Dicerna Pharmaceuticals Inc
Form 424B3
May 11, 2018
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Filed pursuant to Rule 424(b)(3)
Registration Statement No. 333-223778

PROSPECTUS

24,491,663 Shares

DICERNA PHARMACEUTICALS, INC.

Common Stock

This prospectus relates to the possible resale of up to 24,491,663 shares of our common stock, $0.0001 par value per share, by the selling stockholders identified in this prospectus or in supplements to this prospectus. The shares were issued to the selling stockholders in connection with a previously disclosed conversion of our redeemable convertible preferred stock (the Redeemable Convertible Preferred Stock) and an underwritten follow-on public offering of our common stock. See Prospectus Summary Description of the Conversion of Redeemable Convertible Preferred Stock and Prospectus Summary Description of the Underwritten Public Offering of Common Stock, respectively. We are registering the shares to provide the selling stockholders with securities that may be publicly sold. This prospectus does not necessarily mean that the selling stockholders will offer or sell those shares. Up to 24,491,663 shares may be sold from time to time after the effectiveness of the registration statement, of which this prospectus forms a part.

We will receive no proceeds from any sale by the selling stockholders of the shares of our common stock covered by this prospectus, but we have agreed to pay certain expenses relating to the registration of such shares. The selling stockholders may from time to time offer and resell, transfer or otherwise dispose of any or all of the shares of our common stock covered by this prospectus through underwriters or dealers, directly to purchasers or through broker-dealers or agents. See Plan of Distribution.

Our common stock trades on the NASDAQ Global Select Market under the symbol DRNA. On May 9, 2018, the closing price for our common stock, as reported on the NASDAQ Global Select Market, was $14.97 per share.

We are an emerging growth company as defined by the Jumpstart Our Business Startups Act of 2012 and, as such, we are subject to reduced public company reporting requirements. Investing in our securities involves a high degree of risk. You should review carefully the risks and uncertainties described under the heading Risk Factors on page 8 of this prospectus and under similar headings in the documents that are incorporated by reference into this prospectus, as well as Special Note Regarding Forward-Looking Statements on page 9 of this prospectus. You should read the entire prospectus carefully before you make your investment decision.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus is May 9, 2018

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This prospectus is part of a shelf registration statement that we have filed with the Securities and Exchange Commission (the SEC). Under the shelf registration statement, the selling stockholders may offer and resell up to 24,491,663 shares of our common stock in one or more offerings. The exhibits to the registration statement contain the full text of certain contracts and other important documents we have summarized in this prospectus. Since these summaries may not contain all the information that you may find important in deciding whether to purchase our common stock, you should review the full text of these documents. The registration statement and the exhibits can be obtained from the SEC as indicated under the sections entitled Incorporation of Certain Information by Reference and Where You Can Find More Information.

You should rely only on the information provided or incorporated by reference in this prospectus or any applicable prospectus supplement. Neither we nor the selling stockholders have authorized anyone to provide you with different or additional information. Neither we nor the selling stockholders are making an offer to sell our common stock in any jurisdiction where the offer or sale thereof is not permitted. You should not assume that the information appearing in this prospectus or any applicable prospectus supplement or the documents incorporated by reference herein or therein is accurate as of any date other than their respective dates. Our business, financial condition, results of operations and prospects may have changed since those dates. You should read carefully the entirety of this prospectus and any applicable prospectus supplement, as well as the documents incorporated by reference in this prospectus and any applicable prospectus supplement, before making an investment decision.

This prospectus and the information incorporated herein by reference include trademarks, service marks and trade names owned by us or other companies. All trademarks, service marks and trade names included or incorporated by reference in this prospectus are the property of their respective owners.

In this prospectus, unless otherwise specified or the context requires otherwise, we use the terms company, we, us and our to refer to Dicerna Pharmaceuticals, Inc., a Delaware corporation, together with its consolidated subsidiaries.

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PROSPECTUS SUMMARY

The following highlights information about us and our business contained elsewhere or incorporated by reference in this prospectus. It is not complete and does not contain all of the information that you should consider before investing in any of our securities. You should carefully read this prospectus together with the more detailed information incorporated by reference in this prospectus.

Our Company

Dicerna is a biopharmaceutical company focused on the discovery and development of innovative subcutaneously delivered ribonucleic acid (RNA) interference (RNAi)-based pharmaceuticals using our GalXCTM RNAi platform for the treatment of diseases involving the liver, including rare diseases, viral infectious diseases, chronic liver diseases, and cardiovascular diseases. Within these therapeutic areas, we believe our GalXC RNAi platform will allow us to build a broad pipeline of therapeutics with commercially attractive pharmaceutical properties, including a subcutaneous route of administration, infrequent dosing (e.g., dosing that is monthly or quarterly, and potentially even less frequent), high therapeutic index, and specificity to a single target gene. Our key development programs include DCR-PHXC for the treatment of primary hyperoxaluria (PH), currently in a phase 1 clinical trial; and undisclosed product candidate against a serious rare liver disease, currently in Investigational New Drug Application (IND)/Clinical Trial Application (CTA)-enabling studies; and DCR-HBVS for the treatment of hepatitis B virus (HBV), currently in IND/CTA-enabling studies.

All of our GalXC drug discovery and development efforts are based on the therapeutic modality of RNAi, a highly potent and specific mechanism for silencing the activity of a targeted gene. In this naturally occurring biological process, double-stranded RNA molecules induce the enzymatic destruction of the messenger ribonucleic acid (mRNA) of a target gene that contains sequences that are complementary to one strand of the therapeutic double-stranded RNA molecule. The Company s GalXC RNAi platform utilizes a particular structure of double-stranded RNA molecules configured for subcutaneous delivery to the liver. Due to the enzymatic nature of RNAi, a single GalXC molecule incorporated into the RNAi machinery can destroy hundreds or thousands of mRNAs from the targeted gene.

The GalXC RNAi platform supports Dicerna s long-term strategy to retain, subject to the evaluation of potential licensing opportunities as they may arise, a full or substantial ownership stake and to invest internally in diseases with focused patient populations, such as certain rare diseases. We see such diseases as representing opportunities that carry a relatively higher probability of success, with genetically and molecularly defined disease markers, high unmet need, a limited number of Centers of Excellence to facilitate reaching these patients, and the potential for more rapid clinical development programs. For more complex diseases with multiple gene dysfunctions and larger patient populations, we plan to pursue collaborations that can provide the enhanced scale, resources and commercial infrastructure required to maximize these prospects. Our collaborative research and license agreement with Boehringer Ingelheim International GmbH, a wholly-owned subsidiary of C.H. Boehringer Sohn AG & Co. KG (BI), entered into on October 27, 2017 (the BI Agreement) and pursuant to which the Company and BI jointly research and develop product candidates for the treatment of nonalcoholic steatohepatitis (NASH) using our GalXC platform, is an example of such a collaboration.

Development Programs

In choosing which development programs to advance, we apply scientific, clinical, and commercial criteria that we believe allow us to best leverage our GalXC RNAi platform and maximize value. The Company is focusing its efforts on three priority therapeutic programs that currently have a CTA filed or are in IND/CTA enabling studies and on a

series of programs in the clinical candidate selection stage that may be elevated into IND/CTA enabling studies in the future, either on our own or in collaboration with larger pharmaceutical companies.

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Our three priority programs are: DCR-PHXC for the treatment of PH; a program for an undisclosed rare disease; and DCR-HBVS for the treatment of chronic HBV infection. Our programs in clinical candidate selection include multiple programs targeting undisclosed targets in rare diseases, chronic liver diseases, and cardiovascular diseases including a program for the treatment of hypercholesterolemia, for which as a provisional clinical candidate, DCR-PCSK9, has already been selected. In October 2017, we filed a CTA for our lead GalXC product candidate, DCR-PHXC, with the Medicines and Healthcare products Regulatory Agency (MHRA) in the United Kingdom (UK), and in December 2017, we dosed the first human in the Phase 1 DCR-PHXC clinical trial. We expect to file additional CTAs and/or INDs for our programs in 2018 and 2019.

The table below sets forth the state of development of our various GalXC RNAi platform product candidates as of March 31, 2018.

Our current GalXC RNAi platform development programs are as follows:

Primary Hyperoxaluria. We are developing DCR-PHXC for the treatment of all types of PH. PH is a family of rare inborn errors of metabolism in which the liver produces excessive levels of oxalate, which in turn causes damage to the kidneys and to other tissues in the body. Patients often endure frequent painful kidney stone events often requiring surgical intervention, and in many cases patients with PH progress to end stage renal disease. Standard of care for these patients includes intensive dialysis, and combined liver and kidney transplants. In preclinical models of PH, DCR-PHXC reduces oxalate production to near-normal levels, ameliorating the disease condition. Based on evaluation of genome sequence databases, there may be as many as 16,000 people with PH in the US and major European countries.

On October 16, 2017, we announced that we had submitted a CTA for DCR-PHXC to the MHRA in the UK. On December 7, 2017, we announced that we dosed the first human in a Phase 1 trial of DCR-PHXC. The Phase 1 trial for DCR-PHXC, called PHYOX, is a single ascending-dose study of DCR-PHXC in normal healthy volunteers (NHV) and patients with PH. The study is divided into two groups: Group A is a placebo-controlled, single-blind, single center Phase 1 study, enrolling up to 25 NHVs; Group B is an open-label, multi-center study enrolling up to 16 patients with PH types 1 (PH1) and 2 (PH2). The primary objective of the study is to evaluate the safety and tolerability of single doses of DCR-PHXC in both groups. Secondary

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objectives are to characterize the pharmacokinetics of single doses of DCR-PHXC in NHVs and patients with PH, and to evaluate the pharmacodynamic effects of single doses of DCR-PHXC on biochemical markers including, but not limited to, changes in urine oxalate concentrations. Patients with PH will be dosed after safety has been established at the same dose level in normal healthy volunteers. We plan to dose the first patient in Group B in the second quarter of 2018 and expect to have clinical proof-of-concept (POC) data in the second half of 2018. We have submitted CTAs in Germany, France and the Netherlands. Additionally, we expect to initiate a multi-dose Phase 2/3 study in the first quarter of 2019, pending positive POC data and regulatory approvals.

On July 15, 2017, in a series of presentations at the 12th International Workshop on Primary Hyperoxaluria for Professionals, Patients and Families in Tenerife, Spain (12th International Workshop), we presented new preclinical data suggesting the potential utility of DCR-PHXC for treating all forms of PH. In particular, we presented research from animal models demonstrating how DCR-PHXC inhibits the lactate dehydrogenase A (*LDHA*) gene, which we have identified as potentially being an optimal therapeutic target in patients with PH. *LDHA* inhibition was shown in animal models to reduce oxalate to normal or near-normal levels in PH types 1, 2 and ethylene glycol-induced hyperoxaluria (a model for idiopathic PH).

LDHA reduction has a near-linear correlation with oxalate reduction and offers a minimal metabolic intervention. These benefits of *LDHA* inhibition may translate into consistent therapeutic activity even in the event of a missed dose. There are numerous case reports of *LDHA* deficiency naturally occurring in humans, with no reported adverse effects due to deficiency in the liver.

To facilitate DCR-PHXC development, we have completed our Primary HYperoxaluria Observational Study (PHYOS), an international, multicenter, observational study in patients with a genetically confirmed diagnosis of PH1. PHYOS collected data on key biochemical parameters implicated in the pathogenesis of PH1. We are using the data to better understand the baseline PH1 disease state, which will help guide long-term drug development plans. At the 12th International Workshop, we reported interim data from the study s 20 enrolled patients with a median age at screening of 21 years (range 12-61 years). The patients had been diagnosed at a median age of 7 years (range 1-59 years), and 14 patients (74%) had a medical history of renal stones. Over the six-month observation period, the variability (coefficient of variation) between 24-hour urine measurements of oxalate at different time points was 28%. Our clinical team is using these data to design clinical studies using 24-hour urinary oxalate excretion as a surrogate marker for clinical benefit. We expect to publish data from PHYOS in 2018.

An undisclosed rare disease involving the liver. We are developing a GalXC-based therapeutic, targeting a liver-expressed gene involved in a serious rare disease. For competitive reasons, we have not yet publicly disclosed the target gene or disease. We have selected this target gene and disease based on criteria that include having a strong therapeutic hypothesis, a readily-identifiable patient population, the availability of a potentially predictive biomarker, high unmet medical need, favorable competitive positioning and what we believe is a rapid projected path to approval. The disease is a genetic disorder, where mutations in the disease gene lead to the production of an abnormal protein. The protein causes progressive liver damage and fibrosis, in some cases leading to cirrhosis and liver failure, and we believe that silencing of the disease gene will prevent production of the abnormal protein and thereby slow or stop progression of the liver fibrosis. Greater than 100,000 people in the United States (U.S.) are believed to be homozygous (i.e. having identical pairs of genes for any given pair of hereditary characteristics) for the mutation that causes the liver disease, and at least 20% of those people, and potentially a significantly higher fraction, are believed to have liver-associated disease as a consequence. We plan to seek a risk-sharing collaborator for this program before we file an IND and/or CTA, which we expect to be prepared to file in the second quarter of 2018.

Chronic Hepatitis B Virus infection. We have declared a GalXC RNAi platform-based product candidate for the treatment of HBV, DCR-HBVS, and are conducting formal non-clinical development

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studies. We expect to file an IND and/or a CTA during the fourth quarter of 2018. According to the World Health Organization, over 250 million people are currently living with chronic HBV infection worldwide, resulting in nearly a million deaths annually. Current therapies for HBV rarely lead to a long-term immunological cure as measured by the clearance of HBV surface antigen (HBsAg) and sustained HBV deoxyribonucleic acid (DNA) suppression in patient plasma or blood. DCR-HBVS targets HBV messenger RNA, and leads to greater than 99% reduction in circulated HBsAg in mouse models of HBV infection. Based on these preclinical studies, and only if we receive appropriate regulatory approval to begin human clinical trials, we hope to determine the potential of DCR-HBVS to reduce HBsAg and HBV DNA levels in the blood of HBV patients in a subcutaneous dosing paradigm.

Hypercholesterolemia (PCSK9 targeted therapy). We are using our GalXC RNAi platform to develop a therapeutic that targets the PCSK9 gene for the treatment of hypercholesterolemia. The Company has selected a provisional clinical candidate for the program, but is continuing to explore ways to further optimize the program, including exploring more advanced versions of our GalXC platform with enhanced properties, while we assess the market potential of this program. PCSK9 is a validated target for hypercholesterolemia, and there are U.S. Food and Drug Administration (FDA)-approved therapies targeting PCSK9 that are based on monoclonal antibody technology. Based on preclinical studies, we believe that our GalXC RNAi platform has the potential to produce a PCSK9-targeted therapy with attractive commercial properties, such as small subcutaneous injection volumes and less frequent dosing.

Additional pipeline programs. We have developed a robust portfolio of additional targets and diseases that we plan to pursue either on our own or in collaboration with partners. We have applied our GalXC technology to multiple gene targets across our disease focus areas of rare diseases, chronic liver diseases, and cardiovascular diseases. Pursuant to our strategy, we are seeking collaborations with larger pharmaceutical companies to advance our programs in the areas of chronic liver diseases and cardiovascular diseases. Both these disease areas represent large and diverse patient populations, requiring complex clinical development and commercialization paths that we believe can be more effectively pursued in collaboration with larger pharmaceutical companies. For our additional rare diseases, we are continuing to assess their potential for clinical success and market opportunity while optimizing our GalXC molecules. For our additional pipeline programs (including PCSK9), we may utilize more advanced versions of our GalXC technology, that further improve pharmaceutical properties of the GalXC molecules, including enhancing the duration of action and potency. Improvements to our GalXC compound include modification of the tetraloop end of the molecule, which can be applied to any target gene and program, resulting in a substantially longer duration of action in animal models across multiple targets. Modification of the tetraloop only impacts the passenger strand and does not involve any modification to the guide strand. These modifications are unique to our GalXC platform and, we believe, provide a competitive advantage for the Company.

In addition to the GalXC development programs outlined above, on October 27, 2017, we entered into the BI Agreement, pursuant to which the Company and BI jointly research and develop product candidates for the treatment of chronic liver diseases, with an initial focus on NASH, using our GalXC platform. NASH is caused by the buildup of fat in the liver, potentially leading to liver fibrosis and cirrhosis. NASH has an especially high prevalence among obese and diabetic patients, and is an area of high unmet medical need. The BI Agreement is for the development of product candidates against one target gene with an option for BI to add the development of product candidates that target a second gene. We are working exclusively with BI to develop the product candidates against the undisclosed target gene. We are responsible for the discovery and initial profiling of the product candidates, including primary pre-clinical studies, synthesis, and delivery. BI is responsible for evaluating and selecting the product candidates for further development. If BI selects one or more product candidates, it will be responsible for

further pre-clinical development, clinical development, manufacturing and

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commercialization of those products. Also pursuant to the BI Agreement, we granted BI a worldwide license in connection with the research and development of the product candidates and will transfer to BI intellectual property rights of the product candidates selected by BI for clinical development and commercialization. We also may provide assistance to BI in order to help BI further develop selected product candidates. Pursuant to the BI Agreement, BI agreed to pay us a non-refundable upfront payment of $10.0 million for the first target. During the term of the research program, BI will reimburse us the cost of materials and third-party expenses that have been included in the preclinical studies up to an agreed-upon limit. We are eligible to receive up to $191.0 million in potential development and commercial milestones related to the initial target. We are also eligible to receive royalty payments on potential global net sales, subject to certain adjustments, tiered from high single digits up to low double-digits. BI s option to add a second target would provide for an option fee payment and success-based development and commercialization milestones and royalty payments to us.

We are party to a collaboration for our early generation of non-GalXC Dicer Substrate RNAi technology against two targets, the KRAS oncogene and an additional undisclosed gene, with the global pharmaceutical company Kyowa Hakko Kirin Co., Ltd. (KHK), to use for development in oncology and formulated using KHK s proprietary drug delivery system (the KHK Collaboration Agreement). KHK has provided us with notice of termination related to the non-KRAS program. We also have developed a wholly owned clinical candidate, DCR-BCAT, targeting the ß-catenin oncogene. DCR-BCAT is based on an extended version of our earlier generation non-GalXC Dicer Substrate RNAi technology and is delivered by our lipid nanoparticle (LNP) tumor delivery system, EnCoreTM. We plan to out-license or spin out the DCR-BCAT opportunity, given our focus on our GalXC platform-based programs. Given our current development focus, including the GalXC program, we no longer consider the KHK Collaboration Agreement material to our business.

Our executive management team has extensive experience in the biopharmaceutical industry. In addition, various members of our management team and our board of directors have contributed to the progress of the RNAi field through their substantial involvement in companies such as Cephalon Inc., Genta Inc., GlaxoSmithKline plc, Pfizer Inc., Sanofi S.A (Sanofi), Sirna Therapeutics, Inc. (Sirna), and other companies. Our co-founder and chief executive officer, Douglas M. Fambrough III, Ph.D., was a lead venture capital investor and board member of Sirna, an early RNAi company acquired by Merck & Co., Inc. (Merck) in 2006 for $1.1 billion. He played a pivotal role in the restructuring of Ribozyme Pharmaceuticals into Sirna, the management of the company as a member of its Board of Directors, and the execution of its 2006 acquisition by Merck.

Our Corporate Information

We were incorporated in Delaware in October 2006. Our principal executive offices are located at 87 Cambridgepark Drive, Cambridge, MA 02140, and our main telephone number is (617) 621-8097. Additional information can be found on our website, at *dicerna.com*, and in our periodic and current reports filed with the SEC. Copies of our current and periodic reports filed with the SEC are available at the SEC Public Reference Room at 100 F Street, N.E., Washington, D.C. 20549, and online at *sec.gov* and our website at *dicerna.com.* The information contained in, or that can be accessed through, our website is not part of, and is not incorporated into, this prospectus and should not be considered part of this prospectus.

For additional information about our Company, please refer to other documents we have filed with the SEC and that are incorporated by reference into this prospectus, as listed under the heading Incorporation of Certain Information by Reference.

Description of the Conversion of Redeemable Convertible Preferred Stock

On December 18, 2017, as previously disclosed, we completed the conversion of all of our outstanding shares of Redeemable Convertible Preferred Stock into shares of our common stock (the Conversion) at the election of

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selling stockholders. Certain shares of our common stock were issued to the selling stockholders as consideration for, among other things, their election to convert their outstanding shares of Redeemable Convertible Preferred Stock and their agreement to waive and amend certain provisions of an amended and restated registration rights agreement by and among us and the selling stockholders party thereto (the Registration Rights Agreement). The aggregate number of shares of our common stock issued in connection with the Conversion, including the shares issued upon the conversion of our Redeemable Convertible Preferred Stock and the additional shares issued as consideration was 24,206,663 (the Conversion Shares).

The Conversion Shares were issued pursuant to an exemption from the registration requirements of the Securities Act, provided by Section 4(a)(2) thereunder. Each of the selling stockholders provided a written representation to us that they qualify as an accredited investor as that term is defined in Rule 501 under the Securities Act.

Description of the Underwritten Public Offering of Common Stock

On December 18, 2017, we completed an underwritten follow-on public offering of 5,714,286 shares of common stock (the Offering). In connection with the Offering, we entered into an underwriting agreement (the Underwriting Agreement) with Stifel, Nicolaus & Company, Incorporated and Evercore Group LLC as representatives of the underwriters listed in the Underwriting Agreement (collectively, the Underwriters), pursuant to which we granted to the Underwriters a 30-day option to purchase up to an additional 857,143 shares of the Company s common stock (the Overallotment). We completed the sale of 6,571,428 shares, including the exercise of the Overallotment, to the Underwriters on December 18, 2017, and that sale resulted in the receipt by the Company of aggregate gross proceeds of $46.0 million, less Underwriter commissions and additional offering expenses totaling approximately $3.2 million.

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THE OFFERING

Securities Offered by the Selling Stockholders	Up to 24,491,663 shares of common stock
Common Stock Outstanding	51,781,429 shares
Terms of the Offering	The selling stockholders may from time to time offer and resell, transfer or otherwise dispose of any or all of the shares of our common stock covered by this prospectus through underwriters or dealers, directly to purchasers or through broker-dealers or agents. See Plan of Distribution.
Use of Proceeds	We will not receive any of the proceeds from the sale of the shares of common stock being offered under this prospectus. See Use of Proceeds.
NASDAQ Global Select Market Symbol	DRNA
Risk Factors	You should read the Risk Factors section of this prospectus and all other information contained or incorporated by reference in this prospectus for a discussion of factors to consider carefully before deciding to invest in shares of our common stock.

The number of shares of Common Stock Outstanding is based on 51,781,429 shares outstanding as of March 31, 2018 and excludes:

- 2,198 shares of our common stock issuable upon the exercise of outstanding warrants as of March 31, 2018, at an exercise price of $250.00 per share;
- 85,703 shares of our common stock issuable upon the exercise of outstanding warrants as of March 31, 2018, at an exercise price of $7.00 per share;
- 7,171,978 shares of our common stock issuable upon the exercise of outstanding options as of March 31, 2018, at a weighted average exercise price of $8.67 per share; and
- 1,900,471 shares of our common stock available for future issuance pursuant to our existing stock incentive plans as of March 31, 2018.

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RISK FACTORS

We face a variety of significant and diverse risks, many of which are inherent in our business. You should carefully consider the risks described under the caption Risk Factors in our most recent annual report on Form 10-K, subsequent quarterly reports on Form 10-Q and other filings we make with the SEC pursuant to Section 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended (the Exchange Act), incorporated by reference herein, before making an investment decision. In addition to such other risks, set forth below are risks related to this offering. The occurrence of any of the risks set forth above or below could materially and adversely affect our business, prospects, financial condition, results of operations or cash flow. Other risks and uncertainties that we do not now consider to be material or of which we are not now aware may become important factors that affect us in the future. You should carefully consider the risks and uncertainties described below and in the documents incorporated by reference herein before deciding to invest in our common stock.

The number of shares being registered for sale is significant in relation to the number of our outstanding shares of common stock.

We have filed a registration statement of which this prospectus is a part to register the shares offered hereunder for sale into the public market by the selling stockholders. These shares represent a large number of shares of our common stock, and if sold in the market all at once or at about the same time, could depress the market price of our common stock during the period the registration statement remains effective and could also affect our ability to raise equity capital.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus includes and incorporates by reference forward-looking statements within the meaning of the U.S. Private Securities Litigation Reform Act of 1995 and releases issued by the SEC and within the meaning of Section 27A of the Securities Act, and Section 21E of the Exchange Act. All statements other than statements of historical fact are forward-looking statements for purposes of this prospectus. In some cases, you can identify forward-looking statements by terminology such as may, could, will, would, should, expect, plan, anticip estimate, intend, predict, seek, contemplate, project, continue, potential, ongoing, goal, or the neg or other comparable terminology. These forward-looking statements include, but are not limited to, statements about:

- how long we expect to maintain liquidity to fund our planned level of operations and our ability to obtain additional funds for our operations;
- the initiation, timing, progress and results of our research and development programs, preclinical studies, any clinical trials and IND, CTA, New Drug Application (NDA) and other regulatory submissions;
- our ability to identify and develop product candidates for treatment of additional disease indications;
- our or a collaborator s ability to obtain and maintain regulatory approval of any of our product candidates;
- the rate and degree of market acceptance of any approved product candidates;
- the commercialization of any approved product candidates;
- our ability to establish and maintain additional collaborations and retain commercial rights for our product candidates in the collaborations;
- the implementation of our business model and strategic plans for our business, technologies and product candidates;
- our estimates of our expenses, ongoing losses, future revenue and capital requirements;
- our ability to obtain and maintain intellectual property protection for our technologies and product candidates and our ability to operate our business without infringing the intellectual property rights of others;
- our reliance on third parties to conduct our preclinical studies or any clinical trials;

our reliance on third party suppliers and manufacturers to supply the materials and components for, and manufacture, our research and development, preclinical and clinical trial drug supplies;

our ability to attract and retain qualified key management and technical personnel;

our dependence on our existing collaborator, BI, for developing, obtaining regulatory approval for and commercializing product candidates in the collaboration;

our receipt and timing of any milestone payments or royalties under our research collaboration and license agreement with BI or any future arrangements with any other collaborators;

our expectations regarding the time during which we will be an emerging growth company under the Jumpstart Our Business Startups Act;

our financial performance; and

developments relating to our competitors or our industry.

These statements relate to future events or to our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements to be

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materially different from any future results, performance or achievements expressed or implied by these forward-looking statements. In evaluating such forward-looking statements, you should specifically consider various factors that may cause actual results to differ materially from current expectations, including the risks outlined under the heading Risk Factors contained in this prospectus and any related free writing prospectus, and in any other documents incorporated herein or therein (including in our most recent annual report on Form 10-K, subsequent quarterly reports on Form 10-Q and other filings we make with the SEC pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act). Any forward-looking statement in this prospectus reflects our current view with respect to future events and is subject to these and other risks, uncertainties and assumptions relating to our operations, results of operations, industry and future growth. Given these uncertainties, you should not place undue reliance on these forward-looking statements. Except as required by law, we assume no obligation to update or revise these forward-looking statements for any reason, even if new information becomes available in the future.

This prospectus also contains estimates, projections and other information concerning our industry, our business and the markets for certain drugs, 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.

Trademarks

This prospectus includes trademarks, service marks and trade names owned by us or by other companies. All trademarks, service marks and trade names included in this prospectus are the property of their respective owners.

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DESCRIPTION OF CAPITAL STOCK

The following summary description sets forth some of the general terms and provisions of our capital stock. Because this is a summary description, it does not contain all of the information that may be important to you. For a more detailed description of our common stock, you should refer to the applicable provisions of the General Corporation Law of the State of Delaware (the DGCL) and our certificate of incorporation and bylaws as in effect at the time of any offering. Copies of our Amended and Restated Certificate of Incorporation, as amended, and our Amended and Restated Bylaws are included as exhibits to the registration statement of which this prospectus forms a part.

General

Our authorized capital stock consists of 150 million shares of common stock, par value $0.0001 per share, and 5 million shares of preferred stock, par value $0.0001 per share. As of March 31, 2018, there were 51,781,429 shares of common stock outstanding, none held as treasury stock, 87,901 subject to outstanding warrants to purchase common stock (including outstanding warrants to purchase preferred stock that became exercisable for shares of common stock upon the closing of our initial public offering), 7,171,978 reserved for issuance upon exercise of outstanding stock options granted under Company incentive plans, and 1,900,471 available for future issuance pursuant to our existing stock incentive plans. No shares of preferred stock are issued and outstanding.

Common Stock. Holders of our common stock are entitled to one vote for each share of common stock held of record for the election of directors and on all matters submitted to a vote of stockholders. In the election of directors, a majority of the votes cast at a meeting of stockholders is sufficient to elect a director, except that if the number of nominees exceeds the number of directors to be elected, then a plurality of the votes cast at a meeting of stockholders is sufficient to elect a director. Our stockholders do not have cumulative voting rights in the election of directors. Accordingly, holders of a majority of the voting shares are able to elect all of the directors. Except as noted below under Anti-Takeover Effects of Provisions of Delaware Law and Our Charter Documents, a majority vote of common stockholders is generally required to take action under our certificate of incorporation and bylaws. Holders of our common stock are entitled to receive dividends ratably, if any, as may be declared by our board of directors out of legally available funds, subject to any preferential dividend rights of any preferred stock then outstanding. Upon our dissolution, liquidation or winding up, holders of our common stock are entitled to share ratably in our net assets legally available after the payment of all our debts and other liabilities, subject to the preferential rights of any preferred stock then outstanding. Holders of our common stock have no preemptive, subscription or conversion rights, and there are no redemption or sinking fund provisions applicable to our common stock. The rights, preferences and privileges of holders of common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future. All outstanding shares of common stock are fully paid and non-assessable. American Stock Transfer and Trust Company, LLC is the transfer agent and registrar for our common stock.

Preferred Stock. Our board of directors has the authority, without further vote or action by the stockholders, to designate and issue shares of preferred stock in one or more series and to designate the rights, preferences and privileges of each series, which may be greater than the rights of the common stock. We will fix in a certificate of designation the number of shares, the designation and the rights, preferences and privileges, including any dividend, conversion, voting or preemptive rights, terms of redemption or repurchase, liquidation preferences and sinking fund terms, auction and remarketing procedures, and any transfer or other restrictions or limitations of or relating to any series of preferred stock that we sell under this prospectus and applicable prospectus supplements. The DGCL provides that in addition to any voting rights that may be provided in the applicable certificate of designation, preferred stock holders have the right to vote separately as a class on a proposed amendment to our certificate of incorporation involving certain fundamental changes in their rights. Preferred stock terms could adversely affect the

voting power or other rights of common stock holders and the likelihood that they would receive dividend or liquidation payments, and could have the effect of delaying, deferring or preventing a change

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in control. You should read the applicable prospectus or prospectus supplement and the certificate of designation relating to any series of preferred stock we may offer.

Outstanding Warrants. As of March 31, 2018, we had outstanding warrants as follows:

- five warrants to purchase an aggregate of 2,198 shares of our common stock with an exercise price of 250.00 per share, each exercisable at any time on or before June 17, 2020; and

- seven warrants to purchase an aggregate of 85,703 shares of our common stock with an exercise price of $7.00, each exercisable at any time on or before June 26, 2018.

Registration Rights

We are party to an amended and restated registration rights agreement dated as of April 11, 2017, as amended, pursuant to which certain of our stockholders are entitled to demand, Form S-3 and piggyback registration rights. The shares of common stock that they may cause to be registered are referred to as registrable securities .

Demand registration rights

Subject to certain limitations, each holder of registrable securities has the right to demand we file a registration statement on Form S-1 to register all or a portion of their registrable securities, provided that the aggregate offering price of the registrable securities to be sold under the registration statement on Form S-1 is at least $5.0 million, net of underwriting discounts and commissions.

Form S-3 registration rights

Subject to certain limitations, each holder of registrable securities has the right to demand we file an unlimited number of registration statements on Form S-3, provided that the anticipated aggregate offering price of the registrable securities to be sold under the registration statement on Form S-3 exceeds $5.0 million, net of underwriting discounts and commissions.

Piggyback registration rights

Subject to certain conditions, if we propose to register any of our securities under the Securities Act, for sale to the public, the holders of registrable securities are entitled to receive written notice of such registration and to request that we include some or all of their registrable securities for resale in the registration statement. Under certain conditions, the managing underwriter of the offering will have the right to limit the number of shares of selling stockholders to be included in such registration.

Expenses of registration; indemnification

We are generally required to bear all registration expenses incurred in connection with the demand, Form S-3 and piggyback registrations described above. The amended and restated registration rights agreement contains customary indemnification provisions with respect to registration rights.

Termination of registration rights

The demand, Form S-3 and piggyback registration rights described above will terminate on the earlier to occur of (i) the date on which no holder holds any registrable securities and (ii) the date on which we are no longer subject to the reporting requirements of Section 13 or 15(d) of the Exchange Act and are no longer otherwise required to report on an annual or quarterly basis on forms provided for such annual or quarterly reporting pursuant to the rules and regulations promulgated by the SEC.

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Anti-Takeover Effects of Provisions of Delaware Law and Our Charter Documents

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

Removal of directors

Our certificate of incorporation and bylaws provide that subject to any limitations imposed by law and the rights of the holders of any series of our preferred stock, the board of directors or any individual director may be removed from office at any time without cause by the affirmative vote of the holders of a majority of the voting power of all the then-outstanding shares of voting stock of the Company, entitled to vote at an election of directors.

No written consent of stockholders

Our certificate of incorporation and bylaws provide that all stockholder actions are required to be taken by a vote of the stockholders at an annual or special meeting, and that stockholders may not take any action by written consent in lieu of a meeting.

Meetings of stockholders

Our certificate of incorporation and bylaws provide that special meetings of stockholders, which the Company is not obligated to call more than once per calendar year, may only be called by the chairman of our board of directors, our chief executive officer, our board of directors pursuant to a resolution adopted by a majority of the total number of authorized directors, or, subject to certain conditions, by our secretary at the request of the stockholders holding of record, in the aggregate, shares entitled to cast not less than ten percent of the votes at a meeting of the stockholders (assuming all shares entitled to vote at such meeting were present and voted). In addition, our bylaws limit the business that may be conducted at an annual meeting of stockholders to those matters properly brought before the meeting.

Advance notice requirements

Our bylaws establish advance notice procedures with regard to stockholder proposals relating to the nomination of candidates for election as directors or new business to be brought before meetings of our stockholders. These procedures provide that notice of stockholder proposals must be timely given in writing to our secretary prior to the meeting at which the action is to be taken. Generally, to be timely, notice must be received at our principal executive offices not less than the close of business on the ninetieth (90^{th}) day nor earlier than the close of business on the one hundred twentieth (120^{th}) day prior to the first anniversary of the annual meeting for the preceding year. The notice must contain certain information specified in the bylaws. These provisions may have the effect of precluding the conduct of certain business at a meeting if the proper procedures are not followed. These provisions may also discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer s own slate of directors or otherwise attempting to obtain control of our company.

Amendment to certificate of incorporation and bylaws

Our certificate of incorporation provides that the affirmative votes of the holders of at least a majority of the voting power of all of the then-outstanding shares of our voting stock will be required to amend certain provisions of our certificate of incorporation, including provisions relating to the size of our board of directors, removal of directors,

special meeting of stockholders and actions by written consent. The affirmative votes of the holders of at least a majority of the voting power of all of the then-outstanding shares of our voting stock will be required to amend or repeal our bylaws. In addition, our bylaws may be amended or repealed by our board of directors, subject to any limitations set forth in the bylaws.

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Blank check preferred stock

Our certificate of incorporation provides for 5,000,000 authorized shares of preferred stock. The existence of authorized but unissued shares of preferred stock may enable our board of directors to render more difficult or to discourage an attempt to obtain control of us by means of a merger, tender offer, proxy contest or otherwise. For example, if in the due exercise of its fiduciary obligations, our board of directors were to determine that a takeover proposal is not in the best interests of us or our stockholders, our board of directors could cause shares of preferred stock to be issued without stockholder approval in one or more private offerings or other transactions that might dilute the voting or other rights of the proposed acquirer or insurgent stockholder or stockholder group. In this regard, our certificate of incorporation grants our board of directors broad power to establish the rights and preferences of authorized and unissued shares of preferred stock. The issuance of shares of preferred stock could decrease the amount of earnings and assets available for distribution to holders of shares of common stock. The issuance may also adversely affect the rights and powers, including voting rights, of these holders and may have the effect of delaying, deterring or preventing a change in control of us.

Delaware Law

We are subject to the provisions of Section 203 of the DGCL, which, subject to certain exceptions, prohibits a publicly-held Delaware corporation from engaging in a business combination with an interested stockholder for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the interested stockholder attained such status with the approval of the board of directors or the business combination is approved in a prescribed manner. A business combination includes a merger or asset sale involving or other transaction resulting in a financial benefit to the interested stockholder. Subject to various exceptions, an interested stockholder is a person who, together with affiliates and associates, owns, or within the past three years did own, 15% or more of a corporation s voting stock. This statute could prohibit or delay the accomplishment of mergers or other takeover or change in control attempts and, accordingly, may discourage attempts to acquire the Company.

Delaware as sole and exclusive forum

Our bylaws provide, that unless we consent in writing to an alternative forum, the Court of Chancery of the State of Delaware shall, to the fullest extent permitted by law, be the sole and exclusive forum for (i) any derivative action or proceeding brought on behalf of us, (ii) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or other employees, to us or our stockholders, (iii) any action asserting a claim against us arising pursuant to any provision of the DGCL, as amended, or our certificate of incorporation or bylaws, (iv) any action to interpret, apply, enforce or determine the validity of our certificate of incorporation or bylaws, or (v) any action asserting a claim governed by the internal affairs doctrine.

Charter Documents

Our bylaws provide that we will indemnify our directors and executive officers to the fullest extent permitted by Delaware law and that we may indemnify our other officers, employees and other agents. We may enter into indemnification contracts with our directors and officers and purchase insurance on behalf of any person whom we are required or permitted to indemnify. In addition, our certificate of incorporation provides that the liability of our directors for monetary damages shall be eliminated, except for (i) breach of the directors duty of loyalty to the Company or its stockholders, (ii) acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (iii) violating Section 174 of the DGCL, or (iv) any transaction from which the director derived an improper personal benefit. Pursuant to Delaware law and subject to the foregoing exceptions, our directors shall not be liable for monetary damages for breach of the directors fiduciary duty of care to the Company and its

stockholders. This provision does not eliminate the duty of care: in appropriate circumstances, equitable remedies such as injunctive or other forms of non-monetary relief remain available under Delaware law, and it does not affect a director s responsibilities under any other law, such as U.S. federal securities laws or state or federal environmental or other laws.

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Stock Exchange Listing

Our common stock trades on the NASDAQ Global Select Market under the symbol DRNA.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is American Stock Transfer and Trust Company, LLC.

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SELLING STOCKHOLDERS

The selling stockholders named in this prospectus may sell shares of our common stock registered pursuant to the registration statement of which this prospectus forms a part. This prospectus covers the resale of 24,491,663 shares of common stock issued to the selling stockholders named in this prospectus in connection with the Conversion and the Offering. The selling stockholders are not required to offer any of the shares of our common stock covered by this prospectus for resale. Since the selling stockholders may sell all, some or none of their shares, we cannot estimate the aggregate number of shares that the selling stockholders will offer pursuant to this prospectus or that the selling stockholders will own upon completion of the offering to which this prospectus relates.

Information about additional selling stockholders may be set forth in a prospectus supplement, in a post-effective amendment to the registration statement of which this prospectus forms a part or in filings that we make with the SEC under the Exchange Act, which are incorporated by reference in this prospectus.

Each selling stockholder that sells shares of common stock pursuant to this prospectus may be deemed to be an underwriter within the meaning of the Securities Act. Any commissions received by a broker or dealer in connection with resales of our common stock may be deemed to be underwriting commissions or discounts under the Securities Act.

The following table sets forth information with respect to our common stock beneficially owned by the selling stockholders as of March 31, 2018:

	Shares Beneficially Owned Prior to Resale (1)			Shares Beneficially Owned After Resale (2)	
Name of Selling Stockholder	**Number**	**%**	**Shares Offered for Resale**	**Number**	**%**
Funds affiliated with Bain Capital Life Sciences Investors, LLC (3)	8,930,237	17.3%	8,930,237	0	*
Funds affiliated with RTW Investments, LP (4)	5,035,662	9.7%	2,956,671	2,078,991	4.0%
Funds affiliated with EcoR1 Capital, LLC (5)	4,836,547	9.3%	3,544,547	1,292,000	2.5%
Funds affiliated with RA Capital Management, LLC (6)	3,933,489	7.6%	2,645,442	1,288,047	2.5%
Funds affiliated with Cormorant Asset Management, LLC (7)	3,656,670	7.1%	2,956,671	699,999	1.4%
Funds affiliated with Domain Partners (8)	3,515,956	6.8%	1,729,048	1,786,908	3.5%
Skyline Venture Partners V, L.P. (9)	3,297,769	6.4%	1,729,047	1,568,722	3.0%
Total	**33,206,330**		**24,491,663**	**8,714,667**	

* Represents less than 1%.

(1) Based on 51,781,429 shares of our common stock outstanding as of March 31, 2018. In addition, shares underlying options vesting within 60 days of March 31, 2018, and shares underlying warrants exercisable within 60 days of March 31, 2018, are deemed outstanding for the purpose of computing the percentage ownership of the person or persons holding such options, restricted stock units or warrants, but are not deemed outstanding for

computing the percentage ownership of other persons.

(2) Assumes that the selling stockholders will sell all of the shares of common stock saleable pursuant to this prospectus. The registration of these shares does not necessarily mean that the selling stockholders will sell all or any portion of the shares covered by this prospectus.

(3) Based solely on the Schedule 13D/A No. 2 filed with the SEC on December 19, 2017 by Bain Capital Life Sciences Fund, L.P., a Cayman exempted limited partnership (BC LS), and BCIP Life Sciences Associates, LP, a Delaware limited partnership (BCIP LS and, together with BC LS, the Bain Entities). Consists of 8,077,899 shares of our common stock held by BC LS and 852,338 shares of our common stock held by BCIP LS. The governance, investment strategy and decision-making process with respect to the

investments held by all of the Bain Entities is directed by Bain Capital Life Sciences Investors, LLC (BCI LS), whose managers are Jeffrey Schwartz and Adam Koppel. As a result, each of BCI LS, Mr. Schwartz and Dr. Koppel may be deemed to share voting and dispositive power with respect to the securities held by the Bain Entities. Dr. Koppel is a member of our board of directors. See Material Relationships with Selling Stockholders below. The principal business address of each of the Bain Entities, BCI LS, Mr. Schwartz and Dr. Koppel is 200 Clarendon Street, Boston, MA 02116.

(4) Based solely on the Schedule 13G/A No. 3 filed with the SEC on February 14, 2018 by RTW Investments, LP, a Delaware limited partnership (Advisor), RTW Master Fund, Ltd., a company organized under the laws of the Cayman Islands (RTW Fund), and Roderick Wong. Consists of 4,838,560 shares of our common stock held by RTW Fund and 197,102 share of our common stock held by RTW Innovation Master Fund, LTD (Innovation Fund and, together with the RTW Fund, the RTW Funds). The RTW Funds are managed by the Advisor. The Adviser, in its capacity as the investment manager of the RTW Funds, has the power to vote and the power to direct the disposition of all shares held by the RTW Funds and may be deemed to beneficially own such shares. Each of the Advisor and the RTW Funds disclaims beneficial ownership of the shares of common stock except to the extent of its or his pecuniary interest therein. The address of the principal place of business of the RTW Funds and Roderick Wong is c/o RTW Investments, LLC, 250 West 55th Street, 16th Floor, Suite A, New York, New York 10019. The address and principal place of RTW Fund is c/o Intertrust Corporate Services (Cayman) Limited, 190 Elgin Avenue, George Town, Grand Cayman KY1-9001, Cayman Island.

(5) Based solely on the Schedule 13G filed with the SEC on January 3, 2018 by EcoR1 Capital, LLC (EcoR1), Oleg Nodelman (Nodelman) and EcoR1 Capital Fund Qualified, L.P. (Qualified Fund). Consists of 3,962,219 shares of our common stock held by Qualified Fund and 874,328 shares of our common stock held by EcoR1 Capital Fund, L.P. (Capital Fund and, together with the Qualified Fund, the Funds). EcoR1 is the general partner and investment adviser of the Funds. Nodelman is the control person of EcoR1 and has voting and disposition power over the shares. Each of EcoR1, Nodelman and the Funds disclaims beneficial ownership of the shares of common stock except to the extent of its or his pecuniary interest therein. The principal business address of each of EcoR1, the Funds and Nodelman is 409 Illinois Street, San Francisco, California, 94158.

(6) Partially based on the Schedule 13D/A No. 5 filed with the SEC on March 27, 2018 by RA Capital Management, LLC (RA Capital), Peter Kolchinsky and RA Capital Healthcare Fund, L.P. (RA Fund). Consists of 3,446,728 shares of our common stock held by RA Fund and 486,761 shares of our common stock held in a separately managed account (the Account). RA Capital is the general partner of RA Fund and the investment adviser of the Account. Dr. Kolchinsky, a member of our board of directors, is the sole manager of RA Capital. See Material Relationships with Selling Stockholders below. Each of RA Capital and Dr. Kolchinsky may be deemed to beneficially own the reported securities for purposes of Section 13(d) of the Exchange Act. RA Capital and Dr. Kolchinsky disclaim beneficial ownership of the RA Fund reported securities for purposes of Rule 16a-1(a)(1) under the Exchange Act in reliance on Rule 16a-1(a)(1)(v) and (vii), respectively. RA Capital, Dr. Kolchinsky, and RA Fund have no pecuniary interest in the reported securities sold by the Account and disclaim: (A) beneficial ownership of securities held in the Account for purposes of Rule 16a-1(a)(2) and (B) beneficial ownership of securities held by the RA Fund, for purposes of Rule 16a-1(a)(2), except to the extent of their pecuniary interest therein. The address of the principal place of business of RA Fund, RA Capital, the Account and Peter Kolchinsky, Ph.D. is 20 Park Plaza, Suite 1200, Boston, MA 02116.

(7) Partially based on the Schedule 13G/A No. 1 filed with the SEC on February 14, 2018 by Cormorant Asset Management, LLC (CAM) and its affiliates. Funds affiliated with CAM are Cormorant Global Healthcare Master Fund, LP (Master Fund) and Cormorant Private Healthcare Fund I, LP (Fund). CAM serves as investment manager for Master Fund, Fund, and a separately managed account CRMA SPV, L.P. (CRMA). Share ownership consists of 1,130,738 shares of our common stock held by Master Fund, 2,299,633 shares of our common stock held by Fund and 226,299 shares of our common stock held by CRMA. Cormorant Global Healthcare GP, LLC (Master Fund LLC) serves as the general partner of Master Fund. Cormorant Private Healthcare GP, LLC (Fund LLC) serves as the general partner of Fund. Bihua Chen serves as the managing member of Master Fund LLC,

Fund LLC and CAM. Each of CAM,

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Master Fund, Master Fund LLC, Fund, Fund LLC, CRMA and Bihua Chen disclaims beneficial ownership of the shares reported herein, except to the extent of its or his pecuniary interest therein. The address of CAM, Master Fund, Master Fund LLC, Fund, Fund LLC and Account is c/o Cormorant Asset Management, LLC, 200 Clarendon Street, 52nd Floor, Boston, Massachusetts 02116.

(8) Based solely on the Schedule 13D/A No. 1 filed with the SEC on December 20, 2017 by Domain Partners VIII, L.P., a Delaware limited partnership (DP VIII) and DP VIII Associates, L.P., a Delaware limited partnership (DP VIII A) and the Form 4 filed with the SEC on December 20, 2017 by DP VIII and Brian K. Halak. Consists of (a) 3,469,029 shares of our common stock held by DP VIII, (b) 21,041 shares of our common stock issuable upon exercise of warrants held by DP VIII, (c) 25,730 shares of our common stock held by DP VIII A, and (d) 156 shares of our common stock issuable upon exercise of warrants held by DP VIII A. Dr. Halak is a member of our board of directors. See Material Relationships with Selling Stockholders below. The sole general partner of DP VIII and DP VIII A is One Palmer Square Associates VIII, LLC, a Delaware limited liability company (OPSA VIII). James C. Blair, Brian H. Dovey, Jesse I. Treu, Dr. Halak, and Nicole Vitullo are the managing members of OPSA VIII. The managing members of OPSA VIII may be deemed to share the power to vote or direct the voting of and to dispose or direct the disposition of the securities of the Issuer that are beneficially owned by DP VIII and DP VIII A. Each of the managing members of OPSA VIII disclaims beneficial ownership of all securities other than those he or she owns directly, if any, or by virtue of his or her indirect pro rata interest, as a managing member of OPSA VIII, in the securities owned by DP VIII and/or DP VIII A. The address of the principal place of business of DP VIII and DP VII A is One Palmer Square, Suite 515, Princeton, NJ 08542.

(9) Information is partially based on the Schedule 13D filed with the SEC on February 14, 2014 and the Form 4 filed with the SEC on February 24, 2015 by Skyline Venture Partners V, L.P., a Delaware limited partnership (SVP), Skyline Venture Management V, LLC, a California limited liability company (SVM), John G. Freund, M.D. and Yasunori Kaneko, M.D. Consists of 3,275,317 shares of our common stock held by SVP and 22,452 shares of our common stock issuable upon exercise of warrants held by SVP. Mr. Hoffman is a former member of SVM that has transitioned to an independent consultant of SVM, SVP or its affiliates with no financial interest, voting or dispositive power over the shares. John G. Freund, M.D. and Yasunori Kaneko, M.D. are managing directors of SVM, the sole general partner of SVP, and share voting and dispositive power over the shares held by SVP. Each of Drs. Freund and Kaneko disclaims beneficial ownership of such shares, except to the extent of his pecuniary interest therein. The address of the principal place of business of SVP, SVM and Drs. Freund, Kaneko and Hoffman is 525 University Avenue, Suite 1350, Palo Alto, CA 94301.

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MATERIAL RELATIONSHIPS WITH SELLING STOCKHOLDERS

Board of Directors

Adam M. Koppel, M.D., Ph.D., a Managing Director of Bain Capital Life Sciences Investors, LLC, also serves as a director of the Company. He may be deemed to have shared voting and dispositive power with respect to the shares of the common stock owned by Bain Capital Life Sciences Fund, L.P. and BCIP Life Sciences Associates, LP, and he also holds non-qualified stock options exercisable as of March 31, 2018 (or will become exercisable within 60 days of such date) and issuable into 29,158 shares of common stock.

Brian K. Halak, Ph.D., a managing member of One Palmer Square Associates VIII, L.L.C., the general partner of Domain Partners VIII, L.P. and DP Associates VIII, L.P., also serves as a director of the Company. He may be deemed to have shared voting and dispositive power with respect to the shares of the Common Stock owned by Domain Partners VIII, L.P. and DP Associates VIII, L.P. and he also holds non-qualified stock options exercisable as of March 31, 2018 (or will become exercisable within 60 days of such date) and issuable into 90,833 shares of common stock.

Peter Kolchinsky, Ph.D., Portfolio Manager and Managing Director of RA Capital Management, LLC, the general partner of RA Capital Healthcare Fund, L.P., also serves as a director of the Company. He has shared voting and dispositive power with respect to the shares of the common stock owned by RA Capital Healthcare Fund, L.P. and he also holds non-qualified stock options exercisable as of March 31, 2018 (or will become exercisable within 60 days of such date) and issuable into 90,833 shares of common stock.

We entered into a stock purchase agreement, dated as of March 30, 2017, with several institutional investors, including Bain Capital Life Sciences Fund, L.P., pursuant to which Bain Capital Life Sciences Fund, L.P. has the right, so long as it holds 25% of the Common Stock underlying the Redeemable Convertible Preferred Stock held by it at the closing of our redeemable convertible preferred stock offering on April 11, 2017, to name a non-voting board observer, subject to certain restrictions, to the extent Dr. Koppel is not re-elected or ceases to serve as a director.

USE OF PROCEEDS

All of the shares of common stock offered by the selling stockholders pursuant to this prospectus will be sold by the selling stockholders for their respective accounts. We will not receive any of the proceeds from these sales, if any. We will pay all of the fees and expenses incurred by us in connection with this registration. We may be responsible for certain fees and expenses incurred by the selling stockholders or any underwriting discounts or agent s commissions.

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PLAN OF DISTRIBUTION

The selling stockholders and any of their pledgees, assignees and successors-in-interest may, from time to time, sell any or all of the shares of our common stock beneficially owned by them and offered hereby directly or through one or more underwriters, broker-dealers or agents. The selling stockholders will be responsible for any underwriting discounts or agent s commissions. The common stock may be sold in one or more transactions at fixed prices, at prevailing market prices at the time of the sale, at varying prices determined at the time of sale, or at negotiated prices. The selling stockholders may use any one or more of the following methods when selling shares:

- on NASDAQ or any other national securities exchange or quotation service on which the securities may be listed or quoted at the time of sale;
- in the over-the-counter market;
- in transactions otherwise than on these exchanges or systems or in the over-the-counter market;
- through the writing or settlement of options or other hedging transactions entered into after the effective date of the registration statement of which this prospectus is a part, whether such options are listed on an options exchange or otherwise;
- through ordinary brokerage transactions and transactions in which the broker-dealer solicits purchasers;
- through block trades in which the broker-dealer will attempt to sell the shares as agent but may position and resell a portion of the block as principal to facilitate the transaction;
- through purchases by a broker-dealer as principal and resale by the broker-dealer for its account;
- in an exchange distribution in accordance with the rules of the applicable exchange;
- in privately negotiated transactions;
- through the settlement of short sales;
- in one or more transactions at a fixed price or prices, which may be changed from time to time;

through a combination of any such methods of sale; and

through any other method permitted pursuant to applicable law.

The selling stockholders also may sell shares under Rule 144 promulgated under the Securities Act rather than under this prospectus or any related prospectus supplement.

In connection with the sale of our common stock or interests therein, the selling stockholders may enter into hedging transactions with broker-dealers or other financial institutions, which may in turn engage in short sales of our common stock in the course of hedging the positions they assume. The selling stockholders may also sell our common stock short and deliver these shares of our common stock to close out their short positions, or loan or pledge our common stock to broker-dealers that in turn may sell our common stock. The selling stockholders may also enter into option or other transactions with broker-dealers or other financial institutions or create one or more derivative securities which require the delivery to such broker-dealer or other financial institution of the shares of our common stock covered by this prospectus, which shares such broker-dealer or other financial institution may resell pursuant to this prospectus (as supplemented or amended to reflect such transaction).

The selling stockholders and any broker-dealers or agents that are involved in selling the shares may be deemed to be underwriters within the meaning of the Securities Act in connection with such sales. In such event, any compensation received by such broker-dealers or agents and any profit on the resale of the shares purchased by them may be deemed to be underwriting commissions or discounts under the Securities Act. While neither we nor any selling stockholder can presently estimate the amount of such compensation, in compliance with the

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guidelines of the Financial Industry Regulatory Authority, Inc. (FINRA), the aggregate maximum discount, commission, agency fees or other items constituting underwriting compensation to be received by any FINRA member or independent broker-dealer will not exceed 8% of any offering pursuant to this prospectus and any related prospectus supplement. However, it is anticipated that the maximum commission or discount to be received in any particular offering of securities will be less than this amount.

We have agreed to indemnify the selling stockholders against certain liabilities, including liabilities arising under the Securities Act.

The resale securities will be sold only through registered or licensed brokers or dealers if required under applicable state securities laws.

Under applicable rules and regulations under the Exchange Act, any person engaged in the distribution of the resale securities may not simultaneously engage in market making activities with respect to the common stock for the applicable restricted period, as defined in Regulation M, prior to the commencement of the distribution. In addition, the selling stockholders will be subject to applicable provisions of the Exchange Act and the rules and regulations thereunder, including Regulation M, which may limit the timing of purchases and sales of the common stock by the selling stockholders or any other person. We will make copies of this prospectus available to the selling stockholders and have informed them of the need to deliver a copy of this prospectus to each purchaser at or prior to the time of the sale (including by compliance with Rule 172 under the Securities Act).

Each selling stockholder has informed the Company that it does not have any written or oral agreement or understanding, directly or indirectly, with any person to distribute the shares of our common stock covered by this prospectus. Upon being notified by a selling stockholder that any material arrangement has been entered into with an agent, a broker-dealer or underwriter for the sale of shares of common stock through a block trade, special offering, exchange distribution or secondary distribution or a purchase by a broker or dealer, we will file a supplement to this prospectus, if required, pursuant to Rule 424(b) under the Securities Act, disclosing (i) the name of each such selling stockholder and of the participating agent, broker-dealer(s) or underwriter(s), (ii) the number of shares of common stock involved, (iii) the price at which such shares were or will be sold, (iv) the commissions paid or to be paid or discounts or concessions allowed to such agent, broker-dealer(s) or underwriter(s), where applicable, and (v) other facts material to the transaction including, in the case of an agented offering, whether such agent will be acting on a best efforts basis for the period of its appointment.

If the selling stockholders offer and sell our common stock through an underwriter or underwriters, we and the selling stockholders will execute an underwriting agreement with the underwriter or underwriters. The names of the specific managing underwriter or underwriters, as well as any other underwriters, and the terms of the transactions, including compensation of the underwriters and broker-dealers, which may be in the form of discounts, concessions or commissions, if any, will be described in the applicable prospectus supplement, which, along with this prospectus, will be used by the underwriters to make resales of our common stock. If underwriters are used in the sale of any of our common stock in connection with this prospectus, those securities will be acquired by the underwriters for their own account and may be resold from time to time in one or more transactions, including negotiated transactions, at fixed public offering prices or at varying prices determined by the underwriters and the selling stockholders at the time of sale. Our common stock may be offered to the public either through underwriting syndicates represented by managing underwriters or directly by one or more underwriters. If any underwriter or underwriters are used in the sale of our common stock, unless otherwise indicated in a related prospectus supplement, the underwriting agreement will provide that the obligations of the underwriters are subject to some conditions precedent and that with respect to a sale of our common stock the underwriters will be obligated to purchase all such securities if any are purchased.

If any underwriters are involved in the offer and sale of our common stock, they will be permitted to engage in transactions that maintain or otherwise affect the price of the common stock or other securities of ours. These transactions may include over-allotment transactions, purchases to cover short positions created by an

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underwriter in connection with the offering and the imposition of penalty bids. If an underwriter creates a short position in the common stock in connection with the offering, i.e., if it sells more shares of common stock than set forth on the cover page of the applicable prospectus supplement, the underwriter may reduce that short position by purchasing common stock in the open market. In general, purchases of common stock to reduce a short position could cause the price of the common stock to be higher than it might be in the absence of such purchases. As noted above, underwriters may also choose to impose penalty bids on other underwriters and/or selling group members. This means that if underwriters purchase common stock on the open market to reduce their short position or to stabilize the price of the common stock, they may reclaim the amount of the selling concession from those underwriters and/or selling group members who sold such common stock as part of the offering.

If a selling stockholder offers and sells our common stock through a broker-dealer, such selling stockholder or an underwriter may sell our common stock to the broker-dealer, as principal. The broker-dealer may then resell our common stock to the public at varying prices to be determined by the broker-dealer at the time of resale.

We and the selling stockholders may enter into agreements with agents, underwriters and broker-dealers under which we and the selling stockholders may agree to indemnify the agents, underwriters and broker-dealers against certain liabilities, including liabilities under the Securities Act, or to contribute to payments they may be required to make with respect to these liabilities. The terms and conditions of this indemnification or contribution will be described in the applicable prospectus supplement.

Some of the agents, underwriters or broker-dealers, or their affiliates may be customers of, engage in transactions with or perform services for, us or any of our affiliates or any of the selling stockholders or their respective affiliates in the ordinary course of business.

The selling stockholders may also transfer the shares of common stock in other circumstances, in which case the transferees, pledges or other successors in interest will be the selling beneficial owners for purposes of this prospectus.

With certain limited exceptions, we have agreed to use commercially reasonable efforts to keep the registration statement of which this prospectus forms a part effective until the later of (i) the date as of which all shares covered by this prospectus have been sold; and (ii) the date as of which no holder holds registrable securities. There can be no assurance that the selling stockholders will sell any or all of the shares of common stock registered pursuant to the registration statement, of which this prospectus or any related prospectus supplement forms a part.

LEGAL MATTERS

The legality of the issuance of the shares of our common stock offered hereby is being passed upon by Sidley Austin LLP, Palo Alto, California. If counsel for any selling stockholder or underwriter passes on legal matters in connection with an offering of the common stock described in this prospectus, we will name that counsel in the prospectus supplement to that offering.

EXPERTS

The consolidated financial statements incorporated in this prospectus by reference from the Company s Annual Report on Form 10-K for the year ended December 31, 2017, have been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their report, which is incorporated herein by reference. Such financial statements have been so incorporated in reliance upon the report of such firm given upon their authority as experts in accounting and auditing.

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INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to incorporate by reference into this prospectus the information contained in other documents we file with the SEC, which means that we can disclose important information to you by referring you to those documents. Any statement contained in any document incorporated or deemed to be incorporated by reference herein shall be deemed to be modified or superseded, for purposes of this prospectus, to the extent that a statement contained in or omitted from this prospectus, or in any other subsequently filed document that also is or is deemed to be incorporated by reference herein, modifies or supersedes such statement. Any such statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this prospectus. We incorporate by reference the documents listed below which have been filed by us and any future filings we make with the SEC under Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act (i) after the date of the initial registration statement and prior to effectiveness of the registration statement and (ii) between the date of this prospectus and the date of the closing of each offering. These documents contain important information about Dicerna and its business and financial condition.

1. Our Annual Report on Form 10-K, for the year ended December 31, 2017, filed with the SEC on March 8, 2018, as amended;

2. Our Definitive Proxy Statement on Schedule 14A, filed with the SEC on April 26, 2018;

3. Our Current Reports on Form 8-K, filed with the SEC on April 23, 2018 and April 26, 2018 (Items 1.01 and 3.02 only); and

4. The description of the common stock contained in our Registration Statement on Form 8-A as filed with the SEC on January 28, 2014, including any amendments or reports filed for the purpose of updating such description.

Upon written or oral request, we will provide without charge to each person to whom a copy of the prospectus is delivered a copy of the documents incorporated by reference herein (other than exhibits to such documents unless such exhibits are specifically incorporated by reference herein). You may request a copy of these filings, at no cost, by writing or telephoning us at the following address: Dicerna Pharmaceuticals, Inc., 87 Cambridgepark Drive, Cambridge, MA 02140, Attention: Investor Relations, telephone: (617) 621-8097.

WHERE YOU CAN FIND MORE INFORMATION

We are subject to the informational requirements of the Exchange Act and in accordance therewith file reports, proxy statements and other information with the SEC. Our filings are available to the public over the Internet at the SEC s website at *sec.gov*, as well as at our website at *dicerna.com*.

You may also read and copy, at prescribed rates, any document we file with the SEC at the Public Reference Room of the SEC located at 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at (800) SEC-0330 for further information on the SEC s Public Reference Room.

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