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PROSPECTUS

**Filed Pursuant to Rule 424(b)(3)
under the Securities Act of 1933
in connection with
Registration Statement No. 333-192552**

$40,000,000

TARGACEPT, INC.

COMMON STOCK

Targacept, Inc. entered into an At-the-Market Issuance Sales Agreement, or the sales agreement, with MLV & Co. LLC, or MLV, dated November 26, 2013, relating to shares of our common stock offered by this prospectus. In accordance with the terms of the sales agreement, we may offer and sell shares of our common stock, $0.001 par value per share, having an aggregate offering price of up to $40 million from time to time through MLV acting as our sales agent.

Sales of our common stock, if any, under this prospectus may be made in sales deemed to be "at the market offerings" as defined in Rule 415 promulgated under the Securities Act of 1933, as amended, or the Securities Act, including sales made directly on or through the NASDAQ Global Select Market or other market for our common stock in the United States, sales made to or through a market maker other than on an exchange or otherwise, in negotiated transactions at market prices prevailing at the time of sale or at prices related to such prevailing market prices, or any other method permitted by law. MLV is not required to sell any specific number or dollar amount of securities, but will act as a sales agent using commercially reasonable efforts consistent with its normal trading and sales practices, on mutually agreed terms between MLV and us. There is no arrangement for funds to be received in any escrow, trust or similar arrangement.

MLV will be entitled to compensation at a commission rate of up to 3% of the gross sales price per share sold. In connection with the sale of the common stock on our behalf, MLV will be deemed to be an "underwriter" within the meaning of the Securities Act, and the compensation of MLV will be deemed to be underwriting commissions or discounts.

Our common stock is listed on the NASDAQ Global Select Market under the symbol "TRGT." On December 9, 2013, the last reported sale price of our common stock was $5.57 per share. Prospective purchasers of securities are urged to obtain current information as to the market prices of our common stock.

Investing in our securities involves a high degree of risk. Before deciding whether to invest in our securities, you should consider carefully the risks that we have described on page 4 of this prospectus under the caption "Risk Factors."

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.

The date of this prospectus is December 12, 2013.

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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 SEC, utilizing a "shelf" registration process. Pursuant to this prospectus, we may sell, in accordance with the At-the-Market Issuance Sales Agreement, or the sales agreement, that we have entered into with MLV shares of our common stock having an aggregate offering price of up to $40 million.

This prospectus does not contain all of the information included in the registration statement. For a more complete understanding of the offering of securities, you should refer to the registration statement, including its exhibits. This prospectus, together with the documents incorporated by reference in this prospectus includes all material information relating to the offering. You should carefully read this prospectus, the information and documents incorporated by reference in this prospectus and the additional information under the heading "Where You Can Find More Information" before making an investment decision.

You should rely only on the information contained or incorporated by reference in this prospectus. We and MLV have not authorized anyone to provide you with information different from that contained or incorporated by reference in this prospectus. No dealer, salesperson or other person is authorized to give any information or to represent anything not contained or incorporated by reference in this prospectus. You must not rely on any unauthorized information or representation. This prospectus is an offer to sell only the securities offered hereby, but only under circumstances and in jurisdictions where it is lawful to do so. You should assume that the information in this prospectus is accurate only as of the date on the front of the document and that any information we have incorporated by reference in this prospectus is accurate only as of the date of the document that is incorporated by reference, regardless of the time of delivery of this prospectus or any sale of a security.

Unless the context otherwise requires, "Targacept," the "Company," "we," "us," "our" and similar names refer to Targacept, Inc.

PROSPECTUS SUPPLEMENT SUMMARY

We are a biopharmaceutical company engaged in the development of novel NNR Therapeutics™ to treat patients suffering from serious nervous system and gastrointestinal/genitourinary diseases and disorders. Our NNR Therapeutics selectively target a class of receptors known as neuronal nicotinic receptors, which we refer to as NNRs. NNRs are found on nerve cells throughout the nervous system and serve as key regulators of nervous system activity.

Based on years of focused research in the NNR area, we believe that compounds that interact selectively with specific NNR subtypes have the potential to achieve positive medical effects by modulating their activity. We have built an extensive patent estate covering the structure or therapeutic use of small molecules designed to regulate activity in the body by selectively affecting specific NNR subtypes.

We have multiple clinical-stage product candidates in areas in which we believe there are significant medical need and commercial potential.

Our most advanced product candidates are described below:

- *TC-5619*. TC-5619 is a novel small molecule that modulates the activity of the a7 NNR. We are currently conducting a Phase 2b clinical trial of TC-5619 as a treatment for negative symptoms and cognitive dysfunction in schizophrenia. We are also currently evaluating potential additional development of TC-5619 as a treatment for Alzheimer's disease.
- *TC-5214*. TC-5214 acts as an antagonist on the a3ß4 NNR. We are currently conducting a Phase 2b clinical trial of TC-5214 as a treatment for overactive bladder.
- *TC-1734*. TC-1734 (also referred to in previous filings as AZD3480) is a wholly-owned novel small molecule that modulates the activity of the a4ß2 NNR. We are currently conducting a Phase 2b clinical trial of TC-1734 as a treatment for mild to moderate Alzheimer's disease.
- *AZD1446 (TC-6683).* AZD1446 is a novel small molecule that modulates the activity of the a4ß2 NNR and is subject to an ongoing collaboration agreement with AstraZeneca AB, or AstraZeneca. Development decisions and activities for AZD1446 are substantially within the control of AstraZeneca.
- *TC-6499*. TC-6499 is a novel small molecule that modulates the activity of the a3ß4 and other NNRs as an agonist. We are evaluating potential future development options for this product candidate and are preparing to initiate in the first half of 2014 a Phase 2a study for the indication of diabetic gastroparesis, an often debilitating and chronic disorder that slows or stops the passage of food from the stomach to the small intestine.
- *TC-6987*. TC-6987 is a novel small molecule that modulates the activity of the a7 NNR. We have previously evaluated TC-6987 in two Phase 2 exploratory studies and are evaluating potential future development options for this product candidate.

We have an ongoing collaborative research and license agreement with AstraZeneca focused on compounds that act on the a4ß2 NNR, including AZD1446. Under the agreement:

- AstraZeneca has an exclusive license to AZD1446 and earlier-stage compounds that arose from the preclinical research collaboration described below;
- AstraZeneca is responsible for substantially all current and future development costs for AZD1446 and each other compound arising from the preclinical research collaboration described below that it elects to advance; and
- we and AstraZeneca conducted a preclinical research collaboration between January 2006 and January 2010 to discover and develop compounds that act on the a4ß2 NNR as treatments for conditions characterized by cognitive impairment; AstraZeneca paid us research fees, based on a reimbursement rate specified under the agreement, for research services rendered in the preclinical research collaboration.

AstraZeneca can terminate the agreement without cause upon 90 days' notice given at any time or in the event of, among other things, an uncured material breach by us.

We were incorporated in Delaware in 1997 as a wholly owned subsidiary of R.J. Reynolds Tobacco Company. In August 2000, we became an independent company when we issued and sold stock to certain venture capital investors. Since our inception, we have had limited revenue from now discontinued product sales and have funded our operations principally through public and private offerings of equity securities, payments under alliance and collaboration agreements, grants and equipment financing. We have historically devoted substantially all of our resources to the discovery and development of our product candidates and technologies, including the design, conduct and management of preclinical and clinical studies and related manufacturing, regulatory and clinical affairs, as well as intellectual property prosecution.

Except for a small number of periods in which we generated net income due primarily to the recognition into revenue of amounts received under collaboration agreements, we have not been profitable. As of September 30, 2013, we had an accumulated deficit of $267.3 million. During 2012, we implemented a plan to focus our resources on our more advanced programs, closed our laboratory operations, and completed two reductions in force. As a result we are no longer devoting significant resources to drug discovery or preclinical programs. We expect that we will incur losses in future periods should our product candidates advance into later-stage development and as we progress our programs and invest in additional product opportunities. Drug development, including clinical trials in particular, is time-consuming, expensive and may never yield a product that will generate revenue.

Our principal executive offices are located at 100 North Main Street, Suite 1510, Winston-Salem, North Carolina 27101 and our telephone number is (336) 480-2100. Our internet address is *www.targacept.com*. The information contained on, or that can be accessed through, our website is not incorporated by reference in this prospectus and does not constitute a part of this prospectus. We have included our website address as a factual reference and do not intend it as an active link to our website.

Targacept® and NNR Therapeutics™ are trademarks of Targacept, Inc. Any other service marks, trademarks and trade names appearing in this prospectus are the property of their respective owners.

THE OFFERING

Common stock offered by us pursuant to this prospectus	Shares of common stock having an aggregate offering price of up to $40 million.
Manner of offering	“At the market offering” that may be made from time to time through MLV as our sales agent. See “Plan of Distribution.”
Use of proceeds	We intend to use any net proceeds from the sale of our securities to fund our operations and for other general corporate purposes, such as working capital, development of our clinical and preclinical product candidates, intellectual property protection and enforcement, capital expenditures, investments, in-licenses and acquisitions. Pending use of the net proceeds as described above, we intend to invest the net proceeds in interest-bearing, investment grade securities.
Risk Factors	Investing in our securities involves significant risks. See “Risk Factors” beginning on page 3 for a discussion of risk factors that you should carefully consider before making a decision to buy shares of our common stock in this offering.
NASDAQ Global Select Market symbol	TRGT

RISK FACTORS

Investing in our securities involves risk. Prior to making a decision about investing in our securities, you should carefully consider all of the information contained or incorporated by reference in this prospectus. In particular, you should carefully consider the risks, uncertainties and assumptions discussed under the heading "Risk Factors" in our most recent annual report on Form 10-K, which is on file with the SEC and incorporated by reference in this prospectus, and in subsequent filings that we make with the SEC. The risks and uncertainties we have described are not the only ones we face. Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also affect our operations and financial results.

Risks Related to this Offering

Our management will have broad discretion over the amounts, timing and use of the net proceeds from this offering, you may not agree with how we use the proceeds, and the proceeds may not be invested successfully.

Our management will have broad discretion to allocate the net proceeds from this offering, and investors will be relying on the judgment of our management regarding the use of these proceeds. Our management could spend the net proceeds in ways that you and other stockholders may not approve or in ways that do not improve our results of operations or enhance the value of our common stock. Our failure to apply these funds effectively could have a material adverse effect on the development of TC-5619, TC-5214, TC-1734, AZD1446 (TC-6683), TC-6499, TC-6987 or any of our other product candidates or programs, or otherwise on our business or financial condition, and cause the price of our common stock to decline.

You may experience future dilution as a result of future equity offerings and other issuances of our common stock or other securities.

In order to raise additional capital, we may in the future offer additional shares of our common stock or other securities convertible into or exchangeable for our common stock, including convertible debt. We cannot assure you that we will be able to sell shares or other securities in any other offering at a price per share that is equal to or greater than the price per share paid by investors in this offering, and investors purchasing shares or other securities in the future could have rights that are superior to existing stockholders. The price per share at which we sell additional shares of our common stock or other securities convertible into or exchangeable for our common stock in future transactions may be higher or lower than the price per share in this offering. As of September 30, 2013, 7,881,031 shares of common stock were reserved for future issuance under our 2006 stock incentive plan, which includes outstanding options to purchase 3,103,575 shares of our common stock. You will incur dilution upon the grant of any shares under our 2006 stock incentive plan and upon exercise of any outstanding stock options.

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents we file or have filed with the SEC that are incorporated by reference in this prospectus include forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, which we refer to as the Securities Act, or Section 21E of the Securities Exchange Act of 1934, as amended, which we refer to as the Exchange Act. For this purpose, any statement contained in this prospectus or any of the documents we file or have filed with the SEC that are incorporated by reference in this prospectus, other than statements of historical fact, regarding, among other things:

- the progress, scope or duration of the development of TC-5619, TC-5214, TC-1734, AZD1446 (TC-6683), TC-6987, TC-6499 or any of our other product candidates or programs, such as the target indication(s) for development, the size, design, population, location, conduct, objective, duration or endpoints of any clinical trial, or the timing for initiation or completion of or availability of results from any clinical trial, for submission or approval of any regulatory filing, for interactions with regulatory authorities or, where applicable, for a decision by AstraZeneca as to whether to conduct particular development;
- the benefits that may be derived from any of our product candidates or the commercial opportunity in any target indication;
- the timing or amount of any payments that AstraZeneca may make to us;
- our operations, financial position, revenues, costs or expenses; or
- our strategies, prospects, plans, expectations or objectives

is a forward-looking statement made under the provisions of The Private Securities Litigation Reform Act of 1995. In some cases, words such as "may," "will," "could," "would," "should," "expect," "intend," "plan," "anticipate," "believe," "estimate," "predict,"

"project," "potential," "continue," "scheduled," "ongoing" or other comparable words identify forward-looking statements. Actual results, performance or experience may differ materially from those expressed or implied by any forward-looking statement as a result of various important factors, including our critical accounting policies and risks and uncertainties relating, among other things, to:

- whether favorable findings from our completed clinical trial of TC-5619 in patients with schizophrenia will be replicated in our ongoing clinical trial of TC-5619 or potential future clinical trials of TC-5619;
- whether the designs and endpoints of our ongoing clinical trial of TC-5619 and potential future clinical trials of TC-5619 will be deemed by applicable regulatory authorities to be sufficient to support approval of TC-5619 to treat negative symptoms of schizophrenia or cognitive dysfunction in schizophrenia;
- whether findings from nonclinical studies and assessments of TC-5214 and clinical trials of TC-5214 in a different indication will be predictive of a positive outcome in our ongoing Phase 2b clinical trial of TC-5214 in overactive bladder;
- the conduct and results of clinical trials and non-clinical studies and assessments of TC-5619, TC-5214, TC-1734, AZD1446 (TC-6683), TC-6987, TC-6499 or any of our other product candidates, including the performance of third parties engaged to execute them, delays resulting from any changes to the applicable protocols or difficulties or delays in subject enrollment or data analysis;
- whether the executive turnover we have experienced will have an adverse impact on the development of any of our product candidates or our business generally;
- whether TC-5214 will be eligible for treatment in the United States as a new chemical entity with a five-year statutory exclusivity period, either because we submit a new drug application for TC-5214 prior to October 1, 2017 or because the applicable statutory provision is re-authorized by the U.S. Congress;
- the control or significant influence that AstraZeneca has over the development of AZD1446 (TC-6683), including as to the timing, scope and design of any future clinical trials;
- our ability to establish additional strategic alliances, collaborations or licensing or other comparable arrangements on favorable terms;
- our ability to protect our intellectual property; and
- the timing and success of submission, acceptance and approval of regulatory filings.

Risks and uncertainties that we face are described in greater detail under the caption "Risk Factors" in Item 1A of Part I of our most recent annual report on Form 10-K and in subsequent filings that we make with the SEC. As a result of the risks and uncertainties to which our business is subject, the results or events indicated by any forward-looking statement may not occur. We caution you not to place undue reliance on any forward-looking statement.

In addition, any forward-looking statement in this prospectus or any of the documents we file or have filed with the SEC that are incorporated by reference in this prospectus represent our views only as of the respective dates of those documents and should not be relied upon as representing our views as of any later date. We anticipate that subsequent events and developments may cause our views to change. Although we may elect to update these forward-looking statements publicly at some point in the future, we specifically disclaim any obligation to do so, except as required by applicable law. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments we may make or any future strategic alliances, collaborations or licensing or other comparable arrangements that we may enter into.

USE OF PROCEEDS

We intend to use any net proceeds from the sale of our securities to fund our operations and for other general corporate purposes, such as working capital, development of our clinical and preclinical product candidates, intellectual property protection and enforcement, capital expenditures, investments, in-licenses and acquisitions. Pending use of the net proceeds as described above, we intend to invest the net proceeds in interest-bearing, investment grade securities.

DIVIDEND POLICY

We have never declared or paid cash dividends on any of our shares of capital stock. We currently intend to retain future earnings, if any, to finance the expansion and growth of our business and do not anticipate paying any cash dividends in the foreseeable future. Any future determination to pay dividends will be at the discretion of our board of directors and will depend on our financial condition, results of operations, capital requirements and other factors that our board of directors deems relevant. In addition, the terms of any future debt or credit facility may preclude us from paying dividends.

PLAN OF DISTRIBUTION

We have entered into the sales agreement with MLV, under which we may issue and sell shares of our common stock having aggregate sales proceeds of up to $40 million from time to time through MLV as our sales agent. The sales agreement has been filed as an exhibit to the registration statement of which this prospectus forms a part and is incorporated by reference in this prospectus. MLV may sell the common stock by any method that is deemed to be an “at the market” equity offering as defined in Rule 415 promulgated under the Securities Act of 1933, as amended, or the Securities Act, including sales made directly on or through the NASDAQ Global Select Market or any other existing trading market for our common stock in the United States, sales made to or through a market maker other than on an exchange or otherwise, in negotiated transactions at market prices prevailing at the time of sale or at prices related to such prevailing market prices, or any other method permitted by law. MLV may also sell the common stock in privately negotiated transactions, subject to our prior approval. We may instruct MLV not to sell our common stock if the sales cannot be effected at or above the price designated by us from time to time. We or MLV may suspend the offering of our common stock upon notice and subject to other conditions.

Each time we wish to issue and sell common stock under the sales agreement, we will notify MLV of the number of shares to be issued, the dates on which such sales are anticipated to be made and any minimum price below which sales may not be made. Once we have so instructed MLV, unless MLV declines to accept the terms of this notice, MLV has agreed to use its commercially reasonable efforts consistent with its normal trading and sales practices to sell such shares up to the amount specified on such terms. The obligations of MLV under the sales agreement to sell our common stock are subject to a number of conditions that we must meet.

We will pay MLV commissions for its services in acting as agent in the sale of our common stock. MLV will be entitled to compensation at a commission rate of up to 3% of the gross sales price per share sold. In addition, we have agreed to reimburse certain expenses of MLV in an amount not to exceed $25,000. Because there is no minimum offering amount required as a condition to closing this offering, the actual total public offering amount, commissions and proceeds to us, if any, are not determinable at this time.

We estimate that the total expenses for the offering, excluding compensation payable to MLV under the terms of the sales agreement, will be approximately $150,000.

Settlement for sales of our common stock will occur on the third business day following the date on which any sales are made, or on some other date that is agreed upon by us and MLV in connection with a particular transaction, in return for payment of the net proceeds to us. There is no arrangement for funds to be received in an escrow, trust or similar arrangement.

In connection with the sale of the common stock on our behalf, MLV will be deemed to be an "underwriter" within the meaning of the Securities Act, and the compensation of MLV will be deemed to be underwriting commissions or discounts. We have agreed to provide indemnification and contribution to MLV against certain civil liabilities, including liabilities under the Securities Act.

The offering pursuant to the sales agreement will terminate upon the earlier of (1) the issuance and sale of all shares of our common stock subject to the sales agreement; or (2) the termination of the sales agreement as permitted therein.

MLV and its affiliates may in the future provide various investment banking and other financial services to us, for which services they may in the future receive customary fees. To the extent required by Regulation M, MLV will not engage in any market making or stabilizing activities involving our common stock while the offering is ongoing under this prospectus.

LEGAL MATTERS

The validity of the issuance of the securities offered by this prospectus has been passed upon by Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts. LeClairRyan, A Professional Corporation, New York, New York, is counsel for MLV in connection with this offering.

EXPERTS

The financial statements of Targacept, Inc. appearing in Targacept, Inc.'s Annual Report (Form 10-K) for the year ended December 31, 2012, and the effectiveness of Targacept, Inc.'s internal control over financial reporting as of December 31, 2012, 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 financial statements are, and audited financial statements to be included in subsequently filed documents will be, incorporated herein in reliance upon the reports of Ernst & Young LLP pertaining to such financial statements and the effectiveness of our internal control over financial reporting as of the respective dates (to the extent covered by consents filed with the Securities and Exchange Commission) given on the authority of such firm as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We are subject to the reporting requirements of the Exchange Act and file annual, quarterly and current reports, proxy statements and other information with the SEC. You may read and copy these reports, proxy statements and other information at the SEC's public reference facilities at 100 F Street, N.E., Room 1580, Washington, D.C. 20549. You can request copies of these documents by writing to the SEC and paying a fee for the copying cost. Please call the SEC at 1-800-SEC-0330 for more information about the operation of the public reference facilities. SEC filings are also available at the SEC's website at *http://www.sec.gov.* Our common stock is listed on the NASDAQ Global Select Market, and you can read and inspect our filings at the offices of the Financial Industry Regulatory Authority located at 1735 K Street, N.W., Washington, D.C. 20006.

This prospectus is only part of a registration statement on Form S-3 that we have filed with the SEC under the Securities Act and therefore omits certain information contained in the registration statement. We have also filed exhibits with the registration statement that are excluded from this prospectus, and you should refer to the applicable exhibit for a complete description of any statement referring to any contract or other document. You may inspect a copy of the registration statement, including the exhibits, without charge, at the public reference room or obtain a copy from the SEC upon payment of the fees prescribed by the SEC.

The reports, proxy statements and other information that we file with the SEC are available to you free of charge through the Investor Relations page of our website, *www.targacept.com*, as soon as reasonably practicable after they have been electronically filed with, or furnished to, the SEC. We have included our website address as a factual reference and do not intend it as an active link to our website.

INCORPORATION OF DOCUMENTS BY REFERENCE

The SEC allows us to "incorporate by reference" information from other documents that we file, which means that we can disclose important information in this prospectus by referring to those documents. The information incorporated by reference is considered to be part of this prospectus and will automatically add to, update and, if applicable, supersede the information in this prospectus. We incorporate by reference in this prospectus the documents listed below:

- our Annual Report on Form 10-K for the fiscal year ended December 31, 2012, filed on March 15, 2013;
- our Quarterly Report on Form 10-Q for the quarter ended March 31, 2013, filed on May 8, 2013;
- our Quarterly Report on Form 10-Q for the quarter ended June 30, 2013, filed on August 7, 2013;
- our Quarterly Report on Form 10-Q for the quarter ended September 30, 2013, filed on November 6, 2013;
- our Current Reports on Form 8-K filed on January 23, 2013, March 5, 2013, March 18, 2013, June 6, 2013, June 28, 2013, August 14, 2013, November 14, 2013 and November 26, 2013;
- our Definitive Proxy Statement on Schedule 14A for the 2013 annual meeting of stockholders filed on April 17, 2013;
- the description of our common stock contained in our Registration Statement on Form 8-A filed on April 6, 2006; and
- all filings that we make pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act after the date of the filing of the registration statement on Form S-3 of which this prospectus is a part and prior to the termination or completion of any offering of securities under this prospectus (except, in each case, for information contained in any such filing that is furnished and not "filed" under the Exchange Act), which filings will be deemed to be incorporated by reference in this prospectus and to be a part hereof from the respective dates of such filings.

The SEC file number for each of the documents listed above is 000-51173.

We will provide without charge to each person, including any beneficial owner, to whom a copy of this prospectus is delivered, upon the request of any such person, a copy of any or all of the information incorporated herein by reference (exclusive of exhibits to such documents, unless such exhibits are specifically incorporated by reference herein). Requests, whether written or oral, for such copies should be directed to Targacept, Inc., 100 North Main Street, Suite 1510, Winston-Salem, North Carolina 27101, Attn: Chief Financial Officer, (336) 480-2100.

To the extent that any statements contained in a document incorporated by reference are modified or superseded by any statements contained in this prospectus, such statements shall not be deemed incorporated in this prospectus.

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TARGACEPT, INC.

COMMON STOCK

PROSPECTUS

December 12, 2013