

SECURITIES AND EXCHANGE COMMISSION

Washington, DC 20549

SCHEDULE 13G

(Rule 13d-102)

**INFORMATION TO BE INCLUDED IN STATEMENTS FILED PURSUANT
TO RULES 13d-1(b) (c) AND (d) AND AMENDMENTS THERETO FILED
PURSUANT TO 13d-2(b)**

(Amendment No.)¹

Targacept, Inc.

(Name of Issuer)

Common Stock

(Title of Class of Securities)

87611R306

(CUSIP Number)

January 26, 2007

(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)

¹ 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 purposes 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).

1 NAME OF REPORTING PERSON:
Biotechnology Value Fund, L.P.
 I.R.S. IDENTIFICATION NO. OF ABOVE PERSON (ENTITIES ONLY):

2 CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP* (a) x
 (b) o

3 SEC USE ONLY

4 CITIZENSHIP OR PLACE OF ORGANIZATION

Delaware

| | | |
|--|---|--|
| NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH: | 5 | SOLE VOTING POWER 0 |
| | 6 | SHARED VOTING POWER 241,130 |
| | 7 | SOLE DISPOSITIVE POWER 0 |
| | 8 | SHARED DISPOSITIVE POWER 241,130 |

9 AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON
241,130

10 CHECK IF THE AGGREGATE AMOUNT IN ROW (11) EXCLUDES CERTAIN SHARES* o

11 PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)
1.3%

12 TYPE OF REPORTING PERSON*
PN

***SEE INSTRUCTIONS BEFORE FILLING OUT!**

1 NAME OF REPORTING PERSON:
Biotechnology Value Fund II, L.P.
 I.R.S. IDENTIFICATION NO. OF ABOVE PERSON (ENTITIES ONLY):

2 CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP* (a) x
 (b) o

3 SEC USE ONLY

4 CITIZENSHIP OR PLACE OF ORGANIZATION

Delaware

| | | |
|--|---|--|
| NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH: | 5 | SOLE VOTING POWER 0 |
| | 6 | SHARED VOTING POWER 160,300 |
| | 7 | SOLE DISPOSITIVE POWER 0 |
| | 8 | SHARED DISPOSITIVE POWER 160,300 |

9 AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON
160,300

10 CHECK IF THE AGGREGATE AMOUNT IN ROW (11) EXCLUDES CERTAIN SHARES* o

11 PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (11)
0.8%

12 TYPE OF REPORTING PERSON*
PN

***SEE INSTRUCTIONS BEFORE FILLING OUT!**

1 NAME OF REPORTING PERSON:
BVF Investments, L.L.C.
I.R.S. IDENTIFICATION NO. OF ABOVE PERSON (ENTITIES ONLY):

2 CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP* (a) x
(b) o

3 SEC USE ONLY

4 CITIZENSHIP OR PLACE OF ORGANIZATION

Delaware

| | | |
|--|---|--|
| NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH: | 5 | SOLE VOTING POWER 0 |
| | 6 | SHARED VOTING POWER 621,800 |
| | 7 | SOLE DISPOSITIVE POWER 0 |
| | 8 | SHARED DISPOSITIVE POWER 621,800 |

9 AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON
621,800

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

11 PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)
3.3%

12 TYPE OF REPORTING PERSON*
00

***SEE INSTRUCTIONS BEFORE FILLING OUT!**

- 1 NAME OF REPORTING PERSON:
Investment 10, L.L.C.
I.R.S. IDENTIFICATION NO. OF ABOVE PERSON (ENTITIES ONLY):
- 2 CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP* (a) x
(b) o
- 3 SEC USE ONLY
- 4 CITIZENSHIP OR PLACE OF ORGANIZATION
Illinois
- | | | |
|--|---|---|
| NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH: | 5 | SOLE VOTING POWER 0 |
| | 6 | SHARED VOTING POWER 68,600 |
| | 7 | SOLE DISPOSITIVE POWER 0 |
| | 8 | SHARED DISPOSITIVE POWER 68,600 |
- 9 AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON
68,600
- 10 CHECK IF THE AGGREGATE AMOUNT IN ROW (11) EXCLUDES CERTAIN SHARES* o
- 11 PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (11)
0.4%
- 12 TYPE OF REPORTING PERSON*
00

***SEE INSTRUCTIONS BEFORE FILLING OUT!**

1 NAME OF REPORTING PERSON:
BVF Partners L.P.
I.R.S. IDENTIFICATION NO. OF ABOVE PERSON (ENTITIES ONLY):

2 CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP* (a) x
(b) o

3 SEC USE ONLY

4 CITIZENSHIP OR PLACE OF ORGANIZATION

Delaware

| | | |
|--|---|--|
| NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH: | 5 | SOLE VOTING POWER 0 |
| | 6 | SHARED VOTING POWER 1,091,830 |
| | 7 | SOLE DISPOSITIVE POWER 0 |
| | 8 | SHARED DISPOSITIVE POWER 1,091,830 |

9 AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON
1,091,830

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

11 PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW 9
5.7%

12 TYPE OF REPORTING PERSON*
PN

***SEE INSTRUCTIONS BEFORE FILLING OUT!**

-
- 1 NAME OF REPORTING PERSON:
BVF Inc.
I.R.S. IDENTIFICATION NO. OF ABOVE PERSON (ENTITIES ONLY):
-
- 2 CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP* (a) x
(b) o
-
- 3 SEC USE ONLY
-
- 4 CITIZENSHIP OR PLACE OF ORGANIZATION
Delaware
-
- | | | |
|--|---|--|
| NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH: | 5 | SOLE VOTING POWER 0 |
| | 6 | SHARED VOTING POWER 1,091,830 |
| | 7 | SOLE DISPOSITIVE POWER 0 |
| | 8 | SHARED DISPOSITIVE POWER 1,091,830 |
-
- 9 AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON
1,091,830
-
- 10 CHECK IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES* o
-
- 11 PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)
5.7%
-
- 12 TYPE OF REPORTING PERSON*
IA, CO
-

***SEE INSTRUCTIONS BEFORE FILLING OUT!**

ITEM 1(a). NAME OF ISSUER:

Targacept, Inc. ("Targacept")

ITEM 1(b). ADDRESS OF ISSUER'S PRINCIPAL EXECUTIVE OFFICES:

200 East First Street, Suite 300
Winston-Salem, North Carolina 27101

ITEM 2(a). NAME OF PERSON FILING:

This Schedule 13G is being filed on behalf of the following persons (the "Reporting Persons"):

- (i) Biotechnology Value Fund, L.P. ("BVF")
- (ii) Biotechnology Value Fund II, L.P. ("BVF2")
- (iii) BVF Investments, L.L.C. ("Investments")
- (iv) Investment 10, L.L.C. ("ILL10")
- (v) BVF Partners L.P. ("Partners")
- (vi) BVF Inc. ("BVF Inc.")

ITEM 2(b). ADDRESS OF PRINCIPAL BUSINESS OFFICE:

The principal business office of the persons comprising the group filing this Schedule 13G is located at 900 North Michigan Avenue, Suite 1100, Chicago, Illinois, 60611.

ITEM 2(c). CITIZENSHIP:

| | |
|--------------|---------------------------------------|
| BVF: | a Delaware limited partnership |
| BVF2: | a Delaware limited partnership |
| Investments: | a Delaware limited liability company |
| ILL10: | an Illinois limited liability company |
| Partners: | a Delaware limited partnership |
| BVF Inc.: | a Delaware corporation |

ITEM 2(d). TITLE OF CLASS OF SECURITIES:

This Schedule 13G is being filed with respect to the common stock, par value \$0.001 per share (the "Common Stock"), of Targacept. The Reporting Persons' percentage ownership of the Common Stock is based on 19,119,745 shares of the Common Stock being outstanding.

As of January 26, 2007, (i) BVF beneficially owns 241,130 shares of Common Stock; (ii) BVF2 beneficially owns 160,300 shares of Common Stock; (iii) Investments beneficially owns 621,800 shares of Common Stock; and (iv) ILL10 beneficially owns 68,600 shares of Common Stock. Beneficial ownership by Partners and BVF Inc. includes 1,091,830 shares of Common Stock.

ITEM 2(e). CUSIP Number:

87611R306

ITEM 3. IF THIS STATEMENT IS FILED PURSUANT TO RULE 13d-1(b), or 13d-2(b) or (c) CHECK WHETHER THE PERSON FILING IS: One of the following

Not applicable as this Schedule 13G is filed pursuant to Rule 13d-1(c).

ITEM 4. OWNERSHIP:

The information in items 1 and 5 through 11 on the cover pages (pp. 2 - 7) on this Schedule 13G is hereby incorporated by reference.

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

If this statement is being filed to report the fact that as of the date hereof the reporting person has ceased to be the beneficial owner of more than five percent of the class of securities check the following. o

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

Pursuant to the operating agreement of Investments, Partners is authorized, among other things, to invest the funds of Ziff Asset Management, L.P., the majority member of Investments, in shares of the Common Stock and to vote and exercise dispositive power over those shares of the Common Stock. Partners and BVF Inc. share voting and dispositive power over shares of the Common Stock beneficially owned by BVF, BVF2, Investments and those owned by ILL10, on whose behalf Partners acts as an investment manager and, accordingly, Partners and BVF Inc. have beneficial ownership of all of the shares of the Common Stock owned by such parties.

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 A GROUP:

Not applicable.

ITEM 9. NOTICE OF DISSOLUTION OF GROUP:

Not applicable.

ITEM 10. CERTIFICATION

By signing below I certify that, to the best of my knowledge and belief, the securities referred to above were not acquired and are not held for the purpose of or with the effect of changing or influencing the control of the issuer of the securities and were not acquired and are not held in connection with or as a participant in any transaction having that purpose or effect.

After reasonable inquiry and to the best of my knowledge and belief, I certify that the information set forth in this statement is true, complete and correct.

Dated: February 5, 2007

BIOTECHNOLOGY VALUE FUND, L.P.

By: BVF Partners L.P., its general partner

By: BVF Inc., its general partner

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

BIOTECHNOLOGY VALUE FUND II, L.P.

By: BVF Partners L.P., its general partner

By: BVF Inc., its general partner

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

BVF INVESTMENTS, L.L.C.

By: BVF Partners L.P., its manager

By: BVF Inc., its general partner

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

INVESTMENT 10, L.L.C.

By: BVF Partners L.P., its attorney-in-fact

By: BVF Inc., its general partner

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

BVF PARTNERS L.P.

By: BVF Inc., its general partner

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

BVF INC.

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

AGREEMENT REGARDING JOINT FILING

The undersigned, Biotechnology Value Fund, L.P., a Delaware limited partnership, Biotechnology Value Fund II, L.P., a Delaware limited partnership, BVF Investments, L.L.C., a Delaware limited liability company, Investment 10, L.L.C., an Illinois limited liability company, BVF Partners L.P., a Delaware limited partnership, and BVF Inc., a Delaware corporation, hereby agree and acknowledge that the information required by Schedule 13G, to which this Agreement is attached as an exhibit, is filed on behalf of each of them. The undersigned further agree that any amendments or supplements thereto shall also be filed on behalf of each of them.

Dated: February 5, 2007

BIOTECHNOLOGY VALUE FUND, L.P.

By: BVF Partners L.P., its general partner

By: BVF Inc., its general partner

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

BIOTECHNOLOGY VALUE FUND II, L.P.

By: BVF Partners L.P., its general partner

By: BVF Inc., its general partner

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

BVF INVESTMENTS, L.L.C.

By: BVF Partners L.P., its manager

By: BVF Inc., its general partner

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

INVESTMENT 10, L.L.C.

By: BVF Partners L.P., its attorney-in-fact

By: BVF Inc., its general partner

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

BVF PARTNERS L.P.

By: BVF Inc., its general partner

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President

BVF INC.

By: /s/ MARK N. LAMPERT

Mark N. Lampert
President