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

AMENDMENT NO. 1
TO
FORM S-3
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

GENOCEA BIOSCIENCES, INC.
(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction
of incorporation or organization)

51-0596811
(I.R.S. Employer
Identification No.)

**100 Acorn Park Drive
Cambridge, Massachusetts 02140
(617) 876-8191**
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

**William D. Clark
President and Chief Executive Officer
Genocea Biosciences, Inc.
100 Acorn Park Drive
Cambridge, Massachusetts 02140
(617) 876-8191**
(Name, address including zip code, and telephone number, including area code, of agent for service)

**With copies to:
Marc A. Rubenstein, Esq.
Ropes & Gray LLP
Prudential Tower
800 Boylston St.
Boston, Massachusetts 02199
(617) 951-7000**

Approximate date of commencement of proposed sale to the public: From time to time after the effective date of this registration statement.

If the only securities being registered on this Form are being offered pursuant to dividend or interest reinvestment plans, please check the following box.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, other than securities offered only in connection with dividend or interest reinvestment plans, check the following box.

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this Form is a registration statement pursuant to General Instruction I.D. or a post-effective amendment thereto that shall become effective upon filing with the Commission pursuant to Rule 462(e) under the Securities Act, check the following box.

If this Form is a post-effective amendment to a registration statement filed pursuant to General Instruction I.D. filed to register additional securities or additional classes of securities pursuant to Rule 413(b) under the Securities Act, check the following box.

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

Large accelerated filer	<input type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller reporting company	<input checked="" type="checkbox"/>
		Emerging growth company	<input checked="" type="checkbox"/>

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 7(a)(2)(B) of Securities Act.

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	Amount to be Registered(1)	Proposed Maximum Offering Price Per Share	Proposed Maximum Aggregate Offering Price	Amount of Registration Fee
Common Stock	25,599,979	\$0.69(2)	\$ 17,663,985.51	\$ 2,140.88
Common Stock underlying Warrants	11,712,494	\$0.5428(3)	\$ 6,357,541.74	\$ 770.53
Total	37,312,473		\$ 24,021,527.25	\$ 2,911.41 (4)

(1) Pursuant to Rule 416 under the Securities Act of 1933, as amended (the "Securities Act"), the shares of common stock offered hereby also include an indeterminate number of additional shares of common stock as may from time to time become issuable by reason of stock splits, stock dividends, recapitalizations or other similar transactions.

(2) With respect to the shares of common stock offered by the selling stockholders named herein, estimated at \$0.69 per share, the average of the high and low prices as reported on the Nasdaq Capital Market on April 26, 2019, for the purpose of calculating the registration fee in accordance with Rule 457(c) under the Securities Act.

(3) With respect to the warrants offered by the selling stockholders named herein, estimated at \$0.5428 per warrant, which is the weighted average exercise price of the warrants, for purposes of calculating the registration fee pursuant to Rule 457(g) under the Securities Act.

(4) Previously paid.

The registrant hereby amends this registration statement on such date or dates as may be necessary to delay its effective date until the registrant shall file a further amendment which specifically states that this registration statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act, or until the registration statement shall become effective on such date as the Securities and Exchange Commission, acting pursuant to said Section 8(a), may determine.

The information in this prospectus is not complete and may be changed. The selling stockholders may not sell these securities or accept an offer to buy these securities until the Securities and Exchange Commission declares the registration statement effective. This prospectus is not an offer to sell these securities and is not soliciting an offer to buy these securities in any state where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED APRIL 30, 2019

PRELIMINARY PROSPECTUS

GENOCEA BIOSCIENCES, INC.

25,599,979 Shares of Common Stock

11,712,494 Shares of Common Stock Issuable upon Exercise of Warrants

This prospectus relates to the resale or other disposition from time to time of up to (i) 25,599,979 shares of our common stock, par value \$0.001 per share (the "Common Stock"), and (ii) up to 11,712,494 shares of Common Stock upon the exercise of warrants by the selling stockholders identified in this prospectus, including their transferees, pledgees, donees or successors.

The selling stockholders may, from time to time, sell, transfer, or otherwise dispose of any or all of their securities from time to time on any stock exchange, market, or trading facility on which the securities are traded or in private transactions. These dispositions may be at fixed prices, at prevailing market prices at the time of sale, at prices related to the prevailing market price, at varying prices determined at the time of sale, or at negotiated prices. See "Plan of Distribution" which begins on page 11.

We are not offering any shares of our Common Stock for sale under this prospectus. We will not receive any of the proceeds from the sale of common stock by the selling stockholders. However, we will generate proceeds in the event of a cash exercise of the warrants by the selling stockholders. All expenses of registration incurred in connection with this offering are being borne by us. All selling and other expenses incurred by the selling stockholders will be borne by the selling stockholders.

Our common stock is quoted on the Nasdaq Capital Market under the symbol "GNCA." On April 29, 2019, the last reported sale price of our common stock as reported on the Nasdaq Capital Market was \$0.76 per share.

We may amend or supplement this prospectus from time to time by filing amendments or supplements as required. You should read the entire prospectus and any amendments or supplements carefully before you make your investment decision.

Investing in our securities involves risks. See "Risk Factors" on page 3, and any applicable prospectus supplement, and under similar headings in the other documents that are incorporated by reference into this prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

Prospectus dated , 2019

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement on Form S-3 that we filed with the Securities and Exchange Commission (the “SEC”) using a “shelf” registration or continuous offering process.

You should read this prospectus and the information and documents incorporated by reference carefully. Such documents contain important information you should consider when making your investment decision. See “Where You Can Find More Information” and “Incorporation of Documents by Reference” in this prospectus.

This prospectus may be supplemented from time to time to add, to update or change information in this prospectus. Any statement contained in this prospectus will be deemed to be modified or superseded for purposes of this prospectus to the extent that a statement contained in such prospectus supplement modifies or supersedes such statement. Any statement so modified will be deemed to constitute a part of this prospectus only as so modified, and any statement so superseded will be deemed not to constitute a part of this prospectus. You should rely only on the information contained or incorporated by reference in this prospectus, any applicable prospectus supplement or any related free writing prospectus. We have not authorized any other person to provide you with different information. If anyone provides you with different or inconsistent information, you should not rely on it. No dealer, salesperson or other person is authorized to give any information or to represent anything not contained in this prospectus, any applicable prospectus supplement or any related free writing prospectus. This prospectus is not an offer to sell securities, and it is not soliciting an offer to buy securities, in any jurisdiction where the offer or sale is not permitted. You should assume that the information appearing in this prospectus or any prospectus supplement, as well as information we have filed with the SEC that is incorporated by reference, is accurate as of the date on the front of those documents only, regardless of the time of delivery of this prospectus or any applicable prospectus supplement, or any sale of a security. Our business, financial condition, results of operations and prospects may have changed since those dates.

This prospectus contains summaries of certain provisions contained in some of the documents described herein, but reference is made to the actual documents for complete information. All of the summaries are qualified in their entirety by the actual documents. Copies of some of the documents referred to herein have been filed, will be filed or will be incorporated by reference as exhibits to the registration statement of which this prospectus is a part, and you may obtain copies of those documents as described below under “Where You Can Find More Information.”

Unless otherwise stated or the context requires otherwise, references in this prospectus to “Genocea,” the “company” or the “Company,” “we,” “us,” or “our” refer to Genocea Biosciences, Inc.

ABOUT THE COMPANY

Company Overview

We are a biopharmaceutical company that seeks to discover and develop novel cancer immunotherapies. We use our proprietary discovery platform, ATLAS, to profile CD4+ and CD8+ T cell (or cellular) immune responses to tumor antigens. We use insights arising from ATLAS to design novel cancer immunotherapies. We believe that ATLAS, which recreates each individual's T cell immune responses to their tumor in the laboratory, affords Genocera advantages in the design of novel cancer immunotherapies relative to our peers, who we believe rely primarily on software and processes such as "machine learning" to predict immunotherapy targets.

Our most advanced program is GEN-009, a neoantigen (or personalized) cancer vaccine, for which we are conducting a Phase 1/2a clinical trial. The GEN-009 program uses ATLAS to identify neoantigens, or tumor mutations unique to each patient, for inclusion in each patient's GEN-009 vaccine. We are also advancing GEN-011, a neoantigen adoptive T cell therapy program as well as GEN-010, a next-generation neoantigen vaccine program.

Our principal executive offices are located at 100 Acom Park Drive, Cambridge, MA 02140, and our telephone number is (617) 876-8191. Our website address is: www.genocera.com. We have included our website address as a factual reference and do not intend it to be an active link to our website. The information that can be accessed through our website is not part of this prospectus, and investors should not rely on any such information in deciding whether to purchase our common stock.

RISK FACTORS

An investment in our common stock involves risks. Prior to making a decision about investing in our common stock, you should consider carefully the risks together with all of the other information contained or incorporated by reference in this prospectus, including any risks described in the section entitled "Risk Factors" contained in any supplements to this prospectus, in our Annual Report on Form 10-K for the year ended December 31, 2018, and in our subsequent filings with the SEC. Each of the referenced risks and uncertainties could adversely affect our business, prospects, operating results and financial condition, as well as adversely affect the value of an investment in our securities. Additional risks not known to us or that we believe are immaterial may also adversely affect our business, operating results and financial condition and the value of an investment in our securities.

DESCRIPTION OF PRIVATE PLACEMENT OF COMMON STOCK AND WARRANTS

On February 14, 2019, we completed a private placement financing transaction (the “Initial Closing”). Pursuant to a Subscription Agreement (the “Subscription Agreement”), we issued 25,599,979 shares (the “Shares”) of Common Stock, pre-funded warrants (the “Pre-Funded Warrants”) to purchase 4,250,000 shares of Common Stock (the “Pre-Funded Warrant Shares”), and warrants (the “Warrants”) to purchase up to 7,462,494 shares of Common Stock (the “Warrant Shares”). The Shares, Pre-Funded Warrants and Warrants (collectively, the “Units”) were sold at a purchase price of \$0.5026 per Unit. We received gross cash proceeds of approximately \$15,002,599, excluding transactions costs, fees and expenses, for the purchase of the Shares, Pre-Funded Warrant Shares and Warrant Shares. The purchasers of the Shares, Pre-Funded Warrants and Warrants were the selling stockholders named in this prospectus (the “Purchasers”).

Warrants and Pre-Funded Warrants

The material terms and provisions of the Warrants and the Pre-Funded Warrants to purchase shares of Common Stock are summarized below. This summary is subject to and qualified in its entirety by the form of warrant and pre-funded warrant, which were filed with the SEC as exhibits to the Company’s Annual Report on Form 10-K for the year ended December 31, 2018.

Exercisability. The holder may exercise the Warrants at any time or from time to time through February 14, 2024, unless the holder becomes a Non-Participating Purchaser, in which case it will forfeit any unexercised Warrants. The holder may exercise the Pre-Funded Warrants at any time or from time to time through February 14, 2039. As further described under “Selling Stockholders,” notwithstanding the foregoing, certain holders will be prohibited from exercising such warrants into shares of our common stock if, as a result of such exercise, the holder, together with its affiliates, would own more than a specific percentage of the total number of shares of our common stock then issued and outstanding. The Warrants and Pre-Funded Warrants are exercisable, at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice accompanied by payment in full for the number of shares of our common stock purchased upon such exercise (except in the case of a cashless exercise as discussed below).

Exercise Price. The exercise price upon exercise of each Warrant is \$0.5656 per share of Common Stock and the exercise price of each Pre-Funded Warrants is \$0.5026 per share of Common Stock, of which \$0.5025 per share was paid by the holder at the Initial Closing. The exercise price of the warrants is subject to appropriate adjustment in the event of stock dividends, subdivisions, stock splits, stock combinations, reclassifications or reorganizations affecting our common stock.

Payment of Exercise Price. The warrant holders have the option to provide payment of the exercise price of the shares being acquired upon exercise of the warrants (i) by wire transfer or cashier’s check, or (ii) by cashless exercise.

Transferability. Subject to applicable laws and the restriction on transfer set forth in the Warrant Agreement, the warrants may be transferred at the option of the holders upon surrender of the warrants to the warrant agent together with the appropriate instruments of transfer.

Change of Control Transactions. If, at any time while the Warrant or Pre-Funded Warrant is outstanding, there is a Change of Control, which generally includes a merger or consolidation resulting in the sale of 50% or more of the voting securities of the Company, the sale of all or substantially all of the assets or voting securities of the Company, or other change of control transaction, then the holder has the right thereafter to receive, upon exercise of the Warrant or Pre-Funded Warrant, the same amount and kind of securities, cash or property as it would have been entitled to receive upon the occurrence of such Change of Control if it had been, immediately prior to such Change of Control, the holder of the number of Warrant Shares then issuable upon exercise in full of the Warrant or Pre-Funded Warrant (the “Alternate Consideration”). If holders of Common Stock are given any choice as to the securities, cash or property to be received in a Change of Control, then the holder will be given the same choice as to the Alternate Consideration it receives upon any exercise of this Warrant following such Change of Control.

Events of Failure. In the event that we fail to timely deliver shares of Common Stock to any holder, we are required to make whole any holder who purchases shares of Common Stock to deliver in satisfaction of a sale by such holder of shares of Common Stock issuable upon an exercise of the Warrants or the Pre-Funded Warrants that the holder anticipated receiving from the Company, as described in the Warrants and Pre-Funded Warrants.

Rights as a Stockholder. Except for the right to participate in certain dividends and distributions and as otherwise provided in the Warrants and the Pre-Funded Warrants or by virtue of a holder’s ownership of our common stock, the holders of

the Warrants and Pre-Funded Warrants do not have the rights or privileges of holders of our Common Stock, including any voting rights, until they exercise their warrants.

Waivers and Amendments. Any term of the Warrants and Pre-Funded Warrants may be amended or waived with our written consent and the written consent of the holder of such Warrant or Pre-Funded Warrant.

No Fractional Shares. No fractional shares or scrip representing fractional shares shall be issued upon the exercise of the Warrants or Pre-Funded Warrants. As to any fraction of a share which the holder would otherwise be entitled to purchase upon such exercise, we shall cause the warrant agent to, at our option, pay a cash adjustment in respect of such final fraction in an amount equal to such fraction multiplied by the exercise price of the Warrant or Pre-Funded Warrant per whole share or round such fractional share up to the nearest whole share.

Warrant Agent. Our warrant agent is Computershare Trust Company, N.A.

DISCLOSURE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus, any prospectus supplement and the other documents we have filed with the SEC that are incorporated herein by reference, contain forward-looking statements that involve substantial risks and uncertainties. All statements, other than statements of historical facts, including statements regarding our strategy, future operations, future financial position, future revenues, projected costs, prospects, plans and objectives of management, are forward-looking statements. The words “anticipate,” “believe,” “estimate,” “expect,” “intend,” “may,” “plan,” “predict,” “project,” “target,” “potential,” “will,” “would,” “could,” “should,” “continue,” and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. In particular, you should consider the numerous risks described in our Annual Report on Form 10-K for the year ended December 31, 2018 and any subsequent Quarterly Reports on Form 10-Q, each incorporated by reference in this prospectus, and in the “Risk Factors” section in the applicable prospectus supplement. See “Where You Can Find More Information.”

Although we believe the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, level of activity, performance or achievements. You should not rely upon forward-looking statements as predictions of future events. Unless required by law, we will not undertake and we specifically disclaim any obligation to release publicly the result of any revisions which may be made to any forward-looking statements to reflect events or circumstances after the date of such statements or to reflect the occurrence of events, whether or not anticipated. In that respect, we wish to caution readers not to place undue reliance on any such forward-looking statements, which speak only as of the date they are made.

This prospectus and the other documents incorporated by reference herein include statistical and other industry and market data that we obtained from industry publications and research, surveys and studies conducted by third parties. Industry publications and third party research, surveys and studies generally indicate that their information has been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information. While we believe these industry publications and third party research, surveys and studies are reliable, we have not independently verified such data.

These risks and uncertainties include, among other things:

- our estimates regarding the timing and amount of funds we require to initiate clinical trials for GEN-009 and to continue our investments in immuno-oncology;
- our estimate for when we will require additional funding;
- our plans to commercialize GEN-009 and our other product candidates;
- the timing of, and our ability to, obtain and maintain regulatory approvals for our product candidates;
- the rate and degree of market acceptance and clinical utility of any approved product candidate;
- the potential benefits of strategic partnership agreements and our ability to enter into strategic partnership arrangements;
- our ability to quickly and efficiently identify and develop product candidates;
- our commercialization, marketing and manufacturing capabilities and strategy;
- our intellectual property position; and
- our estimates regarding expenses, future revenues, capital requirements, the sufficiency of our current and expected cash resources and our need for additional financing.

USE OF PROCEEDS

The selling stockholders will receive all of the net proceeds from sales of the Common Stock pursuant to this prospectus. However, in the case of Warrants and Pre-Funded Warrants issued to the selling stockholders pursuant to the Subscription Agreement, upon any exercise of the Warrants and Pre-Funded Warrants for cash, the selling stockholders would pay us an exercise price of \$0.5656 and \$0.01 per share of Common Stock, respectively, subject to any adjustment pursuant to the terms of the Warrants and Pre-Funded Warrants. We expect to use any such proceeds primarily to support the ongoing clinical study of GEN-009 and the development of other programs as well as for working capital and other general corporate purposes. The Warrants and Pre-Funded Warrants are also exercisable on a cashless basis by net exercise under certain conditions contained therein. If any of the Warrants or Pre-Funded Warrants are exercised on a cashless basis, we would not receive any cash payment from the applicable selling stockholder upon any such cashless exercise.

SELLING STOCKHOLDERS

Pursuant to the Subscription Agreement, we agreed to file the registration statement of which this prospectus is a part to cover the resale of the shares of our Common Stock and the shares of Common Stock underlying the Warrants and Pre-Funded Warrants, and to keep such registration statement effective with respect to each selling stockholder until the date on which all of the shares of our Common Stock registered for resale under the registration statement have been disposed of in accordance with such registration statement, disposed of pursuant to Rule 144 under the Securities Act, or can be resold pursuant to Rule 144 without restriction or limitation (including without any limitation as to volume of sales and without the selling stockholder complying with any method of sale requirements or notice requirements under Rule 144). The shares issuable upon exercise of the Warrants and Pre-Funded Warrants will become eligible for sale by the selling stockholders under this prospectus only when the Warrants or Pre-Funded Warrants are exercised. We cannot predict when or whether any of the selling stockholders will exercise their Warrants or Pre-Funded Warrants.

We are registering the resale of the above-referenced shares to permit each of the selling stockholders identified below, or their permitted transferees or other successors-in-interest that may be identified in a supplement to this prospectus or, if required, a post-effective amendment to the registration statement of which this prospectus is a part, to resell or otherwise dispose of the shares in the manner contemplated under “Plan of Distribution” in this prospectus (as may be supplemented and amended). This prospectus covers the sale or other disposition by the selling stockholders of up to the total number of shares of Common Stock that have been issued to the selling stockholders pursuant to the Subscription Agreement, plus the total number of shares of Common Stock issuable upon exercise of the Warrants and Pre-Funded Warrants issued to the selling stockholders. Throughout this prospectus, when we refer to the shares of our Common Stock being registered on behalf of the selling stockholders, we are referring to the shares of our Common Stock and the shares underlying the Warrants and Pre-Funded Warrants issued to the selling stockholders pursuant to the Subscription Agreement, and when we refer to the selling stockholders in this prospectus, we are referring to the purchasers under the Subscription Agreement and, as applicable, their permitted transferees or other successors-in-interest that may be identified in a supplement to this prospectus or, if required, a post-effective amendment to the registration statement of which this prospectus is a part.

The selling stockholders may sell some, all or none of their shares. We do not know how long the selling stockholders will hold the shares before selling them, and we currently have no agreements, arrangements or understandings with the selling stockholders regarding the sale or other disposition of any of the shares. The shares of our Common Stock covered hereby may be offered from time to time by the selling stockholders.

When we refer to “selling shareholders” in this prospectus, we mean those persons listed in the table below, as well as their transferees, pledgees or donees or their successors. The information regarding shares beneficially owned after the offering assumes the sale of all shares offered by the selling shareholders. To our knowledge, subject to community property laws where applicable, each person named in the table has sole voting and investment power with respect to the shares of Common Stock set forth opposite such person’s name.

The following table sets forth the name of each selling stockholder, the number and percentage of our Common Stock beneficially owned by the selling stockholders as of March 31, 2019, the number of shares of our Common Stock that may be offered under this prospectus, and the number and percentage of our Common Stock beneficially owned by the selling stockholders assuming all of the shares of our Common Stock registered hereunder are sold. Beneficial ownership is determined in accordance with the rules of the SEC and includes voting or investment power with respect to our Common Stock. Generally, a person “beneficially owns” shares of our Common Stock if the person has or shares with others the right to vote those shares or to dispose of them, or if the person has the right to acquire voting or disposition rights within 60 days. The number of shares of our Common Stock in the column “Number of Shares Offered” represents all of the shares of our Common Stock that a selling stockholder may offer and sell from time to time under this prospectus. For certain selling stockholders, the number of shares of Common Stock into which the Warrants and Pre-Funded Warrants beneficially held by such selling stockholder are exercisable are limited pursuant to the terms of the Warrants and Pre-Funded Warrants to a number of shares of Common Stock which would result in such selling stockholder having aggregate individual beneficial ownership of the total issued and outstanding shares of Common Stock over specified percentage thresholds (collectively, referred to as the “Beneficial Ownership Limitation”).

Name and Address	Prior to Offering	Percentage of Shares Beneficially Owned	Number of Shares Offered	After Offering	Percentage of Shares Beneficially Owned
	Number of Shares Beneficially Owned			Number of Shares Beneficially Owned	
New Enterprise Associates 16, L.P. 1954 Greenspring Drive, Suite 600 Timonium, MD 21093	49,935,336(1)	39.20%	12,435,336	37,500,000	30.03%
S.R. One, Limited 980 Great West Road Brentford, Middlesex, TW8 9GS England	14,557,004(2)	12.67%	12,435,336	2,121,668	1.89%
BVF Partners L.P. 44 Montgomery Street, 40 th Floor San Francisco, CA 94104	11,602,974(3)	9.99%	8,704,735	7,614,455	6.63%
DAFNA Capital Management LLC 10990 Wilshire Boulevard, Suite 1400 Los Angeles, CA 90024	3,362,066(4)	2.96%	2,487,066	875,000	*
Lincoln Park Capital Fund, LLC 440 N. Wells Street, Suite 410 Chicago, IL 60654	1,750,000(5)	1.55%	1,250,000	500,000	*

*Represents less than 1%.

- (1) Based on a Schedule 13D filed with the SEC on February 14, 2019, consisting of 34,948,269 shares of common stock and warrants to purchase 14,987,067 shares of common stock. NEA Partners 16, L.P. ("NEA Partners 16") is the sole general partner of NEA 16. NEA 16 GP, LLC ("NEA 16 LLC") is the sole general partner of NEA Partners 16. The individual managers of NEA 16 LLC are Peter J. Barris, Forest Baskett, Ali Behbahani, Carmen Chang, Anthony A. Florence, Jr., Mohamad H. Makhzoumi, Joshua Makower, David M. Mott, Scott D. Sandell, Peter W. Sonsini and Paul Walker (collectively, the "Managers"). The Managers share voting and dispositive power with regard to the shares held directly by NEA 16.
- (2) Based on a Schedule 13D filed with the SEC on February 25, 2019, consisting of 12,069,937 shares of common stock and 2,487,067 shares of common stock issuable upon the exercise of warrants. These shares and warrants are held directly by S.R. One, Limited, an indirect wholly-owned subsidiary of GlaxoSmithKline plc.
- (3) Consists of securities purchased in connection with a private placement in February 2019 and based on a Schedule 13G filed with the SEC on February 14, 2019, which discloses shares as of December 31, 2018. Consists of 3,777,888 shares of common stock held of record by Biotechnology Value Fund, L.P. ("BVF"), 2,924,147 shares of common stock held of record by Biotechnology Value Fund II, L.P. ("BVF2"), 591,427 shares of common stock held of record by Biotechnology Value Trading Fund OS LP ("Trading Fund OS"), and 534,781 shares of common stock held of record by the Partners Managed Accounts ("Managed Accounts"). Also includes 3,774,731 shares of common stock issuable upon exercise of warrants held by the above referenced BVF entities. Excludes 4,716,216 shares of common stock issuable upon the exercise of warrants, which are not exercisable within 60 days of March 31, 2019 by virtue of the beneficial ownership limitation described below. The number of shares of common stock into which the warrants are convertible is limited to that number of shares of common stock which would result in the stockholders, together with its affiliates, having an aggregate beneficial ownership of no more than 9.99% of the total issued and outstanding shares of common stock. This beneficial ownership limitation may be increased or decreased to an amount not to exceed 19.99% of the number of shares of common stock outstanding immediately after giving effect to the issuance of shares of common stock issuable upon exercise of warrants.
- (4) Consists of (i) 1,352,964 shares of common stock and 863,241 shares of common stock issuable upon exercise of warrants held by DAFNA LifeScience, LP and (ii) 636,689 shares of common and 509,172 shares of common stock issuable upon the exercise of warrants held by DAFNA LifeScience Select LP. DAFNA Capital Management LLC is the sole general partner of DAFNA LifeScience, LP and DAFNA LifeScience Select, LP. The Chief Executive Officer and Chief Investment Officer of DAFNA Capital Management LLC are Dr. Nathan Fischel and Dr. Fariba Ghodisian, respectively. These individuals may be deemed to have shared voting and investment power of the shares held by DAFNA LifeScience, LP and DAFNA LifeScience Select, LP. Each of Dr. Fischel and Dr. Fariba disclaim beneficial ownership of such shares, except to the extent of his or her pecuniary interest therein.

- (5) Consists of 1,000,000 shares of common stock and 750,000 shares of common stock issuable upon the exercise of warrants. Josh Scheinfeld and Jonathan Cope, as principals of Lincoln Park Capital Fund, LLC, are deemed to be beneficial owners of all shares of common stock owned by Lincoln Park Capital Fund, LLC. Messrs. Schienfeld and Cope have shared voting and dispositive power over such shares.

PLAN OF DISTRIBUTION

The selling stockholders, which as used herein includes donees, pledgees, transferees or other successors-in-interest selling shares of Common Stock previously issued and the shares of Common Stock issuable upon exercise of the Warrants or Pre-Funded Warrants or interests in shares of Common Stock received after the date of this prospectus from a selling stockholder as a gift, pledge, partnership distribution or other transfer, may, from time to time, sell, transfer or otherwise dispose of any or all of their shares of Common Stock or interests in shares of Common Stock on any stock exchange, market or trading facility on which the shares are traded or in private transactions. The selling stockholders may sell their shares of our Common Stock pursuant to this prospectus at fixed prices, at prevailing market prices at the time of sale, at prices related to the prevailing market price, 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 disposing of shares or interests therein:

- ordinary brokerage transactions and transactions in which the broker-dealer solicits purchasers;
- 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;
- purchases by a broker-dealer as principal and resale by the broker-dealer for its account;
- an exchange distribution in accordance with the rules of the applicable exchange;
- privately negotiated transactions;
- short sales effected after the date the registration statement of which this Prospectus is a part is declared effective by the SEC;
- through the writing or settlement of options or other hedging transactions, whether through an options exchange or otherwise;
- broker-dealers may agree with the selling stockholders to sell a specified number of such shares at a stipulated price per share;
- a combination of any such methods of sale; and
- any other method permitted by applicable law.

If the selling stockholders effect such transactions by selling shares of Common Stock to or through underwriters, broker-dealers or agents, such underwriters, broker-dealers or agents may receive commissions in the form of discounts, concessions or commissions from the selling stockholders or commissions from purchasers of the shares of Common Stock for whom they may act as agent or to whom they may sell as principal (which discounts, concessions or commissions as to particular underwriters, broker-dealers or agents may be in excess of those customary in the types of transactions involved).

Broker-dealers engaged by the selling stockholders may arrange for other brokers-dealers to participate in sales. Broker-dealers may receive commissions or discounts from the selling stockholders (or, if any broker-dealer acts as agent for the purchaser of securities, from the purchaser) in amounts to be negotiated.

The selling stockholders may, from time to time, pledge or grant a security interest in some or all of the shares of Common Stock owned by them and, if they default in the performance of their secured obligations, the pledgees or secured parties may offer and sell the shares of Common Stock, from time to time, under this prospectus, or under an amendment to this prospectus under Rule 424(b)(3) or other applicable provision of the Securities Act amending the list of selling stockholders to include the pledgee, transferee or other successors in interest as selling stockholders under this prospectus. The selling stockholders also may transfer the shares of Common Stock in other circumstances, in which case the transferees, pledgees or other successors in interest will be the selling beneficial owners for purposes of this prospectus.

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 shares of our Common Stock short and deliver these securities to close out their short positions, or loan or pledge our common stock to broker-dealers that in turn may sell these securities. The selling stockholders may also enter into option or other transactions with broker-dealers or other financial institutions or the creation of one or more derivative securities which require the delivery to such broker-dealer or other financial institution of shares offered 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 aggregate proceeds to the selling stockholders from the sale of the Common Stock offered by them will be the purchase price of the Common Stock less discounts or commissions, if any. Each of the selling stockholders reserves the right to accept and, together with their agents from time to time, to reject, in whole or in part, any proposed purchase of Common Stock to be made directly or through agents. We will not receive any of the proceeds from this offering. Upon any exercise of the Warrants or the Pre-Funded Warrants by payment of cash, however, we will receive the exercise price of the Warrants or Pre-Funded Warrants.

The selling stockholders also may resell all or a portion of the shares of Common Stock in open market transactions in reliance upon Rule 144 under the Securities Act, provided that they meet the criteria and conform to the requirements of that rule. In addition, the selling stockholders may transfer the shares of Common Stock by other means not described in this prospectus.

The selling stockholders and any underwriters, broker-dealers or agents that participate in the sale of the Common Stock or interests therein may be “underwriters” within the meaning of Section 2(11) of the Securities Act. Any discounts, commissions, concessions or profit they earn on any resale of the shares may be underwriting discounts and commissions under the Securities Act. Selling stockholders who are “underwriters” within the meaning of Section 2(11) of the Securities Act will be subject to the prospectus delivery requirements of the Securities Act.

To the extent required, the shares of our Common Stock to be sold, the names of the selling stockholders, the respective purchase prices and public offering prices, the names of any agents, dealer or underwriter, any applicable commissions or discounts with respect to a particular offer will be set forth in an accompanying prospectus supplement or, if appropriate, a post-effective amendment to the registration statement that includes this prospectus.

In order to comply with the securities laws of some states, if applicable, the Common Stock may be sold in these jurisdictions only through registered or licensed brokers or dealers. In addition, in some states the Common Stock may not be sold unless it has been registered or qualified for sale or an exemption from registration or qualification requirements is available and is complied with.

We have advised the selling stockholders that the anti-manipulation rules of Regulation M under the Exchange Act may apply to sales of shares in the market and to the activities of the selling stockholders and their affiliates. In addition, to the extent applicable we will make copies of this prospectus (as it may be supplemented or amended from time to time) available to the selling stockholders for the purpose of satisfying the prospectus delivery requirements of the Securities Act. The selling stockholders may indemnify any broker-dealer that participates in transactions involving the sale of the shares against certain liabilities, including liabilities arising under the Securities Act.

Once sold under the registration statement of which this prospectus forms a part, the shares of Common Stock will be freely tradable in the hands of persons other than our affiliates.

We have agreed to indemnify the selling stockholders against liabilities, including liabilities under the Securities Act and state securities laws, relating to the registration of the shares offered by this prospectus.

We will pay all expenses of the registration of the shares of Common Stock, including, without limitation, SEC filing fees. We have agreed with the selling stockholders to keep the registration statement of which this prospectus constitutes a part effective until such time as the shares offered by the selling stockholders have been effectively registered under the Securities Act and disposed of in accordance with such registration statement, the shares offered by the selling stockholders have been disposed of pursuant to Rule 144 under the Securities Act or the shares offered by the selling stockholders may be resold pursuant to Rule 144 without restriction or limitation (including without any limitation as to volume of sales and without the selling stockholder complying with any method of sale requirements or notice requirements under Rule 144).

LEGAL MATTERS

The validity of the issuance of the securities offered hereby will be passed upon for us by Ropes & Gray LLP, Boston, Massachusetts.

EXPERTS

The consolidated financial statements of Genocea Biosciences, Inc. appearing in Genocea Biosciences, Inc.'s Annual Report (Form 10-K) for the year ended December 31, 2018, have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their report thereon, included therein, and incorporated herein by reference. Such consolidated financial statements are incorporated herein by reference in reliance upon such report given on the authority of such firm as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

This prospectus is part of a registration statement we filed with the SEC. This prospectus does not contain all of the information set forth in the registration statement and the exhibits to the registration statement. For further information with respect to us and the Common Stock we are offering under this prospectus, we refer you to the registration statement and the exhibits and schedules filed as a part of the registration statement. Neither we nor any agent, underwriter or dealer has authorized any person to provide you with different information. We are not making an offer of Common Stock in any state where the offer is not permitted. You should not assume that the information in this prospectus is accurate as of any date other than the date on the front page of this prospectus, regardless of the time of delivery of this prospectus or any sale of Common Stock offered by this prospectus.

We file annual, quarterly and current reports, proxy statements and other information with the SEC. The SEC maintains a website that contains reports, proxy statements and other information regarding issuers that file electronically with the SEC, including us. The address of the SEC website is www.sec.gov.

We maintain a website at www.genocea.com. Information contained in, or accessible through, our website is not a part of, and is not incorporated into, this prospectus, and you should not consider it part of this prospectus.

INCORPORATION OF DOCUMENTS BY REFERENCE

The SEC allows us to “incorporate by reference” into this prospectus the information we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus, and information in documents that we file later with the SEC will automatically update and supersede information in this prospectus. We incorporate by reference into this prospectus the documents listed below and any future filings made by us with the SEC under Section 13(a), 13(c), 14 or 15(d) of the Exchange Act, except for information “furnished” under Items 2.02, 7.01 or 9.01 on Form 8-K or other information “furnished” to the SEC which is not deemed filed and not incorporated in this prospectus, until the termination of the offering of securities described in the applicable prospectus supplement. We hereby incorporate by reference the following documents:

- our Annual Report on Form 10-K for the year ended December 31, 2018, as filed with the SEC on February 28, 2019;
- our Quarterly Report on Form 10-Q for the quarter ended March 31, 2019, as filed with the SEC on April 30, 2019;
- the information specifically incorporated by reference into our Annual Report on Form 10-K for the year ended December 31, 2018 from our definitive proxy statement on Schedule 14A, as filed with the SEC on March 29, 2019;
- our Current Reports on Form 8-K filed with the SEC on February 12, 2019 and February 28, 2019; and
- description of our Common Stock contained in our Registration Statement on Form 8-A, as filed with the SEC on January 30, 2014, including any amendment or report filed for the purpose of updating such description.

Any statement contained in a document incorporated or deemed to be incorporated by reference in this prospectus will be deemed modified, superseded or replaced for purposes of this prospectus to the extent that a statement contained in this prospectus modifies, supersedes or replaces such statement.

You may request a copy of these filings, at no cost, by writing or telephoning us at the following address:

Investor Relations
100 Acorn Park Drive, 5th Floor

Cambridge, Massachusetts 02140
(617) 876-8191
email address: ir@genocea.com

Copies of these filings are also available, without charge, on the SEC's website at www.sec.gov and on our website at www.genocea.com as soon as reasonably practicable after they are filed electronically with the SEC. The information contained on our website is not a part of this prospectus.

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

Item 14. Other Expenses of Issuance and Distribution

The following table sets forth an estimate of the fees and expenses relating to the issuance and distribution of the securities being registered hereby, other than underwriting discounts and commissions, all of which shall be borne by the Registrant. All of such fees and expenses, except for the SEC registration fee, are estimated:

SEC registration fee	\$	2,912
Legal fees and expenses	\$	40,000
Accounting fees and expenses	\$	17,000
Miscellaneous fees and expenses	\$	7,088
Total	\$	67,000

Item 15. Indemnification of Officers and Directors.

Section 102 of the Delaware General Corporation Law permits a corporation to eliminate the personal liability of its directors or its stockholders for monetary damages for a breach of fiduciary duty as a director, except where the director breached his or her duty of loyalty, failed to act in good faith, engaged in intentional misconduct or knowingly violated a law, authorized the payment of a dividend or approved a stock repurchase in violation of Delaware corporate law or obtained an improper personal benefit. Our certificate of incorporation provides that no director shall be personally liable to us or our stockholders for monetary damages for any breach of fiduciary duty as a director, notwithstanding any provision of law imposing such liability, except to the extent that the Delaware General Corporation Law prohibits the elimination or limitation of liability of directors for breaches of fiduciary duty.

Section 145 of the Delaware General Corporation Law provides that a corporation has the power to indemnify a director, officer, employee or agent of the corporation and certain other persons serving at the request of the corporation in related capacities against expenses (including attorneys' fees), judgments, fines and amounts paid in settlements actually and reasonably incurred by the person in connection with an action, suit or proceeding to which he or she is party or is threatened to be made a party by reason of such position, if such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the best interests of the corporation, and, in any criminal action or proceeding, had no reasonable cause to believe his or her conduct was unlawful, except that, in the case of actions brought by or in the right of the corporation, no indemnification shall be made with respect to any claim, issue or matter as to which such person shall have been adjudged to be liable to the corporation unless and only to the extent that the Court of Chancery or other adjudicating court determines that, despite the adjudication of liability but in view of all of the circumstances of the case, such person is fairly and reasonably entitled to indemnification for such expenses which the Court of Chancery or such other court shall deem proper.

Our certificate of incorporation provides that we will indemnify each person who was or is a party or threatened to be made a party to any threatened, pending or completed action, suit or proceeding whether civil, criminal, administrative or investigative (other than an action by or in the right of us) by reason of the fact that he or she is or was, or has agreed to become, our director or officer, or is or was serving, or has agreed to serve, at our request as a director, officer, partner, employee or trustee of, or in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise (all such persons being referred to as an "Indemnitee"), or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding and any appeal therefrom, if such Indemnitee acted in good faith and in a manner he or she reasonably believed to be in, or not opposed to, our best interests, and, with respect to any criminal action or proceeding, he or she had no reasonable cause to believe his or her conduct was unlawful.

Our certificate of incorporation also provides that we will indemnify any Indemnitee who was or is a party to an action or suit by or in the right of us to procure a judgment in our favor by reason of the fact that the Indemnitee is or was, or has agreed to become, our director or officer, or is or was serving, or has agreed to serve, at our request as a director, officer, partner, employee or trustee of, or in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise, or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees) and, to the extent permitted by law, amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding, and any appeal therefrom, if the Indemnitee acted in good faith and in a manner he or she

reasonably believed to be in, or not opposed to, our best interests, except that no indemnification shall be made with respect to any claim, issue or matter as to which such person shall have been adjudged to be liable to us, unless a court determines that, despite such adjudication but in view of all of the circumstances, he or she is entitled to indemnification of such expenses. Notwithstanding the foregoing, to the extent that any Indemnitee has been successful, on the merits or otherwise, he or she will be indemnified by us against all expenses (including attorneys' fees) actually and reasonably incurred by him or her or on his or her behalf in connection therewith. If we don't assume the defense, expenses must be advanced to an Indemnitee under certain circumstances.

We have entered into indemnification agreements with our directors. In general, these agreements provide that we will indemnify the director to the fullest extent permitted by law for claims arising in his or her capacity as a director of our company or in connection with his or her service at our request for another corporation or entity. The indemnification agreements also provide for procedures that will apply in the event that a director makes a claim for indemnification and establish certain presumptions that are favorable to the director.

We maintain a general liability insurance policy which covers certain liabilities of our directors and officers arising out of claims based on acts or omissions in their capacities as directors or officers.

Item 16. Exhibits.

Exhibit Number	Description of Document
3.1	<u>Fifth Amended and Restated Certificate of Incorporation (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, File No. 001-36289, filed on February 12, 2014)</u>
3.2	<u>Amended and Restated By-laws (incorporated by reference to Exhibit 3.2 to the Company's Current Report on Form 8-K, File No. 001-36289, filed on February 12, 2014)</u>
3.3	<u>Certificate of Amendment to Fifth Amended and Restated Certificate of Incorporation (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, File No. 001-36289, filed on June 25, 2018)</u>
4.1	<u>Form of Common Stock Certificate (incorporated by reference to Exhibit 4.1 to the Company's Registration Statement on Form S-1, File No. 333-193043, filed on December 23, 2013)</u>
4.2	<u>Form of Class B Warrant (incorporated by reference to Exhibit 4.8 to the Company's Annual Report on Form 10-K, File No. 001-36289, filed on February 28, 2019)</u>
4.3	<u>Form of Pre-Funded Warrant (incorporated by reference to Exhibit 4.1 to the Company's Form 8-K, File No. 001-26389, filed on February 12, 2019)</u>
5.1	<u>Opinion of Ropes & Gray LLP (filed herewith)</u>
10.1	<u>Subscription Agreement, dated as of February 11, 2019, among Genoclea Biosciences, Inc. and the purchasers party thereto (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q, File No. 001-36289, filed on April 30, 2019)</u>
23.1	<u>Consent of Ernst & Young LLP (filed herewith)</u>
23.2	<u>Consent of Ropes & Gray LLP (included in Exhibit 5.1)</u>
24.1	<u>Power of Attorney (previously filed)</u>

Item 17. Undertakings.

The undersigned registrant hereby undertakes:

(1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:

(i) To include any prospectus required by Section 10(a)(3) of the Securities Act of 1933;

(ii) To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Commission pursuant to Rule 424(b)

if, in the aggregate, the changes in volume and price represent no more than 20 percent change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement;

(iii) To include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;

provided, however, that the undertakings set forth in paragraphs (1)(i), (1)(ii) and (1)(iii) above do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the Commission by the registrant pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934 that are incorporated by reference in this registration statement or is contained in a form of prospectus filed pursuant to Rule 424(b) that is part of this registration statement.

(2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof.

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

(4) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser:

(i) Each prospectus filed by the registrant pursuant to Rule 424(b)(3) shall be deemed to be part of the registration statement as of the date the filed prospectus was deemed part of and included in the registration statement; and

(ii) Each prospectus required to be filed pursuant to Rule 424(b)(2), (b)(5), or (b)(7) as part of a registration statement in reliance on Rule 430B relating to an offering made pursuant to Rule 415(a)(1)(i), (vii), or (x) for the purpose of providing the information required by Section 10(a) of the Securities Act of 1933 shall be deemed to be part of and included in the registration statement as of the earlier of the date such form of prospectus is first used after effectiveness or the date of the first contract of sale of securities in the offering described in the prospectus. As provided in Rule 430B, for liability purposes of the issuer and any person that is at that date an underwriter, such date shall be deemed to be a new effective date of the registration statement relating to the securities in the registration statement to which that prospectus relates, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof. *Provided, however,* that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such effective date, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such effective date.

(5) That, for the purpose of determining liability of the registrant under the Securities Act of 1933 to any purchaser in the initial distribution of the securities, the undersigned registrant undertakes that in a primary offering of securities of the undersigned registrant pursuant to this registration statement, regardless of the underwriting method used to sell the securities to the purchaser, if the securities are offered or sold to such purchaser by means of any of the following communications, the undersigned registrant will be a seller to the purchaser and will be considered to offer or sell such securities to such purchaser: (i) any preliminary prospectus or prospectus of the undersigned registrant relating to the offering required to be filed pursuant to Rule 424; (ii) any free writing prospectus relating to the offering prepared by or on behalf of the undersigned registrant or used or referred to by the undersigned registrant; (iii) the portion of any other free writing prospectus relating to the offering containing material information about the undersigned registrant or its securities provided by or on behalf of the undersigned registrant; and (iv) any other communication that is an offer in the offering made by the undersigned registrant to the purchaser.

(6) That, for purposes of determining any liability under the Securities Act of 1933, each filing of the registrant's annual report pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934 (and, where applicable, each filing of an employee benefit plan's annual report pursuant to Section 15(d) of the Securities Exchange Act of 1934) that is incorporated by reference in the registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof.

Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Commission such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act of 1933 and will be governed by the final adjudication of such issue.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, the Registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-3 and has duly caused this Form S-3 to be signed on its behalf by the undersigned, thereunto duly authorized, in Cambridge, Massachusetts, on the 30th day of April, 2019.

GENOCEA BIOSCIENCES, INC.

By: /s/ WILLIAM D. CLARK

William D. Clark

President and Chief Executive Officer and Director

(Principal Executive Officer)

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ WILLIAM D. CLARK</u> William D. Clark	President and Chief Executive Officer and Director (Principal Executive Officer)	April 30, 2019
<u>*</u> Diantha Duvall	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	April 30, 2019
<u>*</u> Kenneth Bate	Director	April 30, 2019
<u>*</u> Ali Behbahani	Director	April 30, 2019
<u>*</u> Katrine Bosley	Director	April 30, 2019
<u>*</u> Ronald Cooper	Director	April 30, 2019
<u>*</u> Michael Higgins	Director	April 30, 2019
<u>*</u> Howard Mayer, M.D.	Director	April 30, 2019
<u>*</u> George Siber, M.D.	Director	April 30, 2019

*By /s/ WILLIAM D. CLARK

William D. Clark

Attorney-in-Fact



ROPE & GRAY LLP
PRUDENTIAL TOWER
800 BOYLSTON STREET
BOSTON, MA 02199-3600
WWW.ROPEGRAY.COM

April 30, 2019

Cambridge Discovery Park
100 Acorn Park Drive, 5th Floor
Cambridge, MA 02140

Re: Registration Statement on Form S-3

Ladies and Gentlemen:

We have acted as counsel to Genocea Biosciences, Inc., a Delaware corporation (the "Company") in connection with the registration statement on Form S-3 (File No. 333-230577) (the "Registration Statement") to be filed with the Securities and Exchange Commission (the "Commission") under the Securities Act of 1933, as amended (the "Act"), on the date hereof. The Registration Statement relates to the offer and sale, from time to time by certain stockholders of the Company identified in the Registration Statement, of (i) up to 25,599,979 shares (the "Shares") of the Company's common stock, \$0.001 par value (the "Common Stock"), and (ii) up to 11,712,494 shares of Common Stock (the "Warrant Shares") issuable upon the exercise of warrants (the "Warrants"). The Shares and Warrants were sold pursuant to that certain Subscription Agreement, dated as of February 11, 2019, among the Company and the purchasers (the "Purchasers") named therein (the "Subscription Agreement").

In connection with this opinion letter, we have examined such certificates, documents and records and have made such investigation of fact and such examination of law as we have deemed appropriate in order to enable us to render the opinions set forth herein. In conducting such investigation, we have relied, without independent verification, upon certificates of officers of the Company, public officials and other appropriate persons.

The opinions expressed below are limited to the laws of the State of New York and the Delaware General Corporation Law.

Based upon and subject to the foregoing, we are of the opinion that the Shares have been duly authorized and validly issued, fully paid and non-assessable. We are of the opinion that the Warrants have been duly authorized and have been validly issued, fully paid and non-assessable and are binding obligations of the Company, enforceable in accordance with their terms, subject to applicable bankruptcy, insolvency and similar laws affecting creditors' rights generally, concepts of reasonableness and equitable principles of general applicability, provided that we express no opinion as to the validity, legally binding effect or enforceability of any provision in the Warrants that requires or relates to adjustments to the exercise price at a price or in an amount that a court would determine in the circumstances under applicable law to be commercially unreasonable or a penalty or forfeiture. As of the date hereof, the Warrant Shares



have been duly authorized and reserved for issuance pursuant to the terms of the Warrants and, when issued and delivered upon exercise of the Warrants and against payment of the consideration set forth therein, will be validly issued, fully paid and non-assessable.

In connection with the opinion expressed above, we have assumed that each party to the Warrants has been duly incorporated and is validly existing under the laws of the jurisdiction of its organization. In addition, we have assumed that the execution, delivery and performance by each party thereto of the Warrants (a) are within its corporate powers, (b) do not contravene or constitute a default under the certificate of incorporation or bylaws or other constitutive documents of such party, (c) require action by or in respect of, or filing with, any governmental body, agency or official and (d) do not contravene, or constitute a default under, any provisions of applicable law or regulation or any judgment, injunction, order or decree or any agreement or other instrument binding upon such party, provided that we make no such assumption to the extent we have specifically opined as to such matters with respect to the Company.

In addition, we have also assumed that (i) the Registration Statement and any amendments thereto will have become effective and comply with all applicable laws and no stop order suspending the Registration Statement's effectiveness will have been issued and remain in effect, in each case, at the time the Shares or Warrants Shares are offered and sold as contemplated by the Registration Statement and (ii) all Shares and Warrant Shares will be offered and sold in compliance with applicable federal and state securities laws and in the manner stated in the Registration Statement and the applicable prospectus supplement.

We hereby consent to your filing of this opinion as an exhibit to the Registration Statement and to the use of our name therein under the caption "Legal Matters." In giving such consent, we do not thereby admit that we are in the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations of the Commission thereunder.

Very truly yours,

/s/ Ropes & Gray LLP
Ropes & Gray LLP



CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the reference to our firm under the caption “Experts” in Amendment No. 1 to the Registration Statement (Form S-3) and related Prospectus of Genocera Biosciences, Inc. for the registration of 25,599,979 shares of common stock and 11,712,494 warrants to purchase shares of common stock and to the incorporation by reference therein of our report dated February 28, 2019, with respect to the consolidated financial statements of Genocera Biosciences, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2018, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Boston, Massachusetts

April 30, 2019