

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, DC 20549

SCHEDULE 13G

UNDER THE SECURITIES EXCHANGE ACT OF 1934

(AMENDMENT NO.____)*

Targacept, Inc.

(Name of Issuer)

Common Stock, \$.001 par value per share

(Title of Class of Securities)

87611R306

(CUSIP Number)

December 31, 2006

(Date of Event Which Requires Filing of this Statement)

Check the appropriate box to designate the rule pursuant to which this Schedule is filed:

- Rule 13d-1(b)
 Rule 13d-1(c)
 Rule 13d-1(d)

*The remainder of this cover page shall be filled out for a reporting person's initial filing on this form with respect to the subject class of securities, and for any subsequent amendment containing information which would alter the disclosures provided in a prior cover page.

The information required in the remainder of this cover page shall not be deemed to be "filed" for the purpose of Section 18 of the Securities Exchange Act of 1934 ("Act") or otherwise subject to the liabilities of that section of the Act but shall be subject to all other provisions of the Act (however, see the Notes).

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CUSIP NO. 87611R306

13G

1. NAME OF REPORTING PERSONS
I.R.S. IDENTIFICATION NO. OF ABOVE PERSONS (ENTITIES ONLY)

OXFORD BIOSCIENCE PARTNERS IV L.P.

2. CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP*

- (a)
(b)

3. SEC USE ONLY

4. CITIZENSHIP OR PLACE OF ORGANIZATION

Delaware

NUMBER OF	5.	SOLE VOTING POWER
SHARES	0	
BENEFICIALLY	6.	SHARED VOTING POWER
OWNED BY	967,856	
EACH	7.	SOLE DISPOSITIVE POWER
REPORTING	0	
PERSON	8.	SHARED DISPOSITIVE POWER
WITH:	967,856	

9. AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON
967,856

10. CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES*
[]

11. PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW 9
5.1%

12. TYPE OF REPORTING PERSON*
PN

1. NAMES OF REPORTING PERSONS
I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY)

mRNA FUND II L.P.

2. CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP*

(a)

(b)

3. SEC USE ONLY

4. CITIZENSHIP OR PLACE OF ORGANIZATION

Delaware

NUMBER OF 5. SOLE VOTING POWER

SHARES 0

BENEFICIALLY 6. SHARED VOTING POWER

OWNED BY 967,856

EACH 7. SOLE DISPOSITIVE POWER

REPORTING 0

PERSON 8. SHARED DISPOSITIVE POWER

WITH: 967,856

9. AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON

967,856

10. CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES*

11. PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW 9

5.1%

12. TYPE OF REPORTING PERSON*

PN

1. NAMES OF REPORTING PERSONS
I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY)

OBP MANAGEMENT IV L.P.

2. CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP*

(a)
(b)

3. SEC USE ONLY

4. CITIZENSHIP OR PLACE OF ORGANIZATION

Delaware

NUMBER OF	5. SOLE VOTING POWER
SHARES	0

BENEFICIALLY	6. SHARED VOTING POWER
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OWNED BY	967,856
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EACH	7. SOLE DISPOSITIVE POWER
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REPORTING	0
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PERSON	8. SHARED DISPOSITIVE POWER
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WITH:	967,856
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9. AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON

967,856

10. CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES*

11. PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW 9

5.1%

12. TYPE OF REPORTING PERSON*

PN

1. NAMES OF REPORTING PERSONS
I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY)

JEFFREY T. BARNES

2. CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP*

(a)
(b)

3. SEC USE ONLY

4. CITIZENSHIP OR PLACE OF ORGANIZATION

United States

NUMBER OF 5. SOLE VOTING POWER
SHARES 0

BENEFICIALLY 6. SHARED VOTING POWER

OWNED BY 967,856

EACH 7. SOLE DISPOSITIVE POWER
REPORTING 0

PERSON 8. SHARED DISPOSITIVE POWER

WITH: 967,856

9. AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON

967,856

10. CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES*

11. PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW 9

5.1%

12. TYPE OF REPORTING PERSON*

IN

1. NAMES OF REPORTING PERSONS
I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY)

MARK P. CARTHY

2. CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP*

(a)
(b)

3. SEC USE ONLY

4. CITIZENSHIP OR PLACE OF ORGANIZATION

United States

NUMBER OF	5.	SOLE VOTING POWER
SHARES		0

BENEFICIALLY	6.	SHARED VOTING POWER
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OWNED BY		967,856
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EACH	7.	SOLE DISPOSITIVE POWER
REPORTING		0

PERSON	8.	SHARED DISPOSITIVE POWER
WITH:		967,856

9. AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON
967,856

10. CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES*

11. PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW 9

5.1%

12. TYPE OF REPORTING PERSON*

IN

1. NAMES OF REPORTING PERSONS
I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY)

JONATHAN J. FLEMING

2. CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP*

(a)
(b)

3. SEC USE ONLY

4. CITIZENSHIP OR PLACE OF ORGANIZATION

United States

NUMBER OF	5.	SOLE VOTING POWER
SHARES		0

BENEFICIALLY	6.	SHARED VOTING POWER
OWNED BY		967,856

EACH	7.	SOLE DISPOSITIVE POWER
REPORTING		0

PERSON	8.	SHARED DISPOSITIVE POWER
WITH:		967,856

9. AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON
967,856

10. CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES*

11. PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW 9

5.1%

12. TYPE OF REPORTING PERSON*

IN

1. NAMES OF REPORTING PERSONS
I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY)

MICHAEL E. LYTTON

2. CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP*

(a)

(b)

3. SEC USE ONLY

4. CITIZENSHIP OR PLACE OF ORGANIZATION

United States

NUMBER OF 5. SOLE VOTING POWER

SHARES 0

BENEFICIALLY 6. SHARED VOTING POWER

OWNED BY 967,856

EACH 7. SOLE DISPOSITIVE POWER

REPORTING 0

PERSON 8. SHARED DISPOSITIVE POWER

WITH: 967,856

9. AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON

967,856

10. CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES*

11. PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW 9

5.1%

12. TYPE OF REPORTING PERSON*

IN

1. NAMES OF REPORTING PERSONS
I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY)

ALAN G. WALTON

2. CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP*

(a)
(b)

3. SEC USE ONLY

4. CITIZENSHIP OR PLACE OF ORGANIZATION

United States

NUMBER OF 5. SOLE VOTING POWER
SHARES 4,333

BENEFICIALLY 6. SHARED VOTING POWER
OWNED BY 967,856

EACH 7. SOLE DISPOSITIVE POWER
REPORTING 4,333

PERSON 8. SHARED DISPOSITIVE POWER
WITH: 967,856

9. AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON
972,189

10. CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES*

11. PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW 9
5.1%

12. TYPE OF REPORTING PERSON*

IN

- ITEM 1(a). NAME OF ISSUER: Targacept, Inc. (the "Issuer")
- ITEM 1(b). ADDRESS OF ISSUER'S PRINCIPAL EXECUTIVE OFFICES:
200 East First Street, Suite 300, Winston-Salem, NC 27101
- ITEM 2(a). NAMES OF PERSONS FILING: Oxford Bioscience Partners IV L.P. ("Oxford IV") and mRNA Fund II L.P. ("mRNA II") (collectively, the "Funds"); OBP Management IV L.P. ("OBP IV"), which is the sole general partner of Oxford IV and mRNA II; and Jeffrey T. Barnes ("Barnes"), Mark P. Carthy ("Carthy"), Jonathan J. Fleming ("Fleming"), Michael E. Lytton ("Lytton") and Alan G. Walton ("Walton") (collectively, the "General Partners"), who are the general partners of OBP IV. The persons named in this paragraph are referred to individually herein as a "Reporting Person" and collectively as the "Reporting Persons."
- ITEM 2(b). ADDRESS OF PRINCIPAL BUSINESS OFFICE OR, IF NONE, RESIDENCE:
The address of the principal business office of Oxford IV, mRNA II, OBP IV, Barnes, Carthy, Fleming and Lytton is 222 Berkeley Street, Suite 1650, Boston, Massachusetts 02116. The address of the principal business office of Walton is 315 Post Rd. West, Westport, Connecticut 06880.
- ITEM 2(c). CITIZENSHIP: The Funds and OBP IV are limited partnerships organized under the laws of the State of Delaware. Each of the Individual General Partners is a United States citizen.
- ITEM 2(d). TITLE OF CLASS OF SECURITIES: Common Stock, \$.001 par value ("Common Stock").
- ITEM 2(e). CUSIP NUMBER: 87611R306.
- ITEM 3. IF THIS STATEMENT IS FILED PURSUANT TO SS.SS. 240.13d-1(b) OR 240.13d-2(b) OR (c), CHECK WHETHER THE PERSON FILING IS A:

Not applicable.
- ITEM 4. OWNERSHIP.
- (a) Amount Beneficially Owned: Oxford IV is the record owner of 958,242 shares of Common Stock as of December 31, 2006. mRNA II is the record owner of 9,614 shares of Common Stock as of December 31, 2006 (the shares held of record by Oxford IV and mRNA II, the "Record Shares"). As the sole general partner of Oxford IV and mRNA II, OBP IV may be deemed to own the Record Shares. As the individual general partners of OBP IV, each of the General Partners may also be deemed to share the power and direct the disposition and vote of the Record Shares. In addition, as of December 31, 2006, Walton holds options to purchase 4,333 shares of Common Stock (the "Option Shares"), which are exercisable immediately.
- (b) Percent of Class: See Line 11 of the cover sheets. The percentages set forth on the cover sheets for each Reporting Person other than Walton are calculated based on 19,119,745 shares of Common Stock reported to be outstanding by the Issuer in Form 10-Q as filed with the Securities and Exchange Commission on November 13, 2006 for the period ending September 30, 2006 (the "Reported Shares"). Walton's percentage is calculated based on 19,124,078 shares, which includes the Reported Shares and the Option Shares
- (c) Number of shares as to which such person has:

- (i) sole power to vote or to direct the vote: See Line 5 of cover sheets.
- (ii) shared power to vote or to direct the vote: See Line 6 of cover sheets.
- (iii) sole power to dispose or to direct the disposition of: See Line 7 of cover sheets.
- (iv) shared power to dispose or to direct the disposition of: See Line 8 of cover sheets.

Each Reporting Person disclaims beneficial ownership of such shares of Common Stock except for the shares, if any, such Reporting Person holds of record.

ITEM 5. OWNERSHIP OF FIVE PERCENT OR LESS OF A CLASS.

Not applicable.

ITEM 6. OWNERSHIP OF MORE THAN FIVE PERCENT ON BEHALF OF ANOTHER PERSON.

Not applicable.

ITEM 7. IDENTIFICATION AND CLASSIFICATION OF THE SUBSIDIARY WHICH ACQUIRED THE SECURITY BEING REPORTED ON BY THE PARENT HOLDING COMPANY.

Not applicable.

ITEM 8. IDENTIFICATION AND CLASSIFICATION OF MEMBERS OF THE GROUP.

Not applicable. The Reporting Persons expressly disclaim membership in a "group" as used in Rule 13d-5(b).

ITEM 9. NOTICE OF DISSOLUTION OF GROUP.

Not applicable.

ITEM 10. CERTIFICATION.

Not applicable. This statement on Schedule 13G is not filed pursuant to Rule 13d-1(b) or Rule 13d-1(c).

SIGNATURE

After reasonable inquiry and to the best of its knowledge and belief, each of the undersigned certifies that the information set forth in this statement is true, complete and correct.

Date: February 14, 2007

OXFORD BIOSCIENCE PARTNERS IV L.P.

By: OBP MANAGEMENT IV L.P.
General Partner

By: *

Jonathan J. Fleming
General Partner

mRNA FUND II L.P.

By: OBP MANAGEMENT IV L.P.
General Partner

By: *

Jonathan J. Fleming
General Partner

OBP MANAGEMENT IV L.P.

By: *

Jonathan J. Fleming
General Partner

*

Jeffery T. Barnes

*

Mark P. Carthy

*

Jonathan J. Fleming

*

Michael E. Lytton

*

Alan G. Walton

*By: /s/ Raymond Charest

Raymond Charest
As attorney-in-fact

This Schedule 13G was executed by Raymond Charest on behalf of the individuals listed above pursuant to Powers of Attorney, copies of which are attached as EXHIBIT 2.

AGREEMENT

Pursuant to Rule 13d-1(k)(1) under the Securities Exchange Act of 1934, the undersigned hereby agree that only one statement containing the information required by Schedule 13G need be filed with respect to the ownership by each of the undersigned of shares of stock of Acadia Pharmaceuticals, Inc.

EXECUTED this 14 day of February, 2007.

OXFORD BIOSCIENCE PARTNERS IV L.P.

By: OBP MANAGEMENT IV L.P.
General Partner

By: *

Jonathan J. Fleming
General Partner

mRNA FUND II L.P.

By: OBP MANAGEMENT IV L.P.
General Partner

By: *

Jonathan J. Fleming
General Partner

OBP MANAGEMENT IV L.P.

By: *

Jonathan J. Fleming
General Partner

*

Jeffery T. Barnes

*

Mark P. Carthy

*

Jonathan J. Fleming

*

Michael E. Lytton

*

Alan G. Walton

*By: /s/ Raymond Charest

Raymond Charest
As attorney-in-fact

This Schedule 13G was executed by Raymond Charest on behalf of the individuals listed above pursuant to Powers of Attorney, copies of which are attached as EXHIBIT 2.

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Raymond Charest, Alexia Pearsall and Jonathan J. Fleming, and each of them, with full power to act without the other, his true and lawful attorney-in-fact and agent, with full power of substitution, for him and in his name, place and stead, in any and all capacities (until revoked in writing) to sign any and all instruments, certificates and documents required to be executed on behalf of himself as an individual or in his capacity as a general partner or authorized signatory, as the case may be, on behalf of any of Oxford Bioscience Partners IV L.P., mRNA II L.P., or OBP Management IV L.P., pursuant to section 13 or 16 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and any and all regulations promulgated thereunder and to file the same, with all exhibits thereto, and any other documents in connection therewith, with the Securities and Exchange Commission, and with any other entity when and if such is mandated by the Exchange Act or by the By-laws of the National Association of Securities Dealers, Inc., granting unto said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requisite and necessary fully to all intents and purposes as he might or could do in person thereby ratifying and confirming all that said attorney-in-fact and agent, or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof, or may have done in connection with the matters described above.

IN WITNESS WHEREOF, this Power of Attorney has been signed as of the 8th day of April, 2004.

OXFORD BIOSCIENCE PARTNERS IV L.P.
BY ITS GENERAL PARTNER, OBP MANAGEMENT IV L.P.

By: /s/ JONATHAN FLEMING

Name: Jonathan J. Fleming
Title: General Partner

mRNA FUND II L.P.
BY ITS GENERAL PARTNER, OBP MANAGEMENT IV L.P.

By: /s/ JONATHAN FLEMING

Name: Jonathan J. Fleming
Title: General Partner

OBP MANAGEMENT IV L.P.

By: /s/ JONATHAN FLEMING

Name: Jonathan J. Fleming
Title: General Partner

/s/ JEFFREY T. BARNES

Jeffrey T. Barnes

/s/ MARK P. CARTHY

Mark P. Carthy

/s/ JONATHAN J. FLEMING

Jonathan J. Fleming

/s/ MICHAEL E. LYTTON

Michael E. Lytton

/s/ ALAN G. WALTON

Alan G. Walton