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STATEMENT OF CHANGES IN BENEFICIAL OWNERSHIP

Check this box if no longer subject to Section 16. Form 4 or Form 5 obligations may continue. See Instruction 1(b).

Filed pursuant to Section 16(a) of the Securities Exchange Act of 1934 or Section 30(h) of the Investment Company Act of 1940

1. Name and Address of Reporting Person* <u>Flynn James E</u>			2. Issuer Name and Ticker or Trading Symbol <u>RHYTHM PHARMACEUTICALS, INC. [RYTM]</u>			5. Relationship of Reporting Person(s) to Issuer (Check all applicable) Director <input checked="" type="checkbox"/> 10% Owner Officer (give title below) <input checked="" type="checkbox"/> Other (specify below) <u>Possible Member of 10% Group</u>		
(Last)	(First)	(Middle)	3. Date of Earliest Transaction (Month/Day/Year) <u>10/10/2017</u>			6. Individual or Joint/Group Filing (Check Applicable Line) <input checked="" type="checkbox"/> Form filed by One Reporting Person <input type="checkbox"/> Form filed by More than One Reporting Person		
<u>780 THIRD AVENUE, 37TH FLOOR</u>			4. If Amendment, Date of Original Filed (Month/Day/Year)					
(Street)	(City)	(State)	(Zip)	<u>NEW YORK NY 10017</u>				

Table I - Non-Derivative Securities Acquired, Disposed of, or Beneficially Owned

1. Title of Security (Instr. 3)	2. Transaction Date (Month/Day/Year)	2A. Deemed Execution Date, if any (Month/Day/Year)	3. Transaction Code (Instr. 8)		4. Securities Acquired (A) or Disposed Of (D) (Instr. 3, 4 and 5)			5. Amount of Securities Beneficially Owned Following Reported Transaction(s) (Instr. 3 and 4)	6. Ownership Form: Direct (D) or Indirect (I) (Instr. 4)	7. Nature of Indirect Beneficial Ownership (Instr. 4)
			Code	V	Amount	(A) or (D)	Price			
Common Stock	10/10/2017		C		291,005	A	(1)	291,005	I	Through Deerfield Private Design Fund III, L.P.(2)(3)
Common Stock	10/10/2017		C		291,005	A	(1)	291,005	I	Through Deerfield Special Situations Fund, L.P.(2)(3)
Common Stock	10/10/2017		P		177,500	A	\$17	468,505	I	Through Deerfield Private Design Fund III, L.P.(2)(3)
Common Stock	10/10/2017		P		177,500	A	\$17	468,505	I	Through Deerfield Special Situations Fund, L.P.(2)(3)

Table II - Derivative Securities Acquired, Disposed of, or Beneficially Owned (e.g., puts, calls, warrants, options, convertible securities)

1. Title of Derivative Security (Instr. 3)	2. Conversion or Exercise Price of Derivative Security	3. Transaction Date (Month/Day/Year)	3A. Deemed Execution Date, if any (Month/Day/Year)	4. Transaction Code (Instr. 8)		5. Number of Derivative Securities Acquired (A) or Disposed of (D) (Instr. 3, 4 and 5)		6. Date Exercisable and Expiration Date (Month/Day/Year)		7. Title and Amount of Securities Underlying Derivative Security (Instr. 3 and 4)		8. Price of Derivative Security (Instr. 5)	9. Number of derivative Securities Beneficially Owned Following Reported Transaction(s) (Instr. 4)	10. Ownership Form: Direct (D) or Indirect (I) (Instr. 4)	11. Nature of Indirect Beneficial Ownership (Instr. 4)
				Code	V	(A)	(D)	Date Exercisable	Expiration Date	Title	Amount or Number of Shares				
Series A Preferred Stock	(1)	10/10/2017		C		2,668,518		(1)	(1)	Common Stock	291,005	(1)	0	I	Through Deerfield Private Design Fund III, L.P.(2)(3)
Series A Preferred Stock	(1)	10/10/2017		C		2,668,518		(1)	(1)	Common Stock	291,005	(1)	0	I	Through Deerfield Special Situations Fund, L.P.(2)(3)

1. Name and Address of Reporting Person* <u>Flynn James E</u>		
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(Last) (First) (Middle)

780 THIRD AVENUE, 37TH FLOOR

(Street)

NEW YORK NY 10017

(City)

(State)

(Zip)

1. Name and Address of Reporting Person*

Deerfield Mgmt L.P.

(Last) (First) (Middle)

780 THIRD AVENUE

37TH FLOOR

(Street)

NEW YORK NY 10017

(City)

(State)

(Zip)

1. Name and Address of Reporting Person*

DEERFIELD MANAGEMENT CO

(Last) (First) (Middle)

780 THIRD AVENUE, 37TH FLOOR

(Street)

NEW YORK NY 10017

(City)

(State)

(Zip)

1. Name and Address of Reporting Person*

Deerfield Special Situations Fund, L.P.

(Last) (First) (Middle)

780 3RD AVENUE

37TH FLOOR

(Street)

NEW YORK NY 10017

(City)

(State)

(Zip)

1. Name and Address of Reporting Person*

Deerfield Mgmt III, L.P.

(Last) (First) (Middle)

780 THIRD AVENUE, 37TH FLOOR

(Street)

NEW YORK NY 10017

(City)

(State)

(Zip)

1. Name and Address of Reporting Person*

Deerfield Private Design Fund III, L.P.

(Last) (First) (Middle)

780 THIRD AVENUE, 37TH FLOOR

(Street)

NEW YORK NY 10017

(City)

(State)

(Zip)

Explanation of Responses:

- Each share of Series A Preferred Stock automatically converted into 0.1090513 shares of the Issuer's common stock upon the closing of the Issuer's initial public offering (on an adjusted basis, after giving effect to the 1-for-9.17 reverse stock split effected by the Issuer in connection with its initial public offering).
- This Form 4 is being filed by the undersigned as well as the entities listed on the Joint Filer Information Statement attached as an exhibit hereto (the "Reporting Persons"). Deerfield Mgmt III, L.P. is the general partner of Deerfield Private Design Fund III, L.P. ("Fund III"). Deerfield Mgmt, L.P. is the general partner of Deerfield Special Situations Fund, L.P. (collectively with Fund III, the "Funds"). Deerfield Management Company, L.P. is the investment manager of the Funds. James E. Flynn is the sole member of the general partner of each of Deerfield Mgmt III, L.P., Deerfield Mgmt, L.P. and Deerfield Management Company, L.P.
- In accordance with Instruction 4 (b)(iv) to Form 4, the entire amount of the Issuer's securities held by the Funds is reported herein. For purposes of Section 16 of the Securities Exchange Act of 1934, as amended, each Reporting Person disclaims beneficial ownership of any such securities, except to the extent of his/its indirect pecuniary interest therein, if any, and this report shall not be deemed an admission that such Reporting Person is the beneficial owner of such securities for purposes of Section 16 or otherwise.

Remarks:

Jonathan Isler, Attorney-in-Fact: Power of Attorney, which is hereby incorporated by reference to Exhibit 24 to a Form 3 with regard to Proteon Therapeutics, Inc. filed with the Securities and Exchange Commission on August 4, 2017 by Deerfield Special Situations Fund, L.P., Deerfield Partners, L.P., Deerfield International Master Fund, L.P., Deerfield Private Design Fund III, L.P., Deerfield Private Design Fund IV, L.P., Deerfield Mgmt, L.P., Deerfield Mgmt III, L.P., Deerfield Mgmt IV, L.P., Deerfield Management Company, L.P., and James E. Flynn.

/s/ Jonathan Isler, Attorney-in-Fact 10/10/2017

** Signature of Reporting Person Date

Reminder: Report on a separate line for each class of securities beneficially owned directly or indirectly.

* If the form is filed by more than one reporting person, see Instruction 4 (b)(v).

** Intentional misstatements or omissions of facts constitute Federal Criminal Violations See 18 U.S.C. 1001 and 15 U.S.C. 78ff(a).

Note: File three copies of this Form, one of which must be manually signed. If space is insufficient, see Instruction 6 for procedure.

Persons who respond to the collection of information contained in this form are not required to respond unless the form displays a currently valid OMB Number.

Joint Filer Information

Names: Deerfield Mgmt III, L.P., Deerfield Mgmt, L.P., Deerfield Management Company, L.P., Deerfield Private Design Fund III, L.P., Deerfield Special Situations Fund, L.P.

Address: 780 Third Avenue, 37th Floor
New York, NY 10017

Designated Filer: James E. Flynn

Issuer and Ticker Symbol: Rhythm Pharmaceuticals, Inc. [RYTM]

Date of Event Requiring Statement: October 10, 2017

The undersigned, Deerfield Mgmt III, L.P., Deerfield Mgmt, L.P., Deerfield Management Company, L.P., Deerfield Private Design Fund III, L.P. and Deerfield Special Situations Fund, L.P. are jointly filing the attached Statement of Changes in Beneficial Ownership on Form 4 with James E. Flynn with respect to the beneficial ownership of securities of Rhythm Pharmaceuticals, Inc.

Signatures:

DEERFIELD MGMT, L.P.
By: J.E. Flynn Capital, LLC, General Partner

By: /s/ Jonathan Isler
Jonathan Isler, Attorney-In-Fact

DEERFIELD MANAGEMENT COMPANY, L.P.
By: Flynn Management LLC, General Partner

By: /s/ Jonathan Isler
Jonathan Isler, Attorney-In-Fact

DEERFIELD SPECIAL SITUATIONS FUND, L.P.
By: Deerfield Mgmt, L.P., General Partner
By: J.E. Flynn Capital, LLC, General Partner

By: /s/ Jonathan Isler
Jonathan Isler, Attorney-In-Fact

DEERFIELD MGMT III, L.P.
By: J.E. Flynn Capital III, LLC, General Partner

By: /s/ Jonathan Isler
Jonathan Isler, Attorney-In-Fact

DEERFIELD PRIVATE DESIGN FUND III, L.P.
By: Deerfield Mgmt III, L.P., General Partner
By: J.E. Flynn Capital III, LLC, General Partner

By: /s/ Jonathan Isler
Jonathan Isler, Attorney-In-Fact