COMPUGEN LTD
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Prospectus

$200,000,000
Ordinary Shares
Debt Securities
Rights
Warrants
Units

We may offer and sell from time to time in one or more offerings our ordinary shares, debt securities, rights, warrants and units comprising any combination of these securities having an aggregate offering price up to $200,000,000.

Each time we sell securities pursuant to this prospectus, we will provide in a supplement to this prospectus the price and any other material terms of any such offering and the securities offered. Any prospectus supplement may also add, update or change information contained in the prospectus. You should read this prospectus and any applicable prospectus supplement, as well as the documents incorporated by reference or deemed incorporated by reference into this prospectus, carefully before you invest in any securities.

Our ordinary shares are traded on The NASDAQ Global Market and on the Tel Aviv Stock Exchange under the symbol “CGEN.” The closing sale price of our ordinary shares on The NASDAQ Global Market and on the Tel Aviv Stock Exchange on October 10, 2016, was $6.37 and $6.32 per share, respectively. The currency in which our stock is traded on the Tel Aviv Stock Exchange is the New Israeli Shekel, or NIS. The above closing price on the Tel Aviv Stock Exchange represents a conversion from NIS to dollar amounts in accordance with the dollar - NIS conversion rate as of October 11, 2016.

AN INVESTMENT IN OUR SECURITIES INVOLVES A HIGH DEGREE OF RISK. SEE THE SECTION ENTITLED “RISK FACTORS” BEGINNING ON PAGE 4.

Neither the Securities and Exchange Commission nor any state or other 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.

This prospectus may not be used to consummate sales of securities unless it is accompanied by a prospectus supplement.

The date of this prospectus is October 11, 2016

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement that we filed with the Securities and Exchange Commission, or the SEC, using a “shelf” registration process. Under this shelf registration process, we may from time to time sell ordinary shares, debt securities, rights, warrants or units comprising any combination of these securities, in one or more offerings up to a total dollar amount of $200,000,000. We have provided to you in this prospectus a general description of the securities we may offer. Each time we sell securities, we will, to the extent required by law, provide a prospectus supplement that will contain specific information about the terms of the offering. We may also add, update or change in any accompanying prospectus supplement or any free writing prospectus we may authorize to be delivered to you any of the information contained in this prospectus. To the extent there is a conflict between the information contained in this prospectus and the prospectus supplement, you should rely on the information in the prospectus supplement, provided that if any statement in one of these documents is inconsistent with a statement in another document having a later date—for example, a document incorporated by reference in this prospectus or any prospectus supplement—the statement in the document having the later date modifies or supersedes the earlier statement. This prospectus, together with any accompanying prospectus supplement and any free writing prospectus we may authorize to be delivered to you, includes all material information relating to the offering of our securities.

As permitted by the rules and regulations of the SEC, the registration statement, of which this prospectus forms a part, includes additional information not contained in this prospectus. You may read the registration statement and the other reports we file with the SEC at the SEC's web site or at the SEC's offices described below under the heading "Where You Can Find Additional Information."

In this prospectus, unless otherwise stated or the context otherwise requires, references to "Compugen," "the Company," "we," "us", "our" and similar references refer to Compugen Ltd. and our wholly owned subsidiary, Compugen USA, Inc. except where the context otherwise requires or as otherwise indicated.

You should rely only on the information contained or incorporated by reference in this prospectus, any accompanying prospectus supplement or any "free writing prospectus" we may authorize to be delivered to you. We have not authorized anyone to provide you with different information. If anyone provides you with different or inconsistent information, you should not rely on it. You should assume that the information appearing in this prospectus, any prospectus supplement and the documents incorporated by reference herein and therein are accurate only as of their respective dates. Our business, financial condition, results of operations and prospects may have changed since those dates.

Neither this prospectus nor any accompanying prospectus supplement shall constitute an offer or solicitation by anyone in any jurisdiction in which such offer or solicitation is not authorized or in which the person making such offer or solicitation is not qualified to do so or to anyone to whom it is unlawful to make such offer or solicitation.

PROSPECTUS SUMMARY

This summary highlights only some of the information included or incorporated by reference in this prospectus. You should carefully read this prospectus together with the additional information about us described in the sections entitled “Where You Can Find Additional Information” and “Incorporation of Certain Information by Reference” before purchasing our securities.

Compugen Ltd.

Overview

Compugen is a leading therapeutic discovery company utilizing its broadly applicable predictive discovery infrastructure to identify novel drug targets and develop first-in-class biologics. The Company’s current pipeline primarily consists of early-stage immuno-oncology programs aimed at harnessing the immune system to fight cancer. Our pipeline’s focus is on immune checkpoint target candidates discovered by us, which are predicted to serve as promising drug targets for cancer immunotherapies addressing various cancer types and patient populations, both as monotherapy and in combination with other drugs. Our business model relies on extracting the commercial value of our systematic discovery capability by entering into various forms of revenue-sharing collaborations for our novel drug target candidates and therapeutic product candidates at various stages of research and development. Compugen is headquartered in Holon, Israel, with R&D facilities located in both Holon and South San Francisco. At the U.S. facilities, therapeutic monoclonal antibodies (mAbs) are discovered and developed against our novel drug target candidates.

Predictive Discovery of Novel Targets

The establishment of our broadly applicable discovery approach evolved over a decade of pioneering multidisciplinary research involving in-depth understanding of key biological phenomena combined with the development of superior computational modeling capabilities. This approach, which is constantly enhanced and broadened, has been designed to allow us to focus on a selected biomedical field of research, and to emerge with a set of novel drug targets that otherwise would have been challenging to identify. We employ our discovery approach in multiple therapeutic and diagnostic areas and have demonstrated significant advantages of our methodologies in terms of ability to discover novel target candidates, cost, time and probability of successful experimental validation, in comparison to traditional discovery methods.

Therapeutic/Disease Fields of Focus

Oncology and immunology (autoimmune diseases) are two medical fields with significant unmet medical needs. Biologics, such as mAb and Fc-fusion proteins, have revolutionized patients’ treatment in these two disease areas and have demonstrated substantial clinical benefit and commercial success. Compugen has chosen these two growing disease areas as its focus for its broadly applicable predictive capabilities. Biologics are one of the fastest growing segments in the drug industry and made up 27% of 2014 FDA approvals. Seven of the top ten selling drugs in 2014 were biologics including Humira (adalimumab), the top selling drug in 2014 with sales of $12.5 billion, Remicade (infliximab) and Rituxan/MabThera (rituximab), all indicated for the treatment of arthritis. Additionally, biologics to treat cancer represented three of the top ten best-selling drugs in 2014, and included Rituxan, Herceptin and Avastin.

For these reasons oncology and autoimmune diseases continue to be disease areas of high interest to pharmaceutical companies with numerous efforts to identify novel therapeutic solutions. Our science-driven predictive capabilities are well suited for the identification of novel target candidates suitable for therapeutic intervention for these complex, multi-factorial diseases. In recent years, we further focused our activities to be mainly in the field of immuno-oncology, an area of high medical promise and industry interest, where the modulation of the immune system

has shown notable clinical success in treating various types of cancer.

Monoclonal Antibody Therapy for Oncology

mAb therapeutics is a class of biological drugs that harnesses the exquisite specificity and potent binding properties of antibodies to create a mono-specific antibody (drug) that binds to the drug target of interest with high specificity and thereby limits the potential for off-target toxicity that is often seen with small molecule drugs. The extremely large repertoire of possible mAb that can be generated means that one can generate highly specific mAb drug candidates that can: a) bind to almost any extracellular or cell surface target protein; b) bind and antagonize the target of interest or c) bind and agonize the target of interest. Due to the versatility and high specificity of this approach, mAb therapies are being intensively researched, developed and commercialized as treatments for numerous serious diseases with the belief that they have the potential to be more effective treatments with fewer side effects compared to traditional small molecule chemical drugs. During the past two decades, mAbs have emerged as an important and rapidly growing drug class, with over 20 mAbs already approved for therapeutic use in the United States for various clinical indications, including oncology, chronic inflammatory diseases, transplantation, infectious diseases and cardiovascular diseases. For cancer therapy, a mAb may inhibit cellular processes critical for tumor growth, stimulate the patient's immune system to attack the target cancerous cells, or be used for targeted delivery of chemotherapy specifically to the cells identified by the antibodies (known ADC technology). Moreover, according to an analysis by Tufts University, the rate of success for mAb therapeutics from first use in humans to regulatory approval is more than double that of traditional small molecule chemical drugs.

Although significant progress has been made in recent years in mAb therapeutics, numerous challenges still remain. One of the main challenges in this extremely promising field of mAb therapeutics is the identification of novel extracellular or cell surface targets that can translate into clinically relevant therapies for a variety of disease indications. To this end, we have developed several proprietary target discovery platforms through focusing on and integration of various aspects of our unique predictive discovery capabilities to identify novel drug targets for mAb therapies. Our Pipeline Program activities are currently focused on mAbs as the therapeutic modality for cancer immunotherapy, with an additional Fc fusion therapeutics program for autoimmune diseases.

Therapeutic Proteins for Immunology

Therapeutic proteins are another type of biological drug, typically a large biological molecule or a fragment derived from a relevant extracellular or cell surface protein and usually engineered and produced by recombinant technologies to have drug-like properties. For example a cell surface or extracellular protein could be engineered to be fused to the Fc domain of an IgG (antibody) protein to provide a longer half-life in the blood. Therapeutic proteins are clinically used to treat a wide range of diseases including cancer, autoimmune diseases, infectious diseases, blood-related disorders and others. CGEN-15001, our lead program for autoimmune diseases, is an Fc fusion protein. This class of therapeutic proteins, known as Fc fusion proteins, has achieved significant clinical and commercial success as exemplified by the anti-rheumatic biologics ENBREL® (etanercept) with sales of about $8.9 billion in 2014, and ORENCIA® (abatacept) with about $1.6 billion in sales in 2014.

The Pipeline Program

In order to leverage our capability to predict multiple novel drug targets with each discovery effort, we established our Pipeline Program to allow the parallel target validation and early development of multiple therapeutic candidates based on such targets. Our Pipeline Program currently ranges from target validation to pre-clinical studies in the fields of oncology and immunology, with a primary focus on immuno-oncology. The aim of the Pipeline Program is to advance the validation of Compugen-discovered drug target candidates to generate therapeutic drug candidates against such targets – mainly as mAb therapeutics or to a lesser extent as Fc fusion protein therapeutics - and to further advance selected therapeutic candidates beyond their animal proof of concept stage. The newly discovered target candidates enter the Pipeline Program when they begin experimental evaluation following their in silico prediction and selection and undergo various experimental validation studies to confirm their therapeutic potential. The experimental validation studies are conducted at our facilities, or at external expert laboratories, selected specifically for each

relevant field. This is followed by the generation of a therapeutic product candidate to be used for in vitro and in vivo proof of concept studies in disease animal models, as applicable. Therapeutic Fc fusion proteins or mAb product candidates, either humanized or fully-human, then enter the stage of lead candidate selection and optimization, with a final lead to be advanced to investigational new drug application (IND) enabling studies. For selected therapeutic product candidates we intend to continue development into early clinical development. Our strategy is to partner our novel drug target candidates and their respective therapeutic product candidates in our Pipeline Program will be partnered at different stages of the drug development process, under collaborative and/or licensing arrangements of different types with third parties.

Bayer Collaboration

On August 5, 2013, we and Bayer Pharma AG, or Bayer, entered into a Research and Development Collaboration and License Agreement for the research, development and commercialization of antibody-based therapeutics against two novel Compugen-discovered immune checkpoint regulators, CGEN 15001T and CGEN 15022 (referred to herein as the "Bayer Collaboration").

Under the terms of the Bayer Collaboration, we received an upfront payment of $10 million, and we are eligible to receive an aggregate of over $500 million in potential milestone payments for both programs, not including aggregate pre-clinical milestone payments of up to $30 million during the research programs. Additionally, we are eligible to receive mid- to high single digit royalties on global net sales of any approved products under the collaboration. In 2014, we achieved the first and second pre-clinical milestones and in 2015 we achieved the third pre-clinical milestone with respect to CGEN-15001T, one of the two immune checkpoint regulators licensed to Bayer, receiving a total of $15 million in milestone payments for this program. Pursuant to the terms of the Bayer Collaboration, this program was transferred to Bayer's full control for further preclinical and clinical development activities, and worldwide commercialization under milestone and royalty bearing licenses from Compugen.

Bayer and Compugen are continuing the preclinical research program for CGEN-15022, the second of two checkpoint protein candidates discovered by Compugen that are being developed pursuant to the Agreement. In April 2016, pursuant to an amendment to the Bayer Collaboration, we achieved the first preclinical milestone for CGEN-15022 for which we received a $400,000 payment. A joint steering committee consisting of representatives from each party is responsible for overseeing and directing the research program pursuant to an agreed upon workplan. Following the completion of this second research program, Bayer will have full control over further pre-clinical and clinical development of any cancer therapeutic product candidates targeting CGEN-15022 and will have worldwide commercialization under milestone and royalty bearing licenses from Compugen.

Bayer may terminate the Bayer Collaboration, either in whole or only with respect to one of the programs, and in each case also on a product-by-product and/or country-by country basis, at any time without cause, upon prior written notice. Either party may also terminate the Bayer Collaboration, either in whole or with respect to only one of the programs, if the other party is in material breach and such breach has not been cured within the applicable cure period. Upon any termination of the Agreement, depending upon the circumstances, the parties have varying rights and obligations with respect to the continued development and commercialization of any products and certain payment and royalty obligations.

Corporate Information

Our legal and commercial name is Compugen Ltd. We were incorporated on February 10, 1993 as an Israeli corporation and operate under the Israel Companies Law, 5759-1999, as amended (the "Companies Law"). Our principal offices are located at 26 Harokmim Street, Holon 5885849, Israel, and our telephone number is +972-3-765-8585. Our web address is www.cgen.com. The information on our website is not incorporated by reference into this prospectus, is not considered a part of this prospectus and should not be relied upon with respect to any offering.

Compugen USA, Inc., our wholly owned subsidiary, was incorporated in Delaware in March 1997 and is qualified to do business in California. This subsidiary did not have any significant operations from 2008 to March 2012.

RISK FACTORS

Investing in our securities may involve a high degree of risk. Before making an investment decision, you should carefully consider the risks described under "Risk Factors" in the applicable prospectus supplement and in our most recent Annual Report on Form 20-F, or any updates in our Reports on Form 6-K, together with all of the other information appearing in this prospectus or incorporated by reference into this prospectus and any applicable prospectus supplement, in light of your particular investment objectives and financial circumstances. The risks so described are not the only risks facing our company. Additional risks not presently known to us or that we currently deem immaterial may also impair our business operations. Our business, financial condition and results of operations could be materially adversely affected by any of these risks. The trading price of our securities could decline due to any of these risks, and you may lose all or part of your investment.

NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus contains, and any accompanying prospectus supplement will contain, 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, and the Private Securities Litigation Reform Act of 1995. Also, documents that we incorporate by reference into this prospectus, including documents that we subsequently file with the SEC, will contain forward-looking statements. Forward-looking statements are those that predict or describe future events or trends and that do not relate solely to historical matters. You can generally identify forward-looking statements as statements containing the words "may," "will," "could," "should," "expect," "anticipate "objective," "goal," "intend," "estimate," "believe," "project," "plan," "assume" or other similar expressions, or negatives of th expressions, although not all forward-looking statements contain these identifying words. All statements contained or incorporated by reference in this prospectus and any prospectus supplement regarding our future strategy, future operations, projected financial position, proposed products, anticipated collaborations, estimated future revenues, projected costs, future prospects, the future of our industry and results that might be obtained by pursuing management's current plans and objectives are forward-looking statements.

You should not place undue reliance on our forward-looking statements because the matters they describe are subject to certain risks, uncertainties and assumptions, including in many cases decisions or actions by third parties, that are difficult to predict. Our forward-looking statements are based on the information currently available to us and speak only as of the date on the cover of this prospectus, the date of any prospectus supplement, or, in the case of forward-looking statements incorporated by reference, the date of the filing that includes the statement. Over time, our actual results, performance or achievements may differ from those expressed or implied by our forward-looking statements, and such difference might be significant and materially adverse to our security holders. We undertake no obligation to update publicly any forward-looking statements, whether as a result of new information, future events or otherwise.

We have identified some of the important factors that could cause future events to differ from our current expectations and they are described in this prospectus and supplements to this prospectus under the caption "Risk Factors," as well as in our most recent Annual Report on Form 20-F, including without limitation under the captions "Risk Factors" and "Operating and Financial Review and Prospects," and in other documents that we may file with the SEC, all of which you should review carefully. Please consider our forward-looking statements in light of those risks as you read this prospectus and any prospectus supplement.

OFFER STATISTICS AND EXPECTED TIMETABLE

We may sell from time to time pursuant to this prospectus (as may be detailed in prospectus supplements) an indeterminate number of securities as shall have a maximum aggregate offering price of $200,000,000. The actual number of securities and price of the securities that we will offer pursuant hereto will depend on a number of factors

that may be relevant as of the time of offer (see “Plan of Distribution” below).

CAPITALIZATION

The table below sets forth our unaudited capitalization as of June 30, 2016. As of June 30, 2016, we had no indebtedness.

	As of June 30, 2016 (in thousands, except share and per share data)
Shareholder's Equity:	
Ordinary Shares, NIS 0.01 nominal value:	
100,000,000 shares authorized and 50,908,454 shares issued and outstanding (1)	139
Additional paid in capital	331,538
Accumulated other comprehensive income	148
Accumulated deficit	(254,692)
Total Shareholders' Equity	$77,133

(1) Does not include as of June 30, 2016 outstanding options to purchase a total of 7,490,463 ordinary shares, at a weighted average exercise price of $5.11 per share.

PRICE RANGE OF OUR ORDINARY SHARES

Our ordinary shares were listed on The NASDAQ Global Market through June 16, 2009. On June 17, 2009, we transferred the listing of our ordinary shares from The NASDAQ Global Market to The NASDAQ Capital Market, and on January 27, 2014 we transferred the listing of our ordinary shares from The NASDAQ Capital Market back to The NASDAQ Global Market. The high and low sales prices per share of our ordinary shares for the periods indicated are set forth below:

Year Ended	High	Low
December 31, 2011	$5.80	$3.32
December 31, 2012	$6.47	$2.96
December 31, 2013	$11.92	$4.56
December 31, 2014	$14.32	$6.27
December 31, 2015	$9.65	$4.64
Quarter Ended		
March 31, 2014	$14.32	$8.76
June 30, 2014	$11.55	$7.58
September 30, 2014	$10.02	$8.19
December 31, 2014	$9.09	$6.27
March 31, 2015	$9.65	$6.92
June 30, 2015	$7.98	$6.10
September 30, 2015	$7.41	$4.64
December 31, 2015	$7.79	$4.91
March 31, 2016	$6.92	$4.32

June 30, 2016	$7.14	$5.48

Month Ended		
February 29, 2016	$5.03	$4.32
March 31, 2016	$6.09	$4.75
April 30, 2016	$7.14	$5.48
May 31, 2016	$7.13	$6.42
June 30, 2016	$7.04	$6.13
July 31, 2016	$6.83	$6.36

The high and low sales prices per share of our ordinary shares on the Tel Aviv Stock Exchange for the periods indicated are set forth below. The currency in which our stock is traded on the Tel Aviv Stock Exchange is the New Israeli Shekel, or NIS. The below dollar amounts represent a conversion from NIS to dollar amounts in accordance with the dollar NIS conversion rate as of the relevant date.

Year Ended	High	Low
December 31, 2011	$5.92	$3.27
December 31, 2012	$6.35	$3.03
December 31, 2013	$11.80	$4.57
December 31, 2014	$13.48	$6.40
December 31, 2015	$9.66	$4.59
Quarter Ended		
March 31, 2014	$13.48	$8.79
June 30, 2014	$11.35	$7.62
September 30, 2014	$9.69	$8.29
December 31, 2014	$9.07	$6.40
March 31, 2015	$9.66	$7.33
June 30, 2015	$7.88	$6.16
September 30, 2015	$7.20	$4.59
December 31, 2015	$7.74	$5.02
March 31, 2016	$6.93	$