them at fair market value based upon prices on the last day of the fiscal period for identical or similar items. The Company records unrealized gains and losses on marketable debt securities in other comprehensive income (loss) as a component of stockholders' equity until realized. Any premium or discount arising at purchase is amortized and/or accreted to interest income and/or interest expense over the life of the of the underlying security. Realized gains and losses are included in other income, net. The Company uses the specific identification method to determine the cost of securities sold.

Restricted cash

The Company secures a standby letter of credit with a restricted certificate of deposit account as part of its Chicago lease agreement. The Company considers the restricted certificate of deposit account in the amount of $1,200 to be restricted cash because its use to the Company is contractually limited and presents the balance within other noncurrent assets on the accompanying consolidated balance sheet at December 31, 2022.

Fair value of financial instruments

The Company has estimated the fair value of its financial instruments. The carrying amounts for cash, cash equivalents, and accounts payable approximate their fair value due to the relatively short-term nature of these instruments. The Company records short-term investments at their estimated fair value based on quoted market prices for identical or similar instruments.

Concentrations of credit risk and other risks and uncertainties

Financial instruments that potentially expose the Company to concentrations of credit risk consist primarily of cash, cash equivalents, short-term investments, and accounts receivable. The Company places its cash, cash equivalents, and short-term investments with reputable financial institutions. The Company primarily invests its excess cash in debt instruments of corporations, the U.S. Treasury, financial institutions, and U.S. government agencies with strong credit ratings and an investment grade rating at or above a long-term rating of Aa3/AA- and a short-term rating of P1/A1. The Company has established guidelines relative to diversification and maturities that maintain safety and liquidity. The Company periodically reviews and modifies these guidelines to maximize trends in yields and interest rates without compromising safety and liquidity. The Company has not experienced any credit losses in such accounts and does not believe it is exposed to any significant credit risk on these funds. The Company has no financial instruments with off-balance sheet risk of loss.

For the year ended December 31, 2022, the Company's revenue was generated from its collaborations with Ipsen and AbbVie, which were terminated in the fourth quarter.

The Company is currently not profitable and no assurance can be provided that it will ever be profitable. The Company's research and development activities have required significant investment since inception and operations are expected to continue to require cash investment in excess of its revenues. See also Note 1, *Going Concern*, for more information.

The Company is subject to risks common to biotechnology firms including, but not limited to, new and disruptive technological innovations, dependence on key personnel, protection of proprietary technology, the validity of and continued access to its owned and licensed intellectual property, limitations on the supply of critical materials, compliance with governmental regulations and market acceptance. The Company is also subject to risks associated with its exploration of strategic alternatives including, but not limited, the inability to identify any

transactions that will generate value for stockholders, incurrence of excessive costs in seeking to identify and pursue transactions and the possibility that any transaction the Company does pursue will not provide anticipated benefits.

Property and equipment

Property and equipment are recorded at cost and depreciated using the straight-line method over the estimated useful lives of the various classes of property and equipment, which range from three to seven years. Leasehold improvements are amortized using the straight-line method over the shorter of the remaining terms of the respective leases or the estimated lives of the assets. Depreciation begins at the time the asset is placed in service.

Property and equipment are reviewed for impairment at least annually or whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. No impairment losses were recorded from inception in December 2011 through December 31, 2022.

Warrants

The Company accounts for freestanding warrants within stockholder's equity or as liabilities based on the characteristics and provisions of each instrument. The Company evaluates outstanding warrants in accordance with Accounting Standards Codification ("ASC") 480, *Distinguishing Liabilities from Equity*, and ASC 815, *Derivatives and Hedging*. If none of the criteria in the evaluation in these standards are met, the warrants are classified as a component of stockholders' equity and initially recorded at their grant date fair value without subsequent remeasurement. Warrants that meet the criteria are classified as liabilities and remeasured to their fair value, estimated using the Black-Scholes option-pricing model, at the end of each reporting period with changes in the fair value of the liability recorded in other income (expense), net in the consolidated statements of operations.

Revenue recognition

Under ASC 606, *Revenue from Contracts with Customers*, the Company recognizes revenue when its customer obtains control of promised goods or services, in an amount that reflects the consideration which the Company expects to receive in exchange for those goods or services. To determine revenue recognition for arrangements that are within the scope of ASC 606, the Company performs the following five steps:

1. *Identify the contract with the customer.* A contract with a customer exists when (i) the Company enters into an enforceable contract with a customer that defines each party's rights and obligations regarding the goods or services to be transferred and identifies the related payment terms, (ii) the contract has commercial substance, and (iii) the Company determines that collection of substantially all consideration for goods and services that are transferred is probable based on the customer's intent and ability to pay the promised consideration. The Company applies judgment in determining the customer's intent and ability to pay, which is based on a variety of factors including the customer's historical payment experience, or in the case of a new customer, published credit and financial information pertaining to the customer.
2. *Identify the performance obligations in the contract.* Performance obligations promised in a contract are identified based on the goods and services that will be transferred to the customer that are both capable of being distinct, whereby the customer can benefit from the good or service either on its own or together with other available resources, and are distinct in the context of the contract, whereby the transfer of the good or service is separately identifiable from other promises in the contract. To the extent a contract includes multiple promised goods and services, the Company must apply judgment to determine whether promised goods and services are both capable of being distinct and distinct in the context of the contract. If these criteria are not met, the promised goods and services are accounted for as a combined performance obligation.
3. *Determine the transaction price.* The transaction price is determined based on the consideration to which the Company will be entitled in exchange for transferring goods and services to the customer. To the extent the transaction price includes variable consideration, the Company estimates the amount of variable

consideration that should be included in the transaction price utilizing either the expected value method or the most likely amount method, depending on the nature of the variable consideration. Variable consideration is included in the transaction price if, in the Company's judgment, it is probable that a significant future reversal of cumulative revenue under the contract will not occur. Any estimates, including the effect of the constraint on variable consideration, are evaluated at each reporting period for any changes. Determining the transaction price requires significant judgment.

4. *Allocate the transaction price to performance obligations in the contract.* If the contract contains a single performance obligation, the entire transaction price is allocated to the single performance obligation. However, if a series of distinct services that are substantially the same qualifies as a single performance obligation in a contract with variable consideration, the Company must determine if the variable consideration is attributable to the entire contract or to a specific part of the contract. Contracts that contain multiple performance obligations require an allocation of the transaction price to each performance obligation on a relative standalone selling price basis unless the transaction price is variable and meets the criteria to be allocated entirely to a performance obligation or to a distinct service that forms part of a single performance obligation. The consideration to be received is allocated among the separate performance obligations based on relative standalone selling prices.

5. *Recognize revenue when or as the Company satisfies a performance obligation.* The Company satisfies performance obligations either over time or at a point in time. Revenue is recognized over time if either (i) the customer simultaneously receives and consumes the benefits provided by the entity's performance, (ii) the entity's performance creates or enhances an asset that the customer controls as the asset is created or enhanced, or (iii) the entity's performance does not create an asset with an alternative use to the entity and the entity has an enforceable right to payment for performance completed to date. If the entity does not satisfy a performance obligation over time, the related performance obligation is satisfied at a point in time by transferring the control of a promised good or service to a customer. Examples of control are using the asset to produce goods or services, enhance the value of other assets, or settle liabilities, and holding or selling the asset.

   Revenue allocated to performance obligations relating to provision of research and development activities is recognized as the performance obligations are satisfied using an input method to measure progress, based on an estimate of the percentage of completion of the project based on the actual hours incurred on the project as a percentage of the total expected project hours. The determination of the percentage of completion requires management to estimate the total expected project hours. A detailed estimate of the total expected project hours is re-assessed every reporting period based on the latest project plan and discussions with project teams. If a change in facts or circumstances occurs, the estimate will be adjusted and the revenue will be recognized based on the revised estimate. The difference between the cumulative revenue recognized based on the previous estimate and the revenue recognized based on the revised estimate would be recognized as an adjustment to revenue in the period in which the change in estimate occurs. Determining the estimate of total project hours requires significant judgment and may have a significant impact on the amount and timing of revenue recognition.

Licenses of intellectual property: If the license to the Company's intellectual property is determined to be distinct from the other performance obligations identified in the arrangement, the Company recognizes revenues from consideration allocated to the license when the license is transferred to the customer and the customer is able to use and benefit from the licenses. For licenses that are combined with other promises, the Company utilize judgment to assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenue. The Company evaluates the measure of progress each reporting period and, if necessary, adjusts the measure of performance and related revenue recognition.

Milestone payments: At the inception of each arrangement that includes development milestone payments, the Company evaluates the probability of reaching the milestones and estimates the amount to be included in the

transaction price using the most likely amount method. If it is probable that a significant revenue reversal would not occur in the future, the associated milestone value is included in the transaction price. Milestone payments that are not within the control of the Company or the licensee, such as regulatory approvals, are not considered probable of being achieved until those approvals are received and therefore revenue recognized is constrained as management is unable to assert that a reversal of revenue would not be possible. The transaction price is then allocated to each performance obligation on a relative standalone selling price basis, for which the Company recognizes revenue as or when the performance obligations under the contract are satisfied. At the end of each subsequent reporting period, the Company re-evaluates the probability of achievement of such development milestones and any related constraint, and if necessary, adjusts its estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which would affect collaboration revenues and earnings in the period of adjustment. To date, the Company has not recognized any milestone payment revenue from any of its collaboration agreements.

Royalties: For arrangements that include sales-based royalties, including milestone payments based on levels of sales, and the license is deemed to be the predominant item to which the royalties relate, the Company recognizes revenue at the later of (i) when the related sales occur, or (ii) when the performance obligation to which some or all of the royalty has been allocated has been satisfied (or partially satisfied). To date, the Company has not recognized any royalty revenue resulting from any of its collaboration agreements.

Equity-based compensation

The Company measures the cost of equity-based awards at fair value and records the cost of the awards, net of estimated forfeitures, on a straight-line basis over the requisite service period. The Company measures fair value for all common stock options using the Black-Scholes option-pricing model. The fair value of common stock option awards is affected by the valuation assumptions, including the expected volatility based on comparable market participants, expected term of the common stock option, risk-free interest rate, and expected dividends. For all equity-based awards, the fair value measurement date is the date of grant and the requisite service period is the period over which the recipient is required to provide service in exchange for the equity-based awards, which is generally the vesting period.

Segments and geographic information

The Company has determined it has one reporting segment. Disaggregating the Company’s operations is impracticable because the Company’s research and development activities and its assets overlap and management reviews its business as a single operating segment. Thus, discrete financial information is not available by more than one operating segment. All long-lived assets of the Company are located in the United States.

Leases

The Company determines if an arrangement is a lease at contract inception. 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 on the balance sheet at the commencement date of the lease based upon the present value of lease payments over the lease term. When determining the lease term, the Company includes options to extend or to terminate the lease when it is reasonably certain that the Company will exercise that option. The Company uses the implicit interest rate when readily determinable and uses the Company’s incremental borrowing rate when the implicit rate is not readily determinable based upon the information available at the commencement date in determining the present value of the lease payments.

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. In addition, the Company’s lease arrangements may contain lease and non-lease components. The Company combines lease and non-lease components, which are accounted for together as a single lease component. Variable lease payments, such as real

estate taxes and facility maintenance costs that are allocated by the lessor to the lessee and are not based on an index or a rate, are excluded from the measurement of the lease liability.

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 twelve 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. Costs for variable lease payments that are not included in the lease liability are recognized as expense as incurred.

Research and development expense

Research and development expenses are charged to expense as incurred in performing research and development activities in accordance with ASC 730, *Research and Development*. The costs include employee-related expenses including salaries, benefits, and stock-based compensation expense, costs of funding research performed by third parties that conduct research and development and preclinical and clinical activities on the Company's behalf, the cost of purchasing lab supplies and non-capital equipment used in preclinical and clinical activities and in manufacturing preclinical and clinical study materials, consultant fees, facility costs including rent, depreciation and maintenance expenses, fees for acquiring and maintaining licenses under third party licensing agreements, including any sublicensing or success payments made to the Company's licensors, and overhead and other expenses directly related to research and development operations. In accruing service fees, the Company estimates the time period over which services will be performed and the level of effort to be expended in each period. If the actual timing of the performance of services or the level of effort varies from the Company's estimate, the accrual or prepaid is adjusted accordingly. The Company defers and capitalizes non-refundable advance payments made by the Company for research and development activities until the related goods are received or the related services are performed. In circumstances where amounts have been paid in excess of costs incurred, the Company records a prepaid expense.

Income taxes

The Company recognizes deferred tax assets and liabilities for temporary differences between the financial reporting basis and the tax basis of its assets and liabilities and the expected benefits of net operating loss carryforwards. The impact of changes in tax rates and laws on deferred taxes, if any, is applied during the years in which temporary differences are expected to be settled and is reflected in the financial statements in the period of enactment. The measurement of deferred tax assets is reduced, if necessary, if, based on weight of the evidence, it is more likely than not that some, or all, of the deferred tax assets will not be realized. At December 31, 2022 and 2021, the Company established a full valuation allowance against its deferred tax assets to an amount that is more likely than not to be realized.

Recent Accounting Pronouncements Not Yet Adopted

Financial Instruments - Credit Losses

In June 2016, the FASB issued ASU 2016-13, Measurement of Credit Losses on Financial Instruments ("ASU 2016-13). ASU 2016-13 is a new standard intended to improve reporting requirements specific to loans, receivables and other financial instruments. ASU 2016-13 requires that credit losses on financial assets measured at amortized cost be determined using an expected loss model, instead of the current incurred loss model, and requires that credit losses related to available-for-sale debt securities be recorded through an allowance for credit losses and limited to the amount by which carrying value exceeds fair value. ASU 2016-13 also requires enhanced disclosure of credit risk associated with financial assets. The effective date of ASU 2016-13 was deferred by ASU 2019-10, Financial Instruments—Credit Losses (Topic 326), Derivatives and Hedging (Topic 815), and Leases (Topic 842)—Effective Dates to the annual period beginning after December 15, 2022 for companies that (i) meet the definition of an SEC filer and (ii) are eligible as "smaller reporting companies" as such term is defined by the SEC, with early adoption permitted. The Company expects that the adoption of ASU 2016-13 will not have a material impact to the Company's consolidated financial statements.

3. Collaborative Research and License Agreements

Ipsen Collaboration Agreement

Summary of Agreement

On July 30, 2021 (the "Ipsen Effective Date"), the Company entered into a Collaboration, Option and License Agreement with Ipsen (the "Ipsen Collaboration Agreement"). Pursuant to the Ipsen Collaboration Agreement, the Company granted to Ipsen exclusive access and options to license SNA-based therapeutics arising from two collaboration programs related to the treatment of Huntington's disease and Angelman syndrome (each, an "Ipsen Collaboration Program"), respectively. Each such license (obtained in connection with the exercise of an Ipsen Option, as defined and discussed further below) would grant to Ipsen exclusive, royalty-bearing, sublicensable, worldwide rights to develop, manufacture, use and commercialize such SNA therapeutics. Upon written notice to the Company, Ipsen may exercise its option during the corresponding collaboration program's applicable option exercise period, (each, an "Ipsen Option Exercise Period").

On December 12, 2022 (the "Ipsen Termination Agreement Effective Date"), the Company and Ipsen entered into a Mutual Termination Agreement (the "Ipsen Termination Agreement"), pursuant to which the parties mutually agreed to terminate the Ipsen Collaboration Agreement. Following such termination, the parties will jointly own R&D Term IP (as defined in the Ipsen Collaboration Agreement) and Patents Covering the R&D Term IP (as defined in the Ipsen Collaboration Agreement), with each party owning an equal, undivided interest in and to such R&D Term IP and patents. As a result of the termination of the Ipsen Collaboration Agreement, the Company regained the ability to independently develop medicines targeting Angelman syndrome and Huntington's disease while Ipsen retains the right to re-enter into the collaboration with the Company in Huntington's disease and Angelman's syndrome.

As of the Ipsen Effective Date and through the Ipsen Termination Agreement Effective Date, the Company and Ipsen had agreed upon a development plan for each Ipsen Collaboration Program that describes the development activities and timelines required to advance each such Ipsen Collaboration Program through its first IND filing (each, an "Ipsen Development Plan"). The activities described in the Ipsen Development Plans were conducted under the supervision of the Ipsen Joint Steering Committee (the "Ipsen JSC") consisting of three members from each of the Company and Ipsen. Under the terms of the Ipsen Collaboration Agreement, the Company was to use commercially reasonable efforts to conduct discovery and development in two collaboration programs for Huntington's disease (the "HD Program") and Angelman syndrome (the "AS Program") (the "Ipsen Development Activities") respectively. The Company was solely responsible for all costs and expenses of conducting each Ipsen Collaboration Program through the selection of SNA therapeutic candidates for further development ("Ipsen

Selection"), and Ipsen was responsible for all costs and expenses of all activities that were necessary to enable the first filing of an IND for each proposed product candidate. In the event that Ipsen exercised an option, Ipsen would have been responsible for further development from the license effective date and commercialization of the corresponding licensed product.

In the event of completion of all Ipsen Development Activities for the Ipsen Selection (the "Ipsen First R&D Term Activities"), the Company was required to deliver to Ipsen a report that described the results of the Ipsen First R&D Term Activities and identified at least one SNA-based compound that satisfies certain criteria for such Ipsen Collaboration Program as determined by the Ipsen JSC (the "Ipsen First Option Data Package"). Following the delivery of the Ipsen First Option Data Package for an Ipsen Collaboration Program, Ipsen would have had the ability for a defined period of time (the "Ipsen First Option Exercise Period") to exercise an option (each a "First Ipsen Option") to obtain worldwide rights and license to the Company's SNA technology and the Company's interest in joint collaboration technology to make, have made, import, use, sell or offer for sale any product (each an "Ipsen Licensed Product") that resulted from such Ipsen Collaboration Program during the term of the Ipsen Collaboration Agreement.

In the event Ipsen (i) did not exercise the First Ipsen Option with respect to an Ipsen Collaboration Program, (ii) the Ipsen Collaboration Agreement had not expired or been terminated with respect to such Ipsen Collaboration Program, and (iii) Ipsen agreed to fully fund additional research activities for an Ipsen Collaboration Program through IND filing, the Company would have been responsible for research and development activities for such Ipsen Collaboration Program through IND filing (the "Ipsen Second R&D Term Activities"). In the event of completion of the Ipsen Second R&D Term Activities, the Company would have been required to deliver to Ipsen a report that described the results of the Ipsen Second R&D Term Activities (the "Ipsen Second Option Data Package"). Following the delivery of the Ipsen Second Option Data Package for an Ipsen Collaboration Program, Ipsen would have had the ability for a defined period of time (the "Ipsen Second Option Exercise Period") to exercise an option (each a "Second Ipsen Option" and together with the First Ipsen Option, the "Ipsen Options") to obtain worldwide rights and license to the Company's SNA technology and the Company's interest in joint collaboration technology to make, have made, import, use, sell or offer for sale any Ipsen Licensed Product" that results from such Ipsen Collaboration Program during the term of the Ipsen Collaboration Agreement.

In the event of Ipsen's exercise of an Ipsen Option for an Ipsen Collaboration Program, the Company would have been required to supply to Ipsen the licensed SNAs under current Good Manufacturing Practice, at the Company's manufacturing cost pursuant to a clinical supply agreement to be negotiated by the Company and Ipsen in good faith following the Ipsen Effective Date and executed within twelve (12) months after the Ipsen Effective Date (the "Ipsen Supply Agreement"). The Ipsen Supply Agreement would have provided for the transfer by the Company to Ipsen of all documents and information, and the provision by the Company of technical assistance and support, for Ipsen to manufacture or have manufactured by a third party contractor engaged by Ipsen the applicable licensed SNA to the extent it is intended to be actually used in the development and manufacture of the applicable licensed products.

Under the terms of the Ipsen Collaboration Agreement, the Company received a nonrefundable upfront payment of $20,000 (the "Ipsen Upfront Payment"). If Ipsen exercised a First Ipsen Option, Ipsen was required to pay the Company the First Ipsen Option exercise fee of $10,000 for each Ipsen Collaboration Program. If Ipsen exercised a Second Ipsen Option, Ipsen was required to pay the Company the Second Ipsen Option exercise fee of $25,000 for each Ipsen Collaboration Program.

Ipsen would have been required to pay a preclinical milestone payment of $5,000 for each Ipsen Collaboration Program upon achievement of such milestone regardless of whether an Ipsen Option was exercised. In addition to the option exercise fees and the preclinical milestones described above, if Ipsen exercised an Ipsen Option for an Ipsen Collaboration Program, development and regulatory milestones would have been payable for that program upon the initiation of certain clinical trials and the filing for processing by the United States Food and Drug Administration ("FDA") in the United States and by two additional regulators outside the United States of a marketing application for review, per the Ipsen Collaboration Program, with an aggregate total of up to $180,000 if

both Ipsen Options were exercised. Commercial milestones would have been payable for that Ipsen Collaboration Program upon first commercial sale of a licensed product in certain jurisdictions and the achievement of specified aggregate sales thresholds for all licensed products from that program, with an aggregate total of up to $762,000 if both Ipsen Options were exercised. In the event a therapeutic candidate subject to the Ipsen Collaboration Agreement resulted in commercial sales, the Company was eligible to receive tiered royalties at percentages ranging from the mid-single digits to the mid-teens on future net product sales of such commercialized therapeutic candidates. A percentage of the aforementioned payments would have been due to Northwestern University upon receipt, pursuant to the terms of the Company's existing license agreements with Northwestern University (see Note 15, *Commitment and Contingencies,* for more information on the Northwestern University License Agreements (as defined below)). In connection with the receipt of the Ipsen Upfront Payment, the Company paid a $3,000 license fee to Northwestern University under the terms of the Northwestern License Agreements.

The Company's obligations to conduct activities defined in the Ipsen Development Plan under the Ipsen Collaboration Agreement commenced on July 30, 2021 and continued through the Ipsen Termination Agreement effective date.

Accounting Analysis

The Company concluded that Ipsen was a customer in this arrangement, and as such the arrangement falls within the scope of the revenue recognition guidance. Under the Ipsen Collaboration Agreement, the Company has identified two performance obligations, as follows: (1) the performance obligation related to the HD Program that includes (i) the Ipsen First R&D Term Activities related to the HD Program (the "Ipsen HD Program R&D Services"), (ii) Ipsen JSC services related to the HD Program during the Ipsen First Term (the "Ipsen HD Program JSC Services"), and (iii) activities related to the negotiation of the Ipsen Supply Agreement within twelve months of the Ipsen Effective Date; and (2) the performance obligation related to the AS Program that includes (i) the Ipsen First R&D Term Activities related to the AS Program (the "Ipsen AS Program R&D Services"), (ii) Ipsen JSC services related to the AS Program during the Ipsen First Term (the "Ipsen AS Program JSC Services"), (iii) and activities related to the negotiation of the Ipsen Supply Agreement within twelve months of the Ipsen Effective Date. The Company has concluded that the Ipsen HD Program R&D Services and the Ipsen AS Program R&D Services are not distinct from the Ipsen HD Program JSC Services and the Ipsen AS Program JSC Services, respectively. The Company has also concluded that the Ipsen HD Program JSC Services and the Ipsen AS Program JSC Services are not distinct from the activities related to entering the Ipsen Supply Agreements for each respective program. The Ipsen JSC provided oversight and management of the overall Ipsen Collaboration Agreement, and the members of the Ipsen JSC from the Company have specialized industry knowledge, particularly as it relates to SNA technology. The Ipsen JSC was meant to facilitate the early stage research being performed and coordinate the activities of both the Company and Ipsen. Further, the Ipsen JSC services were critical to the ongoing evaluation of the Ipsen Collaboration Programs and the drafting and evaluation of the Ipsen First Option Data Package. The Ipsen JSC would also have provided oversight and management of the activities to enter into the Ipsen Supply Agreement. Accordingly, the Company's participation on the Ipsen JSC was essential to Ipsen receiving value from the Ipsen HD Program R&D Services and the Ipsen AS Program R&D Services, and as such, (i) the Ipsen HD Program JSC Services, along with the Ipsen HD Program R&D Services and the activities related to entering the Ipsen Supply Agreement within twelve months of the Ipsen Effective Date for that program are considered a single performance obligation (the "Ipsen HD Program Services") and (ii) the Ipsen AS Program JSC Services along with the Ipsen AS Program R&D Services and the activities related to entering the Ipsen Supply Agreement within twelve months of the Ipsen Effective Date for that program are considered a single performance obligation (the "Ipsen AS Program Services").

As of the Ipsen Effective Date, the total transaction price was determined to be $20,000, consisting solely of the Ipsen Upfront Payment. The Company also utilized the most likely amount method to estimate any development and regulatory milestone payments to be received. As of the Ipsen Effective Date, there were no milestones included in the transaction price. The preclinical, development, regulatory, and commercial milestones were fully constrained due to the significant uncertainties surrounding such payments. The Company considered the stage of development

and the risks associated with the remaining development required to achieve the milestone, as well as whether the achievement of the milestone is outside the control of the Company or Ipsen. The Company has determined that any commercial milestones and sales-based royalties will be recognized when the related sales occur and therefore, they have also been excluded from the transaction price. The Company re-evaluated the transaction price at the end of each reporting period and as uncertain events were resolved or other changes in circumstances occurred. As of the Ipsen Termination Agreement Effective Date, the Company determined that the total transaction price was $20,000.

The Company allocated the total transaction price to each of the two identified performance obligations under the Ipsen Collaboration Agreement based on an expected cost plus a margin approach, as follows: $10,793 of the transaction price allocated to the Ipsen HD Program Services and $9,207 of the transaction price allocated to the Ipsen AS Program Services.

The Company recognized revenue related to each of Ipsen HD Program Services and the Ipsen AS Program Services as those performance obligations were satisfied using an input method to measure progress for each of those performance obligations. The Company believes the input method that most accurately depicts the measure of progress is the actual hours incurred to date relative to projected hours to complete the activities for the Ipsen HD Program Services and the Ipsen AS Program Services. In connection with the Ipsen Termination Agreement, the Company recognized as revenue any remaining deferred revenue associated with the Ipsen Collaboration Agreement in the fourth quarter of 2022.

During the years ended December 31, 2022 and 2021, the Company recognized revenue under the Ipsen Collaboration Agreement of approximately $17,691 and $2,309, respectively.

AbbVie Collaboration Agreement

Summary of Agreement

On November 13, 2019 (the “AbbVie Effective Date”), the Company entered into a Collaboration, Option and License Agreement (the “AbbVie Collaboration Agreement”), with a wholly-owned subsidiary of Allergan plc, Allergan. On May 8, 2020, Allergan plc, including Allergan was acquired by AbbVie. Pursuant to the AbbVie Collaboration Agreement, the Company granted to AbbVie exclusive access and options to license SNA-based therapeutics arising from two collaboration programs related to the treatment of hair loss disorders (each, an “AbbVie Collaboration Program”). Under each such license (obtained in connection with the exercise of an AbbVie Option, as defined and discussed further below), the Company would grant to AbbVie exclusive, royalty-bearing, sublicensable, nontransferable, worldwide rights to develop, manufacture, use and commercialize such SNA therapeutics. Under the AbbVie Collaboration Agreement, the Company was to use commercially reasonable efforts to conduct the AbbVie Collaboration Programs, each focused on one or more hair loss disorders to discover one or more SNA products that are directed to, bind to or inhibit one or more specific AbbVie Collaboration Program targets.

On December 13, 2022 (the “AbbVie Termination Agreement Effective Date”), the Company and Allergan entered into a letter agreement (the “AbbVie Termination Agreement”), pursuant to which the parties mutually agreed to terminate the AbbVie Collaboration Agreement. Following such termination, the Company transferred to Allergan all data, information, and reports made or generated by the Company in the course of performing activities under the Development Plan (as defined in the AbbVie Collaboration Agreement), and granted to Allergan all rights to transfer, publish, present, or otherwise publicly disclose any Collaboration Technology (as defined in the AbbVie Collaboration Agreement) and data made or generated by the Company in the course of performing activities under the Development Plan. As a result of the termination of the AbbVie Collaboration Agreement, the Company regained the ability to independently develop medicines targeting hair loss disorders.

As of the AbbVie Effective Date and through the AbbVie Termination Agreement Effective Date, the Company and AbbVie had agreed upon a development plan for each AbbVie Collaboration Program that described the development activities and timelines required to advance such AbbVie Collaboration Program through its first IND

filing (each, an "AbbVie Development Plan"). The activities described in the AbbVie Development Plan were conducted under the supervision of the AbbVie Joint Development Committee (the "AbbVie JDC") consisting of three members from each of the Company and AbbVie. The Company was primarily responsible for performing early-stage discovery and preclinical activities (the "AbbVie Collaboration Program Initial Development Activities") set forth in the AbbVie Development Plan for each AbbVie Collaboration Program and would have been solely responsible for all costs and expenses related to the AbbVie Collaboration Program Initial Development Activities. AbbVie had the right to elect, in its sole discretion and at its sole cost and expense, to conduct formulation assessment and *in vivo* testing as set forth in an AbbVie Development Plan.

In the event of completion of all AbbVie Initial Development Activities, the Company would have been required to deliver to AbbVie a report that described the results of the AbbVie Initial Development Activities and identified at least one SNA-based compound that satisfies certain criteria for such AbbVie Collaboration Program as determined by the AbbVie JDC (the "AbbVie Initial Development Report"). Following the delivery of the AbbVie Initial Development Report for an AbbVie Collaboration Program, AbbVie would have had the ability for a defined period of time (the "AbbVie Initial Option Exercise Period") to exercise an option (each an "AbbVie Option") to obtain worldwide rights and license to the Company's SNA technology and the Company's interest in joint collaboration technology to make, have made, import, use, sell or offer for sale any product (each an "AbbVie Licensed Product") that resulted from such AbbVie Collaboration Program during the term of the AbbVie Collaboration Agreement.

At AbbVie's sole option, AbbVie had the right to extend the AbbVie Initial Option Exercise Period (the "AbbVie Option Extension") and require the Company to perform IND-enabling activities described in the AbbVie Development Plan (the "AbbVie IND-Enabling Activities"), subject to the payment of additional consideration ("AbbVie Extension Exercise"). If AbbVie exercised the AbbVie Option Extension, the Company would have been responsible for conducting the AbbVie IND-Enabling Activities and would have been solely responsible for all costs and expenses associated with such activities. In the event of completion of the AbbVie IND-Enabling Activities, the Company would have been required to deliver a report that describes the results of the AbbVie IND-Enabling Activities (the "AbbVie IND-Enabling Activities Data Package") to AbbVie. Following the delivery of AbbVie IND-Enabling Activities Data Package, AbbVie would have had the ability for a defined period of time (the "AbbVie Extended Option Exercise Period") to exercise an AbbVie Option with respect to such AbbVie Collaboration Program. After the exercise of an AbbVie Option with respect to an AbbVie Collaboration Program, AbbVie would have been responsible for all development, manufacturing and commercialization activities, and costs and expense associated with such activities in connection with AbbVie Licensed Products arising from such AbbVie Collaboration Program.

The Company's obligation to conduct the activities defined in the AbbVie Development Plan under the AbbVie Collaboration Agreement commenced on November 13, 2019 and continued through the AbbVie Termination Agreement Effective Date.

Under the terms of the AbbVie Collaboration Agreement, the Company received a $25,000 upfront, non-refundable, non-creditable cash payment (the "AbbVie Upfront Payment") related to the Company's research and development costs for conducting the AbbVie Development Plan for two AbbVie Collaboration Programs, each focused on one or more targets, and certain options to obtain exclusive, worldwide licenses under certain intellectual property rights owned or controlled by the Company to develop, manufacture and commercialize certain products resulting from each such AbbVie Collaboration Programs. The option exercise fee during the AbbVie Initial Option Exercise Period was $10,000 per AbbVie Collaboration Program. If AbbVie elected to extend the AbbVie Initial Option Exercise Period, AbbVie would have been required to pay an additional fee of $10,000. If AbbVie elected to exercise its option during the AbbVie Extended Option Exercise Period, AbbVie would have been required to pay the Company the option exercise fee of $15,000.

Following the exercise by AbbVie of an AbbVie Option with respect to an AbbVie Collaboration Program, AbbVie would have been required to make certain milestone payments to the Company upon the achievement of specified development, product approval and launch, and commercial events, on an AbbVie Licensed Product by

AbbVie Licensed Product basis. On an AbbVie Licensed Product by AbbVie Licensed Product basis, for the first AbbVie Licensed Product to achieve the associated milestone event, the Company was eligible to receive up to an aggregate of $55,000 for development milestone payments and $132,500 for product approval and launch milestone payments. The Company was also eligible for up to $175,000 in sales milestone payments on an AbbVie Collaboration Program by AbbVie Collaboration Program basis, associated with aggregate worldwide sales. Certain product approval milestones were subject to certain reductions under specified circumstances, including for payments required to be made by AbbVie to obtain certain third-party intellectual property rights.

In addition, to the extent there was any AbbVie Licensed Product, the Company would have been entitled to receive tiered royalty payments of mid-single digits to the mid-teens percentage on future net worldwide product sales of such AbbVie Licensed Products, subject to certain reductions under specified circumstances. Royalties were due on a AbbVie Licensed Product by AbbVie Licensed Product and country by country basis from the date of the first commercial sale of each AbbVie Licensed Product in a country until the latest to occur of: (i) the expiration date in such country of the last to expire valid claim within the licensed intellectual property covering the manufacture, use or sale of such AbbVie Licensed Product in such country, (ii) the tenth anniversary of the first commercial sale of such AbbVie Licensed Product in such country, and (iii) the expiration of regulatory exclusivity for such AbbVie Licensed Product in such country.

Accounting Analysis

The Company concluded that AbbVie was a customer in this arrangement, and as such the arrangement falls within the scope of the revenue recognition guidance. Under the AbbVie Collaboration Agreement, the Company has identified a single performance obligation that includes (i) the research and development activities during the AbbVie Research Term (the “AbbVie R&D Services”), and (ii) AbbVie Joint Development Committee services during the AbbVie Research Term (the “AbbVie JDC Services”). The Company has concluded that the AbbVie R&D Services is not distinct from the AbbVie JDC Services during the AbbVie Research Term. The AbbVie JDC provided oversight and management of the overall AbbVie Collaboration Agreement, and the members of the AbbVie JDC from the Company have specialized industry knowledge, particularly as it relates to SNA technology. The AbbVie JDC was meant to facilitate the early-stage research being performed and coordinate the activities of both the Company and AbbVie. Further, the AbbVie JDC services were critical to the ongoing evaluation of an AbbVie Collaboration Program and the drafting and evaluation of the AbbVie Initial Development Report and the AbbVie IND-Enabling Data Package. Accordingly, the Company’s participation on the AbbVie JDC was essential to AbbVie receiving value from the AbbVie R&D Services and as such, the AbbVie JDC Services along with the AbbVie R&D Services are considered one performance obligation (the “AbbVie Collaboration Program Services”). In addition, the Company has concluded that the option to purchase two development and commercialization licenses was considered a marketing offer as the options did not provide any discounts or other rights that would be considered a material right in the arrangement, and thus, not a performance obligation at the onset of the agreement. The consideration for these options would have been accounted for when they are exercised.

As of the AbbVie Effective Date, the total transaction price was determined to be $25,000, consisting solely of the AbbVie Upfront Payment. The Company also utilized the most likely amount method to estimate any development and regulatory milestone payments to be received. As of the AbbVie Effective Date, there were no milestones included in the transaction price. The milestones were fully constrained due to the significant uncertainties surrounding such payments. The Company considered the stage of development and the risks associated with the remaining development required to achieve the milestone, as well as whether the achievement of the milestone is outside the control of the Company or AbbVie. The Company has determined that any commercial milestones and sales-based royalties will be recognized when the related sales occur and therefore they have also been excluded from the transaction price. The Company re-evaluated the transaction price at the end of each reporting period and as uncertain events were resolved or other changes in circumstances occurred. As of the AbbVie Termination Agreement Effective Date, the Company determined the total transaction price was $25,000.

The Company recognized revenue related to the AbbVie Collaboration Program Services as the performance obligation is satisfied using an input method to measure progress. The Company believes the input method that most

accurately depicts the measure of progress is the actual hours incurred to date relative to projected hours to complete the research service.

During the third quarter of 2021, the AbbVie JDC revised the AbbVie Initial Development Plan for each AbbVie Collaboration Program. As a result, the Company had increased its estimate of total hours to complete the research services, requiring an adjustment to cumulative revenue recognized (considered a change in estimate pursuant to ASC 606), which led to a full year revenue reversal of $(2,792) in the prior year.

In connection with the AbbVie Termination Agreement, the Company recognized as revenue any remaining deferred revenue associated with the AbbVie Collaboration Agreement in the fourth quarter of 2022.

During the years ended December 31, 2022 and 2021, the Company recognized revenue under the AbbVie Collaboration Agreement of approximately $11,135 and $(2,792), respectively.

Summary of Contract Liabilities

Up-front payments are recorded as deferred revenue upon receipt or when due until such time as the Company satisfies its performance obligations under these arrangements.

The following table presents changes in the balances of the Company's contract liabilities (in thousands):

	AbbVie Collaboration Agreement	Ipsen Collaboration Agreement
Deferred revenue - Balance at January 1, 2021	$ 8,343	$ —
Additions	—	20,000
Revenue (recognized) reversed	2,792	(2,309)
Deferred revenue - Balance at December 31, 2021	11,135	17,691
Additions	—	—
Revenue recognized	(11,135)	(17,691)
Deferred revenue - Balance at December 31, 2022	$ —	$ —

4. Supplemental Balance Sheet Information

Prepaid expenses and other current assets

	December 31, 2022	December 31, 2021
Prepaid clinical, contract research and manufacturing costs	$ 213	$ 2,484
Prepaid insurance	408	763
Other	853	1,278
Prepaid expenses and other current assets	$ 1,474	$ 4,525

(in thousands, except share and per share data)

Other noncurrent assets

	December 31,	
	2022	2021
Restricted cash	$ 1,200	$ 9,200
Prepaid insurance, noncurrent	2,252	—
Other	38	125
Other noncurrent assets	$ 3,490	$ 9,325

Property and equipment, net

	December 31,	
	2022	2021
Scientific equipment	$ 6,087	$ 6,47
Computers and software	63	6
Furniture and fixtures	30	3
Construction in process	—	3
Property and equipment, gross	6,180	6,59
Less: accumulated depreciation	(3,650)	(2,66
Property and equipment, net	$ 2,530	$ 3,92

Depreciation and amortization expense was $1,163 and $1,123, for the years ended December 31, 2022 and 2021, respectively. During the year ended December 31, 2022, the Company sold scientific equipment with a net book value of $222 and recognized a loss of $17 in the accompanying statement of operations for the year ended December 31, 2022.

Accrued expenses and other current liabilities

	December 31,	
	2022	2021
Accrued clinical, contract research and manufacturing costs	$ 48	$ 3,689
Accrued restructuring costs	48	1,191
Lease liability, current	539	459
Accrued payroll-related expenses	32	167
Accrued other expenses	611	958
Accrued expenses and other current liabilities	$ 1,278	$ 6,464

5. Investments

As of December 31, 2022 and 2021, the Company primarily invested its excess cash in debt instruments of corporations, the U.S. Treasury, financial institutions, and U.S. government agencies with strong credit ratings and an investment grade rating at or above a long-term rating of Aa3/AA- and a short-term rating of P1/A1. The Company has established guidelines relative to diversification and maturities that maintain safety and liquidity. The Company periodically reviews and modifies these guidelines to maximize trends in yields and interest rates without compromising safety and liquidity.

As of December 31, 2022, the balance of available-for-sale securities was zero as the Company’s excess cash was primarily invested in money market funds.

(in thousands, except share and per share data)

As of December 31, 2021, the Company's available-for-sale securities were available to the Company for use in its current operations. As a result, the Company categorized all of these securities as current assets even though the stated maturity of some individual securities may be one year or more beyond the balance sheet date.

The amortized cost, gross unrealized holding gains, gross unrealized holding losses and fair value of available-for-sale securities by type of security at December 31, 2021 were as follows:

	December 31, 2021			
	Amortized Costs	Gross Unrealized Holding Gains	Gross Unrealized Holding Losses	Fair Value
Commercial paper	$ 10,498	$ —	$ (2)	$ 10,496
	$ 10,498	$ —	$ (2)	$ 10,496

6. Debt

MidCap Credit Agreement

On March 15, 2022, pursuant to the terms of the Company's Credit and Security Agreement, dated as of September 25, 2020, as amended on October 21, 2020, July 30, 2021, September 30, 2021, and December 10, 2021 with MidCap Financial Trust, as agent, and the lenders party thereto from time to time (as amended, the "MidCap Credit Agreement"), the Company repaid all remaining outstanding obligations under the MidCap Credit Agreement, including the outstanding principal balance of $7,500 and an exit fee of $506.

The MidCap Credit Agreement provided for a secured term loan facility in an aggregate principal amount of up to $25,000 (the "MidCap Credit Facility"). The Company borrowed the first advance of $17,500 ("Tranche 1") on September 25, 2020 (the "Closing Date"). Amendment No. 4 terminated the availability of the second advance of $7,500 ("Tranche 2"), effective as of December 9, 2021, that was previously available under the MidCap Credit Agreement subject to certain conditions.

Tranche 1 bore interest at a floating rate equal to 6.25% per annum, plus the greater of (i) 1.50% or (ii) one-month LIBOR. Interest on each loan advance is due and payable monthly in arrears. Principal on each loan advance was payable in 36 equal monthly installments beginning October 1, 2022 until paid in full on October 1, 2025 (the "Maturity Date"). Prepayments of the loans under the MidCap Credit Agreement, in whole or in part, were subject to early termination fees in an amount equal to 3.0% of principal prepaid if prepayment occurs on or prior to the first anniversary of the Closing Date and 1.0% of principal prepaid if prepayment occurs after the first anniversary of the Closing Date and prior to the maturity date. Pursuant to Amendment No. 4, the early termination fee associated with the prepayment of $10,000 made in December 2021 was waived and, since the remaining principal amount was repaid on or prior to March 31, 2022, the associated early termination fee for that prepayment was also waived. In connection with execution of the MidCap Credit Agreement, the Company paid MidCap a $125 origination fee.

At the Maturity Date or on any earlier date on which all amounts advanced to the Company become due and payable in full, or are otherwise paid in full, the Company was required to pay an exit fee equal to 3.75% of the principal amount of all loans advanced to the Company under the MidCap Credit Agreement. Upon the advance of Tranche 1, the Company accrued $656 for the related exit fee. Pursuant to Amendment No. 4, since the remaining principal amount was repaid on or prior to March 31, 2022, a portion of the related exit fee that had not been earned by MidCap was waived.

The Company's obligations under the MidCap Credit Agreement were secured by a security interest in substantially all of its assets, excluding intellectual property (which is subject to a negative pledge). Additionally, the Company's future subsidiaries, if any, may have been required to become co-borrowers or guarantors under the MidCap Credit Agreement.

The MidCap Credit Agreement contained customary affirmative covenants and customary negative covenants limiting the Company's ability and the ability of the Company's subsidiaries, if any, to, among other things, dispose of assets, undergo a change in control, merge or consolidate, make acquisitions, incur debt, incur liens, pay dividends, repurchase stock and make investments, in each case subject to certain exceptions.

The MidCap Credit Agreement also contained customary events of default relating to, among other things, payment defaults, breaches of covenants, a material adverse change, delisting of the Company's common stock, bankruptcy and insolvency, cross defaults with certain material indebtedness and certain material contracts, judgments, and inaccuracies of representations and warranties. Upon an event of default, the agent and the lenders may declare all or a portion of the Company's outstanding obligations to be immediately due and payable and exercise other rights and remedies provided for under the agreement. During the existence of an event of default, interest on the obligations could have been increased by 2.0%.

Total proceeds, net of fees and issuance costs, borrowed under Tranche 1 were $16,512. Fees and issuance costs of $332, as well as fees of $656 that were payable to MidCap at maturity of Tranche 1, were recorded as a reduction to the carrying amount of long-term debt on the Company's balance sheet and, prior to the repayment of all remaining outstanding obligations under the MidCap Credit Agreement on March 15, 2022, were amortized to interest expense through the maturity date of October 1, 2025 using the effective interest method. Fees and issuance costs of $73 attributed to the amount available to be borrowed under Tranche 2 were paid and recorded as deferred financing costs (other assets) and were amortized and recorded to interest expense in 2021 when it was determined that amounts under Tranche 2 would not be borrowed.

The Company paid interest on the MidCap Credit Agreement of $194 and $1,375 during the years ended December 31, 2022 and 2021, respectively.

7. Leases

The Company's lease arrangements at December 31, 2022 consist of (i) a lease for office and laboratory space at its headquarters in Chicago, Illinois that commenced in July 2020 (the "Chicago Lease") and (ii) leases for office equipment (the "Office Equipment Leases"). The Chicago Lease and the Office Equipment Leases are classified as operating leases.

The Company's lease arrangement for office and laboratory space at its former headquarters in Skokie, Illinois ended in February 2021 in accordance with the terms of that lease arrangement.

Chicago Lease

The Company has approximately thirty thousand square feet of office and laboratory space in Chicago, Illinois (the "Chicago Lease"). The original term (the "Original Term") of the Chicago Lease is 10 years, commencing on July 1, 2020 (the "Commencement Date"), which is the date the premises were ready for occupancy under the terms of the Chicago Lease. The Company has options to extend the term of the Chicago Lease for two additional successive periods of five years each (the "Extension Periods") at the then prevailing effective market rental rate.

The initial annual base rent during the Original Term is approximately $1,113 for the first 12-month period of the Original Term, payable in monthly installments beginning on the Commencement Date. Base rent thereafter is subject to annual increases of 3%, for an aggregate amount of $12,761 over the Original Term. The Company must also pay its proportionate share of certain operating expenses and taxes for each calendar year during the term. During the first 12-month period of the Original Term, the base rent and the Company's proportionate share of operating expenses and taxes are subject to certain abatements.

Upon execution of the Chicago Lease, the Company paid to the landlord the first installment of base rent and the estimated monthly amount of its pro rata share of taxes and its pro rata share of operating expenses in the aggregate amount of $87 which amount had been adjusted for the abatement as set forth in the lease agreement. The Company also paid the landlord a net amount of $697 toward tenant improvements.

(in thousands, except share and per share data)

As part of the agreement for the Chicago Lease, the Company is required to maintain a standby letter of credit during the term of the lease, currently in the amount of $1,200 and subject to reduction over time, which is secured by a restricted certificate of deposit account and presented within other noncurrent assets on the Company's consolidated balance sheet at December 31, 2022.

The Company recognized a right of use asset of $8,931 and a lease liability of $8,147 on the Commencement Date. Because the rate implicit in the Chicago Lease is not readily determinable, the Company used its incremental borrowing rate of 8.3% on the Commencement Date to determine the present value of the lease payments over the Original Term. The incremental borrowing rate represents an estimate of the interest rate the Company would incur at lease commencement to borrow an amount equal to the lease payments on a collateralized basis over the term of a lease. As of December 31, 2022, the Company determined it is not reasonably certain that the renewal option would not be exercised.

Information related to the Company's operating lease asset and related operating lease liabilities were as follows:

	December 31,	
	2022	2021
Weighted-average remaining lease term	7.5 years	8.5 years
Weighted-average discount rate	8.3 %	8.3 %

The following table summarizes lease costs in the Company's consolidated statement of operations:

	December 31,	
	2022	2021
Operating lease costs	$ 1,305	$ 1,306
Variable lease costs	1,529	1,070
Short term lease costs	17	130
Total lease costs	$ 2,851	$ 2,506

The Company made cash payments for operating leases of $3,024 and $2,134 during the years ended December 31, 2022 and 2021, respectively.

Maturities of the Company's lease liability as of December 31, 2022 were as follows:

Years Ending December 31,	Operating Leases
2023	1,10
2024	1,23
2025	1,27
2026	1,31
Thereafter	4,89
Total	$ 9,81
Less: imputed interest	(2,50
Total lease liability	$ 7,30
Current operating lease liability	$ 53
Noncurrent operating lease liability	6,76
Total lease liability	$ 7,30

8. Restructuring

September 2022 Restructuring

On September 26, 2022, the Company announced its commitment to a plan to wind down the Company's R&D activities (the "September 2022 Restructuring"). This plan resulted in a reduction in force where the Company reduced approximately 66% of the Company's existing workforce in early fourth quarter of 2022. Notified employees were offered separation benefits, including severance payments and temporary healthcare coverage assistance, the majority of which were paid in October 2022 as a lump sum payment. All of the severance costs associated with the September 2022 Restructuring represented cash expenditures and were recorded within research and development expense within the accompanying consolidated statement of operations.

December 2021 Restructuring

On December 10, 2021, the Company announced its commitment to a plan to wind down the Company's immuno-oncology program for cavrotolimod (AST-008) and the Company's XCUR-FXN preclinical program for the treatment of Friedreich's ataxia. The Company intended at the time to realign its research and development resources to support (i) the development of its preclinical program targeting SCN9A for neuropathic pain, (ii) the continued advancement of its partnered programs with Ipsen Biopharm Limited to develop SNA-based treatments in neuroscience targeting Huntington's disease and Angelman syndrome, (iii) its continued advancement of its partnered program with AbbVie to develop SNA-based treatments for hair loss disorders, as well as (iv) the continued research and development of other undisclosed therapeutic product candidates. This plan resulted in a reduction in force where the Company eliminated approximately 50% of the Company's existing workforce on a staggered basis through January 2022 as well as other cost-cutting measures.

Notified employees were offered separation benefits, including severance payments and temporary healthcare coverage assistance. In most cases, the separation benefits were paid as a lump sum in January 2022. Certain of the notified employees had employment agreements which provided for separation benefits in the form of salary continuation; these benefits were paid between February 2022 and January 2023. All of the severance costs represent cash expenditures.

The following table presents changes in the accrued restructuring liability balance for the periods presented (in thousands):

(in thousands, except share and per share data)

	December 2021 Restructuring	September 2022 Restructuring	Total
Balance at December 31, 2021	$ 1,191	$ —	$ 1,191
Payments	(1,154)	(489)	(1,643)
Additions	—	488	488
Adjustments (non-cash)	11	1	12
Balance at December 31, 2022	$ 48	$ —	$ 48

The accrued liability balance at December 31, 2022 associated with the strategic reduction in force announced December 2021 of separation benefits in the form of salary continuation pursuant to an employment agreement and was paid in January 2023.

9. Stockholders' Equity

Preferred Stock

The Company has 10,000,000 shares of preferred stock, par value $0.0001 authorized and no shares issued and outstanding.

Common Stock

The Company has 200,000,000 shares of common stock, par value $0.0001, authorized. As of December 31, 2022 and December 31, 2021, the Company had 4,965,901 and 3,626,073 shares issued and outstanding, respectively.

The holders of shares of the Company's common stock are entitled to one vote per share on all matters to be voted upon by the Company's stockholders and there are no cumulative rights. Subject to preferences that may be applicable to any outstanding preferred stock, the holders of shares of the Company's common stock are entitled to receive ratably any dividends that may be declared from time to time by the Board out of funds legally available for that purpose. In the event of the Company's liquidation, dissolution or winding up, the holders of shares of the Company's common stock are entitled to share ratably in all assets remaining after payment of liabilities, subject to prior distribution rights of preferred stock then outstanding. The Company's common stock has no preemptive or conversion rights or other subscription rights. There are no redemption or sinking fund provisions applicable to the Company's common stock. The outstanding shares of the Company's common stock are fully paid and non-assessable.

September 2022 PIPE

Securities Purchase Agreement

On September 26, 2022, the Company entered into a securities purchase agreement (the "September 2022 Securities Purchase Agreement") with CBI USA, pursuant to which the Company agreed to issue and sell to CBI USA in a private placement an aggregate of 3,400,000 shares (the "September 2022 PIPE Shares") of its common stock, par value $0.0001 per share (the "Common Stock"), at a purchase price of $1.60 per share (the "September 2022 PIPE").

The September 2022 PIPE closed on February 24, 2023 (the "2023 PIPE Closing Date"). Immediately following the closing of the September 2022 PIPE, CBI USA holds approximately 50.4% of the shares of the Company's common stock. At closing of the September 2022 PIPE, the Company received aggregate gross proceeds of $5,440 (or net proceeds of approximately $4,597 after transaction expenses).

Refer to Note 17, *Subsequent Event*, for more information on the September 2022 PIPE.

September 2022 Registration Rights Agreement

Also, on September 26, 2022, the Company entered into a registration rights agreement (the "September 2022 Registration Rights Agreement") with CBI USA, pursuant to which the Company agreed to register the resale of the September 2022 PIPE Shares. Under the September 2022 Registration Rights Agreement, the Company has agreed to file a registration statement covering the resale of the September 2022 PIPE Shares no later than the sixtieth (60th) day following the September 2022 PIPE Closing Date. The Company has agreed to use reasonable best efforts to cause such registration statement to become effective as promptly as practicable after the filing thereof but in any event on or prior to the Effectiveness Deadline (as defined in the September 2022 Registration Rights Agreement), and to keep such registration statement continuously effective until the earlier of (i) the date the September 2022 PIPE Shares covered by such registration statement have been sold or may be resold pursuant to Rule 144 without restriction, or (ii) the date that is two (2) years following the September 2022 PIPE Closing Date. The Company has also agreed, among other things, to pay all reasonable fees and expenses (excluding any underwriters' discounts and commissions and all fees and expenses of legal counsel, accountants and other advisors for CBI USA except as specifically provided in the September 2022 Registration Rights Agreement) incident to the performance of or compliance with the September 2022 Registration Rights Agreement by the Company.

In the event the registration statement has not been filed within 90 days following the September 2022 PIPE Closing Date, subject to certain limited exceptions, then the Company has agreed to make pro rata payments to CBI USA as liquidated damages in an amount equal to 0.5% of the aggregate amount invested by CBI USA in the September 2022 PIPE Shares per 30-day period or pro rata for any portion thereof for each such month during which such event continues, subject to certain caps set forth in the September 2022 Registration Rights Agreement.

The Company has granted CBI USA customary indemnification rights in connection with the registration statement. CBI USA has also granted the Company customary indemnification rights in connection with the registration statement.

May 2022 PIPE

Securities Purchase Agreement

On May 9, 2022, the Company entered into a securities purchase agreement (the "May 2022 Securities Purchase Agreement") with certain accredited investors (the "Investors"), pursuant to which the Company agreed to issue and sell to the Investors in a private placement an aggregate of 867,369 shares (the "May 2022 PIPE Shares") of the Company's Common Stock, par value $0.0001 per share, at a purchase price of $5.81 per share (the "May 2022 PIPE"). The May 2022 PIPE closed on May 18, 2022 (the "May 2022 PIPE Closing Date"). The Company received aggregate net proceeds from the May 2022 PIPE of approximately $4,886 after deducting transaction-related expenses.

Registration Rights Agreement

Also, on May 9, 2022, the Company entered into a registration rights agreement (the "May 2022 Registration Rights Agreement") with the Investors, pursuant to which the Company agreed to register the resale of the May 2022 PIPE Shares. Under the May 2022 Registration Rights Agreement, the Company agreed to file a registration statement covering the resale of the Shares no later than July 18, 2022. On July 11, 2022, the Company filed a registration statement on Form S-3 with the SEC for the resale of the Shares and caused the registration statement to become effective on July 20, 2022.

The Company has granted the Investors customary indemnification rights in connection with the registration statement. The Investors have also granted the Company customary indemnification rights in connection with the registration statement.

Registered Direct Offering

On December 16, 2021, the Company completed a securities purchase agreement (the "Purchase Agreement") with certain institutional purchasers (the "Purchasers") entered into on December 14, 2021, pursuant to which the Company offered to the Purchasers, in a registered direct offering priced at-the-market consistent with the rules of the Nasdaq Stock Market (the "Registered Direct Offering"), (i) an aggregate of 433,553 shares (the "Shares") of the Company's common stock, $0.0001 par value per share, (ii) pre-funded warrants to purchase up to an aggregate of 718,981 shares of Common Stock (the "Pre-Funded Warrants"), and (iii) warrants to purchase up to 576,261 shares of Common Stock (the "Warrants"). The combined purchase price of each share of Common Stock and accompanying Warrant is $9.9780 per share. The combined purchase price of each Pre-Funded Warrant and accompanying Warrant is $9.9480 (equal to the combined purchase price per share of Common Stock and accompanying Warrant, minus $0.03). The per share exercise price for the Warrants is $8.1031, the closing bid price of the Company's Common Stock on December 13, 2021 (and as adjusted for the reverse stock split referenced in Note 1). The Warrants will be exercisable immediately from the closing December 16, 2021, and will expire on the five-year anniversary of the date of issuance, or December 16, 2026. The Pre-Funded Warrants and Warrants, which met equity classification, were recognized as a component of permanent stockholders' equity within additional paid-in-capital together with the net proceeds from the Registered Direct Offering. The gross proceeds to the Company from the Registered Direct Offering (excluding effect of subsequent exercises of pre-funded warrants) were $11,478 and net proceeds after deducting the placement agent's fees and other offering expenses paid or payable by the Company were $10,226. The securities were offered by the Company pursuant to an effective shelf registration statement on Form S-3 (File No. 333-251555) previously filed with the Securities and Exchange Commission (the "SEC") on December 21, 2020, and which was declared effective by the SEC on January 7, 2021 (the "Registration Statement").

Each Warrant is exercisable for one share of Common Stock at an exercise price of $8.1031 per share. The Warrants are immediately exercisable as of the date of issuance of December 16, 2021 and will expire on the five-year anniversary of the date of issuance, or December 16, 2026. The Pre-Funded Warrants were offered in lieu of shares of Common Stock to one of the Purchasers whose purchase of shares of Common Stock in the Registered Direct Offering would otherwise result in said Purchaser, together with its affiliates and certain related parties, beneficially owning more than 4.99% (or, at the election of the Purchaser, 9.99%) of the Company's outstanding Common Stock immediately following the consummation of the Registered Direct Offering. Each Pre-Funded Warrant is exercisable for one share of Common Stock at an exercise price of $0.030 per share. The Pre-Funded Warrants are immediately exercisable and may be exercised at any time until all of the Pre-Funded Warrants are exercised in full.

A holder (together with its affiliates) of the Warrant or Pre-Funded Warrant may not exercise any portion of the Warrant or Pre-Funded Warrant, as applicable, to the extent that the holder would own more than 4.99% (or, at the holder's option upon issuance, 9.99%) of the Company's outstanding Common Stock immediately after exercise, as such percentage ownership is determined in accordance with the terms of the Warrant or Pre-Funded Warrant, as applicable. In lieu of making the cash payment otherwise contemplated to be made to the Company upon exercise of a Warrant in payment of the aggregate exercise price, the holder may elect instead to receive upon such exercise (either in whole or in part) the net number of shares of Common Stock determined according to a formula set forth in the Warrants, provided that such cashless exercise shall only be permitted if the Registration Statement is not effective at the time of such exercise or if the prospectus to which the Registration Statement is a part is not available for the issuance of shares of Common Stock to the Warrant holder.

In lieu of making the cash payment otherwise contemplated to be made to the Company upon exercise of a Pre-Funded Warrant in payment of the aggregate exercise price, the holder may elect instead to receive upon such exercise (either in whole or in part) the net number of shares of Common Stock determined according to a formula set forth in the Pre-Funded Warrants.

(in thousands, except share and per share data)

Common Stock Warrants

In December 2021, 252,315 Pre-Funded Warrants were exercised for a total exercise price of $8, resulting in the issuance of 252,315 shares of common stock. In January 2022, Pre-Funded Warrants were exercised for a total exercise price of $14, resulting in the issuance of 466,666 shares of common stock. As of December 31, 2022, there are no unexercised pre-funded warrants that are outstanding.

As of December 31, 2022, warrants to purchase 576,261 shares of common stock at a price of $8.1031 per share that were acquired in the December 2021 registered-direct offering transaction remain outstanding. The warrants are classified as equity. As a result of the closing of the September 2022 PIPE (see Note 17, *Subsequent Events*), a warrant holder elected to exercise their option within 30 days of the closing of the September 2022 PIPE (February 24, 2023) to receive a cash payout for the outstanding warrants in the amount of the Black-Scholes value of each warrant as prescribed in the warrant agreement (or $800 in the aggregate).

Accumulated Other Comprehensive Loss

The following table summarizes the changes in each component of accumulated other comprehensive loss, net of tax, for 2022:

	Unrealized gains (losses) on short-term investments	Total
Balance at December 31, 2021	$ (2)	$ (2)
Other comprehensive income before reclassifications	2	2
Net current period other comprehensive income	2	2
Balance at December 31, 2022	$ —	$ —

The following table summarizes the changes in each component of accumulated other comprehensive loss, net of tax, for 2021:

	Unrealized gains (losses) on short-term investments	Total
Balance at December 31, 2020	$ 83	$ 83
Other comprehensive loss before reclassifications	(84)	(84)
Net losses reclassified from accumulated other comprehensive income	(1)	(1)
Net current period other comprehensive loss	(85)	(85)
Balance at December 31, 2021	$ (2)	$ (2)

The net gain reclassified from accumulated other comprehensive loss during the year ended December 31, 2021 resulted from available-for-sale securities that were called prior to maturity. The basis on which the cost of the securities was determined was specific identification. Proceeds related to these sales were $4,000.

10. Equity-Based Compensation

2017 Equity Incentive Plan

On September 22, 2017, the Company's stockholders approved the Exicure, Inc. 2017 Equity Incentive Plan (the "2017 Plan"), which became effective on November 15, 2017. The 2017 Plan provides for the issuance of incentive awards of up to 194,750 shares of Exicure common stock, which includes 72,330 shares of Exicure common stock to be issued to officers, employees, consultants and directors, plus a number of shares not to exceed 122,793 that are subject to issued and outstanding awards under the Exicure OpCo 2015 Equity Incentive Plan (the "2015 Plan") and were assumed in the merger transaction on September 26, 2017. Awards that may be awarded under the 2017 Equity Incentive Plan include non-qualified and incentive stock options, stock appreciation rights, bonus shares, restricted stock, restricted stock units, performance units and cash-based awards. The number of shares of common stock reserved for issuance under the 2017 Equity Incentive Plan automatically increases on January 1 of each year, beginning on January 1, 2020, by the lesser of (i) 153,333 shares, (ii) 5% of the total number of shares of its capital stock outstanding on December 31 of the preceding calendar year, or (iii) a lesser number of shares determined by the Compensation Committee of the Board (the "Compensation Committee"). No future awards will be made under the 2015 Plan upon the effectiveness of the 2017 Plan.

As of December 31, 2022, the aggregate number of awards available for grant under the 2017 Plan was 259,031. On January 1, 2023, pursuant to the terms of the 2017 Plan, the number of awards that are reserved and may be awarded under the 2017 Plan was automatically increased by 153,333 awards.

Awards granted under the 2017 Plan are contingent on the participants' continued employment or provision of non-employee services and are subject to forfeiture if employment or continued service terminates for any reason. The initial award granted to an employee or consultant generally vests 25% on the first 12-month anniversary of the grant date and vests 1/48th monthly thereafter until fully vested at the end of 48 months. Subsequent awards granted to employees or consultants generally vest 1/48th monthly until fully vested at the end of 48 months. The initial stock option grant to a non-employee director vests 1/36th monthly until fully vested at the end of 36 months. Subsequent stock option grants to a non-employee director vests 1/12th monthly until fully vested at the end of 12 months. The term of common stock option grants is 10 years unless terminated earlier as described above.

Inducement Grant

In May 2021, the Company granted stock options to purchase up to 20,000 shares of common stock as a material inducement to Brian C. Bock to enter into employment with the Company as the Company's Chief Financial Officer (the "Inducement Grant"). The Inducement Grant, which was made pursuant to a stand-alone nonstatutory stock option agreement (the "Inducement Award Agreement"), was approved by the Compensation Committee, was awarded in accordance with Nasdaq Listing Rule 5635(c)(4) and outside of the Company's 2017 Equity Incentive Plan and is subject to the terms and conditions of the Inducement Award Agreement. As such, any shares underlying the Inducement Grant are not, upon forfeiture, cancellation or expiration, returned to a pool of shares reserved for future issuance. In connection with Mr. Bock's resignation from the Company on February 4, 2022, the stock options underlying the Inducement Grant were forfeited.

(in thousands, except share and per share data)

Employee Stock Purchase Plan

The 2017 Employee Stock Purchase Plan (the "ESPP") was adopted by the Board in September 2017 and approved by the Company's stockholders in September 2017. Through the ESPP, eligible employees may authorize payroll deductions of up to 15% of their compensation to purchase common stock. The maximum number of shares that an employee may purchase on any exercise date in an offer period will be the smaller of (i) 250 shares or (ii) such number of shares as has a fair market value (determined as of the offering date for such offer period) equal to $25,000 within one calendar year minus the fair market value of any other shares of common stock that are attributed to such calendar year. The purchase price per share at each purchase date is equal to 85% of the lower of (i) the closing market price per share of Exicure common stock on the employee's offering date or (ii) the closing market price per share of Exicure common stock on the exercise date. Each offering period is approximately six-months in duration and the first offering period began on November 16, 2020 and ended on May 14, 2021. During 2022, the Company issued 1,851 shares of common stock that were purchased under the ESPP.

The ESPP provides that the number of shares reserved and available for issuance will automatically increase each January 1, beginning on January 1, 2018 and each January 1 thereafter through January 1, 2027, by the least of (i) 10,000 shares; (ii) 0.3% of the outstanding shares of common stock on the last day of the immediately preceding calendar year; or (iii) a lesser number of shares determined by the Board. As of December 31, 2022, there were 41,971 shares available for issuance under the ESPP. On January 1, 2023, the number of shares of common stock available for issuance under the ESPP increased by 10,000 shares.

Equity-based compensation expense is classified in the statements of operations as follows:

	Year Ended December 31,	
	2022	2021
Research and development expense	$ 507	$ 1,362
General and administrative expense	862	1,577
	$ 1,369	$ 2,939

Unamortized equity-based compensation expense at December 31, 2022 was $$2,014, which is expected to be amortized over a weighted-average period of 2.8 years.

The Company utilizes the Black-Scholes option-pricing model to determine the fair value of common stock option grants. The Black-Scholes option-pricing model was developed for use in estimating the fair value of traded options that have no vesting restrictions and are fully transferable. The model also requires the input of highly subjective assumptions. In addition to an assumption on the expected term of the option grants as discussed below, application of the Black-Scholes model requires additional inputs for which we have assumed the values described in the table below:

	Year Ended December 31,	
	2022	2021
Expected term	5.3 to 6.1 years	5.0 to 6.1 yea
Risk-free interest rate	2.86% to 3.56%; weighted avg. 2.90%	0.36% to 1.12% weighted avg. 1.05
Expected volatility	95.2% to 95.8%; weighted avg. 95.2%	81.7% to 83.6% weighted avg. 82.6
Forfeiture rate	5 %	5
Expected dividend yield	— %	—

(in thousands, except share and per share data)

The expected term is based upon the “simplified method” as described in Staff Accounting Bulletin Topic 14.D.2. Currently, the Company does not have sufficient experience to provide a reasonable estimate of an expected term of its common stock options. The Company will continue to use the “simplified method” until there is sufficient experience to provide a more reasonable estimate in conformance with ASC 718-10-30-25 through 30-26. The risk-free interest rate assumptions were based on the U.S. Treasury bond rate appropriate for the expected term in effect at the time of grant. For stock options granted after December 31, 2021, the expected volatility is based on the volatility of shares of the Company. For stock options granted prior to January 1, 2022, the expected volatility is based on calculated enterprise value volatilities for publicly traded companies in the same industry and general stage of development. The estimated forfeiture rates were based on historical experience for similar classes of employees. The dividend yield was based on expected dividends at the time of grant.

The fair value of the underlying common stock and the exercise price for the common stock options granted during the years ended December 31, 2022 and 2021 are summarized in the table below:

Common Stock Options Granted During Period Ended:	Fair Value of Underlying Common Stock	Exercise Price of Common Stock Optio
Year ended December 31, 2022	$3.46 to $5.51; weighted avg. $4.56	$3.46 to $5.51; weighted avg. $4.5
Year ended December 31, 2021	$34.50 to $77.10; weighted avg. $56.10	$34.50 to $77.10; weighted avg. $56.1

The weighted-average grant date fair value of common stock options granted in the years ended December 31, 2022 and 2021 was $2.52 and $39.00 per common stock option, respectively.

A summary of common stock option activity as of the periods indicated is as follows:

	Options	Weighted-Average Exercise Price [1]	Weighted-Average Remaining Contractual Term (years)	Aggregate Intrinsic Valu (thousands)
Outstanding - December 31, 2021	331,420	$ 61.82	7.0	$ -
Granted	232,028	4.56		
Settled	(124)	5.51		
Forfeited	(340,491)	60.18		
Outstanding - December 31, 2022	222,833	$ 4.74	7.5	$ -
Exercisable - December 31, 2022	90,499	$ 5.94	5.1	$ -
Vested and Expected to Vest - December 31, 2022	213,753	$ 4.78	7.4	$ -

(1) On March 24, 2022, the Company’s Board of Directors unanimously approved the repricing of all outstanding and unexercised stock options granted under our 2015 Equity Incentive Plan and 2017 Equity Incentive Plan and held by its current employees, executive officers, and directors. Effective April 1, 2022, the exercise price of the eligible stock options was reduced to $5.51, the closing price of our common stock on April 1, 2022. See below section titled “Repricing of Outstanding and Unexercised Options” for more information.

The aggregate intrinsic value of common stock options exercised during the years ended December 31, 2022 and 2021 was $0 and $243, respectively.

(in thousands, except share and per share data)

A summary of restricted stock unit activity of the periods indicated is as follows:

	Restricted Stock Units	Weighted-Average Grant Date Fair Value
Unvested balance - December 31, 2021	10,109	$ 50.04
Granted	51,536	3.42
Vested	(5,535)	22.04
Forfeited	(35,225)	4.72
Unvested balance - December 31, 2022	20,885	$ 12.65

The grant date fair value of restricted stock units is based on the Company's closing stock price at the date of grant. At vesting, each outstanding restricted stock unit will be exchanged for one share of the Company's common stock. The restricted stock units granted during the 2022 period generally vest evenly on a quarterly basis over a period of 4 years in exchange for continued service provided by the restricted stock unit recipient during that vesting period.

A summary of performance-based restricted stock unit activity of the periods indicated is as follows:

	Restricted Stock Units	Weighted-Average Grant Date Fair Value
Unvested balance - December 31, 2021	—	$ —
Granted	97,643	3.45
Unvested balance - December 31, 2022	97,643	$ 3.45

The grant date fair value of performance-based restricted stock units is based on the Company's closing stock price at the date of grant. At vesting, each outstanding restricted stock unit will be exchanged for one share of the Company's common stock. Certain performance metrics must be met by the performance measurement date in 2023 in order for the performance-based restricted stock units granted during 2022 to vest as follows: one-third on May 16, 2023, one-third on May 16, 2024, and one-third on May 16, 2025, in exchange for continued service provided by the performance-based restricted stock unit recipient during that vesting period.

Repricing of Outstanding and Unexercised Options

On March 24, 2022, the Board unanimously approved the repricing of all outstanding and unexercised stock options granted under the 2015 Plan and 2017 Plan (the "Plans") and held by current employees, executive officers, and directors of the Company (the "Eligible Stock Options"). Effective April 1,2022, the exercise price of the eligible stock options was reduced to $5.51, the closing price of its common stock on April 1, 2022. Except for the modification to the exercise price of the Eligible Stock Options, all other terms and conditions of each of the Eligible Stock Options will remain in full force and effect.

Pursuant to the Plans, the Board, as the administrator of the Plans, has discretionary authority, exercisable on such terms and conditions that it deems appropriate under the circumstances, to reduce the exercise price in effect for outstanding options under the Plans. In approving the repricing, the Board considered the impact of the current exercise prices of outstanding stock options on the incentives provided to employees and directors, the lack of retention value provided by the outstanding stock options to employees and directors, and the impact of such options on the capital structure of the Company. As of March 24, 2022, there were 233,224 stock options outstanding under the Plans, and all of the Company's outstanding stock options had exercise prices in excess of the current fair market

(in thousands, except share and per share data)

value of the Company's common stock as of March 24, 2022, which is why the Board made the determination to deem all outstanding and unexercised stock options held by current employees, executive officers, and directors as Eligible Stock Options.

Matthias Schroff, the Company's Chief Executive Officer, and Elias Papadimas, the Company's Chief Financial Officer, held Eligible Stock Options exercisable into an aggregate of 29,373 and 12,513 shares of the Company's common stock, respectively. Former non-employee directors, Jeffrey Cleland, Elizabeth Garofalo, Bali Muralidhar and James Sulat, held Eligible Stock Options exercisable into an aggregate of 3,835, 5,000, 3,835 and 3,112 shares of the Company's common stock, respectively.

The option repricing resulted in incremental stock-based compensation of $291, of which $213 was recorded as expense in the year ended December 31, 2022 and the remaining balance is expected to be recognized as expense over the requisite service period in which the stock options vest.

11. Income Taxes

Pre-tax loss before income taxes was $2,373 and $64,102 for the years ended December 31, 2022 and 2021, respectively, which consists entirely of losses in the U.S. and resulted in $209 and $0 provision for income tax expense during the years then ended, respectively.

Components for the provision for income taxes consist of the following:

	Year Ended December 31,	
	2022	2021
Current		
Federal	$ 115	$ —
State and local	94	—
Total current tax expense	$ 209	$ —
Deferred		
Federal	$ —	$ —
State and local	—	—
Total deferred tax expense	$ —	$ —
Provision for income tax expense	$ 209	$ —

(in thousands, except share and per share data)

The differences between income taxes computed using the U.S. federal income tax rate and the provision for income taxes are as follows:

	Year Ended December 31,			
	2022		2021	
Federal income tax expense at statutory rate	$ (498)	21.0 %	$ (13,461)	21.0 %
State income tax expense at statutory rate	(87)	3.7	(4,816)	7.5
Permanent differences	108	(4.6)	245	(0.4)
Research and development credit	(31)	1.3	—	—
Other	(16)	0.7	(32)	—
Change in valuation allowance	733	(30.9)	18,064	(28.1)
	$ 209	(8.8)%	$ —	— %

The effective tax rate for the year ended December 31, 2022 is attributable to the fact that the Company is subject to the IRC Sec. 174 regulations requiring companies to capitalize certain research and experimental expenditures and IRC Sec. 382 loss limitation rules on the Company's ability to utilize net operating losses to offset the capitalization requirement. The effective income tax rate for the year ended December 31, 2021 was 0% because the Company generated tax losses and provided a full valuation allowance against its deferred tax assets to an amount that is more likely than not to be realized.

The significant components of the Company’s net deferred tax assets are as follows:

	December 31,	
	2022	2021
Deferred Tax Assets		
Net operating losses	$ 36,331	$ 42,769
Tax credits	472	3,922
Capitalized R&D expenses	5,795	—
Intangibles	117	134
Accrued expenses	40	1,331
Operating lease liability	2,097	2,253
Equity-based compensation	1,874	1,622
Deferred revenue	—	3,191
Other	56	54
Less: Valuation allowance	(44,145)	(52,392)
Total deferred tax assets	2,637	2,884
Deferred Tax Liabilities		
Prepaid expenses	(262)	(308)
Fixed assets and other	(292)	(298)
Right-of-use asset	(2,083)	(2,278)
Total deferred tax liabilities	(2,637)	(2,884)
Deferred taxes, net	$ —	$ —

The Company's effective income tax rate for the year ended December 31, 2022 is (8.8)%. The Company has recorded a full valuation allowance against its deferred tax assets. This determination is based on significant negative evidence, including:

- *Cumulative losses:* The Company has been in a significant cumulative loss position since its inception in 2012.

- *Projected realization of net operating loss carry forward amounts:* Projections of future pre-tax book loss and taxable losses based on the Company's recent actual performance and current industry data indicate it is more likely than not that the benefits will not be recognized.

At December 31, 2022, the Company had a federal net operating loss carryforward of $120,346, which will begin to expire in 2035. At December 31, 2022, the Company had $148,344 of state net operating loss carryforwards which will begin to expire in 2027.

As provided by Section 382 of the Internal Revenue Code of 1986 ("Section 382"), and similar state provisions, utilization of net operating losses and tax credit carryforwards may be subject to substantial annual limitations due to ownership change limitations that have previously occurred or that could occur in the future. Ownership changes may limit the amount of net operating losses and tax credit carryforwards that can be utilized annually to offset future taxable income and tax, respectively. In general, an ownership change, as defined by Section 382, results from transactions that increase the ownership of five percent stockholders in the stock of a corporation by more than 50 percent in the aggregate over a three-year period. The Company completed a review of its changes in ownership through December 31, 2022 and determined that it had experienced an "ownership change" within the meaning of Section 382(g) during the fourth quarter of 2022. This ownership change has and will continue to subject the Company's net operating loss carryforwards to an annual limitation, which will significantly restrict the Company's ability to use them to offset its taxable income in periods following the ownership change. In general, the annual use limitation equals the aggregate value of our stock at the time of the ownership change multiplied by a specified tax-exempt interest rate.

The Company determined that at the date of the 2022 ownership change, it had a net unrealized built-in loss ("NUBIL"). The NUBIL was determined based on the difference between the fair market value of the Company's assets and their tax basis at the ownership change date. Because of the NUBIL, certain deductions recognized during the five-year period beginning on the date of the Section 382 ownership change (the "recognition period") are subject to the same limitation as the net operating loss carryforwards or certain other deductions.

At December 31, 2022 and 2021, the Company had no unrecognized tax benefits. The Company's estimate of the potential outcome of any uncertain tax positions is subject to management's assessment of relevant risks, facts and circumstances existing at that time. The Company evaluates uncertain tax positions to determine if it is more-likely-than-not that they would be sustained upon examination. The Company recognizes interest and penalties related to unrecognized tax benefits in the provision for income taxes.

The Company is subject to taxation in the U.S. and various state jurisdictions. The Company remains subject to examination by U.S. federal and state tax authorities for the years 2018 through 2022. There are no pending examinations in any jurisdiction.

12. Loss Per Common Share

Basic loss per common share is calculated by dividing net loss by the weighted-average number of shares of common stock outstanding during the period. Diluted loss per common share is calculated using the treasury share method by giving effect to all potentially dilutive securities that were outstanding. Potentially dilutive options, restricted stock units and warrants to purchase common stock that were outstanding during the periods presented were excluded from the diluted loss per share calculation for the periods presented because such shares had an anti-

(in thousands, except share and per share data)

dilutive effect due to the net loss reported in those periods. Therefore, basic and diluted loss per common share is the same for each of the years ended December 31, 2022 and 2021.

The following is the computation of loss per common share for the years ended December 31, 2022 and 2021:

	Year Ended December 31,	
	2022	2021
Net loss	$ (2,582)	$ (64,102)
Weighted-average basic and diluted common shares outstanding	4,619,471	2,953,901
Loss per share - basic and diluted	$ (0.56)	$ (21.70)

The outstanding securities presented below were excluded from the calculation of loss per common share, for the periods presented, because such securities would have been anti-dilutive due to the Company's loss per share during that period:

	December 31,	
	2022	2021
Options to purchase common stock	222,833	331,42
Restricted stock units	20,885	10,10
Performance stock units	97,643	-
Warrants to purchase common stock	576,261	1,042,92

13. Fair Value Measurements

ASC Topic 820, *Fair Value Measurement*, establishes a three-tier fair value hierarchy, which prioritizes the inputs used in measuring fair value, as follows: Level 1 Inputs - unadjusted quoted prices in active markets for identical assets or liabilities accessible to the reporting entity at the measurement date; Level 2 Inputs - other than quoted prices included in Level 1 inputs that are observable for the asset or liability, either directly or indirectly, for substantially the full term of the asset or liability; and Level 3 Inputs - unobservable inputs for the asset or liability used to measure fair value to the extent that observable inputs are not available, thereby allowing for situations in which there is little, if any, market activity for the asset or liability at measurement date.

Assets measured at fair value on a recurring basis as of December 31, 2022 are as follows:

	Total	Level 1	Level 2	Level 3
Assets				
Cash equivalents:				
Money market funds	$ 1,612	$ 1,612	$ —	$ —
Total financial assets	$ 1,612	$ 1,612	$ —	$ —

(in thousands, except share and per share data)

Assets measured at fair value on a recurring basis as of December 31, 2021 are as follows:

	Total	Level 1	Level 2	Level 3
Assets				
Cash equivalents:				
Money market funds	$ 21,125	$ 21,125	$ —	$ —
Commercial paper	5,999	—	5,999	—
Short-term investments:				
Commercial paper	4,497	—	4,497	—
Total financial assets	$ 31,621	$ 21,125	$ 10,496	$ —

The Company uses the market approach and Level 1 and Level 2 inputs to value its cash equivalents and Level 2 inputs to value its short-term investments. The Company's long-term debt bore interest at the prevailing market rates for instruments with similar characteristics and, accordingly, the carrying value for this instrument also approximated its fair value and the financial measurement was also classified within Level 2 of the fair value hierarchy.

As of December 31, 2022, the Company's common stock warrant liability associated with warrants issued in a private placement offering of common stock in 2017 was $0 and no warrants were outstanding underlying the common stock warrant liability as those warrants expired unexercised during 2021. The following is a reconciliation of the Company's liabilities measured at fair value on a recurring basis using unobservable inputs (Level 3) for the years ended December 31, 2022 and 2021:

	Fair Value Measurements Using Significant Unobservable Inputs (Level 3)
	Common Stock Warrant Liability
Balance at December 31, 2020	$ 15
Gain included in other income (expense), net	(15)
Balance at December 31, 2021	$ —
Gain included in other income (expense), net	—
Balance at December 31, 2022	$ —

14. Defined Contribution Plan

Exicure maintains a defined contribution savings plan for the benefit of its employees. Company contributions are determined under various formulas. The expense recognized for this plan was $276 and $402 for the years ended December 31, 2022 and 2021, respectively.

15. Commitments and Contingencies

Legal Proceedings

On December 13, 2021, Mark Colwell filed a putative securities class action lawsuit against the Company, David A. Giljohann and Brian C. Bock in the United States District Court for the Northern District of Illinois, captioned Colwell v. Exicure, Inc. et al., Case No. 1:21-cv-0663. On February 4, 2021, plaintiff filed an amended putative securities class action complaint. The amended complaint alleges that Dr. Giljohann and Mr. Bock made materially false and/or misleading statements related to the Company's clinical programs purportedly causing losses to investors who acquired Company securities between January 7, 2021 and December 10, 2021. The amended

complaint does not quantify any alleged damages but, in addition to attorneys' fees and costs, plaintiff seeks to recover damages on behalf of himself and others who acquired the Company's stock during the putative class period at allegedly inflated prices and purportedly suffered financial harm as a result. On March 20, 2023, the Court issued an Order appointing James Mathew as Lead Plaintiff, and Bleichmar Fonti & Auld LLP as Lead Counsel for the purported class. The parties are required to submit, within two weeks of that Order, a schedule to the Court governing the filing of a further amended complaint and the timing of defendants' answer or response.

On March 1, 2022, Kapil Puri filed a shareholder derivative lawsuit on behalf of the Company in the United States District Court for the Northern District of Illinois, against Dr. Giljohann and Mr. Bock, Jeffrey L. Cleland, Elizabeth Garofalo, Bosun Hau, Bali Muralidhar, Andrew Sassine, Matthias Schroff, James Sulat and Timothy Walbert, captioned Puri v. Giljohann, et al., Case No. 1:22-cv-01083. On March 8, 2022, Yixin Sim filed a similar shareholder derivative lawsuit in the same court against the same individuals, captioned Sim v. Giljohann, et al., Case No. 1:22-cv-01217. On April 25,2022, Stourbridge Investments LLC filed a similar shareholder derivative lawsuit against the same individuals in the United States District Court for the District of Delaware, captioned Stourbridge Investments LLC v. Exicure, Inc. et al., Case No. 1:22-cv-00526. Based on similar factual allegations presented in the Colwell complaint, described above, the Puri, Sim, and Stourbridge complaints (collectively, the "Derivative Complaints") allege that the defendants caused the Company to issue false and/or misleading statements in the proxy statement for its 2021 Annual Meeting of Stockholders regarding risk oversight, code of conduct, clinical program and compensation matters, among other things, in violation of federal securities law, and committed breaches of fiduciary duties. The Derivative Complaints also assert that Dr. Giljohann and Mr. Bock are liable for contribution under the federal securities laws. The Puri and Stourbridge complaints further assert state law claims for unjust enrichment, and the Puri complaint additionally asserts state law claims for abuse of control, gross mismanagement and corporate waste. The plaintiffs do not quantify any alleged damages in the Derivative Complaints, but seek restitution for damages to the Company, attorneys' fees, costs, and expenses, as well as an order directing that certain proposals for strengthening board oversight be put to a vote of the Company's shareholders.

All of the Derivative Cases have been stayed pending a decision on any motion to dismiss that may be filed in the Colwell case. In addition, the Stourbridge case has been administratively closed pending the decision on motion to dismiss that may be filed in the Colwell case.

Leases

Refer to Note 7, *Leases*, for a discussion of the commitments associated with the Company's lease agreements.

Northwestern University License Agreements

On December 12, 2011, (1) AuraSense, LLC, the Company's former parent, assigned to the Company all of its worldwide rights and interests under AuraSense, LLC's 2009 license agreement with Northwestern University ("NU") in the field of the use of nanoparticles, nanotechnology, microtechnology or nanomaterial-based constructs as therapeutics or accompanying therapeutics as a means of delivery, but expressly excluding diagnostics (the "assigned field"); (2) in accordance with the terms and conditions of this assignment, the Company assumed all liabilities and obligations of AuraSense, LLC as set forth in its license agreement in the assigned field; and (3) in order to secure this assignment and the patent rights from NU, the Company agreed (i) to pay NU an annual license fee, which may be credited against any royalties due to NU in the same year, (ii) to reimburse NU for expenses associated with the prosecution and maintenance of the license patent rights, (iii) to pay NU royalties based on any net revenue generated by the Company's sale or transfer of any licensed product, (iv) to pay NU, in the event the Company grants a sublicense under the licensed patent rights, the greater of a percentage of all sublicensee royalties or a percentage of any net revenue generated by a sublicensee's sale or transfer of any licensed product, and (v) to pay NU a percentage of all other sublicense payments received by the Company. In August 2015, the Company entered into a restated license agreement with NU (the "Restated License Agreement"). In February 2016, the Company obtained exclusive license as to NU's rights in certain SNA technology it jointly owns with NU (the "Co-owned Technology License"). The Company's license to NU's rights is limited to the assigned field, however the Company has no such limitation as to its own rights in this jointly owned technology. The Company's rights and obligations in the Co-owned Technology License agreement is substantially the same as in the Restated License Agreement from August 2015 (collectively referred to as "the Northwestern University License Agreements"). As of December 31, 2022, the Company has paid to NU an aggregate of $11,515 in consideration of each of the obligations described above.

16. Related-Party Transactions

The Company received consulting services from, and paid fees to, one of its co-founders who is not an employee but, through April 30, 2021, served as a member of the Board. The consulting agreement with this co-founder and former Board member expired on September 30, 2021 under the terms of the agreement and was not renewed. The Company recognized expense of $75 for the year ended December 31, 2021 in connection with these consulting services in the accompanying consolidated statement of operations.

17. Subsequent Events

Closing of September 2022 PIPE

The September 2022 PIPE (see Note 9, Stockholders' Equity) closed on February 24, 2023. As a result of the closing of the September 2022 PIPE, CBI USA is the beneficial owner of approximately 50.4% of the Company's outstanding shares. Pursuant to the board designation rights of CBI USA, CBI USA designated three members to the Company's board of directors effective as of February 24, 2023. Subsequently, the board appointed additional directors. As a result, the board of directors current has 6 members, only one which, Matthias Schroff, the Company's Chief Executive Officer, served as a director prior to the closing.

In February 2023, the Company received gross proceeds of $5,440 from the September 2022 PIPE (or net proceeds of $4,597 after transaction expenses). Following the closing, a holder of warrants to purchase 526,151 shares of common stock at a price of $8.1031 per share that were acquired in the December 2021 registered-direct offering transaction elected to exercise their option to receive a cash payout for the outstanding warrants in the amount of the Black-Scholes value of each warrant as prescribed in the warrant agreement (or $800 in the aggregate).

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure.

None.

Item 9A. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

We maintain "disclosure controls and procedures" as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act, that are designed to ensure that information required to be disclosed in our periodic and current reports that we file with the SEC under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including our principal executive officer and principal financial officer, as appropriate, to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

Our management, with the participation of our principal executive officer and our principal financial officer, evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2022. Based on the evaluation of our disclosure controls and procedures as of December 31, 2022, our principal executive officer and principal financial officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) of the Exchange Act). Under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2022 based on the guidelines established in Internal Control-Integrated Framework 2013 issued by the Committee of Sponsoring Organizations of the Treadway Commission.

Based on the results of its evaluation, management concluded that our internal control over financial reporting was effective as of December 31, 2022.

Attestation Report of the Registered Public Accounting Firm

This Annual Report on Form 10-K does not include an attestation report of our independent registered public accounting firm as we are a non-accelerated filer and an "emerging growth company" as of December 31, 2022, as defined in the Jumpstart Our Business Startups Act of 2012.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting during the fiscal quarter ended December 31, 2022 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Inherent Limitations on Effectiveness of Controls

Our management, including our principal executive officer and principal financial officer, believes that our disclosure controls and procedures and internal control over financial reporting are designed to provide reasonable assurance of achieving their objectives and are effective at the reasonable assurance level. However, our management does not expect that our disclosure controls and procedures or our internal control over financial reporting will prevent all errors and all fraud. A control system, no matter how well conceived and operated, can

provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, have been detected. These inherent limitations include the realities that judgments in decision making can be faulty, and that breakdowns can occur because of a simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by management override of the controls. The design of any system of controls also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected.

Item 9B. Other Information.

None.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections.

Not applicable.

PART III

We expect to file a definitive proxy statement for our 2023 Annual Meeting of Stockholders, or the Proxy Statement, with the SEC, pursuant to Regulation 14A, not later than 120 days after the end of our fiscal year. Accordingly, certain information required by Part III has been omitted under General Instruction G(3) to Form 10-K. Only those sections of the Proxy Statement that specifically address the items set forth herein are incorporated by reference.

Item 10. Directors, Executive Officers and Corporate Governance.

The information required by Item 10 is incorporated herein by reference to the sections of the 2023 Proxy Statement under the captions “Board of Directors and Corporate Governance,” “Election of Directors,” and “Executive Officers.”

Item 11. Executive Compensation.

The information required by Item 11 is incorporated herein by reference to the sections of the 2023 Proxy Statement under the captions “Executive Compensation” and “Director Compensation.”

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The information required by Item 12 is incorporated herein by reference to the sections of the 2023 Proxy Statement under the captions “Security Ownership of Certain Beneficial Owners and Management” and “Securities Authorized for Issuance under Equity Compensation Plans.”

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The information required by Item 13 is incorporated herein by reference to the sections of the 2023 Proxy Statement under the captions “Certain Relationships and Related Party Transactions” and “Independence of the Board of Directors.”

Item 14. Principal Accounting Fees and Services.

Our independent public accounting firm is KPMG LLP, Chicago, Illinois (PCAOB ID: 185). The information required by Item 14 is incorporated herein by reference to the sections of the 2023 Proxy Statement under the caption “Ratification of Selection of Independent Registered Public Accounting Firm.”

PART IV

Item 15. Exhibit and Financial Statement Schedules.

(a) The following documents are filed as part of this report:

1. Financial Statements

See Index to Financial Statements on page 43 of this Annual Report on Form 10-K.

2. Financial Statement Schedules

All financial statement schedules are omitted because they are not applicable or the required information is included in the financial statements or notes thereto.

3. Exhibits

Exhibit Number	Exhibit Description	Filed with this Report	Incorporated by Reference herein from Form or Schedule	Filing Date	SEC File/Reg. Number
3.1	Amended and Restated Certificate of Incorporation, as filed with the Secretary of State of the State of Delaware on November 15, 2017.		10-K (Exhibit 3.3)	3/11/2021	001-39011
3.2	Certificate of Amendment to Amended and Restated Certificate of Incorporation of Exicure, Inc., effective June 29, 2022.		8-K (Exhibit 3.1)	6/29/2022	001-39011
3.3	Amended and Restated Bylaws, as currently in effect.		8-K (Exhibit 3.4)	10/2/2017	000-55764
4.1	Description of Securities		10-K (Exhibit 4.4)	3/10/2020	001-39011
10.1+	2015 Equity Incentive Plan and forms of awards thereunder, assumed in the Merger.		8-K (Exhibit 10.1)	10/2/2017	000-55764
10.2+	2017 Equity Incentive Plan and forms of award agreements thereunder.		8-K (Exhibit 10.2)	10/2/2017	000-55764
10.3+	2017 Employee Stock Purchase Plan.		8-K (Exhibit 10.3)	10/2/2017	000-55764
10.4+	Form of Indemnification Agreement by and between the Company and each of its directors and executive officers.		8-K (Exhibit 10.4)	10/2/2017	000-55764
10.5+	Separation and Transition Agreement by and between Exicure Inc. and David A. Giljohann, Ph.D.		8-K (Exhibit 10.3)	2/4/2022	001-39011
10.6+	Second Amended and Restated Employment Agreement, by and between Exicure, Inc. and Matthias Schroff, Ph.D.		8-K (Exhibit 10.2)	2/4/2022	001-39011
10.7+	First Amendment to the Second Amended and Restated Employment Agreement, by and between Exicure, Inc. and Matthias Schroff, dated September 23, 2022.		8-K (Exhibit 10.3)	9/27/2022	001-39011
10.8+	Advisor Agreement by and between Exicure, Inc. and Brian C. Bock		8-K (Exhibit 10.1)	2/4/2022	001-39011
10.9+	Amended and Restated Employment Agreement dated as of June 1, 2021 by and between Elias D. Papadimas and Exicure, Inc.		10-Q (Exhibit 10.3)	8/12/2021	001-39011
10.10+	First Amendment to Amended and Restated Employment Agreement by and between Exicure, Inc. and Elias D. Papadimas, dated January 17, 2022		8-K (Exhibit 10.2)	1/18/2022	001-39011
10.11+	Second Amendment to the Amended and Restated Employment Agreement, by and between Exicure, Inc. and Elias Papadimas, dated September 23, 2022.		8-K (Exhibit 10.4)	9/27/2022	001-39011
10.12+	Retention Agreement by and between Exicure, Inc. and Elias D. Papadimas		10-K (Exhibit 10.20)	3/25/2022	001-39011

10.14+	Employment Agreement by and between Exicure, Inc. and Sarah Longoria, dated March 5, 2021	X			
10.15+	First Amendment to Employment Agreement by and between Exicure, Inc. and Sarah Longoria, dated December 10, 2021	X			
10.16+	Second Amendment to Employment Agreement by and between Exicure, Inc. and Sarah Longoria, dated September 23, 2022	X			
10.17	Lease Agreement dated as of February 28, 2020 by and between 2430 N. Halsted, LLC and Exicure, Inc.		10-Q (Exhibit 10.1)	5/14/2020	001-39011
10.18*	Restated License Agreement between Exicure OpCo and Northwestern University dated as of August 15, 2015.		8-K/A (Exhibit 10.20)	11/7/2017	000-55764
10.19.1*	Amendment One to the Amended Restated License Agreement between Exicure OpCo and Northwestern University dated as of September 27, 2016.		8-K/A (Exhibit 10.23)	11/7/2017	000-55764
10.19.2*	Amendment Two to the Amended Restated License Agreement between Exicure OpCo and Northwestern University dated as of November 30, 2017.		10-K (Exhibit 10.22)	3/10/2020	001-39011
10.19.3*	Amendment Three to the Amended Restated License Agreement between Exicure OpCo and Northwestern University dated as of January 1, 2019.		10-K (Exhibit 10.23)	3/10/2020	001-39011
10.19.4	Amendment Four to the Amended Restated License Agreement between Exicure OpCo and Northwestern University dated as of November 13, 2019.		10-K (Exhibit 10.24)	3/10/2020	001-39011
10.19.5	Amendment Five to the Amended Restated License Agreement between Exicure OpCo and Northwestern University dated as of September 8, 2021.		10- Q (Exhibit 10.5)	11/19/2021	001-39011
10.20*	License Agreement between Exicure OpCo and Northwestern University dated as of February 10, 2016 and effective as of May 27, 2014.		8-K/A (Exhibit 10.21)	11/7/2017	000-55764
10.21.1*	Amendment One dated and effective as of June 11, 2018 to the License Agreement between Exicure OpCo and Northwestern University dated as of February 10, 2016 and effective as of May 27, 2014.		10-K (Exhibit 10.26)	3/10/2020	001-39011
10.22.2	Amendment Two dated and effective as of November 13, 2019 to the License Agreement between Exicure OpCo and Northwestern University dated as of February 10, 2016 and effective as of May 27, 2014.		10-K (Exhibit 10.27)	3/10/2020	001-39011
10.23*	License Agreement between Exicure OpCo and Northwestern University dated as of June 17, 2016.		8-K/A (Exhibit 10.22)	11/7/2017	000-55764
10.24*	Amendment One dated and effective June 11, 2018 to the License Agreement between Exicure OpCo and Northwestern University dated as of June 17, 2016.		10-K (Exhibit 10.27)	3/10/2020	001-39011
10.25*	Research Collaboration, Option and License Agreement between Exicure OpCo and Purdue Pharma L.P. dated as of December 2, 2016.		8-K/A (Exhibit 10.24)	11/7/2017	000-55764
10.26*	License and Development Agreement between Exicure, Inc. and DERMELIX LLC dated February 17, 2019.		10-Q (Exhibit 10.2)	5/8/2019	000-55764
10.27	Side Agreement to Northwestern Agreements by and among Exicure OpCo, Northwestern University and Purdue Pharma L.P. dated as of October 11, 2016.		8-K/A (Exhibit 10.25)	11/7/2017	000-55764
10.28*	Letter Agreement, dated December 13, 2022, by and between Exicure, Inc. and Allergan Pharmaceuticals International Limited.		8-K (Exhibit 10.2)	12/14/2022	001-39011
10.29*	Collaboration, Option and License Agreement between Exicure, Inc. and Allergan Pharmaceuticals International Limited dated as of November 13, 2019		10-K (Exhibit 10.33)	3/10/2020	001-39011
10.30	Side Agreement to Northwestern Agreements by and among Exicure Inc., Northwestern University and Allergan Pharmaceuticals International Limited dated as of November 13, 2019.		10-K (Exhibit 10.34)	3/10/2020	001-39011

10.31	Mutual Termination Agreement, dated December 12, 2022, by and between Exicure, Inc. and Ipsen Biopharm Limited.		8-K (Exhibit 10.1)	12/14/2022	001-39011
10.32*	Collaboration, Option and License Agreement between Exicure, Inc. and Ipsen Biopharm Limited dated as of July 30, 2021		10- Q (Exhibit 10.3)	11/19/2021	001-39011
10.33	Side Agreement to Northwestern Agreements by and among Exicure Inc., Northwestern University and Ipsen Biopharm Limited dated as of July 30, 2021.		10- Q (Exhibit 10.4)	11/19/2021	001-39011
10.34	Form of Securities Purchase Agreement, dated May 9, 2022, by and among Exicure, Inc. and the purchaser parties thereto.		8-K (Exhibit 10.1)	5/13/2022	001-39011
10.35	Registration Rights Agreement, dated May 9, 2022, by and among Exicure, Inc. and the purchasers party thereto.		8-K (Exhibit 10.2)	5/13/2022	001-39011
10.36	Securities Purchase Agreement, dated September 26, 2022, by and between Exicure, Inc. and CBI USA.		8-K (Exhibit 10.1)	9/27/2022	001-39011
10.37	Registration Rights Agreement, dated September 26, 2022, by and between Exicure, Inc. and CBI USA.		8-K (Exhibit 10.2)	9/27/2022	001-39011
21.1	Subsidiaries of Exicure, Inc.	X			
23.1	Consent of KPMG LLP, independent registered public accounting firm.	X			
24.1	Power of Attorney (included on the signature page hereto).	X			
31.1	Certification of Principal Executive Officer Pursuant to Rule 13a-14(a) of the Securities Exchange Act of 1934, As Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.	X			
31.2	Certification of Principal Financial Officer Pursuant to Rule 13a-14(a) of the Securities Exchange Act of 1934, As Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.	X			
32.1**	Certifications of Principal Executive Officer and Principal Financial Officer Pursuant to 18 U.S.C. Section 1350, As Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.	X			
101.INS	Inline XBRL Instance Document – the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document	X			
101.SCH	Inline XBRL Taxonomy Extension Schema Document	X			
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document	X			
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document	X			
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document	X			
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document	X			
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)	X			

+ Indicates a management contract or compensatory plan.

* Indicates that portions of this exhibit have been omitted pursuant to Item 601(b)(10)(iv) of Regulation S-K.

** This certification is not deemed filed with the SEC and is not to be incorporated by reference into any filing of Exicure, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of such Form 10-K), irrespective of any general incorporation language contained in such filing.

Item 16. Form 10-K Summary.

None.

SIGNATURES

Pursuant to the requirements of Section 13 or Section 15(d) of the Securities Exchange Act of 1934, as amended, the registrant has duly caused this Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Chicago, State of Illinois, on March 27, 2023.

EXICURE, INC.

By: /s/ Matthias Schroff, Ph.D.
Matthias Schroff, Ph.D.
Chief Executive Officer

By: /s/ Elias D. Papadimas
Elias D. Papadimas
Chief Financial Officer

POWER OF ATTORNEY

We, the undersigned directors and officers of Exicure, Inc., hereby severally constitute and appoint Matthias Schroff, Ph.D. and Elias D. Papadimas, and each of them singly, our true and lawful attorneys-in-fact, with full power to them, and to each of them singly, to sign for us and in our names in the capacities indicated below, any and all amendments to this Annual Report on Form 10-K and to file or cause to be filed the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as each of them might or could do in person, and hereby ratifying and confirming all that said attorneys-in-fact, and each of them, or their substitute or substitutes, shall do or cause to be done by virtue of this Power of Attorney. This Power of Attorney does not revoke any power of attorney previously granted by the undersigned, or any of them.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Annual Report on Form 10-K has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated:

SIGNATURE	TITLE	DATE
/s/ Matthias Schroff, Ph.D. Matthias Schroff, Ph.D.	President, Chief Executive Officer, and Director (*Principal Executive Officer)*	March 27, 2023
/s/ Elias D. Papadimas Elias D. Papadimas	Chief Financial Officer (*Principal Financial Officer and Principal Accounting Officer)*	March 27, 2023
/s/ Seung Soo Shin Seung Soo Shin	Chair of the Board of Directors	March 27, 2023
/s/ Changil Ahn Changil Ahn	Director	March 27, 2023
/s/ Cheolho Jo Cheolho Jo	Director	March 27, 2023
/s/ Paul Kang Paul Kang	Director	March 27, 2023
/s/ Hyukku Lee Hyukku Lee	Director	March 27, 2023