

**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

**FORM 10-Q**

(Mark One)

**QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the quarterly period ended September 30, 2015

OR

**TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from \_\_\_\_\_ to \_\_\_\_\_

Commission File Number 001-32157

**Mast Therapeutics, Inc.**

(Exact name of registrant as specified in its charter)

**Delaware**  
(State or other jurisdiction of  
incorporation or organization)

**3611 Valley Centre Dr., Suite 500, San Diego, CA**  
(Address of principal executive offices)

**84-1318182**  
(I.R.S. Employer  
Identification No.)

**92130**  
(Zip Code)

**(858) 552-0866**

(Registrant's telephone number, including area code)

**N/A**

(Former name, former address and former fiscal year, if changed since last report)

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes  No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes  No

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

Large accelerated filer

Accelerated filer

Non-accelerated filer

Smaller reporting company

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes  No

The number of shares outstanding of the registrant's common stock, \$0.001 par value per share, as of November 9, 2015 was 163,614,297.

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## PART I — FINANCIAL INFORMATION

## Item 1. Financial Statements

**Mast Therapeutics, Inc. and Subsidiaries**  
**Condensed Consolidated Balance Sheets**  
(Unaudited)  
(in thousands, except for share and par value data)

	September 30, 2015	December 31, 2014
<b>Assets</b>		
Current assets:		
Cash and cash equivalents	\$ 32,207	\$ 35,808
Investment securities	17,706	21,481
Prepaid expenses and other current assets	1,536	1,114
Total current assets	51,449	58,403
Property and equipment, net	250	188
In-process research and development	8,549	8,549
Goodwill	3,007	3,007
Other assets	183	353
Total assets	\$ 63,438	\$ 70,500
<b>Liabilities and Stockholders' Equity</b>		
Current liabilities:		
Accounts payable	\$ 2,931	\$ 1,370
Accrued liabilities	7,763	5,625
Accrued compensation and payroll taxes	1,289	1,443
Debt facility	1,537	—
Total current liabilities	13,520	8,438
Long-term lease obligation	24	—
Debt facility, net of current portion	12,951	—
Deferred income tax liability	3,404	3,404
Total liabilities	29,899	11,842
Stockholders' equity:		
Common stock, \$0.001 par value; 500,000,000 shares authorized; 163,614,297 and 159,458,376 shares issued and outstanding at September 30, 2015 and December 31, 2014, respectively	164	159
Additional paid-in capital	298,176	293,655
Accumulated other comprehensive loss	9	(25)
Accumulated deficit	(264,810)	(235,131)
Total stockholders' equity	33,539	58,658
Total liabilities and stockholders' equity	\$ 63,438	\$ 70,500

See accompanying notes to unaudited condensed consolidated financial statements.

**Mast Therapeutics, Inc. and Subsidiaries**  
**Condensed Consolidated Statements of Operations and Comprehensive Loss**  
(Unaudited)  
(in thousands, except for share and per share data)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2015	2014	2015	2014
Revenues	\$ —	\$ —	\$ —	\$ —
Operating expenses:				
Research and development	7,330	5,402	21,106	14,503
Selling, general and administrative	2,460	2,455	8,448	7,091
Transaction-related expenses	—	2	—	271
Depreciation and amortization	38	25	105	60
Total operating expenses	9,828	7,884	29,659	21,925
Loss from operations	(9,828)	(7,884)	(29,659)	(21,925)
Interest income	32	18	94	50
Interest expense	(101)	—	(102)	—
Other (expense)/income, net	(15)	0	(12)	486
Net loss	\$ (9,912)	\$ (7,866)	\$ (29,679)	\$ (21,389)
Net loss per share - basic and diluted	\$ (0.06)	\$ (0.06)	\$ (0.18)	\$ (0.19)
Weighted average shares outstanding - basic and diluted	163,614,297	123,287,118	161,748,944	114,709,434
<u>Comprehensive Income/(Loss):</u>				
Net loss	\$ (9,912)	\$ (7,866)	\$ (29,679)	\$ (21,389)
Other comprehensive (loss)/income	(1)	(7)	34	(4)
Comprehensive net loss	\$ (9,913)	\$ (7,873)	\$ (29,645)	\$ (21,393)

See accompanying notes to unaudited condensed consolidated financial statements.

**Mast Therapeutics, Inc. and Subsidiaries**  
**Condensed Consolidated Statements of Cash Flows**  
(Unaudited)  
(in thousands)

	Nine Months Ended September 30,	
	2015	2014
<b>Cash flows from operating activities:</b>		
Net loss	\$ (29,679)	\$ (21,389)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	105	60
Gain on bargain purchase	—	(486)
Share-based compensation expense	2,122	1,513
Amortization of debt issuance costs and debt discount	29	—
Changes in assets and liabilities, net of effect of acquisitions:		
(Increase)/decrease in prepaid expenses and other assets	(251)	61
Increase in accounts payable and accrued liabilities	3,536	1,611
Net cash used in operating activities	<u>(24,138)</u>	<u>(18,630)</u>
<b>Cash flows from investing activities:</b>		
Purchases of certificates of deposit	(8,235)	(12,463)
Proceeds from maturities of certificates of deposit	12,044	14,078
Purchases of property and equipment	(118)	(137)
Security deposit for new sublease	—	(130)
Cash obtained through acquisition	—	3,534
Net cash (used in)/provided by investing activities	<u>3,691</u>	<u>4,882</u>
<b>Cash flows from financing activities:</b>		
Proceeds from borrowings under term loan	15,000	—
Costs paid in connection with term loan	(160)	—
Proceeds from sale of common stock	2,140	14,766
Proceeds from exercise of warrants	—	0
Payments for capital lease	(5)	—
Payments for offering costs	(129)	(717)
Net cash provided by financing activities	<u>16,846</u>	<u>14,049</u>
Net (decrease)/increase in cash and cash equivalents	(3,601)	301
Cash and cash equivalents at beginning of period	35,808	25,681
Cash and cash equivalents at end of period	<u>\$ 32,207</u>	<u>\$ 25,982</u>

See accompanying notes to unaudited condensed consolidated financial statements.

## **1. Basis of Presentation**

Mast Therapeutics, Inc., a Delaware corporation (“Mast Therapeutics,” “we” or “our company”), prepared the unaudited interim condensed consolidated financial statements included in this report in accordance with United States generally accepted accounting principles (“U.S. GAAP”) for interim financial information and the rules and regulations of the Securities and Exchange Commission (“SEC”) related to quarterly reports on Form 10-Q. Accordingly, they do not include all of the information and disclosures required by U.S. GAAP for annual audited financial statements and should be read in conjunction with our audited consolidated financial statements and notes thereto included in our Annual Report on Form 10-K for the year ended December 31, 2014, filed with the SEC on March 24, 2015 (“2014 Annual Report”). The condensed consolidated balance sheet as of December 31, 2014 included in this report has been derived from the audited consolidated financial statements included in the 2014 Annual Report. In the opinion of management, these condensed consolidated financial statements include all adjustments (consisting of normal recurring adjustments) necessary for a fair statement of the financial position, results of operations and cash flows for the periods presented. The results of operations for the interim periods shown in this report are not necessarily indicative of the results that may be expected for any future period, including the full year.

We are a clinical-stage, biopharmaceutical company focused on developing therapies for serious or life-threatening diseases. We have devoted substantially all of our resources to research and development (“R&D”) and acquisition of our product candidates. We have not yet marketed or sold any products or generated any significant revenue. Through our acquisition of SynthRx, Inc. (“SynthRx”) in 2011, we acquired our Membrane Adhesion & Sealant Technology (MAST) platform, which includes proprietary poloxamer-related data and know-how derived from over two decades of clinical, nonclinical and manufacturing experience, and we are leveraging the MAST platform to develop vepoloxamer (also known as MST-188) for serious or life-threatening diseases and conditions typically characterized by impaired microvascular blood flow and damaged cell membranes. Through our acquisition of Aires Pharmaceuticals, Inc. (“Aires”) in February 2014, we acquired AIR001, a sodium nitrite inhalation solution for intermittent inhalation via nebulizer, which we are developing for the treatment of heart failure with preserved ejection fraction (HFpEF).

Our business, operating results, financial condition, and growth prospects are subject to significant risks and uncertainties, including failing to obtain regulatory approval to commercialize our product candidates and failing to secure additional funding to complete development of and to successfully commercialize our product candidates.

## **2. Use of Estimates**

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the amounts reported in our consolidated financial statements and accompanying notes. On an ongoing basis, we evaluate our estimates and assumptions, including estimates related to R&D expenses, in-process research and development (“IPR&D”), goodwill and share-based compensation expenses, and assumptions related to the probability of achieving milestones in connection with the potential prepayment obligation under our debt facility with Hercules. We base our estimates on historical experience and various other relevant assumptions we believe to be reasonable under the circumstances. Actual results may differ from these estimates and assumptions.

## **3. Acquisition of Aires**

On February 27, 2014, we completed the acquisition of Aires in an all-stock transaction pursuant to the terms of an agreement and plan of merger, dated February 7, 2014, by and among us, AP Acquisition Sub, Inc., a wholly-owned subsidiary of ours, Aires, and a stockholders’ representative (the “Merger Agreement”). Aires was a clinical-stage company with its lead product candidate, AIR001 (sodium nitrite) inhalation solution, in Phase 2 studies in pulmonary hypertension. Aires survived the merger transaction as a wholly-owned subsidiary of ours.

Upon completion of the merger, we issued an aggregate of 1,049,706 unregistered shares of our common stock to former Aires stockholders and, in September 2014 after the six-month “holdback” period, we issued an aggregate of 4,053,996 additional unregistered shares of our common stock to former Aires stockholders, all in accordance with the merger agreement. There are no milestone or earn-out payments under the merger agreement; therefore, the total merger consideration was 5,103,702 shares.

We accounted for the acquisition of Aires in accordance with Accounting Standards Codification (“ASC”) Topic 805, *Business Combinations* (“ASC Topic 805”). The total purchase price of the acquisition was approximately \$3.3 million. We calculated the purchase price by first multiplying the total number of shares of our common stock issued by \$0.80, which was the closing

price per share of our common stock on February 27, 2014, the acquisition date. Then, we applied a discount factor to account for lack of market liquidity due to the restrictions on transfer of the securities for a period of six months following the acquisition in accordance with stockholder agreements we entered into with the former Aires stockholders and the fact that the shares are unregistered and we have no obligation to register them for resale.

Under the acquisition method of accounting, the total purchase price is allocated to Aires' net tangible and intangible assets and liabilities based on their estimated fair values as of the acquisition date. The table below summarizes the estimated fair values of Aires' net tangible and intangible assets and liabilities on the acquisition date (in thousands):

Cash and cash equivalents	\$	3,534
Prepaid expenses and other assets		86
In-process research and development		<u>2,000</u>
Total assets:		5,620
Accounts payable and accrued liabilities		1,069
Deferred tax liability		<u>795</u>
Total liabilities:		<u>1,864</u>
Net assets acquired	\$	<u><u>3,756</u></u>

The estimated fair value of the net assets acquired exceeds the purchase price by approximately \$0.5 million. Accordingly, we recognized the \$0.5 million excess as a bargain purchase gain in other (expense)/income net in our condensed consolidated statements of operations and comprehensive loss. We were able to realize a gain because Aires was in a distressed sale situation. Aires lacked sufficient capital to continue operations and was unable to secure additional capital in the timeframe it required.

#### ***Acquired In-Process Research and Development***

Acquired IPR&D is the estimated fair value of the AIR001 program as of the acquisition date. We determined that the estimated fair value of the AIR001 program was \$2.0 million as of the acquisition date using the Multi-Period Excess Earnings Method, or MPEEM, which is a form of the income approach. Under the MPEEM, the fair value of an intangible asset is equal to the present value of the asset's incremental after-tax cash flows (excess earnings) remaining after deducting the market rates of return on the estimated value of contributory assets (contributory charge) over its remaining useful life.

To calculate fair value of the AIR001 program under the MPEEM, we used probability-weighted, projected cash flows discounted at a rate considered appropriate given the significant inherent risks associated with drug development by clinical-stage companies. Cash flows were calculated based on estimated projections of revenues and expenses related to AIR001 and then reduced by a contributory charge on requisite assets employed. Contributory assets included debt-free working capital, net fixed assets and assembled workforce. Rates of return on the contributory assets were based on rates used for comparable market participants. Cash flows were assumed to extend through a seven-year market exclusivity period. The resultant cash flows were then discounted to present value using a weighted-average cost of capital for companies with profiles substantially similar to that of Aires, which we believe represents the rate that market participants would use to value the assets. We compensated for the phase of development of the program by applying a probability factor to our estimation of the expected future cash flows. The projected cash flows were based on significant assumptions, including the indication in which we will pursue development of AIR001, the time and resources needed to complete the development and regulatory approval of AIR001, estimates of revenue and operating profit related to the program considering its stage of development, the life of the potential commercialized product, market penetration and competition, and risks associated with achieving commercialization, including delay or failure to obtain regulatory approvals to conduct clinical studies, failure of clinical studies, delay or failure to obtain required market clearances, and intellectual property litigation.

#### ***Deferred Income Tax Liability***

The \$0.8 million recorded as deferred income tax liability resulting from the acquisition reflects the tax impact of the difference between the book basis and tax basis of acquired IPR&D. Such deferred income tax liability cannot be used to offset deferred tax assets when analyzing our valuation allowance as the acquired IPR&D is considered to have an indefinite life until we complete or abandon development of AIR001.

#### 4. Goodwill and IPR&D

At September 30, 2015 and December 31, 2014, our goodwill and IPR&D consisted of the following (in thousands):

Goodwill	\$	3,007
<b>IPR&amp;D</b>		
Acquired IPR&D related to SynthRx acquisition		6,549
Acquired IPR&D related to Aires acquisition		2,000
Total goodwill and IPR&D	\$	<u>11,556</u>

Our goodwill represents the difference between the total purchase price for SynthRx and the aggregate fair values of tangible and intangible assets acquired, less liabilities assumed.

Our IPR&D consists of the estimated fair values of the vepoloxamer and AIR001 programs as of the dates we acquired SynthRx and Aires, respectively.

We test our goodwill and acquired IPR&D for impairment annually as of September 30, or, in the case of initially acquired IPR&D, on the first anniversary of the date we acquired it and subsequently on September 30, and between annual tests if we become aware of an event or a change in circumstances that would indicate the carrying value may be impaired. We performed a qualitative assessment of our goodwill and our acquired IPR&D as of September 30, 2015. We concluded that it is not more likely than not that the carrying value of our goodwill or our acquired IPR&D exceeds its fair value. Therefore, we concluded that no impairment charge is required.

#### 5. Investment Securities

Investment securities are marketable equity or debt securities. All of our investment securities are “available-for-sale” securities and carried at fair value. Fair value for securities with short maturities and infrequent secondary market trades typically is determined by using a curve-based evaluation model that utilizes quoted prices for similar securities. The evaluation model takes into consideration the days to maturity, coupon rate and settlement date convention. Net unrealized gains or losses on these securities are included in accumulated other comprehensive loss, which is a separate component of stockholders’ equity. Realized gains and realized losses are included in other (expense)/income, net while amortization of premiums and accretion of discounts are included in interest income. Interest and dividends on available-for-sale securities are included in interest income. We periodically evaluate our investment securities for impairment. If we determine that a decline in fair value of any investment security is other than temporary, then the cost basis would be written down to fair value and the decline in value would be charged to earnings.

Our investment securities are under the custodianship of a major financial institution and consist of FDIC-insured certificates of deposit. We have classified all of our available-for-sale investment securities, including those with maturities beyond one year from the date of purchase, as current assets on our consolidated balance sheets because we consider them to be highly liquid and available for use, if needed, in current operations. As of September 30, 2015, \$2.9 million, or approximately 17%, of our investment securities had contractual maturity dates of more than one year and less than or equal to 18 months and none were greater than 18 months.

At September 30, 2015 and December 31, 2014, our investment securities were as follows (in thousands):

	September 30, 2015	December 31, 2014
Fair value of investment securities	\$ 17,706	\$ 21,481
Cost basis of investment securities	17,697	21,506
	September 30, 2015	December 31, 2014
Net unrealized gains/(losses) on investment securities	9	(25)



## 6. Fair Value of Financial Instruments

Our cash equivalents are recorded at cost plus accrued interest, which approximates fair value. Our investment securities are carried at fair value. The fair value of financial assets and liabilities is measured under a framework that establishes “levels” which are defined as follows: (i) Level 1 fair value is determined from observable, quoted prices in active markets for identical assets or liabilities; (ii) Level 2 fair value is determined from inputs, other than Level 1 inputs, that are observable, either directly or indirectly, such as quoted prices for similar assets or liabilities, quoted prices in markets that are not active, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities, and (iii) Level 3 fair value is determined using the entity’s own assumptions about the inputs that market participants would use in pricing an asset or liability.

The fair values at September 30, 2015 and December 31, 2014 of our cash equivalents and investment securities are summarized in the following table (in thousands):

	Total Fair Value	Fair Value Determined Under:		
		(Level 1)	(Level 2)	(Level 3)
At September 30, 2015:				
Cash equivalents	\$ 16,018	\$ 16,018	\$ —	\$ —
Investment securities	\$ 17,706	\$ —	\$ 17,706	\$ —
At December 31, 2014:				
Cash equivalents	\$ 16,626	\$ 16,626	\$ —	\$ —
Investment securities	\$ 21,481	\$ —	\$ 21,481	\$ —

We believe that our debt facility bears interest at a rate that approximates prevailing market rates for instruments with similar characteristics and, accordingly, the carrying value of the debt facility approximates fair value. The fair value of our debt facility is determined under Level 2 in the fair value hierarchy.

## 7. Property and Equipment

Property and equipment are stated at cost, less accumulated depreciation and amortization. Property and equipment are depreciated using the straight-line method over the estimated useful lives of the assets, which generally is three to five years. Leasehold improvements are amortized over the economic life of the asset or the lease term, whichever is shorter. Repairs and maintenance are expensed as incurred.

We lease phone equipment under a lease agreement classified as a capital lease. The lease obligation is \$35,000 with an interest rate of 7.94% per annum and the lease expires in December 2019. The equipment is being amortized over five years.

## 8. Accrued Liabilities

Accrued liabilities at September 30, 2015 and December 31, 2014 were as follows (in thousands):

	September 30, 2015	December 31, 2014
Accrued R&D agreements and study expenses	\$ 7,306	\$ 5,383
Deferred rent	107	—
Other accrued liabilities	350	242
Total accrued liabilities	\$ 7,763	\$ 5,625

## 9. Debt Facility

### *Hercules Loan and Security Agreement*

On August 11, 2015, we entered into a loan and security agreement (the “Loan Agreement”) with Hercules Technology III, L.P. and Hercules Technology Growth Capital, Inc. (together, “Hercules”), which provided for a \$15.0 million debt facility, and borrowed the first tranche of \$5.0 million (“Tranche 1”). On September 28, 2015, we entered into an amendment to the Loan Agreement (the “First Amendment”) and borrowed the second tranche of \$10.0 million (“Tranche 2”).

Under the Loan Agreement, as amended, if our vepoloxamer and AIR001 programs do not achieve certain clinical development milestones by December 31, 2015, and by April 30, 2016 we do not either (a) receive unrestricted and unencumbered net cash proceeds of at least \$15 million from either, or a combination of, upfront cash payments from one or more strategic corporate partnerships or one or more equity financings, or (b) demonstrate positive results in our Phase 3 “EPIC” study of vepoloxamer in sickle cell disease, we are required to prepay \$10 million of the outstanding principal due to Hercules on April 30, 2016.

The interest rate for the principal balance under the Loan Agreement, as amended, is the greater of (i) 8.95% plus the prime rate as reported in The Wall Street Journal minus 3.25%, and (ii) 8.95%, determined on a daily basis. Monthly payments under the amended Loan Agreement are interest only until June 1, 2016, followed by equal monthly payments of principal and interest through the scheduled maturity date of January 1, 2019. The interest-only period will be extended to September 1, 2016 if, on or before June 1, 2016, we have demonstrated positive results in the EPIC study and no event of default has occurred (the “First Interest Only Extension Condition”), and extended further to March 1, 2017 if we have satisfied the First Interest Only Extension Condition, have not prepaid Tranche 2, and no event of default has occurred. If our interest-only payment period is extended to March 1, 2017, the maturity date would extend to October 1, 2019. An end of term charge of \$712,500 will be due on the scheduled maturity date and is being accrued through interest expense using the effective interest method.

If we elect to prepay the principal balance under the amended Loan Agreement prior to maturity, a prepayment charge of 1%, 2% or 3%, of the then outstanding principal balance also will be due, depending upon when the prepayment occurs. A prepayment charge will not be applied to our prepayment of Tranche 2 if such prepayment is required on April 30, 2016.

Our obligations under the amended Loan Agreement are secured by a first priority security interest in substantially all of our assets, excluding our intellectual property but including the proceeds from the sale, licensing or disposition of our intellectual property. Our intellectual property is subject to customary negative covenants.

In connection with the Loan Agreement and First Amendment, we paid facility charges of \$112,500 and a commitment charge of \$25,000. Such charges were accounted for as debt issuance costs and are being amortized to interest expense using the effective interest method through the scheduled maturity date.

In connection with the Loan Agreement and First Amendment, we issued warrants to Hercules which are exercisable for an aggregate of 1,524,390 shares of our common stock and at an exercise price of \$0.41 per share. The warrants were valued using the Black-Scholes option pricing model with the following assumptions: volatility of 77%, expected term of five years, risk-free interest rate of 1.5% and a zero dividend yield. The warrant fair value of \$0.4 million has been recorded as a debt discount and is being amortized through interest expense using the effective interest method through the scheduled maturity date. See Note 14 “Stockholders’ Equity – Outstanding Warrants,” for further description of the terms of the warrants

### *Summary of Carrying Value*

The following table summarizes the components of the debt facility carrying value. Short-term values represent amounts to be paid within the next twelve months.

	As of September 30, 2015	
	Short-term	Long-term
Obligations to lender	\$ 2,104	\$ 13,608
Accrued interest	45	-
Debt issuance costs	(426)	(458)
Debt discount related to warrants	(186)	(199)
Carrying value	<u>\$ 1,537</u>	<u>\$ 12,951</u>

## 10. Share-Based Compensation Expense

Share-based compensation expense related to equity awards granted to our employees and non-employee directors for the three and nine months ended September 30, 2015 and 2014 was as follows (in thousands):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2015	2014	2015	2014
Selling, general and administrative expense	\$ 375	\$ 465	\$ 1,687	\$ 1,152
Research and development expense	169	224	435	361
Share-based compensation expense	<u>\$ 544</u>	<u>\$ 689</u>	<u>\$ 2,122</u>	<u>\$ 1,513</u>

During the nine months ended September 30, 2015, the only equity awards granted to our employees and non-employee directors were stock option awards. The following table summarizes the equity award activity during such nine-month period:

	Shares Underlying Option Awards	Weighted-Average Exercise Price
Outstanding at December 31, 2014	13,616,137	\$ 1.00
Granted	12,547,752	\$ 0.55
Exercised	—	\$ —
Expired/forfeited	(3,708,082)	\$ 0.66
Outstanding at September 30, 2015	<u>22,455,807</u>	<u>\$ 0.81</u>

At September 30, 2015, total unrecognized estimated compensation cost related to non-vested employee and non-employee director share-based awards granted prior to that date was \$4.8 million, which is expected to be recognized over a weighted-average period of 3.0 years.

## 11. Net Loss Per Common Share

Basic and diluted net loss per common share was calculated by dividing the net loss for the three and nine months ended September 30, 2015 and 2014 by the weighted-average number of common shares outstanding during those periods, respectively, without consideration for outstanding common stock equivalents because their effect would have been anti-dilutive. Common stock equivalents are included in the calculation of diluted earnings per common share only if their effect is dilutive. For the periods presented, our outstanding common stock equivalents consisted of options and warrants to purchase shares of our common stock. All common stock equivalents presented had an anti-dilutive impact due to losses reported in the applicable periods. The weighted-average number of those common stock equivalents outstanding for each of the periods presented is set forth in the table below:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2015	2014	2015	2014
Options	22,453,351	13,824,355	21,128,025	11,129,739
Warrants	76,356,327	44,424,075	77,345,043	44,518,635

## 12. Recent Accounting Pronouncements

In April 2015, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (“ASU”) No. 2015-03, *Simplifying the Presentation of Debt Issuance Costs* (“ASU 2015-03”). The new standard requires debt issuance costs to be presented on the balance sheet as a direct reduction of the carrying value of the associated debt liability, consistent with the presentation of debt discounts. The recognition and measurement requirements will not change as a result of this guidance. ASU 2015-03 is effective for the annual reporting periods beginning after December 15, 2015 and requires a retrospective application. The Company elected to early adopt this guidance and it did not have a material impact on the Company’s financial statements.

In August 2014, the FASB issued ASU No. 2014-15, *Presentation of Financial Statements - Going Concern (Subtopic 205-40): Disclosure of Uncertainties about an Entity's Ability to Continue as a Going Concern* ("ASU 2014-15"). The amendments in ASU 2014-15 will require management to assess, at each annual and interim reporting period, the entity's ability to continue as a going concern and, if management identifies conditions or events that raise substantial doubt about the entity's ability to continue as a going concern within one year after the date that the financial statements are issued, to disclose in the notes to the entity's financial statements the principal conditions or events that raised substantial doubt about the entity's ability to continue as a going concern, management's evaluation of their significance, and management's plans that alleviated or are intended to alleviate substantial doubt about the entity's ability to continue as a going concern. ASU 2014-15 is effective for annual periods ending after December 15, 2016 and early application is permitted. The amendments in ASU 2014-15 do not have any application to an entity's financial statements, but only to the related notes.

### 13. Supplemental Cash Flow Information

Non-cash investing and financing transactions presented separately from the condensed consolidated statements of cash flows for the nine months ended September 30, 2015 and 2014 are as follows (in thousands):

	Nine Months Ended September 30,	
	2015	2014
Supplemental disclosures of non-cash investing and financing activities:		
Issuance of common stock for acquisitions	\$ -	\$ 3,270
Assumptions of liabilities in acquisitions	\$ -	\$ 1,069
Fair value of warrants issued in connection with debt facility	\$ 393	\$ -
Unrealized (gain)/loss on investment securities	\$ (34)	\$ 4
Purchases of property and equipment in accounts payable	\$ 31	\$ -
Purchase of equipment under capital lease	\$ 35	\$ -
Debt facility costs in accounts payable and accrued liabilities	\$ 33	\$ -

### 14. Stockholders' Equity

#### ***Underwritten Public Offering of Common Stock, Pre-funded Warrants and Warrants***

In November 2014, we completed an underwritten public offering of 30,941,102 shares of our common stock, 13,081,428 "pre-funded" warrants exercisable for up to 13,081,428 shares of our common stock, and 22,011,265 warrants exercisable for up to 22,011,265 shares of our common stock. These securities were offered and sold to the underwriters and the public in units with each Series A unit consisting of one share of our common stock and one-half (0.5) of a warrant and each Series B unit consisting of one pre-funded warrant and one-half (0.5) of a warrant. Each whole warrant is exercisable for one share of our common stock. We sold an aggregate of 30,941,102 Series A units and 13,081,428 Series B units. The gross proceeds from this financing were \$21.0 million and, after deducting underwriting discounts and commissions and other offering expenses, our net proceeds were \$19.7 million. We may receive up to \$0.1 million and \$16.5 million of additional proceeds from the exercise of the pre-funded warrants and warrants, respectively, issued in the offering. The exercise price of the pre-funded warrants is \$0.01 per share and exercise price of the warrants is \$0.75 per share. Subject to certain beneficial ownership limitations, the pre-funded warrants and warrants are exercisable at any time on or before November 12, 2019.

#### ***"At the Market" Equity Offering Program***

In February 2014, we entered into a sales agreement with Cowen and Company, LLC ("Cowen"), to sell shares of our common stock, with aggregate gross sales proceeds of up to \$30 million, from time to time, through an "at the market," or ATM, equity offering program (the "2014 Sales Agreement"), under which Cowen acted as sales agent. In August 2015, we terminated the 2014 Sales Agreement upon entry into a new sales agreement with Cowen to sell shares of our common stock, with aggregate gross sales proceeds of up to \$30 million, from time to time, through an ATM program. As of September 30, 2015, we had sold and issued an aggregate of 24,859,107 shares at a weighted-average sales price of \$0.70 per share under the ATM programs for aggregate gross proceeds of \$17.5 million and \$16.6 million in net proceeds, after deducting sales agent commission and discounts and our other offering costs.

#### ***Shares Issuable to Former SynthRx Stockholders Upon Achievement of Milestones***

In April 2011, we acquired SynthRx as a wholly-owned subsidiary through a merger transaction in exchange for shares of our common stock and rights to additional shares of our common stock upon achievement of specified milestones related to the development of MST-188 in sickle cell disease. We have issued an aggregate of 3,050,851 shares of our common stock to the

former SynthRx stockholders, 1,454,079 of which we repurchased in December 2012 for \$0.001 per share pursuant to our exercise of a repurchase right under the merger agreement. We could issue up to an aggregate of 12,478,050 additional shares of our common stock to the former SynthRx stockholders if and when the development of MST-188 achieves the following milestones: (a) 3,839,400 shares upon acceptance for review by the U.S. Food and Drug Administration (“FDA”) of a new drug application (“NDA”) covering the use of purified poloxamer 188 for the treatment of sickle cell crisis in children and (b) 8,638,650 shares upon approval of such NDA by the FDA.

### **Outstanding Warrants**

At September 30, 2015, outstanding warrants to purchase shares of common stock are as follows:

Shares Underlying Outstanding Warrants	Exercise Price	Expiration Date
2,046,139	\$ 2.750	January 2016
10,625,000	\$ 1.100	November 2016
28,097,400	\$ 0.650	June 2018
13,081,428	\$ 0.010	November 2019
22,011,265	\$ 0.750	November 2019
1,524,390	\$ 0.410	August 2020
<u>77,385,622</u>		

### **Warrants Issued to Hercules**

In connection with the Loan Agreement, on August 11, 2015, we entered into a Warrant Agreement with Hercules Technology III, L.P. and, in connection with the First Amendment, on September 28, 2015, we entered into a First Amendment to Warrant Agreement with Hercules Technology III, L.P. (together, the “Amended Warrant Agreement”). The Amended Warrant Agreement provides Hercules with a right to purchase an aggregate of 1,524,390 shares of our common stock at an exercise price of \$0.41 per share, at any time, or from time to time, through August 11, 2020. The exercise price and the number of shares underlying the warrants subject to the Amended Warrant Agreement are subject to adjustment in the event of a merger event, reclassification of our common stock, subdivision or combination of our common stock, or certain dividend payments. Upon exercise, the aggregate exercise price may be paid, at Hercules’ election, in cash or on a net issuance basis, based upon the fair market value of our common stock at the time of exercise. If the fair market value of our common stock is greater than the exercise price of the warrants as of immediately before their expiration, to the extent the warrants are not previously exercised in full, the warrants shall be deemed automatically exercised on a net issuance basis as of immediately before their expiration.

## Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

*The following discussion and analysis of our financial condition and results of operations should be read in conjunction with the condensed consolidated financial statements and accompanying notes appearing elsewhere in this report. For additional context with which to understand our financial condition and results of operations, see the discussion and analysis included in Part II, Item 7 of our annual report on Form 10-K for the year ended December 31, 2014, filed with the U.S. Securities and Exchange Commission, or SEC, on March 24, 2015, as well as the consolidated financial statements and accompanying notes contained therein. In addition to historical information, this discussion and analysis contains forward-looking statements that involve risks, uncertainties, and assumptions. Our actual results may differ materially from those anticipated in these forward-looking statements as a result of various factors, including but not limited to those identified under "Forward Looking Statements" below and those discussed in Item 1A (Risk Factors) of Part II of this report and our quarterly report on Form 10-Q filed with the SEC on August 12, 2015. Mast Therapeutics, our corporate logo, Aires Pharmaceuticals, Inc., and SynthRx are trademarks of our company. All trademarks, service marks or trade names appearing in this report are the property of their respective owners. Use or display by us of other parties' trademarks, service marks or trade names is not intended to and does not imply a relationship with, or endorsements or sponsorship of, us by the trademark, service mark or trade name owners.*

### Overview

We are a clinical-stage, biopharmaceutical company developing novel therapies for serious or life-threatening diseases with significant unmet needs. We are leveraging our Molecular Adhesion & Sealant Technology, or MAST, platform, derived from over two decades of clinical, nonclinical, and manufacturing experience with purified and non-purified poloxamers, to develop vepoloxamer (also known as MST-188), our lead drug candidate. Vepoloxamer has demonstrated multiple pharmacologic effects that may provide clinical benefit in a wide range of diseases and conditions typically characterized by impaired microvascular blood flow and/or damaged cell membranes. We currently are developing vepoloxamer for the treatment of sickle cell disease, heart failure, and stroke. We also are developing AIR001, a sodium nitrite solution for intermittent inhalation via nebulizer. AIR001 has demonstrated positive hemodynamic effects in patients with pulmonary hypertension and we are developing it for the treatment of heart failure with preserved ejection fraction, or HFpEF.

We have devoted substantially all of our resources to research and development, or R&D, and to acquisition of our product candidates. We have not yet marketed or sold any products or generated any significant revenue and we have incurred significant annual operating losses since inception. We incurred a loss from operations of \$29.7 million for the nine months ended September 30, 2015. As of September 30, 2015, we had an accumulated deficit of \$264.8 million. Our cash, cash equivalents, and investment securities were \$49.9 million as of September 30, 2015.

We continue to focus our resources primarily on the development of vepoloxamer. Enrolling subjects in EPIC, our pivotal Phase 3 study of vepoloxamer in patients with sickle cell disease, is one of our top priorities. We also initiated a Phase 2 study of vepoloxamer in patients with chronic heart failure in October 2015. In addition, we continue to pursue the opportunity for clinical development of vepoloxamer in ischemic stroke. Our vepoloxamer pipeline also includes a preclinical development program in resuscitation following major trauma (i.e., restoration of circulating blood volume and pressure).

Our second product candidate, AIR001, is being tested in two institution-sponsored Phase 2a clinical studies in patients with HFpEF. We obtained the AIR001 program through our acquisition of Aires Pharmaceuticals, Inc. in February 2014. If data from the Phase 2a studies are positive, we expect to conduct a Phase 2b proof-of-concept study in HFpEF patients.

### Acquisition of Aires Pharmaceuticals

In February 2014, we acquired Aires Pharmaceuticals, Inc. in a merger transaction, which resulted in Aires becoming our wholly-owned subsidiary. Upon completion of the merger, we issued an aggregate of 1,049,706 unregistered shares of our common stock to former Aires stockholders and, in September 2014, following a six-month "holdback" period, we issued an aggregate of 4,053,996 additional unregistered shares of our common stock to former Aires stockholders, all in accordance with the merger agreement. There are no milestone or earn-out payments under the merger agreement. Accordingly, the total merger consideration was 5,103,702 shares.

### Critical Accounting Policies and Significant Judgments and Estimates

Our discussion and analysis of our financial condition and results of operations included in this report is based upon consolidated financial statements and condensed consolidated financial statements that we have prepared in accordance with U.S. generally accepted accounting principles, or U.S. GAAP. The preparation of these financial statements requires us to make a number of estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses in these financial statements and accompanying notes. On an ongoing basis, we evaluate these estimates and assumptions, including those related to determination

of the fair value of goodwill and acquired in-process research and development, or IPR&D, and recognition of R&D expenses and share-based compensation and assumptions related to the probability of achieving milestones in connection with the potential prepayment obligation under our debt facility with Hercules. We base our estimates on historical information, when available, and assumptions believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities not readily apparent from other sources. Actual results may differ materially from these estimates under different assumptions or conditions.

We believe the following accounting estimates are those that can have a material impact on our financial condition or operating performance and involve substantial subjectivity and judgment in the application of our accounting policies to account for highly uncertain matters or the susceptibility of such matters to change. The following is not intended to be a comprehensive discussion of all of our significant accounting policies. See the notes accompanying our consolidated financial statements appearing in our most recent annual report on Form 10-K for a summary of all of our significant accounting policies and other disclosures required by U.S. GAAP.

**Accrued Research and Development Expenses.** As part of the process of preparing our financial statements, we are required to estimate our accrued expenses. This process involves reviewing open contracts and purchase orders, communicating with our personnel to identify services that have been performed on our behalf and estimating the level of service performed and the associated cost incurred for the service when we have not yet been invoiced or otherwise notified of the actual cost. Many of our service providers invoice us monthly in arrears for services performed or when contractual milestones are met. We make estimates of our accrued expenses as of each balance sheet date in our financial statements based on facts and circumstances known to us at that time. We periodically confirm the accuracy of our estimates with the service providers and make adjustments, if necessary. The majority of our accrued expenses relate to R&D services and related expenses. Examples of estimated accrued R&D expenses include:

- fees paid to contract research organizations, or CROs, in connection with clinical studies;
- fees paid to investigative sites and investigators in connection with clinical studies;
- fees paid to contract manufacturing organizations, or CMOs, in connection with process development activities and production of nonclinical and clinical trial material;
- fees paid to vendors in connection with nonclinical development activities; and
- fees paid to consultants for regulatory-related advisory and data management services.

We base our accrued expenses related to CROs and CMOs on our estimates of the services received and efforts expended pursuant to purchase orders or contracts with multiple service providers that we engage to conduct and manage our clinical studies and manufacture our clinical trial material on our behalf. The financial terms of our arrangements with our CROs and CMOs are subject to negotiation, vary from contract to contract and may result in uneven payment flows. Payments under some of these contracts depend on factors such as the successful completion of specified process development activities or the successful enrollment of patients and the completion of clinical study milestones. In accruing these service fees, we estimate, as applicable, the time period over which services will be performed (e.g., enrollment of patients, activation of clinical sites, etc.). If the actual timing varies from our estimate, we adjust the accrual accordingly. In addition, there may be instances in which payments made to service providers will exceed the level of services provided and result in a prepayment of R&D expense, which we report as an asset. The actual costs and timing of clinical studies and research-related manufacturing are uncertain and subject to change depending on a number of factors. Differences between actual costs of these services and the estimated costs that we have accrued in a prior period are recorded in the subsequent period in which the actual costs become known to us. Historically, these differences have not resulted in material adjustments, but such differences may occur in the future and have a material impact on our consolidated results of operations or financial position.

**Business Combinations.** We account for business combinations, such as our acquisitions of SynthRx in April 2011 and Aires Pharmaceuticals in February 2014, in accordance with Accounting Standards Codification, or ASC, Topic 805, *Business Combinations*, which requires the purchase price to be measured at fair value. When the purchase consideration consists entirely of shares of our common stock, we calculate the purchase price by determining the fair value, as of the acquisition date, of shares issued in connection with the closing of the acquisition and, if the transaction involves contingent consideration based on achievement of milestones or earn-out events, the probability-weighted fair value, as of the acquisition date, of shares issuable upon the occurrence of future events or conditions pursuant to the terms of the agreement governing the business combination. If the transaction involves such contingent consideration, our calculation of the purchase price involves probability inputs that are highly judgmental due to the inherent unpredictability of drug development, particularly by development-stage companies such as ours. We recognize estimated fair values of the tangible assets and intangible assets acquired, including IPR&D, and liabilities assumed as of the acquisition date, and we record as goodwill any amount of the fair value of the tangible and intangible assets acquired and liabilities assumed in excess of the purchase price.

**Goodwill and Acquired IPR&D.** In accordance with ASC Topic 350, *Intangibles – Goodwill and Other*, or ASC Topic 350, our goodwill and acquired IPR&D are determined to have indefinite lives and, therefore, are not amortized. Instead, they are tested for impairment annually and between annual tests if we become aware of an event or a change in circumstances that would indicate the carrying value may be impaired. We perform our annual impairment testing as of September 30 of each year, or, in the case of initially acquired IPR&D, on the first anniversary of the date we acquired it and subsequently on September 30. Pursuant to Accounting Standards Update, or ASU, No. 2011-08, *Intangibles – Goodwill and Other (Topic 350): Testing Goodwill for Impairment*, and No. 2012-02, *Intangibles – Goodwill and Other (Topic 350): Testing Indefinite-Lived Intangible Assets for Impairment*, we have the option to first assess qualitative factors to determine whether the existence of events or circumstances leads us to determine that it is more likely than not (that is, a likelihood of more than 50%) that our goodwill or our acquired IPR&D is impaired. If we choose to first assess qualitative factors and we determine that it is not more likely than not goodwill or acquired IPR&D is impaired, we are not required to take further action to test for impairment. We also have the option to bypass the qualitative assessment and perform only the quantitative impairment test, which we may choose to do in some periods but not in others.

If we perform a quantitative assessment of goodwill, we utilize the two-step approach prescribed under ASC Topic 350. Step 1 requires a comparison of the carrying value of a reporting unit, including goodwill, to its estimated fair value. We test for impairment at the entity level because we operate on the basis of a single reporting unit. If our carrying value exceeds our fair value, we then perform Step 2 to measure the amount of impairment loss, if any. In Step 2, we estimate the fair value of our individual assets, including identifiable intangible assets, and liabilities to determine the implied fair value of goodwill. We then compare the carrying value of our goodwill to its implied fair value. The excess of the carrying value of goodwill over its implied fair value, if any, is recorded as an impairment charge.

If we perform a quantitative assessment of IPR&D, we calculate the estimated fair value of acquired IPR&D by using the Multi-Period Excess Earnings Method, or MPEEM, which is a form of the income approach. Under the MPEEM, the fair value of an intangible asset is equal to the present value of the asset's projected incremental after-tax cash flows (excess earnings) remaining after deducting the market rates of return on the estimated value of contributory assets (contributory charge) over its remaining useful life.

Our determinations as to whether, and, if so, the extent to which, goodwill and acquired IPR&D become impaired are highly judgmental and based on significant assumptions regarding our projected future financial condition and operating results, changes in the manner of our use of the acquired assets, development of our acquired assets or our overall business strategy, and regulatory, market and economic environment and trends.

**Share-based Compensation Expenses.** We account for share-based compensation awards granted to employees, including non-employee members of our board of directors, in accordance with ASC Topic 718, *Compensation — Stock Compensation*. Compensation expense for all share-based awards is based on the estimated fair value of the award on its date of grant and recognized on a straight-line basis over its vesting period. As share-based compensation expense is based on awards ultimately expected to vest, it is reduced for estimated forfeitures. We estimate forfeitures at the time of grant based on the expected forfeiture rate for our unvested stock options, which is based in large part on our historical forfeiture rates, but also on assumptions believed to be reasonable under the circumstances. We revise our estimates in subsequent periods if actual forfeitures differ from those estimates. Although share-based compensation expense can be significant to our consolidated financial statements, it does not involve the payment of any cash by us.

We estimate the grant date fair value of a stock option award using the Black-Scholes option-pricing model, or Black-Scholes model. In determining the grant date fair value of a stock option award under the Black-Scholes model, we must make a number of assumptions, including the term of the award, the volatility of the price of our common stock over the term of the award, and the risk-free interest rate. Changes in these or other assumptions could have a material impact on the compensation expense we recognize.

## Results of Operations – Overview

We operate our business and evaluate our company on the basis of a single reportable segment, which is the business of developing therapies for serious or life-threatening diseases.

## Revenue

We have not generated any revenue from product sales to date, and we do not expect to generate revenue from product sales until such time, if any, that we have obtained approval from a regulatory agency to sell one or more of our product candidates, which we cannot predict with certainty will occur. If we enter into any licensing or other collaborative arrangements regarding our development programs, we may recognize revenue from those arrangements prior to commercial sale of any products.



## **Operating Expenses**

*Research and Development Expenses.* We maintain and evaluate our R&D expenses by the type of cost incurred rather than by project. We do this primarily because we outsource a substantial portion of our work and our R&D personnel and consultants work across multiple programs rather than dedicating their time to one particular program. We categorize our R&D expenses as external clinical study fees and expenses, external nonclinical study fees and expenses, personnel costs and share-based compensation expense. The major components of our external clinical study fees and expenses are fees and expenses related to CROs and clinical study investigative sites and investigators. The major components of our external nonclinical study fees and expenses are fees and expenses related to preclinical studies and other nonclinical testing, research-related manufacturing, and quality assurance and regulatory affairs services. Research-related manufacturing expenses include costs associated with producing and/or purchasing active pharmaceutical ingredient (API), conducting process development activities, producing clinical trial material, producing material for stability testing to support regulatory filings, related labeling, testing and release, packaging and storing services and related consulting fees. Impairment losses on R&D-related manufacturing equipment are also considered research-related manufacturing expenses. Personnel costs relate to employee salaries, benefits and related costs.

A general understanding of drug development is critical to understanding our results of operations and, particularly, our R&D expenses. Drug development in the United States and most countries throughout the world is a process that includes several steps defined by the U.S. Food and Drug Administration, or FDA, and similar regulatory authorities in foreign countries. The FDA approval processes relating to new drug products differ depending on the nature of the particular product candidate for which approval is sought. With respect to any product candidate with active ingredients not previously approved by the FDA, a prospective drug product manufacturer is required to submit a new drug application, or NDA, that includes complete reports of pre-clinical, clinical and laboratory studies and extensive manufacturing information to demonstrate the product candidate's safety and effectiveness. Generally, an NDA must be supported by at least phase 1, 2 and 3 clinical studies, with each study typically more expensive and lengthy than the previous study.

Future expenditures on R&D programs are subject to many uncertainties, including the number of clinical studies required to be conducted for each development program and whether we will develop a product candidate with a partner or independently. At this time, due to such uncertainties and the risks inherent in drug product development and the associated regulatory process, we cannot estimate with any reasonable certainty the duration of or costs to complete our R&D programs, or whether or when or to what extent revenues will be generated from the commercialization and sale of any of our product candidates. The duration and costs of our R&D programs, in particular, the duration and costs associated with clinical studies and research-related manufacturing, can vary significantly as a result of a variety of factors, including:

- the number of clinical and nonclinical studies necessary to demonstrate the safety and efficacy of a product candidate in a particular indication;
- the number of patients who participate in each clinical study;
- the number and location of sites included and the rate of site approval in each clinical study;
- the rate of patient enrollment and ratio of randomized to evaluable patients in each clinical study;
- the duration of patient treatment and follow-up;
- the potential additional safety monitoring or other studies requested by regulatory agencies;
- the time and cost to manufacture clinical trial material and commercial product, including process development and scale-up activities, and to conduct stability studies, which can last several years;
- the availability and cost of comparative agents used in clinical studies;
- the timing and terms of any collaborative or other strategic arrangements that we may establish; and
- the cost, requirements, timing of and the ability to secure regulatory approvals.

We regularly evaluate the prospects of our R&D programs, including in response to available scientific, nonclinical and clinical data, our assessments of a product candidate's market potential and our available resources, and make determinations as to which programs to pursue and how much funding to direct to each one.

*Selling, General and Administrative Expenses.* Selling, general and administrative, or SG&A, expenses consist primarily of salaries, benefits and related costs for personnel in executive, finance and accounting, legal and market research functions, and professional and consulting fees for accounting, legal, investor relations, business development, market research, human resources and information technology services. Other SG&A expenses include facility lease and insurance costs.

**Transaction-Related Expenses.** Transaction-related expenses consist of legal, accounting, financial and business development advisory fees associated with the evaluation of potential acquisition targets and execution of acquisition transactions, including our acquisitions of Aires and SynthRx.

**Interest Expense.** Interest expense consists of interest payments made on the principal balance under our debt facility with Hercules and interest expense associated with payments under capital leases of equipment.

**Other (Expense)/Income, Net.** Other (expense)/income, net includes the bargain purchase gain related to the acquisition of Aires in 2014, as well as unrealized and realized gains and losses from foreign currency transactions and other non-operating gains and losses.

#### Comparison of Three Months Ended September 30, 2015 and 2014

**Revenue.** We recognized no revenue for the three months ended September 30, 2015 and 2014.

**R&D Expenses.** Our R&D expenses for the three months ended September 30, 2015 consisted primarily of external costs associated with the EPIC study, our Phase 2 study of vepoloxamer in heart failure and research-related manufacturing for vepoloxamer and AIR001. These expenses consisted primarily of CRO and CMO expenses, clinical study-related consulting and study site expenses, which include start-up costs as well as patient costs. The following table summarizes our consolidated R&D expenses by type for each of the periods listed and their respective percent of our total R&D expenses for such periods (in thousands, except for percentages):

	Three Months Ended September 30,			
	2015	%	2014	%
External clinical study fees and expenses	\$ 3,362	46%	\$ 3,168	59%
External nonclinical study fees and expenses	2,785	38%	962	18%
Personnel costs	1,014	14%	1,048	19%
Share-based compensation expense	169	2%	224	4%
Total	\$ 7,330	100%	\$ 5,402	100%

R&D expenses increased by \$1.9 million, or approximately 35.7%, to \$7.3 million for the three months ended September 30, 2015, compared to \$5.4 million for the same period in 2014. This increase was due primarily to a \$1.8 million increase in external nonclinical study fees and expenses and a \$0.2 million increase in external clinical study fees and expenses, offset by a \$0.1 million decrease in personnel costs and share-based compensation expense.

The \$1.8 million increase in external nonclinical study fees and expenses was due primarily to an increase in research-related manufacturing costs for vepoloxamer. The \$0.2 million increase in external clinical study fees and expenses was due primarily to an increase of \$0.4 million in costs for our Phase 2 study of vepoloxamer in heart failure, offset by a decrease of \$0.2 million in costs for the Phase 2 study of vepoloxamer in acute limb ischemia, or ALI, which we discontinued and began to wind-down during the three months ended September 2015.

**SG&A Expenses.** SG&A expenses of \$2.5 million for the three months ended September 30, 2015 were consistent with the same period in 2014.

**Transaction-Related Expenses.** There were no transaction-related expenses for the three months ended September 30, 2015. Transaction-related expenses for the three months ended September 30, 2014 were negligible.

**Interest Expense.** Interest expense for the three months ended September 30, 2015 was \$101,000. There was no interest expense in the three months ended September 30, 2014.

**Net Loss.** Net loss was \$9.9 million, or \$0.06 per share, for the three months ended September 30, 2015, compared to net loss of \$7.9 million, or \$0.06 per share, for the same period in 2014.

## Comparison of Nine Months Ended September 30, 2015 and 2014

**Revenue.** We recognized no revenue for the nine months ended September 30, 2015 and 2014.

**R&D Expenses.** Our R&D expenses for the nine months ended September 30, 2015 consisted primarily of external costs associated with the EPIC study, our Phase 2 study of vepoloxamer in ALI, our Phase 2 study of vepoloxamer in heart failure and research-related manufacturing for vepoloxamer and AIR001. These expenses consisted primarily of CRO and CMO expenses, clinical study-related consulting and study site expenses, which include start-up costs as well as patient costs. The following table summarizes our consolidated R&D expenses by type for each of the periods listed and their respective percent of our total R&D expenses for such periods (in thousands, except for percentages):

	Nine Months Ended September 30,			
	2015	%	2014	%
External clinical study fees and expenses	\$ 10,573	50%	\$ 8,397	58%
External nonclinical study fees and expenses	7,177	34%	3,058	21%
Personnel costs	2,921	14%	2,687	19%
Share-based compensation expense	435	2%	361	2%
Total	\$ 21,106	100%	\$ 14,503	100%

R&D expenses increased by \$6.6 million, or approximately 45.5%, to \$21.1 million for the nine months ended September 30, 2015, compared to \$14.5 million for the same period in 2014. This increase was due primarily to a \$4.1 million increase in external nonclinical study fees and expenses, a \$2.2 million increase in external clinical study fees and expenses and a \$0.2 million increase in personnel expenses.

The \$4.1 million increase in external nonclinical study fees and expenses was due primarily to a \$3.8 million increase in research-related manufacturing costs for vepoloxamer and a \$0.3 million increase in research-related manufacturing costs for AIR001. The \$2.2 million increase in external clinical study fees and expenses was due primarily to increases of \$2.7 million in EPIC study costs and \$0.4 million in costs for our Phase 2 study of vepoloxamer in heart failure, offset by decreases of \$0.5 million in clinical study costs related to Aires' pre-acquisition clinical studies of AIR001 in pulmonary arterial hypertension and \$0.5 million in costs for the Phase 2 study of vepoloxamer in ALI, which we discontinued and began to wind-down during the three months ended September 30, 2015.

**SG&A Expenses.** SG&A expenses increased by \$1.3 million, or approximately 19.1%, to \$8.4 million for the nine months ended September 30, 2015, compared to \$7.1 million for the same period in 2014. This increase was due primarily to a \$0.7 million increase in personnel costs and a \$0.5 million increase in professional and consulting fees. Personnel costs for the nine months ended September 30, 2015 include \$0.4 million of severance expense and \$0.3 million of share-based compensation expense resulting from the termination of employment of our former president and chief operating officer in February 2015 and the acceleration of stock option vesting pursuant to the terms of his option agreements.

**Transaction-Related Expenses.** There were no transaction-related expenses for the nine months ended September 30, 2015. Transaction-related expenses of \$0.3 million for the nine months ended September 30, 2014 consisted primarily of legal fees associated with the acquisition of Aires.

**Interest Expense.** Interest expense for the nine months ended September 30, 2015 was \$102,000. There was no interest expense in the nine months ended September 30, 2014.

**Other (Expense)/Income, Net.** Other (expense)/income, net for the nine months ended September 30, 2015 was negligible. Other (expense)/income, net for the nine months ended September 30, 2014 consisted primarily of a \$0.5 million bargain purchase gain associated with the acquisition of Aires.

**Net Loss.** Net loss was \$29.7 million, or \$0.18 per share, for the nine months ended September 30, 2015, compared to net loss of \$21.4 million, or \$0.19 per share, for the same period in 2014.

## Liquidity and Capital Resources

We have a history of annual losses from operations and we anticipate that we will continue to incur losses for at least the next several years. For the nine months ended September 30, 2015, we incurred a loss from operations of \$29.7 million. Our cash, cash equivalents and investment securities were \$49.9 million as of September 30, 2015.

We historically have funded our operations principally through proceeds from sales of our equity securities. In November 2014, we completed an underwritten public offering with gross proceeds of \$21.0 million from the sale and issuance of units consisting of shares of our common stock and warrants to purchase our common stock at an exercise price of \$0.75 per share and units consisting of “pre-funded” warrants to purchase shares of our common stock at an exercise price of \$0.01 per share and warrants to purchase shares of our common stock at an exercise price of \$0.75 per share. We issued and sold an aggregate of 30,941,102 shares of our common stock, 13,081,428 pre-funded warrants exercisable for up to 13,081,428 shares, and 22,011,265 warrants exercisable for up to 22,011,265 shares. Net proceeds, after deducting underwriting discounts and commissions and other offering expenses, were \$19.7 million. The pre-funded warrants and the warrants are exercisable at any time on or before November 12, 2019, subject to certain beneficial ownership limitations.

We may receive up to \$5.6 million, \$11.7 million, \$18.3 million, \$0.1 million and \$16.5 million of additional net proceeds from the exercise of warrants issued in the registered direct equity financings we completed in January 2011 and the underwritten public offerings we completed in November 2011, June 2013 and November 2014, respectively. However, the timing of the exercise and extent to which any of these warrants are exercised before they expire are beyond our control and depend on a number of factors, including certain beneficial ownership limitations and the market price of our common stock. The exercise prices of these warrants are \$2.75, \$1.10, \$0.65, \$0.01 and \$0.75 per share, respectively. In comparison, the closing sale price of our common stock on September 30, 2015 was \$0.58 per share and we do not expect the holders of the warrants to exercise them unless and until our common stock trades at or above the exercise price of their warrants.

In February 2014, we entered into a sales agreement with Cowen and Company, LLC, or Cowen, to sell shares of our common stock, with aggregate gross sales proceeds of up to \$30 million, from time to time, through an “at the market,” or ATM, equity offering program, under which Cowen acts as sales agent. We refer to that agreement as the 2014 Sales Agreement. In August 2015, we terminated the 2014 Sales Agreement upon entry into a new sales agreement with Cowen to sell shares of our common stock, with aggregate gross sales proceeds of up to \$30 million, from time to time, through an ATM program. As of September 30, 2015, we had sold and issued an aggregate of 24,859,107 shares at a weighted-average sales price of \$0.70 per share under the ATM programs for aggregate gross proceeds of \$17.5 million and \$16.6 million in net proceeds, after deducting sales agent commission and discounts and our other offering costs.

We have borrowed \$15 million under a debt facility and have received proceeds of approximately \$14.8 million, net of fees. We borrowed the first tranche of \$5.0 million in August 2015 upon entry into a loan and security agreement with Hercules Technology III, L.P. and Hercules Technology Growth Capital, Inc., together referred to as Hercules, and we borrowed the second tranche of \$10.0 million in September 2015 upon entry into an amendment to that agreement. If we do not satisfy specific financial and/or clinical development conditions, as described in Note 9, “Debt Facility,” of the Notes to the Condensed Consolidated Financial Statements (Unaudited) in this report, we will be required to prepay \$10 million of the principal balance of the loan on April 30, 2016. Our obligations under our agreement with Hercules are secured by substantially all of our assets other than our intellectual property, but including proceeds from the sale, licensing or other disposition of our intellectual property. Our intellectual property is subject to negative covenants, which, among other things, prohibit us from selling, transferring, assigning, mortgaging, pledging, leasing, granting a security interest in or otherwise encumbering our intellectual property, subject to limited exceptions. The agreement includes other customary restrictive covenants that may limit our ability to raise capital through other debt or equity financing.

For a discussion of our liquidity and capital resources outlook, see “Management Outlook” below.

**Operating activities.** Net cash used in operating activities was \$24.1 million for the nine months ended September 30, 2015 and consisted primarily of a net loss of \$29.7 million adjusted for non-cash items, including share-based compensation expenses of \$2.1 million and a net increase of \$3.3 million due to changes in assets and liabilities. Net cash used in operating activities was \$18.6 million for the nine months ended September 30, 2014 and consisted primarily of a net loss of \$21.4 million adjusted for non-cash items, including share-based compensation expenses of \$1.5 million and a net increase of \$1.7 million due to changes in assets and liabilities, offset by a gain on bargain purchase of \$0.5 million.

**Investing activities.** Net cash provided by investing activities was \$3.7 million for the nine months ended September 30, 2015 compared to net cash provided by investing activities of \$4.9 million for the same period in 2014. Net proceeds from the maturity of certificates of deposit, offset by the purchase of new certificates of deposit were \$3.8 million for the nine months ended September 30, 2015 compared to \$1.6 million for the same period in 2014. In the nine months ended September 30, 2014, we obtained \$3.5 million of cash through our acquisition of Aires.

**Financing activities.** Net cash provided by financing activities was \$16.8 million for the nine months ended September 30, 2015, primarily consisting of the net proceeds of \$14.8 million under our debt facility with Hercules and \$2.0 million from sales of our shares of common stock through our ATM program. Net cash provided by financing activities was \$14.0 million for the nine months ended September 30, 2014, representing the net proceeds from sales of our shares of common stock through our ATM program.

## Management Outlook

We anticipate that our cash, cash equivalents and investment securities as of September 30, 2015 will be sufficient to fund our operations for at least the next 12 months; provided that we are not required to prepay \$10 million of the principal balance under our debt facility with Hercules on April 30, 2016. We expect our operating expenses for the last three months of 2015 will be approximately \$9 million to \$10 million, excluding share-based compensation expense.

Our estimate of our operating expenses for the remaining three months of 2015 and of the period of time through which our current financial resources will be adequate to support our operations are forward-looking statements based on significant assumptions and we could utilize our financial resources sooner than we currently expect. Forward-looking statements involve a number of risks and uncertainties and actual results could differ materially if the assumptions on which we have based our forward-looking statements prove to be wrong. Factors that will affect our operating expenses and future capital requirements include, but are not limited to:

- the design, initiation, scope, rate of progress, results and timing of our clinical and nonclinical studies of our product candidates, including the EPIC study;
- the successful completion of our development programs and our ability to manage costs associated with clinical and nonclinical development of our product candidates, including research-related manufacturing activities;
- our ability to obtain and maintain regulatory approvals of our product candidates, the scope of regulatory approval we pursue, and the extent to which we do so independently or through collaborations;
- our ability to manage timelines and costs related to commercial manufacture of our products, should any of our product candidates obtain regulatory approval;
- the extent to which we increase our workforce, including in connection with establishing or acquiring sales and distribution capabilities;
- our ability to protect our intellectual property and operate our business without infringing upon the intellectual property rights of others;
- the extent of commercial success of any of our product candidates for which we receive regulatory approval; and
- the extent to which we seek to expand our product pipeline through acquisitions and execute on transactions intended to do so.

## Vepoloxamer

We are focusing our resources primarily on development of vepoloxamer. Enrolling subjects in the EPIC study is one of our top priorities. We expect to enroll 388 subjects into EPIC and have enrolled more than 80% of those subjects. In addition, we have more than 75 EPIC study sites open in 12 countries, reflecting broad international support for the study among the physician community. However, we experienced slower than predicted enrollment in October, requiring us to update our anticipated timeline for announcement of top-line data. Although predicting the rate of enrollment and timing of availability of data for any clinical study, including EPIC, is subject to a number of significant assumptions and completion of the study and timing of data may differ materially, we expect to announce top-line results in the second quarter of 2016.

In addition to EPIC, we are conducting other activities to evaluate vepoloxamer's potential in sickle cell disease, including enrolling patients participating in EPIC at selected U.S. study sites in a sub-study to investigate and quantify the effect of vepoloxamer on tissue oxygenation using non-invasive methods. Further, during the second quarter of 2015, we initiated an open-label, multicenter extension study called EPIC-E to expand our existing safety database regarding repeat exposure to vepoloxamer. The study is enrolling patients who have completed the EPIC study and are hospitalized for subsequent vaso-occlusive crisis. To further enhance the safety database for our new drug application and help guide dosage adjustments for special populations, we also plan to initiate a clinical study of vepoloxamer in approximately 40 patients with varying degrees of renal impairment.

We also are advancing our other vepoloxamer programs. In October 2015, we initiated a randomized, double-blind, placebo-controlled, multicenter Phase 2 study of vepoloxamer in ambulatory patients with chronic heart failure. Approximately 150 patients will be randomized into one of three approximately 50-patient study arms and receive one of two dose levels of a new formulation of vepoloxamer, which we designed to be more suitable for heart failure patients, or the placebo control. The study will evaluate the safety and efficacy of a single, three-hour infusion of vepoloxamer compared to placebo, including vepoloxamer's effect on markers of cardiac injury (troponin) and wall stress (NT-proBNP), as well as clinical outcomes such as changes in echocardiographic

measurements, exercise tolerance and quality of life. The study drugs will be administered in an outpatient setting or short-stay inpatient unit depending on local practice and resource availability.

We also are evaluating vepoloxamer's potential in stroke. Based on nonclinical data we announced earlier this year, as well as published data from recent third party studies of poloxamer 188, we believe, and several medical experts in the field have agreed, that sufficient data now exists to support clinical development of vepoloxamer in stroke. Consequently, during the third quarter, we elected to discontinue our clinical program in ALI and further pursue the opportunity for clinical development of vepoloxamer in stroke. We anticipate the cost savings from discontinuing the ALI study to more than offset 2015 expenses related to the stroke program.

In addition to our clinical studies, we are conducting or plan to conduct a number of other *ex vivo*, nonclinical *in vivo* and *in vitro* studies of vepoloxamer to further characterize its pharmacologic effects and support our intellectual property positions. We also are conducting and plan to conduct additional research-related manufacturing activities, some of which may result in additional intellectual property rights and protection for our product candidates.

### **AIR001**

Based on the positive hemodynamic effects observed in Phase 1 and Phase 2 studies of AIR001 in more than 120 healthy volunteers and patients with various forms of pulmonary hypertension and data showing AIR001 was well tolerated in those studies, we believe AIR001 may be uniquely suitable to address the serious unmet need of patients with HFpEF. To better understand AIR001's potential in that patient population, we are supporting ongoing Phase 2a studies of AIR001 in patients with HFpEF sponsored by Mayo Clinic and the University of Pittsburgh. If results from these Phase 2a studies are positive, we expect to conduct a Phase 2b proof-of-concept study of AIR001 in HFpEF patients.

In parallel with our independent development of vepoloxamer and AIR001, from time to time, we evaluate opportunities for strategic collaborations, including with respect to country-specific development and regulatory or commercial expertise that would enhance the value of our programs.

Although we anticipate that our cash, cash equivalents and investment securities will be sufficient to fund our operations for at least the next 12 months, provided that we are not required to prepay \$10 million of the principal balance under our debt facility with Hercules on April 30, 2016, we do not anticipate that such capital alone will be sufficient to fund our operations through the completion of development and commercialization of our product candidates. As described above under "Liquidity and Capital Resources," if we do not satisfy specific financial and/or clinical development conditions under our loan and security agreement with Hercules, we will be required to prepay \$10 million of the principal balance on April 30, 2016, in which case, based on our cash, cash equivalents and investment securities as of September 30, 2015, we may not have sufficient resources to fund our operations for the next 12 months. In addition, we may utilize our financial resources sooner than we currently expect if we incur unanticipated expenses or we pursue development or commercial-readiness activities for our product candidates at levels or on timelines other than currently planned or we expand our product pipeline through acquisition of new product candidates and/or technologies. For the foreseeable future, we plan to fund our operations through public or private equity and/or debt financings and through collaborations, including licensing arrangements. However, adequate additional capital may not be available to us in the future on acceptable terms, on a timely basis, or at all. Our failure to raise capital as and when needed would have a material and adverse effect on our financial condition and ability to pursue our business strategy.

### **Recent Accounting Pronouncements**

See Note 12, "Recent Accounting Pronouncements," of the Notes to the Condensed Consolidated Financial Statements (Unaudited) in this report for a discussion of recent accounting pronouncements and their effect, if any, on us.

### **Forward Looking Statements**

This report, particularly in Part I, Item 2, "Management's Discussion and Analysis of Financial Condition and Results of Operations," includes forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. All statements, other than statements of historical fact, are statements that could be deemed forward-looking statements, including, but not limited to, statements we make regarding our business strategy, expectations and plans, our objectives for future operations and our future financial position. When used in this report, the words "believe," "may," "could," "would," "will," "estimate," "continue," "anticipate," "plan," "intend," "expect," "indicate" and similar expressions are intended to identify forward-looking statements. Examples of forward-looking statements include, but are not limited to, statements we make regarding activities, timing and costs related to developing and seeking regulatory approval for our product candidates, including the nature, timing of initiation and completion, and costs of clinical studies and nonclinical testing, the indications in which we plan to pursue development of our product candidates, our plans regarding partnering or other collaborative arrangements and for raising additional capital to support our operations, and our belief that we have

sufficient liquidity to fund our operations for at least the next 12 months. The foregoing is not an exclusive list of all forward-looking statements we make.

We have based the forward-looking statements we make on our current expectations and projections about future events and trends that we believe may affect our financial condition, results of operations, business strategy, short-term and long-term business operations and objectives, and financial needs. The forward-looking statements we make are subject to known and unknown risks and uncertainties that could cause our actual results, performance or achievements to be materially different from any result, performance or achievement expressed or implied by the forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to the following:

- our ability, or that of a future partner, to successfully develop, obtain regulatory approval for, and then successfully commercialize our product candidates;
- delays in the commencement or completion of clinical studies or manufacturing and regulatory activities necessary to obtain regulatory approval to commercialize our product candidates, including vepoloxamer;
- suspension or termination of a clinical study, including due to patient safety concerns or capital constraints;
- our ability to successfully execute clinical studies, including timely enrollment, and the ability of our product candidates to demonstrate acceptable safety and efficacy in clinical studies;
- our ability to maintain our relationships with the single-source third-party manufacturers and suppliers for clinical trial material, including the API and finished drug product, and the ability of such manufacturers and suppliers to successfully and consistently meet our manufacturing and supply requirements;
- the satisfactory performance of third parties, including CROs, on whom we rely significantly to conduct or assist in the conduct of our nonclinical testing, clinical studies and other aspects of our development programs;
- our ability to obtain additional capital as needed on acceptable terms, or at all;
- an event of default under our loan and security agreement with Hercules requiring us to repay all principal balance and accumulated interest immediately, or our failure to satisfy certain conditions under the agreement, which would trigger prepayment of \$10 million of the principal balance on April 30, 2016;
- the potential for us to delay, scale back, or discontinue development of a product candidate, partner it at inopportune times, or pursue less expensive but higher-risk and/or lower-return development paths if we are unable to raise sufficient additional capital as needed;
- the potential for the FDA, or another regulatory agency, to require additional nonclinical or clinical studies of vepoloxamer in sickle cell disease prior to accepting a new drug application for review or granting regulatory approval, even if the EPIC study is successful;
- the potential for the FDA, or another regulatory agency, to require additional nonclinical or clinical studies of vepoloxamer or AIR001 prior to our initiation of a Phase 2 clinical study in any new indication;
- the potential that, even if clinical studies of a product candidate in one indication are successful, clinical studies in another indication may not be successful;
- the potential for unsuccessful nonclinical or clinical studies in one indication or jurisdiction, or by a future partner that may be outside of our control, to adversely affect opportunities for a product candidate in other indications or jurisdictions;
- the potential that we may enter into one or more collaborative arrangements, including partnering or licensing arrangements, for a product candidate, and the terms of any such arrangements;
- the extent to which we increase our workforce and our ability to attract and retain qualified personnel and manage growth;
- the extent of market acceptance of our product candidates, if we receive regulatory approval, and available alternative treatments;
- our ability to establish and protect our intellectual property rights related to our product candidates;
- claims against us for infringing the proprietary rights of third parties;
- healthcare reform measures and reimbursement policies that, if not favorable to our products, could hinder or prevent commercial success;

- undesirable side effects that our product candidates or products may cause;
- potential product liability exposure and, if successful claims are brought against us, liability for a product or product candidate;
- the extent to which we acquire new technologies and/or product candidates and our ability to integrate them successfully into our operations;
- our ability to maintain compliance with NYSE MKT continued listing standards and maintain the listing of our common stock on the NYSE MKT equities market or another national securities exchange; and
- the other factors that are described in Item 1A (Risk Factors) of Part II of this report and our quarterly report on Form 10-Q filed with the SEC on August 12, 2015.

Except as required by law, we do not intend to update the forward-looking statements discussed in this report publicly or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future. In light of these risks and uncertainties and our assumptions, actual results may differ materially and adversely from expectations indicated or implied by the forward-looking statements contained in this report and in any documents incorporated in this report. Accordingly, you are cautioned not to place undue reliance on such forward-looking statements.

### **Item 3. Quantitative and Qualitative Disclosures About Market Risk**

Under SEC rules and regulations, as a smaller reporting company we are not required to provide the information required by this item.

### **Item 4. Controls and Procedures**

#### ***Evaluation of Disclosure Controls and Procedures***

We maintain disclosure controls and procedures that are designed to provide reasonable assurance that information required to be disclosed by us in the reports we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including our principal executive officer and principal financial officer, as appropriate to allow timely decisions regarding required disclosure. In designing and evaluating the disclosure controls and procedures, management recognized that any controls and procedures, no matter how well designed and operated, can only provide reasonable assurance of achieving the desired control objectives, and in reaching a reasonable level of assurance, management necessarily was required to apply its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

Under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, we have evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) as of September 30, 2015. Based on that evaluation, our principal executive officer and principal financial officer have concluded that as of September 30, 2015 these disclosure controls and procedures were effective at the reasonable assurance level.

#### ***Changes in Internal Control over Financial Reporting***

There was no change in our internal control over financial reporting identified in connection with the evaluation required by Rules 13a-15(d) and 15d-15(d) under the Exchange Act that occurred during the quarterly period covered by this report that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

## **PART II—OTHER INFORMATION**

### **Item 1. Legal Proceedings**

From time to time, we may become involved in various claims and legal proceedings. Regardless of outcome, litigation and other legal and administrative proceedings can have an adverse impact on us because of defense and settlement costs, diversion of management resources and other factors. We are not currently a party to any material pending litigation or other material legal proceeding.



## Item 1A. Risk Factors

Investment in our securities involves a high degree of risk and uncertainty. Our business, operating results, growth prospects and financial condition are subject to various risks, many of which are not exclusively within our control, that may cause actual performance to differ materially from historical or projected future performance. We urge investors to consider carefully the risks described below, together with those described in Item 1A of Part II of our quarterly report on Form 10-Q for the quarter ended June 30, 2015, filed with the SEC on August 12, 2015, and all of the information in this report and our other public filings, before making investment decisions regarding our securities. Each of these risk factors, as well as additional risks not presently known to us or that we currently deem immaterial, could adversely affect our business, operating results, growth prospects or financial condition, as well as the trading price of our common stock, in which case you may lose all or part of your investment.

The risk factors set forth below contain material changes to the risk factors previously disclosed and included in our quarterly report on Form 10-Q for the quarter ended June 30, 2015, filed with the SEC on August 12, 2015.

***The terms of our debt facility place restrictions on our operating and financial flexibility, and failure to comply with covenants or to satisfy certain conditions of the agreement governing the debt facility may result in acceleration of our repayment obligations and foreclosure on our pledged assets, which could significantly harm our liquidity, financial condition, operating results, business and prospects and cause the price of our common stock to decline.***

We have an outstanding principal balance of \$15 million under our debt facility with Hercules Technology Growth Capital, Inc. and Hercules Technology III, L.P. (collectively referred to as Hercules) that is secured by a lien covering substantially all of our assets, excluding intellectual property, but including proceeds from the sale, licensing or disposition of our intellectual property. The loan and security agreement governing the debt facility requires us to comply with customary covenants (affirmative and negative), including restrictive covenants that limit our ability to: incur additional indebtedness; encumber the collateral securing the loan; acquire, own or make investments; repurchase or redeem any class of stock or other equity interest; declare or pay any cash dividend or make a cash distribution on any class of stock or other equity interest; transfer a material portion of our assets; acquire other businesses; and merge or consolidate with or into any other organization or otherwise suffer a change in control, in each case subject to exceptions. Our intellectual property also is subject to customary negative covenants. In addition, subject to limited exceptions, Hercules could declare an event of default upon the occurrence of any event that it interprets as having a material adverse effect upon our business, operations, properties, assets, or financial condition or upon our ability to perform or pay the secured obligations under the loan and security agreement or upon the collateral or Hercules' liens on the collateral under the agreement, thereby requiring us to repay the loan immediately or renegotiate the terms of the agreement. If we default under the facility, Hercules may accelerate all of our repayment obligations and, if we are unable to access funds to meet those obligations or to renegotiate our agreement, Hercules could take control of our pledged assets and we could immediately cease operations. If we were to renegotiate our agreement under such circumstances, the terms may be significantly less favorable to us. If we were liquidated, Hercules' right to repayment would be senior to the rights of our stockholders to receive any proceeds from the liquidation. Any declaration by Hercules of an event of default could significantly harm our liquidity, financial condition, operating results, business, and prospects and cause the price of our common stock to decline.

In addition, our loan and security agreement with Hercules requires us to prepay \$10 million of the principal balance on April 30, 2016, unless our vepoloxamer and AIR001 programs achieve certain clinical development milestones by December 31, 2015, and, by April 30, 2016, we either (a) receive unrestricted and unencumbered net cash proceeds of at least \$15 million from either, or a combination of, upfront cash payments from one or more strategic corporate partnerships or one or more equity financings, or (b) demonstrate positive results from the EPIC study. If this prepayment obligation is triggered, the payment of \$10 million to Hercules that would be required on April 30, 2016 could not only significantly harm our liquidity, financial condition and operating results and cause the price of our common stock to decline, but also significantly impair our ability to raise adequate additional capital to fund our operations and pursue our business strategy.

***Sales of substantial amounts of our common stock or the perception that such sales may occur could cause the market price of our common stock to decline significantly, even if our business is performing well.***

The market price of our common stock could decline as a result of sales by, or the perceived possibility of sales by, us or our existing stockholders of shares of our common stock. Sales by our existing stockholders might also make it more difficult for us to sell equity securities at a time and price that we deem appropriate. In August 2015, we entered into a new sales agreement under which we may, from time to time, sell shares of our common stock having an aggregate offering price of up to \$30 million through an "at the market" equity offering program, or ATM program. As of September 30, 2015, we had not yet sold any shares under the ATM program. The shelf registration statement on Form S-3 under which the ATM program is registered may be used to register the sale and issuance of up to approximately \$120 million of additional securities, subject to limitations if our public float is less than \$75 million. In addition, we have outstanding warrants to purchase approximately 77.4 million additional shares of our common stock and warrants to purchase

more than 13 million of those shares have an exercise price of \$0.01 per share and warrants to purchase another 51.6 million of those shares have an exercise price of less than \$1.00 per share. Collectively, the ATM program, the shelf registration statement and the outstanding, in-the-money warrants, may increase the likelihood of sales of substantial amounts of our shares, or the perception that substantial sales may occur, by us or our existing securityholders from time to time, which could cause the market price of our common stock to decline significantly.

## **Item 2. Unregistered Sales of Equity Securities and Use of Proceeds**

In connection with our loan and security agreement with Hercules and the amendment thereto, on August 11, 2015, we entered into a Warrant Agreement with Hercules Technology III, L.P. and, on September 28, 2015, we entered into a First Amendment to Warrant Agreement with Hercules Technology III, L.P., together, referred to as the Amended Warrant Agreement. The Amended Warrant Agreement provides for warrants to purchase an aggregate of 1,524,390 shares of our common stock and at an exercise price of \$0.41 per share, at any time, or from time to time, through August 11, 2020. Upon exercise, the aggregate exercise price may be paid, at Hercules' election, in cash or on a net issuance basis, based upon the fair market value of our common stock at the time of exercise. Under the Amended Warrant Agreement, Hercules received a warrant exercisable for 853,658 shares as of August 11, 2015 and a warrant exercisable for an additional 670,732 shares as of September 28, 2015, which, in the aggregate, represent the right to purchase 1,524,390 shares of our common stock.

We offered and sold the warrants described above to Hercules in reliance upon the exemption from the registration requirements of the Securities Act of 1933, as amended, or the Securities Act, provided by Section 4(2) of the Securities Act. We relied on this exemption based in part on representations made to us by Hercules, including Hercules' intention to acquire the securities for investment only and not with a view to, or a present intention of, selling or distributing any part thereof in violation of applicable laws, and Hercules' status as an "accredited investor," as such term is defined in Rule 501 of Regulation D promulgated under the Securities Act.

## **Item 3. Defaults Upon Senior Securities**

None.

## **Item 4. Mine Safety Disclosures**

Not applicable.

## **Item 5. Other Information**

None.

## **Item 6. Exhibits**

An Exhibit Index has been attached as part of this report and is incorporated herein by reference.

## Signatures

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

Mast Therapeutics, Inc.

Date: November 12, 2015

By: /s/ Brian M. Culley  
Brian M. Culley  
Chief Executive Officer  
(Principal Executive Officer)

By: /s/ Brandi L. Roberts  
Brandi L. Roberts  
Chief Financial Officer and Senior Vice President  
(Principal Financial and Accounting Officer)

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**EXHIBIT INDEX**

Exhibit No.	Description	Filed Herewith	Incorporated by Reference		
			Form	File/Film No.	Date Filed
10.1	Loan and Security Agreement, dated as of August 11, 2015, among the registrant, Hercules Technology III, L.P. and Hercules Technology Growth Capital, Inc.	X			
10.2	First Amendment to Loan and Security Agreement, dated as of September 28, 2015, among the registrant, Hercules Technology III, L.P. and Hercules Technology Growth Capital, Inc.	X			
10.3	Warrant Agreement, dated as of August 11, 2015, between the registrant and Hercules Technology III, L.P.	X			
10.4	First Amendment to Warrant Agreement, dated as of September 28, 2015, between the registrant and Hercules Technology III, L.P.	X			
10.5	Sales Agreement, dated August 21, 2015, between the registrant and Cowen and Company, LLC		Form 8-K	001-32157-151069175	08/21/15
31.1	Certification of principal executive officer pursuant to Rule 13a-14(a)/15d-14(a)	X			
31.2	Certification of principal financial officer pursuant to Rule 13a-14(a)/15d-14(a)	X			
32.1±	Certification of principal executive officer and principal financial officer pursuant to 18 U.S.C. 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002	X			
101.INS	XBRL Instance Document	X			
101.SCH	XBRL Taxonomy Extension Schema Document	X			
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document	X			
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document	X			
101.LAB	XBRL Taxonomy Extension Label Linkbase Document	X			
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document	X			

± These certifications are being furnished solely to accompany this report pursuant to 18 U.S.C. 1350, and are not being filed for purposes of Section 18 of the Securities Exchange Act of 1934 and are not to be incorporated by reference into any filing of the registrant, whether made before or after the date hereof, regardless of any general incorporation by reference language in such filing.

**LOAN AND SECURITY AGREEMENT**

THIS LOAN AND SECURITY AGREEMENT is made and dated as of August 11, 2015 and is entered into by and among MAST THERAPEUTICS, INC., a Delaware corporation, and each of its Qualified Subsidiaries (hereinafter collectively referred to as "Borrower"), HERCULES TECHNOLOGY III, L.P., a Delaware limited partnership, and the several banks and other financial institutions or entities from time to time parties to this Agreement (collectively referred to as "Lender"), and HERCULES TECHNOLOGY GROWTH CAPITAL, INC., a Maryland corporation, as administrative agent ("Agent").

**RECITALS**

A. Lender has agreed to make available to Borrower a loan in an aggregate principal amount of up to \$15,000,000 (the "Term Loan," and such amount the "Maximum Term Loan Amount").

B. Lender is willing to make the Term Loan on the terms and conditions set forth in this Agreement.

**AGREEMENT**

NOW, THEREFORE, Borrower, Agent and Lender agree as follows:

**SECTION 1. DEFINITIONS AND RULES OF CONSTRUCTION**

1.1 **Definitions.** Unless otherwise defined herein, the following capitalized terms shall have the following meanings:

"Account Control Agreement(s)" means any agreement entered into by and among Agent, Borrower and a third-party Bank or other institution (including a Securities Intermediary) in which Borrower maintains a Deposit Account or an account holding Investment Property and which grants Agent a perfected first priority security interest in the subject account or accounts.

"ACH Authorization" means the ACH Debit Authorization Agreement in substantially the form of Exhibit F.

"Advance(s)" means the Term Loan funds advanced under this Agreement, including, the Advance made on the Closing Date and the Second Advance, as applicable.

"Advance Date" means the funding date of any Advance.

"Advance Request" means a request for an Advance submitted by Borrower to Agent in substantially the form of Exhibit A.

"Affiliate" means (a) any Person that directly or indirectly controls, is controlled by, or is under common control with the Person in question, (b) any Person directly or indirectly owning, controlling or holding with power to vote 10% or more of the outstanding voting securities of another Person, (c) any Person 10% or more of whose outstanding voting securities are directly or indirectly owned, controlled or held by another Person with power to vote such securities, or (d) any Person related by blood or marriage to any Person described in subsection (a), (b) or (c) of this paragraph. As used in the definition of "Affiliate," the term "control" means the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of a Person, whether through ownership of voting securities, by contract or otherwise.

"Agent" has the meaning given to it in the preamble to this Agreement.

"Agreement" means this Loan and Security Agreement, as amended from time to time.

"Amortization Date" means June 1, 2016; provided, however, (a) if the First Interest Only Extension Condition is satisfied, then the Amortization Date shall mean September 1, 2016, and (b) if the Second Interest Only Extension Condition is satisfied, then the Amortization Date shall mean March 1, 2017.

"Assignee" has the meaning given to it in Section 11.13.

"Borrower" has the meaning given to it in the preamble to this Agreement.

"Borrower Products" means all products, software, service offerings, technical data or technology currently being designed, manufactured or sold by Borrower or which Borrower intends to sell, license, or distribute in the future including any products or service offerings under development, collectively, together with all products, software, service offerings, technical data or technology that have been sold, licensed or distributed by Borrower since its incorporation.

“Business Day” means any day other than Saturday, Sunday and any other day on which banking institutions in the State of California are closed for business.

“Cash” means cash, cash equivalents and liquid funds.

“Change in Control” means any reorganization, recapitalization, consolidation or merger (or similar transaction or series of related transactions) of Borrower (or, for purposes of Section 7.11, Borrower or any Subsidiary), or a sale or exchange of outstanding shares (or similar transaction or series of related transactions) of Borrower (or, for purposes of Section 7.11, Borrower or any Subsidiary), in which the holders of Borrower’s (or, for purposes of Section 7.11, Borrower’s or any Subsidiary’s) outstanding shares immediately before consummation of such transaction or series of related transactions do not, immediately after consummation of such transaction or series of related transactions, retain shares representing more than 50% of the voting power of the surviving entity of such transaction or series of related transactions (or the parent of such surviving entity if such surviving entity is wholly owned by such parent), in each case without regard to whether Borrower (or, for purposes of Section 7.11, Borrower or any Subsidiary) is the surviving entity; provided, however, that no such change resulting from an equity financing of Borrower for capital raising purposes shall be considered a Change in Control.

“Claims” has the meaning given to it in Section 11.10(a).

“Closing Date” means the date of this Agreement.

“Collateral” means the property described in Section 3.

“Commitment Fee” means \$25,000, which fee is due to Lender on or prior to the Closing Date, and shall be deemed fully earned on such date regardless of the early termination of this Agreement.

“Confidential Information” has the meaning given to it in Section 11.12.

“Contingent Obligation” means, as applied to any Person, any direct or indirect liability, contingent or otherwise, of that Person with respect to (i) any Indebtedness, lease, dividend, letter of credit or other obligation of another, including any such obligation directly or indirectly guaranteed, endorsed, co-made or discounted or sold with recourse by that Person, or in respect of which that Person is otherwise directly or indirectly liable; (ii) any obligations with respect to undrawn letters of credit, corporate credit cards or merchant services issued for the account of that Person; and (iii) all obligations arising under any interest rate, currency or commodity swap agreement, interest rate cap agreement, interest rate collar agreement, or other agreement or arrangement designated to protect a Person against fluctuation in interest rates, currency exchange rates or commodity prices; provided, however, that the term “Contingent Obligation” shall not include endorsements for collection or deposit in the ordinary course of business. The amount of any Contingent Obligation shall be deemed to be an amount equal to the stated or determined amount of the primary obligation in respect of which such Contingent Obligation is made or, if not stated or determinable, the maximum reasonably anticipated liability in respect thereof as determined by such Person in good faith; provided, however, that such amount shall not in any event exceed the maximum amount of the obligations under the guarantee or other support arrangement.

“Copyright License” means any written agreement granting to Borrower any right to use any Copyright or Copyright registration, now owned or hereafter acquired by Borrower or in which Borrower now holds or hereafter acquires any interest.

“Copyrights” means all copyrights, whether registered or unregistered, held by Borrower pursuant to the laws of the United States, any State thereof, or of any other country.

“Deposit Accounts” means any “deposit accounts,” as such term is defined in the UCC, and includes any checking account, savings account, or certificate of deposit.

“Domestic Subsidiary” means any Subsidiary that is not a Foreign Subsidiary.

“Eligible Foreign Subsidiary” means a Foreign Subsidiary whose execution of a Joinder Agreement would not result in a material adverse tax consequence to Borrower.

“Equity Event” means any sale or issuance of Borrower securities for financing purposes to primarily institutional investors (whether in a private placement, broadly-marketed offering, other registered offering, or otherwise) consummated by Borrower after the Closing Date.

“ERISA” means the Employee Retirement Income Security Act of 1974, as amended, and the regulations promulgated thereunder.

“Event of Default” has the meaning given to it in Section 9.

“**FSHCO**” means any direct or indirect Domestic Subsidiary substantially all of the assets of which consist of equity interests of one or more direct or indirect Foreign Subsidiaries other than Eligible Foreign Subsidiaries (or of the equity interests and debt of such Foreign Subsidiaries other than Eligible Foreign Subsidiaries).

“**Facility Charge**” means \$75,000, which represents an amount equal to 0.50% of the Maximum Term Loan Amount.

“**Financial Statements**” has the meaning given to it in Section 7.1.

“**First Interest Only Extension Condition**” means Borrower’s satisfaction of each of the following conditions: (a) no default or Event of Default under any Loan Document shall have occurred and be continuing, and (b) demonstration by Borrower, to the reasonable satisfaction of Agent, of positive results in the EPIC Phase 3 study of vepoloxamer in patients with sickle cell disease.

“**Foreign Subsidiary**” means any Subsidiary other than a Subsidiary organized under the laws of any state within the United States.

“**Funded Advances**” has the meaning given to it in Section 2.5.

“**GAAP**” means generally accepted accounting principles in the United States of America, as in effect from time to time.

“**Indebtedness**” means indebtedness of any kind, including (a) all indebtedness for borrowed money or the deferred purchase price of property or services (excluding trade credit entered into in the ordinary course of business due within sixty (60) days), including reimbursement and other obligations with respect to surety bonds and letters of credit, (b) all obligations evidenced by notes, bonds, debentures or similar instruments, (c) all capital lease obligations, and (d) all Contingent Obligations.

“**Indemnified Person**” has the meaning given to it in Section 6.3.

“**Intellectual Property**” means all of Borrower’s Copyrights; Trademarks; Patents; Licenses; trade secrets and inventions; mask works; Borrower’s applications therefor and reissues, extensions, or renewals thereof; and Borrower’s goodwill associated with any of the foregoing, together with Borrower’s rights to sue for past, present and future infringement of Intellectual Property and the goodwill associated therewith.

“**Investment**” means any beneficial ownership (including stock, partnership or limited liability company interests) of or in any Person, or any loan, advance or capital contribution to any Person or the acquisition of all, or substantially all, of the assets of another Person.

“**Joinder Agreements**” means, for each Qualified Subsidiary, a completed and executed Joinder Agreement in substantially the form attached hereto as Exhibit E.

“**Judicial Holding**” means a holding by a judicial authority (including a U.S. Bankruptcy Court) that a security interest in the underlying Intellectual Property is necessary to have a security interest in the Rights to Payment.

“**Lender**” has the meaning given to it in the preamble to this Agreement.

“**Liabilities**” has the meaning given to it in Section 6.3.

“**License**” means any Copyright License, Patent License, Trademark License or other license of rights or interests to Borrower.

“**Lien**” means any mortgage, deed of trust, pledge, hypothecation, assignment for security, security interest, encumbrance, levy, lien or charge of any kind, whether voluntarily incurred or arising by operation of law or otherwise, against any property, any conditional sale or other title retention agreement, and any lease in the nature of a security interest.

“**Loan**” means the Advances made under this Agreement.

“**Loan Documents**” means this Agreement, the Notes (if any), the ACH Authorization, the Account Control Agreements, all UCC Financing Statements, the Warrant and any other documents executed in connection with the Secured Obligations or the transactions contemplated hereby, as the same may from time to time be amended, modified, supplemented or restated.

“**Material Adverse Effect**” means a material adverse effect upon: (i) the business, operations, properties, assets or financial condition of Borrower and its Subsidiaries taken as a whole; or (ii) the ability of Borrower to perform or pay the Secured Obligations in accordance with the terms of the Loan Documents, or the ability of Agent or Lender to enforce any of its rights or remedies with respect to the Secured Obligations; or (iii) the Collateral or Agent’s Liens on the Collateral or the priority of such Liens.

“**Maximum Rate**” has the meaning given to it in Section 2.2.

“Maximum Term Loan Amount” has the meaning given to it in the Recitals.

“Note(s)” means a secured term promissory note or secured term promissory notes to evidence the Loan under this Agreement, in substantially the form attached hereto as Exhibit B.

“Patent License” means any written agreement granting any right to Borrower with respect to any invention on which a Patent is in existence or a Patent application is pending, in which agreement Borrower now holds or hereafter acquires any interest.

“Patents” means all letters patent of, or rights corresponding thereto, held by Borrower in the United States or in any other country, all registrations and recordings thereof, and all applications for letters patent of, or rights corresponding thereto held by Borrower, in the United States or any other country.

“Permitted Indebtedness” means: (i) Indebtedness of Borrower in favor of Lender or Agent arising under this Agreement or any other Loan Document; (ii) Indebtedness existing on the Closing Date which is disclosed in Schedule 1A; (iii) Indebtedness of up to \$500,000 outstanding at any time secured by a Lien described in clause (vii) of the defined term “Permitted Liens,” provided that such Indebtedness does not exceed the lesser of the cost or fair market value of the Equipment financed with such Indebtedness; (iv) Indebtedness to trade creditors incurred in the ordinary course of business, including Indebtedness incurred in the ordinary course of business with corporate credit cards; (v) Indebtedness that also constitutes a Permitted Investment; (vi) Subordinated Indebtedness; (vii) reimbursement obligations in connection with letters of credit that are secured by Cash and issued on behalf of Borrower or a Subsidiary thereof in an amount not to exceed \$300,000 at any time outstanding, (viii) other Indebtedness in an amount not to exceed \$200,000 at any time outstanding; and (ix) extensions, refinancings, modifications, amendments, restatements and renewals of any items of Permitted Indebtedness, provided that the principal amount is not increased above the applicable limit set forth herein for such Indebtedness, or the terms modified to impose materially more burdensome terms upon Borrower or its Subsidiary, as the case may be.

“Permitted Investment” means: (i) Investments existing on the Closing Date which are disclosed in Schedule 1B; (ii) (a) marketable direct obligations issued or unconditionally guaranteed by the United States of America or any agency or any State thereof maturing within eighteen months from the date of acquisition thereof, (b) commercial paper maturing no more than eighteen months from the date of creation thereof and currently having a rating of at least A-2 or P-2 from either Standard & Poor’s Corporation or Moody’s Investors Service, (c) certificates of deposit issued by any bank with assets of at least \$500,000,000 maturing no more than eighteen months from the date of investment therein, and (d) money market accounts; (iii) repurchases of stock from former employees, directors, or consultants of Borrower under the terms of applicable repurchase agreements at the original issuance price of such securities in an aggregate amount not to exceed \$250,000 in any fiscal year, provided that no Event of Default has occurred, is continuing or would exist after giving effect to the repurchases; (iv) Investments accepted in connection with Permitted Transfers; (v) Investments (including debt obligations) received in connection with the bankruptcy or reorganization of customers or suppliers and in settlement of delinquent obligations of, and other disputes with, customers or suppliers arising in the ordinary course of Borrower’s business; (vi) Investments consisting of notes receivable of, or prepaid royalties and other credit extensions, to customers and suppliers who are not Affiliates, in the ordinary course of business, provided that this subparagraph (vi) shall not apply to Investments of Borrower in any Subsidiary; (vii) Investments consisting of loans not involving the net transfer on a substantially contemporaneous basis of cash proceeds to employees, officers or directors relating to the purchase of capital stock of Borrower pursuant to employee stock purchase plans or other similar agreements approved by Borrower’s Board of Directors; (viii) Investments consisting of travel advances, relocation loans and other loans and advances (or guarantees thereof) to employees, officers and directors in the ordinary course of business and otherwise in compliance with the Sarbanes-Oxley Act of 2002, as amended, and not to exceed \$250,000 outstanding at any one time in the aggregate; (ix) Investments in a Qualified Subsidiary so long as such Qualified Subsidiary has entered into a Joinder Agreement or has otherwise become party to this Agreement; (x) Investments in Foreign Subsidiaries approved in advance in writing by Agent; (xi) Investments by any Qualified Subsidiary into Borrower; (xii) joint ventures or strategic alliances in the ordinary course of Borrower’s business consisting of the nonexclusive licensing of technology, the development of technology or the providing of technical support, provided that any cash Investments by Borrower do not exceed \$250,000 in the aggregate in any fiscal year; and (xiii) additional Investments that do not exceed \$250,000 in the aggregate.

“Permitted Liens” means any and all of the following: (i) Liens in favor of Agent or Lender; (ii) Liens existing on the Closing Date which are disclosed in Schedule 1C; (iii) Liens for taxes, fees, assessments or other governmental charges or levies, either not delinquent or being contested in good faith by appropriate proceedings; provided, that Borrower maintains adequate reserves therefor in accordance with GAAP; (iv) Liens securing claims or demands of materialmen, artisans, mechanics, carriers, warehousemen, landlords and other like Persons arising in the ordinary course of Borrower’s business and imposed without action of such parties; provided, that the payment thereof is not yet required; (v) Liens arising from judgments, decrees or attachments in circumstances which do not constitute an Event of Default hereunder; (vi) the following deposits, to the extent made in the ordinary course of business: deposits under worker’s compensation, unemployment insurance, social security and other similar laws, or to secure the performance of bids, tenders or contracts (other than for the repayment of borrowed money) or to secure indemnity, performance or other similar bonds for the performance of bids, tenders or contracts (other than for the repayment of borrowed



money) or to secure statutory obligations (other than Liens arising under ERISA or environmental Liens) or surety or appeal bonds, or to secure indemnity, performance or other similar bonds; (vii) Liens on Equipment or software or other intellectual property constituting purchase money Liens and Liens in connection with capital leases securing Indebtedness permitted in clause (iii) of "Permitted Indebtedness"; (viii) Liens incurred in connection with Subordinated Indebtedness; (ix) leasehold interests in leases or subleases and licenses granted in the ordinary course of business and not interfering in any material respect with the business of the licensor; (x) Liens in favor of customs and revenue authorities arising as a matter of law to secure payment of custom duties that are promptly paid on or before the date they become due; (xi) Liens on insurance proceeds securing the payment of financed insurance premiums that are promptly paid on or before the date they become due (provided that such Liens extend only to such insurance proceeds and not to any other property or assets); (xii) statutory and common law rights of set-off and other similar rights as to deposits of cash and securities in favor of banks, other depository institutions and brokerage firms; (xiii) easements, zoning restrictions, rights-of-way and similar encumbrances on real property imposed by law or arising in the ordinary course of business so long as they do not materially impair the value or marketability of the related property; (xiv) Liens on Cash securing obligations permitted under clause (vii) of the definition of Permitted Indebtedness; and (xv) Liens incurred in connection with the extension, renewal or refinancing of the Indebtedness secured by Liens of the type described in clauses (i) through (xi) above; provided, that any extension, renewal or replacement Lien shall be limited to the property encumbered by the existing Lien and the principal amount of the Indebtedness being extended, renewed or refinanced (as may have been reduced by any payment thereon) does not increase.

"Permitted Transfers" means (i) sales of Inventory in the ordinary course of business; (ii) non-exclusive licenses and similar arrangements for the use of Intellectual Property in the ordinary course of business and licenses that could not result in a legal transfer of title of the licensed property but that may be exclusive in respects other than territory and that may be exclusive as to territory only as to discreet geographical areas outside of the United States in the ordinary course of business; (iii) dispositions of worn-out, obsolete or surplus Equipment at fair market value in the ordinary course of business; and (iv) other Transfers of assets having a fair market value of not more than \$250,000 in the aggregate in any fiscal year.

"Person" means any individual, sole proprietorship, partnership, joint venture, trust, unincorporated organization, association, corporation, limited liability company, institution, other entity or government.

"Prepayment Charge" has the meaning given to it in [Section 2.4](#).

"Prime Rate" means the "prime rate" as reported in The Wall Street Journal, and if not reported, then the prime rate most recently reported in The Wall Street Journal.

"Publicity Materials" has the meaning given to it in [Section 11.18](#).

"Qualified Subsidiary" means any direct or indirect Domestic Subsidiary (other than a FSHCO) or Eligible Foreign Subsidiary.

"Receivables" means (i) all of Borrower's Accounts, Instruments, Documents, Chattel Paper, Supporting Obligations, letters of credit, proceeds of any letter of credit, and Letter of Credit Rights, and (ii) all customer lists, software, and business records related thereto.

"Required Lenders" means, at any time, the holders of more than 50% of the sum of the aggregate unpaid principal amount of the Term Loan then outstanding.

"Rights to Payment" has the meaning given to it in [Section 3](#).

"SBA" has the meaning given to it in [Section 7.15](#).

"SBIC" has the meaning given to it in [Section 7.15](#).

"SBIC Act" has the meaning given to it in [Section 7.15](#).

"Second Advance" has the meaning given to it in [Section 2.1\(a\)](#).

"Second Advance Milestone" means Borrower's achievement of each of the following on or before December 31, 2015: (a) treatment of the first patient in Borrower's planned Phase 2 clinical study of vepoloxamer in patients with heart failure; (b) positive data is received from an investigator-sponsored Phase 2 clinical study of AIR001 (Clinicaltrials.gov Identifier: NCT02262078) and another investigator-sponsored Phase 2 clinical study of AIR001 (Clinicaltrials.gov Identifier: NCT01431313) is ongoing; and (c) Borrower's receipt of unrestricted and unencumbered net cash proceeds in an amount equal to at least \$15,000,000 from either, or a combination of, (i) upfront cash payments to Borrower resulting from strategic corporate partnerships or (ii) the completion by Borrower of one or more Equity Events, provided that, if any such Equity Event relates to Borrower's offer and sale of Common Stock through an "at the market" offering program, (X) only 50% of any net proceeds received by Borrower after the Closing Date in connection with such offering program shall qualify for the satisfaction of the condition set forth in this clause (c) and (Y) Borrower may only apply an aggregate of \$3,000,000 of net proceeds received by Borrower after the Closing Date with respect to such offering program in satisfaction of the condition set forth in this clause (c).

“Second Advance Period” means the earlier of (a) the date that is 30 days following the date on which Borrower achieves the Second Advance Milestone and (b) December 31, 2015.

“Second Interest Only Extension Condition” means Borrower’s satisfaction of each of the following conditions: (a) no default or Event of Default under any Loan Document shall have occurred and be continuing, (b) Borrower has achieved the conditions set forth in clause (b) of the definition of “First Interest Only Extension Condition”, and (c) Borrower has requested, and Lender has advanced the Second Advance pursuant to, and in accordance with, Section 2.1(a).

“Secured Obligations” means Borrower’s obligations under this Agreement and any Loan Document (other than the Warrant), including any obligation to pay any amount now owing or later arising.

“Subordinated Indebtedness” means Indebtedness subordinated to the Secured Obligations in amounts and on terms and conditions satisfactory to Agent in its sole discretion.

“Subsidiary” means an entity, whether corporate, partnership, limited liability company, joint venture or otherwise, in which Borrower owns or controls 50% or more of the outstanding voting securities, including each entity listed on Schedule 1 hereto.

“Term Commitment” means as to any Lender, the obligation of such Lender, if any, to make an Advance to Borrower in a principal amount not to exceed the amount set forth under the heading “Term Commitment” opposite such Lender’s name on Schedule 1.1.

“Term Loan” has the meaning given to it in the Recitals.

“Term Loan Interest Rate” means for any day a per annum rate of interest equal to the greater of (i) 8.95% plus the Prime Rate minus 3.25%, and (ii) 8.95%.

“Term Loan Maturity Date” means January 1, 2019; provided, however, (a) if the Amortization Date is extended to September 1, 2016, then the Term Loan Maturity Date shall mean April 1, 2019, and (b) if the Amortization Date is extended to March 1, 2017, then the Term Loan Maturity Date shall mean October 1, 2019.

“Trademark License” means any written agreement granting to Borrower any right to use any Trademark or Trademark registration, now owned or hereafter acquired by Borrower or in which Borrower now holds or hereafter acquires any interest.

“Trademarks” means all trademarks (registered, common law or otherwise) and any applications in connection therewith held by Borrower, including registrations, recordings and applications in the United States Patent and Trademark Office or in any similar office or agency of the United States, any State thereof or any other country or any political subdivision thereof.

“UCC” means the Uniform Commercial Code as the same is, from time to time, in effect in the State of California; provided, that in the event that, by reason of mandatory provisions of law, any or all of the attachment, perfection or priority of, or remedies with respect to, Agent’s Lien on any Collateral is governed by the Uniform Commercial Code as the same is, from time to time, in effect in a jurisdiction other than the State of California, then the term “UCC” shall mean the Uniform Commercial Code as in effect, from time to time, in such other jurisdiction solely for purposes of the provisions thereof relating to such attachment, perfection, priority or remedies and for purposes of definitions related to such provisions.

“Unfunded Term Loan Amount” means the difference between the Maximum Term Loan Amount and the Funded Advances.

“Warrant” means any warrant entered into in connection with the Loan, as may be amended, restated or modified from time to time.

**1.2. Rules of Construction.** Unless otherwise specified, all references in this Agreement or any Annex or Schedule hereto to a “Section,” “subsection,” “Exhibit,” “Annex,” or “Schedule” shall refer to the corresponding Section, subsection, Exhibit, Annex, or Schedule in or to this Agreement. Unless otherwise specifically provided herein, any accounting term used in this Agreement or the other Loan Documents shall have the meaning customarily given such term in accordance with GAAP, and all financial computations hereunder shall be computed in accordance with GAAP, consistently applied. Unless otherwise defined herein or in the other Loan Documents, terms that are used herein or in the other Loan Documents and defined in the UCC shall have the meanings given to them in the UCC.

**SECTION 2. THE LOAN**

**2.1 Term Loan.**

(a) Advances.

- (i) Subject to the terms and conditions of this Agreement, Lender will severally (and not jointly) make, in an amount not to exceed its respective Term Commitment, and Borrower agrees to draw, an initial Advance of \$5,000,000 on the Closing Date.
- (ii) During the Second Advance Period, Borrower may request an additional Advance in an amount equal to \$10,000,000 (the "Second Advance"), and, subject to Borrower's achievement of the Second Advance Milestone, Lender will severally (and not jointly) make, in an amount not to exceed its respective Term Commitment, the Second Advance.

The aggregate outstanding Advances shall not exceed the Maximum Term Loan Amount. Proceeds of any Advance shall be deposited into an account that is subject to a first priority perfected security interest in favor of Agent perfected by an Account Control Agreement.

(b) Advance Request. To obtain an Advance, Borrower shall complete, sign and deliver an Advance Request to Agent at least three Business Days before the Advance Date (other than the Advance funded on the Closing Date, which shall be received on or before the Closing Date). Lender shall fund an Advance in the manner requested by the applicable Advance Request; provided, that Lender's obligation to fund any Advance is subject to Borrower's satisfaction of all applicable conditions precedent to such Advance as of the applicable Advance Date.

(c) Interest. The principal balance of each Advance shall bear interest thereon from the applicable Advance Date at the Term Loan Interest Rate based on a year consisting of 360 days, with interest computed daily based on the actual number of days elapsed. The Term Loan Interest Rate will float and change on the day the Prime Rate changes from time to time.

(d) Payment. Borrower will pay interest on each Advance on the first Business Day of each month, beginning the month after the applicable Advance Date. Commencing on the Amortization Date, and continuing on the first Business Day of each month thereafter, until the Secured Obligations are repaid, Borrower shall repay the aggregate principal balance of the Advances that are outstanding on the day immediately preceding the Amortization Date, in equal monthly installments of principal and interest ("mortgage style"). The entire Term Loan principal balance and all accrued but unpaid interest hereunder shall be due and payable on Term Loan Maturity Date. Borrower shall make all payments under this Agreement without setoff, recoupment or deduction and regardless of any counterclaim or defense. Lender will initiate debit entries to Borrower's account as authorized on the ACH Authorization (i) on each payment date of all periodic obligations payable to Lender under each Advance, and (ii) out-of-pocket legal fees and costs incurred by Agent or Lender in connection with Section 11.11 and notified to Borrower in writing at least 10 Business Days prior to the payment of such legal fees and costs.

**2.2 Maximum Interest.** Notwithstanding any provision in this Agreement or any other Loan Document, it is the parties' intent not to contract for, charge or receive interest at a rate that is greater than the maximum rate permissible by law that a court of competent jurisdiction shall deem applicable hereto (which under the laws of the State of California shall be deemed to be the laws relating to permissible rates of interest on commercial loans) (the "Maximum Rate"). If a court of competent jurisdiction shall finally determine that Borrower has actually paid to Lender an amount of interest in excess of the amount that would have been payable if all of the Secured Obligations had at all times borne interest at the Maximum Rate, then such excess interest actually paid by Borrower shall be applied as follows: first, to the payment of the Secured Obligations consisting of the outstanding principal; second, after all principal is repaid, to the payment of Lender's accrued interest, costs, expenses, professional fees and any other Secured Obligations; and third, after all Secured Obligations are repaid, the excess (if any) shall be refunded to Borrower.

**2.3 Default Interest.** In the event any payment is not paid on the scheduled payment date, other than due to a failure of any ACH debit, an amount equal to 5% of the past due amount shall be payable on demand. In addition, upon the occurrence and during the continuation of an Event of Default hereunder, all Secured Obligations, including principal, interest, compounded interest, and professional fees, shall bear interest at a rate per annum equal to the rate set forth in Section 2.1(c) plus 5% per annum. In the event any interest is not paid when due hereunder, delinquent interest shall be added to principal and shall bear interest on interest, compounded at the rate set forth in Section 2.1(c) or this Section 2.3, as applicable.

**2.4 Prepayment.** At its option upon at least five Business Days prior notice to Agent, Borrower may prepay all, but not less than all, of the outstanding Advances by paying the entire principal balance and all accrued and unpaid interest thereon, together with a prepayment charge in an amount equal to the following percentage of the Advance amounts being prepaid (each, a "Prepayment Charge"): (i) if the Advance amounts are prepaid during any of the first 12 months following the Closing Date, 3.00%; (ii) if the Advance amounts are prepaid during the period commencing after such 12 months following the Closing Date but on or prior to 24 months following the Closing Date, 2.00%; and (iii) if the Advance amounts are prepaid during any period after such 24

months following the Closing Date but prior to the Term Loan Maturity Date, 1.00%. Borrower agrees that the Prepayment Charge is a reasonable calculation of Lender's lost profits in view of the difficulties and impracticality of determining actual damages resulting from an early repayment of the Advances. Upon the occurrence of a Change in Control, Borrower shall prepay the outstanding amount of all principal and accrued interest through the prepayment date and all unpaid fees and expenses accrued to the date of repayment, together with the applicable Prepayment Charge. For the avoidance of doubt, (i) Borrower may not borrow, and Lender shall not lend, any Advance amounts that are prepaid under this [Section 2.4](#), and (ii) Lender shall not be entitled to any Prepayment Charge in the event all or a portion of the Advances are repaid to Lender in connection with the concurrent extension of additional loans by Lender and/or its Affiliates to Borrower.

**2.5 End of Term Charge.** On the earliest to occur of (i) the Term Loan Maturity Date, (ii) the date that Borrower prepays the outstanding Secured Obligations, or (iii) the date that the Secured Obligations become due and payable in full, Borrower shall pay Lender an amount equal to the sum of (A) the product of (x) 4.75% and (y) the aggregate amount of Advances made by Lender to Borrower under this Agreement (the "[Funded Advances](#)"), and (B) the product of (x) 4.75% and (y) an amount equal to 35% of the Unfunded Term Loan Amount. Notwithstanding the required payment date of such charge, it shall be deemed earned by Lender as of the Closing Date.

**2.6 Notes.** If requested by Lender in a written notice to Borrower, Borrower shall execute and deliver to Lender (and/or, if applicable and if so specified in such notice, to any Person who is an assignee of Lender pursuant to [Section 11.13](#)) (promptly after Borrower's receipt of such notice) a Note or Notes to evidence Lender's Loans.

**2.7 Pro Rata Treatment.** Each payment (including prepayment) on account of any fee and any reduction of the Term Loan shall be made pro rata according to the Term Commitments of the relevant Lender.

### **SECTION 3. SECURITY INTEREST**

As security for the prompt, complete and indefeasible payment when due (whether on the payment dates or otherwise) of all the Secured Obligations, Borrower grants to Agent a security interest in all of Borrower's right, title, and interest in and to the following personal property whether now owned or hereafter acquired (collectively, the "[Collateral](#)"): (a) Receivables; (b) Equipment; (c) Fixtures; (d) General Intangibles (other than Intellectual Property); (e) Inventory; (f) Investment Property (but excluding 35% of the presently existing and hereafter arising issued and outstanding shares of capital stock owned by Borrower of any Foreign Subsidiary (other than an Eligible Foreign Subsidiary) which shares entitle the holder thereof to vote for directors or any other matter); (g) Deposit Accounts; (h) Cash; (i) Goods; and all other tangible and intangible personal property (other than Intellectual Property) of Borrower whether now or hereafter owned or existing, leased, consigned by or to, or acquired by, Borrower and wherever located, and any of Borrower's property in the possession or under the control of Agent; and, to the extent not otherwise included, all Proceeds of each of the foregoing and all accessions to, substitutions and replacements for, and rents, profits and products of each of the foregoing; provided, however, that the Collateral shall include all Accounts and General Intangibles that consist of rights to payment and proceeds from the sale, licensing or disposition of all or any part, or rights in, the Intellectual Property (the "[Rights to Payment](#)") and in the event of a Judicial Holding, the Intellectual Property to the extent necessary to permit perfection of Agent's security interest in the Rights to Payment. Notwithstanding the foregoing, the Collateral does not include (i) more than 65% of the presently existing and hereafter arising issued and outstanding shares of capital stock owned by Borrower of any Foreign Subsidiary (other than an Eligible Foreign Subsidiary) which shares entitle the holder thereof to vote for directors or any other matter, (ii) nonassignable licenses or contracts, which by their terms require the consent of the licensor thereof or another party (but only to the extent such prohibition on transfer is enforceable under applicable law, including, without limitation, Sections 9406 and 9408 of the UCC), (iii) any "intent to use" trademarks at all times prior to the first use thereof, whether by the actual use thereof in commerce, the recording of a statement of use with the United States Patent and Trademark Office or otherwise, and (iv) the Intellectual Property.

### **SECTION 4. CONDITIONS PRECEDENT TO LOAN**

The obligations of Lender to make the Loan hereunder are subject to the satisfaction by Borrower of the conditions set forth in [Section 4.1](#), [Section 4.2](#), [Section 4.3](#), and [Section 4.4](#).

**4.1 Initial Advance.** On or prior to the Closing Date, Borrower shall have delivered to Agent the following:

(a) executed originals of the Loan Documents, a legal opinion of Borrower's counsel, Account Control Agreements, and all other documents and instruments reasonably required by Agent to effectuate the transactions contemplated hereby or to create and perfect the Liens of Agent with respect to all Collateral, in all cases in form and substance reasonably acceptable to Agent;

(b) certified copy of resolutions of Borrower's board of directors evidencing approval of (i) the Loan and other transactions evidenced by the Loan Documents; and (ii) the Warrant and transactions evidenced thereby;

(c) certified copies of the Certificate of Incorporation and the Bylaws, as amended through the Closing Date, of Borrower;

(d) a certificate of good standing for Borrower from the Secretary of State of the State of Delaware and similar certificates from all other jurisdictions in which it does business and where the failure to be qualified would have a Material Adverse Effect;

(e) payment of the Facility Charge, payment of the Commitment Fee (which has been paid by Borrower to Lender on or before the date hereof) and reimbursement of Agent's and Lender's current expenses reimbursable pursuant to this Agreement, which amounts may be deducted from the initial Advance; and

(f) such other documents as Agent may reasonably request.

**4.2 Additional Advance.** In addition to all other conditions applicable under this Agreement, Lender's obligation to make the Second Advance is subject to Borrower's achievement of the Second Advance Milestone. For the avoidance of doubt, if Borrower fails to achieve the Second Advance Milestone, Lender shall have no obligation with respect to the Second Advance.

**4.3 All Advances.** On each applicable Advance Date:

(a) Agent shall have received (i) an Advance Request for the relevant Advance as required by **Section 2.1(b)**, each duly executed by Borrower's Chief Executive Officer or Chief Financial Officer and (ii) any other documents Agent may reasonably request.

(b) The representations and warranties set forth in this Agreement shall be true and correct in all material respects on and as of the Advance Date with the same effect as though made on and as of such date, except to the extent such representations and warranties expressly relate to an earlier date.

(c) Borrower shall be in compliance with all the terms and provisions set forth herein and in each other Loan Document on its part to be observed or performed, and at the time of and immediately after such Advance no Event of Default shall have occurred and be continuing.

(d) Each Advance Request shall be deemed to constitute a representation and warranty by Borrower on the relevant Advance Date as to the matters specified in paragraphs (b) and (c) of this **Section 4.3** and as to the matters set forth in the Advance Request.

**4.4 No Default.** As of the Closing Date and each Advance Date, (i) no fact or condition exists that would (or would, with the passage of time, the giving of notice, or both) constitute an Event of Default and (ii) no event that has had or could reasonably be expected to have a Material Adverse Effect has occurred and is continuing.

## **SECTION 5. REPRESENTATIONS AND WARRANTIES OF BORROWER**

Borrower represents and warrants that:

**5.1 Corporate Status.** Borrower is a corporation duly organized, legally existing and in good standing under the laws of the State of Delaware, and is duly qualified as a foreign corporation in all jurisdictions in which the nature of its business or location of its properties require such qualifications and where the failure to be qualified could reasonably be expected to have a Material Adverse Effect. Borrower's present name, former names (if any), locations, place of formation, tax identification number, organizational identification number and other information are correctly set forth in **Exhibit C**, as may be updated by Borrower in a written notice (including any Compliance Certificate) provided to Agent after the Closing Date.

**5.2 Collateral.** Borrower owns the Collateral free of all Liens, except for Permitted Liens. Borrower has the power and authority to grant to Agent a Lien in the Collateral as security for the Secured Obligations.

**5.3 Consents.** Borrower's execution, delivery and performance of this Agreement and all other Loan Documents, (i) have been duly authorized by all necessary corporate action of Borrower, (ii) will not result in the creation or imposition of any Lien upon the Collateral or the Intellectual Property, other than Permitted Liens and the Liens created by this Agreement and the other Loan Documents, (iii) do not violate any provisions of Borrower's Certificate of Incorporation, bylaws, or any law, regulation, order, injunction, judgment, decree or writ to which Borrower is subject and (iv) except as described on **Schedule 5.3**, do not violate any contract or agreement or require the consent or approval of any other Person which has not already been obtained. The individual or individuals executing the Loan Documents are duly authorized to do so.

**5.4 Material Adverse Effect.** No event that has had or would reasonably be expected to have a Material Adverse Effect has occurred and is continuing. Borrower is not aware of any event likely to occur that is reasonably expected to result in a Material Adverse Effect.

**5.5 Actions Before Governmental Authorities.** Except as described on **Schedule 5.5**, there are no actions, suits or proceedings at law or in equity or by or before any governmental authority now pending or, to the knowledge of Borrower, threatened in writing against or affecting Borrower or its property that, if adversely determined, would reasonably be expected to have a Material Adverse Effect.

**5.6 Laws.** Borrower is not in violation of any law, rule or regulation, or in default with respect to any judgment, writ, injunction or decree of any governmental authority, where such violation or default is reasonably expected to result in a Material Adverse Effect. Borrower is not in default in any manner under any provision of any agreement or instrument evidencing material Indebtedness.

**5.7 Information Correct and Current.** No information, report, Advance Request, financial statement, exhibit or schedule furnished, by or on behalf of Borrower to Agent in connection with any Loan Document or included therein or delivered pursuant thereto contained, or, when taken as a whole, contains or will contain any material misstatement of fact or, when taken together with all other such information or documents, omitted, omits or will omit to state any material fact necessary to make the statements therein, in the light of the circumstances under which they were, are or will be made, not misleading at the time such statement was made or deemed made. Additionally, any and all financial or business projections provided by Borrower to Agent, whether prior to or after the Closing Date shall be (i) provided in good faith and based on the most current data and information available to Borrower, and (ii) the most current of such projections provided to Borrower's Board of Directors.

**5.8 Tax Matters.** Except as described on Schedule 5.8, (a) Borrower has filed all federal, state and material local tax returns that it is required to file (or extensions thereof), (b) Borrower has duly paid or fully reserved for all taxes or installments thereof (including any interest or penalties) as and when due, which have or may become due pursuant to such returns, and (c) Borrower has paid or fully reserved for any tax assessment received by Borrower for the three (3) years preceding the Closing Date, if any (including any taxes being contested in good faith and by appropriate proceedings).

**5.9 Intellectual Property Claims.** Borrower is the sole owner of, or otherwise has the right to use, the Intellectual Property material to Borrower's business as currently conducted, or, as disclosed in Borrower's filings with the Securities and Exchange Commission, contemplated to be conducted. Except as otherwise disclosed to Lender, to the knowledge of Borrower, (i) each of the registered Copyrights, registered Trademarks and issued or granted Patents owned by Borrower is valid and enforceable, (ii) no material part of the Intellectual Property has been judged invalid or unenforceable, in whole or in part, and (iii) no claim has been made to Borrower that any material part of the Intellectual Property violates the rights of any third-party. Borrower is not in material breach of, nor has Borrower failed to perform any material obligations under, any of the foregoing contracts, licenses or agreements and, to Borrower's knowledge, no third-party to any such contract, license or agreement is in material breach thereof or has failed to perform any material obligations thereunder.

**5.10 Intellectual Property.** Borrower has, or in the case of any proposed business, reasonably believes it will have, all material rights with respect to Intellectual Property necessary or material in the operation or conduct of Borrower's business as currently conducted and proposed to be conducted by Borrower. Without limiting the generality of the foregoing, and in the case of Licenses, except for restrictions that are unenforceable under Division 9 of the UCC, and Borrower has the right, to the extent required to operate Borrower's business, to freely transfer, license or assign Intellectual Property necessary or material in the operation or conduct of Borrower's business as currently conducted and proposed to be conducted by Borrower, without condition, restriction or payment of any kind (other than license payments in the ordinary course of business) to any third-party, and Borrower owns or has the right to use, pursuant to valid licenses, all software development tools, library functions, compilers and all other third-party software and other items that are material to Borrower's business and used in the design, development, promotion, sale, license, manufacture, import, export, use or distribution of Borrower Products except customary covenants in inbound license agreements and equipment leases where Borrower is the licensee or lessee.

**5.11 Borrower Products.** No Intellectual Property material to Borrower's business owned by Borrower or Borrower Product has been or is subject to any actual or, to the knowledge of Borrower, threatened litigation, proceeding (including any proceeding in the United States Patent and Trademark Office or any corresponding foreign office or agency) or outstanding decree, order, judgment, settlement agreement or stipulation that restricts in any material manner Borrower's use, transfer or licensing thereof or that may materially affect the validity, use or enforceability thereof. There is no decree, order, judgment, agreement, stipulation, arbitral award or other provision entered into in connection with any litigation or proceeding that obligates Borrower to grant licenses or ownership interest in any future Intellectual Property related to the operation or conduct of the business of Borrower or Borrower Products. Borrower has not received any written notice or claim, or, to the knowledge of Borrower, oral notice or claim, challenging or questioning Borrower's ownership in any Intellectual Property material to Borrower's business (or written notice of any claim challenging or questioning the ownership in any licensed Intellectual Property of the owner thereof) or suggesting that any third-party has any claim of legal or beneficial ownership with respect thereto nor, to Borrower's knowledge, is there a reasonable basis for any such claim. To Borrower's knowledge, neither Borrower's use of its Intellectual Property that is material to its business nor the production and sale of Borrower Products that are material to its business infringes the Intellectual Property or other rights of others in any material respect.

5.12 **Financial Accounts.** On or before the Closing Date, Borrower has delivered to Lender a true, correct and complete list of (a) all banks and other financial institutions at which Borrower or any Subsidiary maintains Deposit Accounts and (b) all institutions at which Borrower or any Subsidiary maintains an account holding Investment Property, and such list delivered to Lender correctly identifies the name, address and telephone number of each bank or other institution, the name in which the account is held, a description of the purpose of the account, and the complete account number thereof.

5.13 **Employee Loans.** Except for Permitted Investments of the type described in clause (viii) of the definition thereof, Borrower has no outstanding loans to any employee, officer or director of Borrower nor has Borrower guaranteed the payment of any loan made to an employee, officer or director of Borrower by a third-party.

5.14 **Subsidiaries.** Borrower does not own any stock, partnership interest or other securities of any Person, except for Permitted Investments and equity securities of its Subsidiaries. Attached as Schedule 5.14, as may be updated by Borrower in a written notice provided after the Closing Date, is a true, correct and complete list of each Subsidiary.

## **SECTION 6. INSURANCE; INDEMNIFICATION**

6.1 **Coverage.** Borrower shall cause to be carried and maintained commercial general liability insurance, on an occurrence form, against risks customarily insured against in Borrower's line of business. Such risks shall include the risks of bodily injury, including death, property damage, personal injury, advertising injury, and contractual liability per the terms of the indemnification agreement found in Section 6.3. Borrower must maintain a minimum of \$2,000,000 of commercial general liability insurance for each occurrence. Borrower has and agrees to maintain a minimum of \$2,000,000 of directors' and officers' insurance for each occurrence and \$5,000,000 in the aggregate. So long as there are any Secured Obligations outstanding, Borrower shall also cause to be carried and maintained insurance upon the Collateral, insuring against all risks of physical loss or damage howsoever caused, in an amount not less than the full replacement cost of the Collateral, provided that such insurance may be subject to standard exceptions and deductibles.

6.2 **Certificates.** Borrower shall deliver to Agent certificates of insurance that evidence Borrower's compliance with its insurance obligations in Section 6.1 and the obligations contained in this Section 6.2. Borrower's insurance certificate shall state Agent is an additional insured for commercial general liability, a loss payee for all risk property damage insurance, subject to the insurer's approval, and a loss payee for property insurance and additional insured for liability insurance for any future insurance that Borrower may acquire from such insurer. Attached to the certificates of insurance will be additional insured endorsements for liability and lender's loss payable endorsements for all risk property damage insurance. All certificates of insurance will provide for a minimum of 30 days advance written notice to Agent of cancellation or any other change adverse to Agent's interests. Any failure of Agent to scrutinize such insurance certificates for compliance is not a waiver of any of Agent's rights, all of which are reserved.

6.3 **Indemnity.** Borrower agrees to indemnify and hold Agent, Lender and their officers, directors, employees, agents, in-house attorneys, representatives and shareholders (each, an "Indemnified Person") harmless from and against any and all claims, costs, expenses, damages and liabilities (including such claims, costs, expenses, damages and liabilities based on liability in tort, including strict liability in tort), including reasonable attorneys' fees and disbursements and other costs of investigation or defense (including those incurred upon any appeal) (collectively, "Liabilities"), that may be instituted or asserted against or incurred by such Indemnified Person as the result of credit having been extended, suspended or terminated under this Agreement and the other Loan Documents or the administration of such credit, or in connection with or arising out of the transactions contemplated hereunder and thereunder, or any actions or failures to act in connection therewith, or arising out of the disposition or utilization of the Collateral, excluding in all cases Liabilities to the extent resulting solely from any Indemnified Person's fraud, gross negligence or willful misconduct. Borrower agrees to pay, and to save Agent and Lender harmless from, any and all liabilities with respect to, or resulting from any delay in paying, any and all excise, sales or other similar taxes (excluding taxes imposed on or measured by the net income of Agent or Lender) that may be payable or determined to be payable with respect to any of the Collateral or this Agreement, provided, however, that Lender shall notify Borrower of any liabilities under this Section 6.3 within 60 days of the initial date Lender had knowledge of Lender's exposure to such liabilities. In no event shall any Indemnified Person be liable on any theory of liability for any special, indirect, consequential or punitive damages (including any loss of profits, business or anticipated savings).

## **SECTION 7. COVENANTS OF BORROWER**

Borrower agrees as follows:

7.1 **Financial Reports.** Borrower shall furnish to Agent the financial statements and reports listed hereinafter (the "Financial Statements"):

(a) as soon as practicable (and in any event within 30 days) after the end of each month, unaudited interim and year-to-date financial statements as of the end of such month (prepared on a consolidated and consolidating basis, if applicable), including balance sheet and related statements of income (and excluding statements of cashflows) accompanied by a report detailing any

material contingencies (including the commencement of any material litigation by or against Borrower) or any other occurrence that would reasonably be expected to have a Material Adverse Effect, all certified by Borrower's Chief Executive Officer or Chief Financial Officer to the effect that they have been prepared in accordance with GAAP, except (i) for the absence of footnotes, (ii) that they are subject to normal year-end adjustments, and (iii) they do not contain certain non-cash items that are customarily included in quarterly and annual financial statements;

(b) as soon as practicable (and in any event within 45 days) after the end of each of the first three calendar quarters during each fiscal year, unaudited interim and year-to-date financial statements as of the end of such calendar quarter (prepared on a consolidated and consolidating basis, if applicable), including balance sheet and related statements of income and cash flows accompanied by a report detailing any material contingencies (including the commencement of any material litigation by or against Borrower) or any other occurrence that would reasonably be expected to have a Material Adverse Effect, certified by Borrower's Chief Executive Officer or Chief Financial Officer to the effect that they have been prepared in accordance with GAAP, except (i) for the absence of footnotes, and (ii) that they are subject to normal year-end adjustments;

(c) as soon as practicable (and in any event within 90 days) after the end of each fiscal year, unqualified audited financial statements as of the end of such year (prepared on a consolidated and consolidating basis, if applicable), including balance sheet and related statements of income and cash flows, and setting forth in comparative form the corresponding figures for the preceding fiscal year, certified by a firm of independent certified public accountants selected by Borrower and reasonably acceptable to Agent, accompanied by any management report from such accountants;

(d) as soon as practicable (and in any event within 30 days) after the end of each month, a Compliance Certificate in the form of Exhibit D;

(e) promptly after the sending or filing thereof, as the case may be, copies of any proxy statements, financial statements or reports that Borrower has made available to its stockholders and copies of any regular, periodic and special reports or registration statements that Borrower files with the SEC or any governmental authority that may be substituted therefor; and

(f) financial and business projections promptly following their approval by Borrower's Board of Directors, and in any event, within 30 days prior to the end of Borrower's fiscal year, as well as budgets, operating plans and other financial information reasonably requested by Agent.

Borrower shall not (without the consent of Agent, such consent not to be unreasonably withheld or delayed), make any change in its (a) accounting policies or reporting practices, except as required by GAAP or (b) fiscal years or fiscal quarters. Borrower hereby represents and confirms that Borrower's fiscal year ends on December 31.

The executed Compliance Certificate may be sent via facsimile to Agent at (650) 473-9194 or via e-mail to [financialstatements@herculestech.com](mailto:financialstatements@herculestech.com) or [arora@herculestech.com](mailto:arora@herculestech.com). All Financial Statements required to be delivered pursuant to Section 7.1 shall be sent via e-mail to the following addresses: [financialstatements@herculestech.com](mailto:financialstatements@herculestech.com), [legal@herculestech.com](mailto:legal@herculestech.com), [arora@herculestech.com](mailto:arora@herculestech.com), provided, that if e-mail is not available or sending such Financial Statements via e-mail is not possible, they shall be sent via facsimile to Agent at: (866) 468-8916, attention Chief Investment Officer.

Notwithstanding the foregoing, documents required to be delivered pursuant to the terms hereof (to the extent any such documents are included in materials otherwise filed with the SEC) may be delivered electronically, and if so delivered, they shall be deemed to have been delivered on the date on which Borrower e-mails a link thereto to Agent at the e-mail addresses set forth in the immediately preceding paragraph.

**7.2 Management Rights.** Borrower shall permit any representative that Agent or Lender authorizes, including its attorneys and accountants, to inspect the Collateral and examine and make copies and abstracts of the books of account and records of Borrower at reasonable times and upon reasonable notice during normal business hours; provided, however, that so long as no Event of Default has occurred and is continuing, such examinations shall be limited to no more often than twice per fiscal year. In addition, any such representative shall have the right to meet with management and officers of Borrower to discuss such books of account and records. In addition, Agent or Lender shall be entitled at reasonable times and intervals to consult with and advise the management and officers of Borrower concerning significant business issues affecting Borrower. Such consultations shall not unreasonably interfere with Borrower's business operations. The parties intend that the rights granted Agent and Lender shall constitute "management rights" within the meaning of 29 C.F.R. Section 2510.3-101(d)(3)(ii), but that any advice, recommendations or participation by Agent or Lender with respect to any business issues shall not be deemed to give Agent or Lender, nor be deemed an exercise by Agent or Lender of, control over Borrower's management or policies.

### **7.3 Further Assurances.**

(a) Borrower shall from time to time execute, deliver and file, alone or with Agent, any financing statements, security agreements, collateral assignments, notices, control agreements, or other documents reasonably requested by Agent to perfect or give the highest priority to Agent's Lien on the Collateral.



(b) Borrower shall from time to time procure any further instruments or documents as may be reasonably requested by Agent, and take all further action that may be necessary, or that Agent may reasonably request, to perfect and protect the Liens granted hereby and thereby. In addition, and for such purposes only, Borrower hereby authorizes Agent to execute and deliver on behalf of Borrower and to file such financing statements, collateral assignments, notices, control agreements, security agreements and other documents without the signature of Borrower either in Agent's name or in the name of Agent as agent and attorney-in-fact for Borrower. Borrower shall protect and defend Borrower's title to the Collateral and Agent's Lien thereon against all Persons claiming any interest adverse to Borrower or Agent other than Permitted Liens.

**7.4 Indebtedness.** Borrower shall not create, incur, assume, guarantee or be or remain liable with respect to any Indebtedness, or permit any Subsidiary so to do, other than Permitted Indebtedness, or prepay any Indebtedness or take any actions which impose on Borrower an obligation to prepay any Indebtedness, other than Permitted Indebtedness (provided, that, Borrower may not prepay any Permitted Indebtedness that is Subordinated Indebtedness) and except for the conversion of Indebtedness into equity securities and the payment of cash in lieu of fractional shares in connection with such conversion.

**7.5 Collateral; Negative Pledge.** Borrower shall at all times keep the Collateral and all other property and assets used in Borrower's business or in which Borrower now or hereafter holds any interest free and clear from any legal process or Liens whatsoever (except for Permitted Liens), and shall give Agent prompt written notice of any legal process that is reasonably likely to result in damages or expenses in excess of \$250,000 affecting the Collateral and such other property and assets, or any Liens thereon; provided, however, that the Collateral and such other property and assets may be subject to Permitted Liens, except that there shall be no Liens whatsoever on Intellectual Property. Borrower shall cause its Subsidiaries to protect and defend such Subsidiary's title to its assets from and against all Persons claiming any interest adverse to such Subsidiary, and Borrower shall cause its Subsidiaries at all times to keep such Subsidiary's property and assets free and clear from any legal process or Liens whatsoever (except for Permitted Liens, provided however, that there shall be no Liens whatsoever on Intellectual Property), and shall give Agent prompt written notice of any legal process that is reasonably likely to result in damages or expenses in excess of \$250,000 affecting such Subsidiary's assets. Borrower shall not agree with any Person other than Agent or Lender not to encumber its property.

**7.6 Investments.** Borrower shall not directly or indirectly acquire or own, or make any Investment in or to any Person, or permit any of its Subsidiaries so to do, other than Permitted Investments.

**7.7 Distributions.** Borrower shall not, and shall not allow any Subsidiary to, (a) repurchase or redeem any class of stock or other equity interest other than pursuant to employee, director or consultant repurchase plans or other similar agreements; provided, however, in each case the repurchase or redemption price does not exceed the original consideration paid for such stock or equity interests; (b) declare or pay any cash dividend or make a cash distribution on any class of stock or other equity interest, except that a Subsidiary may pay dividends or make distributions to Borrower; (c) lend money to any employees, officers or directors or guarantee the payment of any such loans granted by a third-party in excess of \$150,000 in the aggregate; or (d) waive, release or forgive any Indebtedness owed by any employees, officers or directors in excess of \$150,000 in the aggregate.

**7.8 Transfers.** Except for Permitted Transfers, Borrower shall not, and shall not allow any Subsidiary to, voluntarily or involuntarily transfer, sell, lease, license, lend or in any other manner convey any equitable, beneficial or legal interest in any material portion of its assets.

**7.9 Mergers or Acquisitions.** Borrower shall not merge or consolidate, or permit any of its Subsidiaries to merge or consolidate, with or into any other business organization (other than mergers or consolidations of (a) a Subsidiary which is not a Borrower into a Qualified Subsidiary or into Borrower or (b) a Borrower into another Borrower), or acquire, or permit any of its Subsidiaries to acquire, all or substantially all of the capital stock or property of another Person.

**7.10 Taxes.** Borrower and its Subsidiaries shall pay when due all taxes, fees or other charges of any nature whatsoever (together with any related interest or penalties) now or hereafter imposed or assessed against Borrower, Agent, Lender or the Collateral or upon Borrower's ownership, possession, use, operation or disposition thereof or upon Borrower's rents, receipts or earnings arising therefrom. Borrower shall file on or before the due date therefor all personal property tax returns in respect of the Collateral. Notwithstanding the foregoing, Borrower may contest, in good faith and by appropriate proceedings, taxes for which Borrower maintains adequate reserves therefor in accordance with GAAP.

**7.11 Corporate Changes.** Neither Borrower nor any Subsidiary shall change its corporate name, legal form or jurisdiction of formation without 20 days' prior written notice to Agent. Neither Borrower nor any Subsidiary shall suffer a Change in Control. Neither Borrower nor any Subsidiary shall relocate its chief executive office or its principal place of business unless: (a) it has provided prior written notice to Agent; and (b) such relocation shall be within the continental United States. Neither Borrower nor any Subsidiary shall relocate any item of Collateral (other than (i) sales of Inventory in the ordinary course of business, (ii) relocations of Equipment having an aggregate value of up to \$200,000 in any fiscal year (other than Equipment located at clinical trial sites, provided, that the aggregate value of all such Equipment at trial sites shall not exceed \$200,000 at any one time), (iii) relocations of Collateral from a location described on Exhibit C to another location described on Exhibit C, and (iv) relocations in the ordinary course of business, consistent with prior practices, of drug substance and drug product for use in clinical trials or for regulatory

approval or compliance purposes among third-parties that provide drug substance or drug product manufacturing, packaging and distribution services to Borrower or any Subsidiary and clinical trial sites) unless (A) it has provided prompt written notice to Agent, (B) such relocation is within the continental United States (or a country other than the United States, provided that the aggregate value of such Collateral shall not exceed \$100,000 at any one time) and, (C) if such relocation is to a third-party bailee, it has delivered a bailee agreement in form and substance reasonably acceptable to Agent.

7.12 **Deposit Accounts.** Neither Borrower nor any Subsidiary shall maintain any Deposit Accounts, or accounts holding Investment Property, except with respect to which Agent has an Account Control Agreement.

7.13 **Subsidiaries.** Borrower shall notify Agent of each Subsidiary formed subsequent to the Closing Date and, within 15 days of formation, shall cause any such Subsidiary that is a Qualified Subsidiary to execute and deliver to Agent a Joinder Agreement.

7.14 **Notification of Event of Default.** Borrower shall notify Agent immediately of the occurrence of any Event of Default.

7.15 **SBIC Matters.** Agent and Lender have received a license from the U.S. Small Business Administration (the "SBA") to extend loans as a small business investment company ("**SBIC**") pursuant to the Small Business Investment Company Act of 1958, as amended, and the associated regulations (collectively, the "**SBIC Act**"). All or a portion of the loan to Borrower will be made under the SBA license and the SBIC Act. Addendum 1 to this Agreement outlines various responsibilities of Agent, Lender and Borrower associated with an SBA loan, and such Addendum 1 is hereby incorporated by reference.

7.16 **Post-Closing Items.** Borrower shall use its commercially reasonable efforts to deliver or cause to be delivered the documents listed on Schedule 7.16 on or before the corresponding dates set forth on Schedule 7.16.

## **SECTION 8. RIGHT TO INVEST**

Lender or its assignee or nominee shall have the right, in its discretion, to purchase Borrower securities in one or more broadly-marketed Equity Events (but excluding the issuance of equity securities in connection with an "at the market" offering program); provided, however, Lender's right to purchase Borrower securities in one or more Equity Events shall be limited in the aggregate to securities having an initial aggregate purchase price of up to \$2,000,000, and such right shall be on the same terms and conditions afforded to other investors in the Equity Event. Lender's rights under this Section 8 shall terminate on the later of (a) the third anniversary of the Closing Date and (b) the date on which neither Lender nor any of its Affiliates is a Lender under this Agreement.

## **SECTION 9. EVENTS OF DEFAULT**

The occurrence of any one or more of the following events shall be an Event of Default:

9.1 **Payments.** Borrower fails to pay any amount due under this Agreement or any of the other Loan Documents on the due date; provided, however, that an Event of Default shall not occur on account of a failure to pay due solely to an administrative or operational error of Lender or Borrower's bank if Borrower had the funds to make the payment when due and makes the payment within three Business Days following Borrower's knowledge of such failure to pay; or

9.2 **Covenants.** Borrower breaches or defaults in the performance of any covenant or Secured Obligation under this Agreement, or any of the other Loan Documents or any other agreement among Borrower, Agent and Lender, and (a) with respect to a default under any covenant under this Agreement (other than under Sections 6, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.12, 7.14 and 7.15), any other Loan Document or any other agreement among Borrower, Agent and Lender, such default continues for more than 10 days after the earlier of the date on which (i) Agent or Lender has given notice of such default to Borrower and (ii) Borrower has actual knowledge of such default or (b) with respect to a default under any of Sections 6, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.12, 7.14 and 7.15, the occurrence of such default; or

9.3 **Material Adverse Effect.** Agent shall have provided Borrower written notice that a circumstance has occurred that would reasonably be expected to have a Material Adverse Effect and such circumstance continues for three Business Days following Borrower's receipt of such notice, during which time Agent and Borrower shall have engaged in good faith discussions regarding such circumstance and its consequences; provided that solely for purposes of this Section 9.3, the occurrence of any of the following, in and of itself, shall not constitute a Material Adverse Effect: (a) adverse results or delays in any nonclinical or clinical trial; (b) the denial, delay or limitation of approval of, or taking of any other regulatory action by, the United States Food and Drug Administration or any other governmental entity with respect to any of Borrower's products; or (c) a change in or discontinuation of a strategic partnership or other collaboration or license arrangement); or

9.4 **Representations.** Any representation or warranty made by Borrower in any Loan Document shall have been false or misleading in any material respect when made or when deemed made; or

**9.5 Insolvency.** Borrower (A) (i) shall make an assignment for the benefit of creditors; or (ii) shall be unable to pay its debts as they become due, or be unable to pay or perform under the Loan Documents, or shall become insolvent; or (iii) shall file a voluntary petition in bankruptcy; or (iv) shall file any petition, answer, or document seeking for itself any reorganization, arrangement, composition, readjustment, liquidation, dissolution or similar relief under any present or future statute, law or regulation pertinent to such circumstances; or (v) shall seek or consent to or acquiesce in the appointment of any trustee, receiver, or liquidator of Borrower or of all or any substantial part (i.e., 33-1/3% or more) of the assets or property of Borrower; or (vi) shall cease operations of its business as its business has normally been conducted, or terminate substantially all of its employees; or (vii) Borrower or its directors or majority shareholders shall take any action initiating any of the foregoing actions described in clauses (i) through (vi); or (B) either (i) 45 days shall have expired after the commencement of an involuntary action against Borrower seeking reorganization, arrangement, composition, readjustment, liquidation, dissolution or similar relief under any present or future statute, law or regulation, without such action being dismissed or all orders or proceedings thereunder affecting the operations or the business of Borrower being stayed; or (ii) a stay of any such order or proceedings shall thereafter be set aside and the action setting it aside shall not be timely appealed; or (iii) Borrower shall file any answer admitting or not contesting the material allegations of a petition filed against Borrower in any such proceedings; or (iv) the court in which such proceedings are pending shall enter a decree or order granting the relief sought in any such proceedings; or (v) 45 days shall have expired after the appointment, without the consent or acquiescence of Borrower, of any trustee, receiver or liquidator of Borrower or of all or any substantial part of the properties of Borrower without such appointment being vacated; or

**9.6 Attachments; Judgments.** Any portion of Borrower's assets having a value in excess of \$250,000, individually or in the aggregate, is attached or seized, or a levy is filed against any such assets, or a judgment or judgments is/are entered for the payment of money (not covered by independent third-party insurance as to which liability has not been rejected by such insurance carrier), individually or in the aggregate, of at least \$250,000, or Borrower is enjoined or in any way prevented by court order from conducting any part of its business; or

**9.7 Other Obligations.** The occurrence of any default (after giving effect to any applicable grace or cure period) under any agreement or obligation of Borrower involving any Indebtedness in excess of \$200,000.

## **SECTION 10. REMEDIES**

**10.1 General.** Upon and during the continuance of any one or more Events of Default, (i) Agent may, at its option, accelerate and demand payment of all or any part of the Secured Obligations together with a Prepayment Charge and declare them to be immediately due and payable (provided, that upon the occurrence of an Event of Default of the type described in [Section 9.5](#), all of the Secured Obligations shall automatically be accelerated and made due and payable, in each case without any further notice or act), (ii) Agent may, at its option, sign and file in Borrower's name any and all collateral assignments, notices, control agreements, security agreements and other documents it deems necessary or appropriate to perfect or protect the repayment of the Secured Obligations, and in furtherance thereof, Borrower hereby grants Agent an irrevocable power of attorney coupled with an interest, and (iii) Agent may notify any of Borrower's account debtors to make payment directly to Agent, compromise the amount of any such account on Borrower's behalf and endorse Agent's name without recourse on any such payment for deposit directly to Agent's account. Agent may exercise all rights and remedies with respect to the Collateral under the Loan Documents or otherwise available to it under the UCC and other applicable law, including the right to release, hold, sell, lease, liquidate, collect, realize upon, or otherwise dispose of all or any part of the Collateral and the right to occupy, utilize, process and commingle the Collateral. All Agent's rights and remedies shall be cumulative and not exclusive.

**10.2 Collection; Foreclosure.** Upon the occurrence and during the continuance of any Event of Default, Agent may, at any time or from time to time, apply, collect, liquidate, sell in one or more sales, lease or otherwise dispose of, any or all of the Collateral, in its then condition or following any commercially reasonable preparation or processing, in such order as Agent may elect. Any such sale may be made either at public or private sale at its place of business or elsewhere. Borrower agrees that any such public or private sale may occur upon 10 calendar days' prior written notice to Borrower. Agent may require Borrower to assemble the Collateral and make it available to Agent at a place designated by Agent that is reasonably convenient to Agent and Borrower. The proceeds of any sale, disposition or other realization upon all or any part of the Collateral shall be applied by Agent in the following order of priorities:

First, to Agent and Lender in an amount sufficient to pay in full Agent's and Lender's costs and professionals' and advisors' fees and expenses as described in [Section 11.11](#);

Second, to Lender in an amount equal to the then unpaid amount of the Secured Obligations (including principal, interest, and the Default Rate interest), in such order and priority as Agent may choose in its sole discretion; and

Finally, after the full, final, and indefeasible payment in Cash of all of the Secured Obligations, to any creditor holding a junior Lien on the Collateral, or to Borrower or its representatives or as a court of competent jurisdiction may direct.

Agent shall be deemed to have acted reasonably in the custody, preservation and disposition of any of the Collateral if it complies with the obligations of a secured party under the UCC.

10.3 **No Waiver.** Agent shall be under no obligation to marshal any of the Collateral for the benefit of Borrower or any other Person, and Borrower expressly waives all rights, if any, to require Agent to marshal any Collateral.

10.4 **Cumulative Remedies.** The rights, powers and remedies of Agent hereunder shall be in addition to all rights, powers and remedies given by statute or rule of law and are cumulative. The exercise of any one or more of the rights, powers and remedies provided herein shall not be construed as a waiver of or election of remedies with respect to any other rights, powers and remedies of Agent.

**SECTION 11. MISCELLANEOUS**

11.1 **Severability.** Whenever possible, each provision of this Agreement shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Agreement shall be prohibited by or invalid under such law, such provision shall be ineffective only to the extent and duration of such prohibition or invalidity, without invalidating the remainder of such provision or the remaining provisions of this Agreement.

11.2 **Notice.** Except as otherwise provided herein, any notice, demand, request, consent, approval, declaration, service of process or other communication (including the delivery of Financial Statements) that is required, contemplated, or permitted under the Loan Documents or with respect to the subject matter hereof shall be in writing, and shall be deemed to have been validly served, given, delivered, and received upon the earlier of: (i) the day of transmission by facsimile or hand delivery or delivery by an overnight express service or overnight mail delivery service; or (ii) the third calendar day after deposit in the United States mails, with proper first class postage prepaid, in each case addressed to the party to be notified as follows:

(a) If to Agent:

HERCULES TECHNOLOGY GROWTH CAPITAL, INC.  
Legal Department  
Attention: Deputy General Counsel  
400 Hamilton Avenue, Suite 310  
Palo Alto, CA 94301  
Facsimile: 650-473-9194  
Telephone: 650-289-3060

(b) If to Lender:

HERCULES TECHNOLOGY III, L.P.  
Legal Department  
Attention: Deputy General Counsel  
400 Hamilton Avenue, Suite 310  
Palo Alto, CA 94301  
Facsimile: 650-473-9194  
Telephone: 650-289-3060

(c) If to Borrower:

MAST THERAPEUTICS, INC.  
Attention: Chief Financial Officer  
3611 Valley Centre Drive, Suite 500  
San Diego, CA 92130  
Facsimile: (858) 552-0876  
Telephone: (858) 552-0866

With a copy to:

Gunderson Dettmer Stough Villeneuve Franklin & Hachigian, LLP  
Attention: Kirt Shuldborg  
3570 Carmel Mountain Road, Suite 200  
San Diego, CA 92130  
Facsimile: (858) 436-8061  
Email: kshuldborg@gunder.com

or to such other address as each party may designate for itself by like notice.

**11.3 Entire Agreement; Amendments.**

(a) This Agreement and the other Loan Documents constitute the entire agreement and understanding of the parties hereto in respect of the subject matter hereof and thereof, and supersede and replace in their entirety any prior proposals, term sheets, non-disclosure or confidentiality agreements, letters, negotiations or other documents or agreements, whether written or oral, with respect to the subject matter hereof or thereof (including Agent's proposal letter executed by Borrower on July 8, 2015).

(b) Neither this Agreement, any other Loan Document, nor any terms hereof or thereof may be amended, supplemented or modified except in accordance with the provisions of this Section 11.3(b). The Required Lenders and Borrower party to the relevant Loan Document may, or, with the written consent of the Required Lenders, Agent and Borrower party to the relevant Loan Document may, from time to time, (i) enter into written amendments, supplements or modifications hereto and to the other Loan Documents for the purpose of adding any provisions to this Agreement or the other Loan Documents or changing in any manner the rights of Lender or of Borrower hereunder or thereunder or (ii) waive, on such terms and conditions as the Required Lenders or Agent, as the case may be, may specify in such instrument, any of the requirements of this Agreement or the other Loan Documents or any default or Event of Default and its consequences; provided, however, that no such waiver and no such amendment, supplement or modification shall (A) forgive the principal amount or extend the final scheduled date of maturity of any Loan, extend the scheduled date of any amortization payment in respect of any Term Loan, reduce the stated rate of any interest or fee payable hereunder), in each case without the written consent of each Lender directly affected thereby; (B) eliminate or reduce the voting rights of any Lender under this Section 11.3(b) without the written consent of such Lender; (C) reduce any percentage specified in the definition of Required Lenders, consent to the assignment or transfer by Borrower of any of its rights and obligations under this Agreement and the other Loan Documents, release all or substantially all of the Collateral or release a Borrower from its obligations under the Loan Documents, in each case without the written consent of all Lenders; or (D) amend, modify or waive any provision of Section 11.17 without the written consent of Agent. Any such waiver and any such amendment, supplement or modification shall apply equally to each Lender and shall be binding upon Borrower, Lender, Agent and all future holders of the Loans.

**11.4 No Strict Construction.** The parties hereto have participated jointly in the negotiation and drafting of this Agreement. In the event an ambiguity or question of intent or interpretation arises, this Agreement shall be construed as if drafted jointly by the parties hereto and no presumption or burden of proof shall arise favoring or disfavoring any party by virtue of the authorship of any provisions of this Agreement.

**11.5 No Waiver.** The powers conferred upon Agent and Lender by this Agreement are solely to protect its rights hereunder and under the other Loan Documents and its interest in the Collateral and shall not impose any duty upon Agent or Lender to exercise any such powers. No omission or delay by Agent or Lender at any time to enforce any right or remedy reserved to it, or to require performance of any of the terms, covenants or provisions hereof by Borrower at any time designated, shall be a waiver of any such right or remedy to which Agent or Lender is entitled, nor shall it in any way affect the right of Agent or Lender to enforce such provisions thereafter.

**11.6 Survival.** All agreements, representations and warranties contained in this Agreement and the other Loan Documents or in any document delivered pursuant hereto or thereto shall be for the benefit of Agent and Lender and shall survive the execution and delivery of this Agreement and the expiration or other termination of this Agreement.

**11.7 Successors and Assigns.** The provisions of this Agreement and the other Loan Documents shall inure to the benefit of and be binding on Borrower and its permitted assigns (if any). Borrower shall not assign its obligations under this Agreement or any of the other Loan Documents without Agent's express prior written consent, and any such attempted assignment shall be void and of no effect. Agent and Lender may assign, transfer, or endorse its rights hereunder and under the other Loan Documents without prior notice to Borrower, and all of such rights shall inure to the benefit of Agent's and Lender's successors and assigns; provided that as long as no Event of Default has occurred and is continuing, neither Agent nor any Lender may assign, transfer or endorse its rights hereunder or under the Loan Documents to any party that is a direct competitor of Borrower or a distressed debt or vulture fund (each term as reasonably determined by Agent), it being acknowledged that in all cases, any transfer to an Affiliate of any Lender or Agent shall be allowed.

**11.8 Governing Law.** This Agreement and the other Loan Documents have been negotiated and delivered to Agent and Lender in the State of California, and shall have been accepted by Agent and Lender in the State of California. Payment to Agent and Lender by Borrower of the Secured Obligations is due in the State of California. This Agreement and the other Loan Documents shall be governed by, and construed and enforced in accordance with, the laws of the State of California, excluding conflict of laws principles that would cause the application of laws of any other jurisdiction.

**11.9 Consent to Jurisdiction and Venue.** All judicial proceedings (to the extent that the reference requirement of Section 11.10 is not applicable) arising in or under or related to this Agreement or any of the other Loan Documents may be brought in any state or federal court located in the State of California. By execution and delivery of this Agreement, each party hereto generally and unconditionally: (a) consents to nonexclusive personal jurisdiction in Santa Clara County, State of California; (b) waives any objection as to jurisdiction or venue in Santa Clara County, State of California; (c) agrees not to assert any defense based on lack of jurisdiction

or venue in the aforesaid courts; and (d) irrevocably agrees to be bound by any judgment rendered thereby in connection with this Agreement or the other Loan Documents. Service of process on any party hereto in any action arising out of or relating to this Agreement shall be effective if given in accordance with the requirements for notice set forth in Section 11.2, and shall be deemed effective and received as set forth in Section 11.2. Nothing herein shall affect the right to serve process in any other manner permitted by law or shall limit the right of either party to bring proceedings in the courts of any other jurisdiction.

#### **11.10 Mutual Waiver of Jury Trial / Judicial Reference.**

(a) Because disputes arising in connection with complex financial transactions are most quickly and economically resolved by an experienced and expert Person and the parties wish applicable state and federal laws to apply (rather than arbitration rules), the parties desire that their disputes be resolved by a judge applying such applicable laws. EACH OF BORROWER, AGENT AND LENDER SPECIFICALLY WAIVES ANY RIGHT IT MAY HAVE TO TRIAL BY JURY OF ANY CAUSE OF ACTION, CLAIM, CROSS-CLAIM, COUNTERCLAIM, THIRD-PARTY CLAIM OR ANY OTHER CLAIM (COLLECTIVELY, "**CLAIMS**") ASSERTED BY BORROWER AGAINST AGENT, LENDER OR THEIR RESPECTIVE ASSIGNEE OR BY AGENT, LENDER OR THEIR RESPECTIVE ASSIGNEE AGAINST BORROWER. This waiver extends to all such Claims, including Claims that involve Persons other than Agent, Borrower and Lender; Claims that arise out of or are in any way connected to the relationship among Borrower, Agent and Lender; and any Claims for damages, breach of contract, tort, specific performance, or any equitable or legal relief of any kind, arising out of this Agreement, any other Loan Document.

(b) If the waiver of jury trial set forth in Section 11.10(a) is ineffective or unenforceable, the parties agree that all Claims shall be resolved by reference to a private judge sitting without a jury, pursuant to Code of Civil Procedure Section 638, before a mutually acceptable referee or, if the parties cannot agree, a referee selected by the Presiding Judge of the Santa Clara County, California. Such proceeding shall be conducted in Santa Clara County, California, with California rules of evidence and discovery applicable to such proceeding.

(c) In the event Claims are to be resolved by judicial reference, either party may seek from a court identified in Section 11.9, any prejudgment order, writ or other relief and have such prejudgment order, writ or other relief enforced to the fullest extent permitted by law notwithstanding that all Claims are otherwise subject to resolution by judicial reference.

**11.11 Professional Fees.** Borrower promises to pay Agent's and Lender's fees and expenses necessary to finalize the loan documentation, including but not limited to reasonable attorneys fees, UCC searches, filing costs, and other miscellaneous expenses. In addition, Borrower promises to pay any and all reasonable attorneys' and other professionals' fees and expenses (including fees and expenses of in-house counsel) incurred by Agent and Lender after the Closing Date in connection with or related to: (a) the Loan; (b) the administration, collection, or enforcement of the Loan; (c) the amendment or modification of the Loan Documents; (d) any waiver, consent, release, or termination under the Loan Documents; (e) the protection, preservation, audit, field exam, sale, lease, liquidation, or disposition of Collateral or the exercise of remedies with respect to the Collateral; (f) any legal, litigation, administrative, arbitration, or out of court proceeding in connection with or related to Borrower or the Collateral, and any appeal or review thereof; and (g) any bankruptcy, restructuring, reorganization, assignment for the benefit of creditors, workout, foreclosure, or other action related to Borrower, the Collateral, the Loan Documents, including representing Agent or Lender in any adversary proceeding or contested matter commenced or continued by or on behalf of Borrower's estate, and any appeal or review thereof.

**11.12 Confidentiality.** Agent and Lender acknowledge that certain items of Collateral and information provided to Agent and Lender by Borrower are confidential and proprietary information of Borrower, if and to the extent such information either (x) is marked as confidential by Borrower at the time of disclosure, or (y) should reasonably be understood to be confidential (the "**Confidential Information**"). Accordingly, Agent and Lender agree that any Confidential Information it may obtain in the course of acquiring, administering, or perfecting Agent's security interest in the Collateral shall not be disclosed to any other Person or entity in any manner whatsoever, in whole or in part, without the prior written consent of Borrower, except that Agent and Lender may disclose any such information: (a) to its own directors, officers, employees, accountants, counsel and other professional advisors and to its Affiliates if Agent or Lender in their sole discretion determines that any such party should have access to such information in connection with such party's responsibilities in connection with the Loan or this Agreement and, provided that such recipient of such Confidential Information either (i) agrees to be bound by the confidentiality provisions of this paragraph or (ii) is otherwise subject to confidentiality restrictions that reasonably protect against the disclosure of Confidential Information; (b) if such information is generally available to the public other than as a result of violation of this Section 11.12 by either of Agent or Lender; (c) if required or appropriate in any report, statement or testimony submitted to any governmental authority having or claiming to have jurisdiction over Agent or Lender; (d) if required in response to any summons or subpoena or in connection with any litigation, to the extent required as advised by Agent's or Lender's counsel; (e) to comply with any legal requirement or law applicable to Agent or Lender; (f) to the extent reasonably necessary in connection with the exercise of any right or remedy under any Loan Document, including Agent's sale, lease, or other disposition of Collateral after default; (g) to any participant or assignee of Agent or Lender or any prospective participant or assignee; provided, that such participant or assignee or prospective participant or assignee agrees in writing to be bound by this Section prior to disclosure; or (h) otherwise with the prior consent of Borrower; provided, that any disclosure made in violation of this Agreement shall not affect the obligations of Borrower or any of its Affiliates or any guarantor under this Agreement or the other Loan Documents.

11.13 **Assignment of Rights.** Borrower acknowledges and understands that Agent or Lender may, subject to Section 11.7, sell and assign all or part of its interest hereunder and under the Loan Documents to any Person or entity (an “Assignee”). After such assignment the term “Agent” or “Lender” as used in the Loan Documents shall mean and include such Assignee, and such Assignee shall be vested with all rights, powers and remedies of Agent and Lender hereunder with respect to the interest so assigned; but with respect to any such interest not so transferred, Agent and Lender shall retain all rights, powers and remedies hereby given. No such assignment by Agent or Lender shall relieve Borrower of any of its obligations hereunder. Lender agrees that in the event of any transfer by it of the Note(s)(if any), it will endorse thereon a notation as to the portion of the principal of the Note(s), which shall have been paid at the time of such transfer and as to the date to which interest shall have been last paid thereon.

11.14 **Revival of Secured Obligations.** This Agreement and the Loan Documents shall remain in full force and effect and continue to be effective if any petition is filed by or against Borrower for liquidation or reorganization, if Borrower becomes insolvent or makes an assignment for the benefit of creditors, if a receiver or trustee is appointed for all or any significant part of Borrower’s assets, or if any payment or transfer of Collateral is recovered from Agent or Lender. The Loan Documents and the Secured Obligations and Collateral security shall continue to be effective, or shall be revived or reinstated, as the case may be, if at any time payment and performance of the Secured Obligations or any transfer of Collateral to Agent, or any part thereof is rescinded, avoided or avoidable, reduced in amount, or must otherwise be restored or returned by, or is recovered from, Agent, Lender or by any obligee of the Secured Obligations, whether as a “voidable preference,” “fraudulent conveyance,” or otherwise, all as though such payment, performance, or transfer of Collateral had not been made. In the event that any payment, or any part thereof, is rescinded, reduced, avoided, avoidable, restored, returned, or recovered, the Loan Documents and the Secured Obligations shall be deemed, without any further action or documentation, to have been revived and reinstated except to the extent of the full, final, and indefeasible payment to Agent or Lender in Cash.

11.15 **Counterparts.** This Agreement and any amendments, waivers, consents or supplements hereto may be executed in any number of counterparts, and by different parties hereto in separate counterparts, each of which when so delivered shall be deemed an original, but all of which counterparts shall constitute but one and the same instrument.

11.16 **No Third-Party Beneficiaries.** No provisions of the Loan Documents are intended, nor will be interpreted, to provide or create any third-party beneficiary rights or any other rights of any kind in any Person other than Agent, Lender and Borrower unless specifically provided otherwise herein, and, except as otherwise so provided, all provisions of the Loan Documents will be personal and solely among Agent, Lender and Borrower.

11.17 **Agency.**

(a) Lender hereby irrevocably appoints Hercules Technology Growth Capital, Inc. to act on its behalf as Agent hereunder and under the other Loan Documents and authorizes Agent to take such actions on its behalf and to exercise such powers as are delegated to Agent by the terms hereof or thereof, together with such actions and powers as are reasonably incidental thereto.

(b) Lender agrees to indemnify Agent in its capacity as such (to the extent not reimbursed by Borrower and without limiting the obligation of Borrower to do so), according to its respective Term Commitment percentages (based upon the total outstanding Term Loan Commitments) in effect on the date on which indemnification is sought under this Section 11.7, from and against any and all liabilities, obligations, losses, damages, penalties, actions, judgments, suits, costs, expenses or disbursements of any kind whatsoever that may at any time be imposed on, incurred by or asserted against Agent in any way relating to or arising out of, this Agreement, any of the other Loan Documents or any documents contemplated by or referred to herein or therein or the transactions contemplated hereby or thereby or any action taken or omitted by Agent under or in connection with any of the foregoing. The agreements in this Section shall survive the payment of the Loans and all other amounts payable hereunder.

(c) The Person serving as Agent hereunder shall have the same rights and powers in its capacity as a Lender as any other Lender and may exercise the same as though it were not Agent and the term “Lender” shall, unless otherwise expressly indicated or unless the context otherwise requires, include each such Person serving as Agent hereunder in its individual capacity.

(d) Agent shall have no duties or obligations except those expressly set forth herein and in the other Loan Documents. Without limiting the generality of the foregoing, Agent shall not:

- (i) be subject to any fiduciary or other implied duties, regardless of whether any default or any Event of Default has occurred and is continuing;
- (ii) have any duty to take any discretionary action or exercise any discretionary powers, except discretionary rights and powers expressly contemplated hereby or by the other Loan Documents that Agent is required to exercise as directed in writing by Lender, provided that Agent shall not be required to take any action that, in its opinion or the opinion of its counsel, may expose Agent to liability or that is contrary to any Loan Document or applicable law; and

(iii) except as expressly set forth herein and in the other Loan Documents, have any duty to disclose, and Agent shall not be liable for the failure to disclose, any information relating to Borrower or any of its Affiliates that is communicated to or obtained by any Person serving as Agent or any of its Affiliates in any capacity.

(e) Agent shall not be liable for any action taken or not taken by it (i) with the consent or at the request of Lender or as Agent shall believe in good faith shall be necessary, under the circumstances or (ii) in the absence of its own gross negligence or willful misconduct.

(f) Agent shall not be responsible for or have any duty to ascertain or inquire into (i) any statement, warranty or representation made in or in connection with this Agreement or any other Loan Document, (ii) the contents of any certificate, report or other document delivered hereunder or thereunder or in connection herewith or therewith, (iii) the performance or observance of any of the covenants, agreements or other terms or conditions set forth herein or therein or the occurrence of any default or Event of Default, (iv) the validity, enforceability, effectiveness or genuineness of this Agreement, any other Loan Document or any other agreement, instrument or document or (v) the satisfaction of any condition set forth in Section 4 or elsewhere herein, other than to confirm receipt of items expressly required to be delivered to Agent.

(g) Agent may rely, and shall be fully protected in acting, or refraining to act, upon, any resolution, statement, certificate, instrument, opinion, report, notice, request, consent, order, bond or other paper or document that it has no reason to believe to be other than genuine and to have been signed or presented by the proper party or parties or, in the case of cables, telecopies and telexes, to have been sent by the proper party or parties. In the absence of its gross negligence or willful misconduct, Agent may conclusively rely, as to the truth of the statements and the correctness of the opinions expressed therein, upon any certificates or opinions furnished to Agent and conforming to the requirements of the Loan Agreement or any of the other Loan Documents. Agent may consult with counsel, and any opinion or legal advice of such counsel shall be full and complete authorization and protection in respect of any action taken, not taken or suffered by Agent hereunder or under any Loan Documents in accordance therewith. Agent shall have the right at any time to seek instructions concerning the administration of the Collateral from any court of competent jurisdiction. Agent shall not be under any obligation to exercise any of the rights or powers granted to Agent by this Agreement, the Loan Agreement and the other Loan Documents at the request or direction of Lenders unless Agent shall have been provided by Lender with adequate security and indemnity against the costs, expenses and liabilities that may be incurred by it in compliance with such request or direction.

**11.18 Publicity.** None of the parties hereto nor any of its respective member businesses and Affiliates shall, without the other parties' prior written consent (which shall not be unreasonably withheld or delayed), publicize or use (a) the other party's name (including a brief description of the relationship among the parties hereto), logo or hyperlink to such other parties' web site, separately or together, in written and oral presentations, advertising, promotional and marketing materials, client lists, public relations materials or on its web site (together, the "Publicity Materials"); (b) the names of officers of such other parties in the Publicity Materials; and (c) such other parties' name, trademarks, servicemarks in any news or press release concerning such party; provided, however, notwithstanding anything to the contrary herein, no such consent shall be required (i) (A) to the extent necessary to comply with the requests of any regulators, legal requirements or laws applicable to such party, pursuant to any listing agreement with any national securities exchange or (B) disclosed on any earnings and investors' calls or any press releases specifically related thereto (so long as, in each case, such party provides prior notice to the other party hereto to the extent reasonably practicable; provided that no such prior review shall be required for disclosure of factual information that has previously been approved by the other party) and (ii) to comply with Section 11.12.

(SIGNATURES TO FOLLOW)



IN WITNESS WHEREOF, Borrower, Agent and Lender have duly executed and delivered this Loan and Security Agreement as of the day and year first above written.

**BORROWER:**

MAST THERAPEUTICS, INC.

Signature: /s/ Brandi Roberts  
Print Name: Brandi Roberts  
Title: Chief Financial Officer

Accepted in Palo Alto, California:

**AGENT:**

HERCULES TECHNOLOGY GROWTH CAPITAL, INC.

Signature: /s/ Christine Fera  
Print Name: Christine Fera  
Title: Director of Contract Originations

**LENDER:**

HERCULES TECHNOLOGY III, L.P.,  
a Delaware limited partnership

By: Hercules Technology SBIC Management, LLC,  
its General Partner

By: Hercules Technology Growth Capital, Inc., its  
Manager

Signature: /s/ Christine Fera  
Print Name: Christine Fera  
Title: Director of Contract Originations

**TABLE OF ADDENDA, EXHIBITS AND SCHEDULES**

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**ADDENDUM 1 TO LOAN AND SECURITY AGREEMENT**

(a) **Borrower's Business.** For purposes of this **Addendum 1**, Borrower shall be deemed to include its "affiliates" as defined in Title 13 Code of Federal Regulations Section 121.103. Borrower represents and warrants to Agent and Lender as of the Closing Date and covenants to Agent and Lender for a period of one year after the Closing Date with respect to subsections 2, 3, 4, 5, 6 and 7 below, as follows:

1. **Size Status.** Borrower's primary NAICS code is 325412 and Borrower has less than 100 employees;

2. **No Relender.** Borrower's primary business activity does not involve, directly or indirectly, providing funds to others, purchasing debt obligations, factoring, or long-term leasing of equipment with no provision for maintenance or repair;

3. **No Passive Business.** Borrower is engaged in a regular and continuous business operation (excluding the mere receipt of payments such as dividends, rents, lease payments, or royalties). Borrower's employees are carrying on the majority of day to day operations. Borrower will not pass through substantially all of the proceeds of the Loan to another entity;

4. **No Real Estate Business.** Borrower is not classified under Major Group 65 (Real Estate) or Industry No. 1531 (Operative Builders) of the SIC Manual. The proceeds of the Loan will not be used to acquire or refinance real property unless Borrower (x) is acquiring an existing property and will use at least 51 percent of the usable square footage for its business purposes; (y) is building or renovating a building and will use at least 67 percent of the usable square footage for its business purposes; or (z) occupies the subject property and uses at least 67 percent of the usable square footage for its business purposes.

5. **No Project Finance.** Borrower's assets are not intended to be reduced or consumed, generally without replacement, as the life of its business progresses, and the nature of Borrower's business does not require that a stream of cash payments be made to the business's financing sources, on a basis associated with the continuing sale of assets (e.g., real estate development projects and oil and gas wells). The primary purpose of the Loan is not to fund production of a single item or defined limited number of items, generally over a defined production period, where such production will constitute the majority of the activities of Borrower (e.g., motion pictures and electric generating plants).

6. **No Farm Land Purchases.** Borrower will not use the proceeds of the Loan to acquire farm land which is or is intended to be used for agricultural or forestry purposes, such as the production of food, fiber, or wood, or is so taxed or zoned.

7. **No Foreign Investment.** The proceeds of the Loan will not be used substantially for a foreign operation. At the time of the Loan, Borrower will not have more than 49 percent of its employees or tangible assets located outside the United States. The representation in this subsection (7) is made only as of the date hereof and shall not continue for one year as contemplated in the first sentence of this Section 1.

(b) **Small Business Administration Documentation.** Agent and Lender acknowledge that Borrower completed, executed and delivered to Agent SBA Forms 480, 652 and 1031 (Parts A and B) together with a business plan showing Borrower's financial projections (including balance sheets and income and cash flows statements) for the period described therein and a written statement (whether included in the purchase agreement or pursuant to a separate statement) from Borrower regarding its intended use of proceeds from the sale of securities to Lender (the "Use of Proceeds Statement"). Borrower represents and warrants to Agent and Lender that the information regarding Borrower and its affiliates set forth in the SBA Form 480, Form 652 and Form 1031 and the Use of Proceeds Statement delivered as of the Closing Date is accurate and complete.

(c) **Inspection.** The following covenants contained in this **Section (c)** are intended to supplement and not to restrict the related provisions of the Loan Documents. Subject to the preceding sentence, Borrower will permit, for so long as Lender holds any debt or equity securities of Borrower, Agent, Lender or their representative, at Agent's or Lender's expense, and examiners of the SBA to visit and inspect the properties and assets of Borrower, to examine its books of account and records, and to discuss Borrower's affairs, finances and accounts with Borrower's officers, senior management and accountants, all at such reasonable times as may be requested by Agent or Lender or the SBA.

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(d) **Annual Assessment.** Promptly after the end of each calendar year (but in any event prior to February 28 of each year) and at such other times as may be reasonably requested by Agent or Lender, Borrower will deliver to Agent a written assessment of the economic impact of Lender's investment in Borrower, specifying the full-time equivalent jobs created or retained in connection with the investment, the impact of the investment on the businesses of Borrower in terms of expanded revenue and taxes, other economic benefits resulting from the investment (such as technology development or commercialization, minority business development, or expansion of exports) and such other information as may be required regarding Borrower in connection with Lender's filing of Lender's SBA Form 468. Lender will assist Borrower with preparing such assessment. In addition to any other rights granted hereunder, Borrower will grant Agent and Lender and the SBA access to Borrower's books and records for the purpose of verifying the use of such proceeds. Borrower also will furnish or cause to be furnished to Agent and Lender such other information regarding the business, affairs and condition of Borrower as Agent or Lender may from time to time reasonably request.

(e) **Use of Proceeds.** Borrower will use the proceeds from the Loan only for sound business purposes in accordance with applicable portions of the SBIC Act. Borrower will deliver to Agent from time to time promptly following Agent's request, a written report, certified as correct by Borrower's Chief Financial Officer, verifying the purposes and amounts for which proceeds from the Loan have been disbursed. Borrower will supply to Agent such additional information and documents as Agent reasonably requests with respect to its use of proceeds and will permit Agent and Lender and the SBA to have access to any and all Borrower records and information and personnel as Agent deems necessary to verify how such proceeds have been or are being used, and to assure that the proceeds have been used for the purposes specified above.

(f) **Activities and Proceeds.** Neither Borrower nor any of its affiliates (if any) will engage in any activities or use directly or indirectly the proceeds from the Loan for any purpose for which a small business investment company is prohibited from providing funds by the SBIC Act, including 13 C.F.R. §107.720. Without obtaining the prior written approval of Agent, Borrower will not change within 1 year of the date hereof, Borrower's current business activity to a business activity which a licensee under the SBIC Act is prohibited from providing funds by the SBIC Act.

(g) **Redemption Provisions.** Notwithstanding any provision to the contrary contained in the Certificate of Incorporation of Borrower, as amended from time to time (the "Charter"), if, pursuant to the redemption provisions contained in the Charter, Lender is entitled to a redemption of its Warrant, such redemption (in the case of Lender) will be at a price equal to the redemption price set forth in the Charter (the "Existing Redemption Price"). If, however, Lender delivers written notice to Borrower that the then current regulations promulgated under the SBIC Act prohibit payment of the Existing Redemption Price in the case of an SBIC (or, if applied, the Existing Redemption Price would cause the stock purchasable by such Warrant to lose its classification as an "equity security" and Lender has determined that such classification is unadvisable), the amount Lender will be entitled to receive shall be the greater of (i) fair market value of the securities being redeemed taking into account the rights and preferences of such securities plus any costs and expenses of the Lender incurred in making or maintaining the Warrant, and (ii) the Existing Redemption Price where the amount of accrued but unpaid dividends payable to the Lender is limited to Borrower's earnings plus any costs and expenses of the Lender incurred in making or maintaining the Warrant; provided, however, the amount calculated in subsections (i) or (ii) above shall not exceed the Existing Redemption Price.

(h) **Compliance and Resolution.** Borrower agrees that a failure to comply with Borrower's obligations under this Addendum, or any other set of facts or circumstances where it has been asserted by any governmental regulatory agency (or Agent or Lender believes that there is a substantial risk of such assertion) that Agent, Lender and their Affiliates are not entitled to hold, or exercise any significant right with respect to, any securities issued to Lender by Borrower, will constitute a breach of the obligations of Borrower under the financing agreements among Borrower, Agent and Lender. In the event of (i) a failure to comply with Borrower's obligations under this Addendum; or (ii) an assertion by any governmental regulatory agency (or Agent or Lender reasonably believes that there is a substantial risk of such assertion) of a failure to comply with Borrower's obligations under this Addendum, then (i) Agent, Lender and Borrower will meet and resolve any such issue in good faith to the satisfaction of Borrower, Agent, Lender, and any governmental regulatory agency, and (ii) upon request of Lender or Agent, Borrower will cooperate and assist with any assignment of the financing agreements among Hercules Technology III, L.P. and Hercules Technology Growth Capital, Inc.

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**EXHIBIT A**

**ADVANCE REQUEST**

To: Agent:

Date: [●]

Hercules Technology Growth Capital, Inc. (the "Agent")  
400 Hamilton Avenue, Suite 310  
Palo Alto, CA 94301  
Facsimile: 650-473-9194  
Attn:

Mast Therapeutics, Inc. ("**Borrower**") hereby requests that Agent direct the applicable lender ("**Lender**") to make an Advance in the amount of \$[●] on [●] (the "**Advance Date**") pursuant to the Loan and Security Agreement among Borrower, Agent and Lender (the "**Agreement**"). Capitalized words and other terms used but not otherwise defined herein are used with the same meanings as defined in the Agreement.

Please:

(a) Issue a check payable to Borrower \_\_\_\_\_  
or

(b) Wire Funds to Borrower's account \_\_\_\_\_

Bank: \_\_\_\_\_  
Address: \_\_\_\_\_  
ABA Number: \_\_\_\_\_  
Account Number: \_\_\_\_\_  
Account Name: \_\_\_\_\_

Borrower represents that the conditions precedent to the Advance set forth in the Agreement are satisfied and shall be satisfied upon the making of such Advance, including but not limited to: (i) that no event that has had or could reasonably be expected to have a Material Adverse Effect has occurred and is continuing; (ii) that the representations and warranties set forth in the Agreement and in the Warrant are and shall be true and correct in all material respects on and as of the Advance Date with the same effect as though made on and as of such date, except to the extent such representations and warranties expressly relate to an earlier date; (iii) that Borrower is in compliance with all the terms and provisions set forth in each Loan Document on its part to be observed or performed; and (iv) that as of the Advance Date, no fact or condition exists that would (or would, with the passage of time, the giving of notice, or both) constitute an Event of Default under the Loan Documents. Borrower understands and acknowledges that Agent has the right to review the financial information supporting this representation and, based upon such review in its sole discretion, Lender may decline to fund the requested Advance.

Borrower hereby represents that Borrower's corporate status and locations have not changed since the date of the Agreement or, if the Attachment to this Advance Request is completed, are as set forth in the Attachment to this Advance Request.

Borrower agrees to notify Agent promptly before the funding of the Loan if any of the matters which have been represented above shall not be true and correct on the Borrowing Date and if Agent has received no such notice before the Advance Date then the statements set forth above shall be deemed to have been made and shall be deemed to be true and correct as of the Advance Date.

Executed as of [●]

BORROWER:

MAST THERAPEUTICS, INC.

SIGNATURE: \_\_\_\_\_

TITLE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

\_\_\_\_\_

**ATTACHMENT TO ADVANCE REQUEST**

Dated: [●]

Borrower hereby represents and warrants to Agent that Borrower's current name and organizational status is as follows:

Name: MAST THERAPEUTICS, INC.

Type of organization: CORPORATION

State of organization: DELAWARE

Organization file number: 2558142

Borrower hereby represents and warrants to Agent that the street addresses, cities, states and postal codes of its current locations are as follows: 3611 Valley Centre Drive, Suite 500, San Diego, CA 92130.

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**EXHIBIT B**

**SECURED TERM PROMISSORY NOTE**

\$[●],000,000

Advance Date: \_\_\_\_ \_\_, 20[●]

Maturity Date: \_\_\_\_\_, 20[●]

FOR VALUE RECEIVED, MAST THERAPEUTICS, INC., a Delaware corporation, for itself and each of its Qualified Subsidiaries (the "Borrower"), hereby promises to pay to the order of HERCULES TECHNOLOGY III, L.P., a Delaware limited partnership, or the holder hereof (the "Lender"), at 400 Hamilton Avenue, Suite 310, Palo Alto, CA 94301, or such other place of payment as the holder of this Secured Term Promissory Note (this "Promissory Note") may specify from time to time in writing, in lawful money of the United States of America, the principal amount of \$[●],000,000 or such other principal amount as Lender has advanced to Borrower, together with interest at the Term Loan Interest Rate, as such term is defined in that certain Loan and Security Agreement, dated August 11, 2015, by and among Borrower, Hercules Technology Growth Capital, Inc., in its capacity as agent (the "Agent"), and the several banks and other financial institutions or entities from time to time party thereto as lender (as the same may from time to time be amended, modified or supplemented in accordance with its terms, the "Loan Agreement").

This Promissory Note is the Note referred to in, and is executed and delivered in connection with, the Loan Agreement, and is entitled to the benefit and security of the Loan Agreement and the other Loan Documents (as defined in the Loan Agreement), to which reference is made for a statement of all of the terms and conditions thereof. All payments shall be made in accordance with the Loan Agreement. All terms defined in the Loan Agreement shall have the same definitions when used herein, unless otherwise defined herein. An Event of Default under the Loan Agreement shall constitute a default under this Promissory Note.

Borrower waives presentment and demand for payment, notice of dishonor, protest and notice of protest under the UCC or any applicable law. Borrower agrees to make all payments under this Promissory Note without setoff, recoupment or deduction and regardless of any counterclaim or defense. This Promissory Note has been negotiated and delivered to Lender and is payable in the State of California. This Promissory Note shall be governed by and construed and enforced in accordance with, the laws of the State of California, excluding any conflicts of law rules or principles that would cause the application of the laws of any other jurisdiction.

BORROWER FOR ITSELF AND  
ON BEHALF OF EACH OF ITS  
QUALIFIED SUBSIDIARIES:

MAST THERAPEUTICS, INC.

By: \_\_\_\_\_  
Title: \_\_\_\_\_

\_\_\_\_\_

**EXHIBIT C**

**NAME, LOCATIONS, AND OTHER INFORMATION FOR BORROWER**

1. Borrower represents and warrants to Agent that Borrower's current name and organizational status as of the Closing Date is as follows:

Name: MAST THERAPEUTICS, INC.

Type of organization: CORPORATION

State of organization: DELAWARE

Organization file number: 2558142

2. Borrower represents and warrants to Agent that for five (5) years prior to the Closing Date, Borrower did not do business under any other name or organization or form except the following:

Name: ADVENTRX PHARMACEUTICALS, INC.

Used during dates of: May 2003 – March 11, 2013

Type of Organization: CORPORATION

State of organization: DELAWARE

Organization file Number: 2558142

Borrower's fiscal year ends on December 31

Borrower's federal employer tax identification number is: 84-1318182

3. Borrower represents and warrants to Agent that its chief executive office is located at 3611 Valley Centre Drive, Suite 500, San Diego, CA 92130.

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**EXHIBIT D**

**COMPLIANCE CERTIFICATE**

Hercules Technology Growth Capital, Inc. (as "Agent")  
400 Hamilton Avenue, Suite 310  
Palo Alto, CA 94301

Reference is made to that certain Loan and Security Agreement dated August 11, 2015 and the Loan Documents (as defined therein) entered into in connection with such Loan and Security Agreement all as may be amended from time to time (hereinafter referred to collectively as the "Loan Agreement") by and among the several banks and other financial institutions or entities from time to time party thereto (collectively, "Lender"), Hercules Technology Growth Capital, Inc., as agent for Lender ("Agent"), and Mast Therapeutics, Inc., as Borrower (the "Company"). All capitalized terms not defined herein shall have the same meaning as defined in the Loan Agreement.

The undersigned is an Officer of the Company, knowledgeable of all Company financial matters, and is authorized to provide certification of information regarding the Company; hereby certifies, in such capacity, that in accordance with the terms and conditions of the Loan Agreement, the Company is in compliance for the period ending [●] of all covenants, conditions and terms and hereby reaffirms that all representations and warranties contained therein are true and correct on and as of the date of this Compliance Certificate with the same effect as though made on and as of such date, except (i) to the extent such representations and warranties expressly relate to an earlier date, after giving effect in all cases to any standard(s) of materiality contained in the Loan Agreement as to such representations and warranties, and (ii) as otherwise disclosed in the letter dated as of the date of the Loan Agreement and provided by Borrower to Agent and Lender. Attached are the required documents supporting the above certification. The undersigned further certifies that these are prepared in accordance with GAAP (except for the absence of footnotes with respect to unaudited financial statement and subject to normal year-end adjustments) and are consistent from one period to the next except as explained below.

REPORTING REQUIREMENT	REQUIRED	CHECK IF ATTACHED
Interim Financial Statements	Monthly within 30 days	
Interim Financial Statements	Quarterly within 45 days	
Audited Financial Statements	FYE within 90 days	

Very Truly Yours,

MAST THERAPEUTICS, INC.

By: \_\_\_\_\_  
Name: \_\_\_\_\_  
Its: \_\_\_\_\_

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**EXHIBIT E**

**FORM OF JOINDER AGREEMENT**

This JOINDER AGREEMENT (the “Joinder Agreement”) is made and dated as of [●], and is entered into by and between [●], a [●] corporation (“Subsidiary”), and HERCULES TECHNOLOGY GROWTH CAPITAL, INC., a Maryland corporation (as “Agent”).

**RECITALS**

A. Subsidiary’s Affiliate, Mast Therapeutics, Inc., a Delaware corporation (the “Company”), has entered into that certain Loan and Security Agreement dated August 11, 2015 with the several banks and other financial institutions or entities from time to time party thereto as lender (collectively, the “Lender”) and Agent, as such agreement may be amended (the “Loan Agreement”), together with the other agreements executed and delivered in connection therewith.

B. Subsidiary acknowledges and agrees that it will benefit both directly and indirectly from the Company’s execution of the Loan Agreement and the other agreements executed and delivered in connection therewith.

**AGREEMENT**

NOW THEREFORE, Subsidiary and Agent agree as follows:

1. The recitals set forth above are incorporated into and made part of this Joinder Agreement. Capitalized terms not defined herein shall have the meaning provided in the Loan Agreement.
2. By signing this Joinder Agreement, Subsidiary shall be bound by the terms and conditions of the Loan Agreement to the same extent as if it were the Borrower (as defined in the Loan Agreement) under the Loan Agreement, *mutatis mutandis* (and pursuant hereto, Subsidiary confirms and agrees each representation, warranty, covenant, agreement and obligation as a Borrower under the Loan Agreement); provided however, that (a) with respect to (i) Section 5.1 of the Loan Agreement, Subsidiary represents that it is an entity duly organized, legally existing and in good standing under the laws of [●], (b) neither Agent nor Lender shall have any duties, responsibilities or obligations to Subsidiary arising under or related to the Loan Agreement or the other agreements executed and delivered in connection therewith, (c) if Subsidiary is covered by the Company’s insurance, Subsidiary shall not be required to maintain separate insurance or comply with the provisions of Sections 6.1 and 6.2 of the Loan Agreement, and (d) as long as the Company satisfies the requirements of Section 7.1 of the Loan Agreement, Subsidiary shall not have to provide Agent separate Financial Statements. To the extent that Agent or Lender has any duties, responsibilities or obligations arising under or related to the Loan Agreement or the other agreements executed and delivered in connection therewith, those duties, responsibilities or obligations shall flow only to the Company and not to Subsidiary or any other Person (as defined in the Loan Agreement). By way of example (and not an exclusive list): (i) Agent’s providing notice to the Company in accordance with the Loan Agreement or as otherwise agreed among the Company, Agent and Lender shall be deemed provided to Subsidiary; (ii) a Lender’s providing an Advance to the Company shall be deemed an Advance to Subsidiary; and (iii) Subsidiary shall have no right to request an Advance or make any other demand on Lender.
3. Subsidiary agrees not to certificate its equity securities without Agent’s prior written consent, which consent may be conditioned on the delivery of such equity securities to Agent in order to perfect Agent’s security interest in such equity securities.
4. Subsidiary acknowledges that it benefits, both directly and indirectly, from the Loan Agreement, and hereby waives, for itself and on behalf on any and all successors in interest (including without limitation any assignee for the benefit of creditors, receiver, bankruptcy trustee or itself as debtor-in-possession under any bankruptcy proceeding) to the fullest extent provided by law, any and all claims, rights or defenses to the enforcement of this Joinder Agreement on the basis that (a) it failed to receive adequate consideration for the execution and delivery of this Joinder Agreement or (b) its obligations under this Joinder Agreement are avoidable as a fraudulent conveyance.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

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[SIGNATURE PAGE TO JOINDER AGREEMENT]

SUBSIDIARY:

\_\_\_\_\_

By: \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_  
Facsimile: \_\_\_\_\_

AGENT:

HERCULES TECHNOLOGY GROWTH CAPITAL, INC.

By: \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_

Address:  
400 Hamilton Ave., Suite 310  
Palo Alto, CA 94301  
Facsimile: 650-473-9194  
Telephone: 650-289-3060

\_\_\_\_\_

**EXHIBIT F**

**ACH DEBIT AUTHORIZATION AGREEMENT**

Hercules Technology Growth Capital, Inc.  
400 Hamilton Avenue, Suite 310  
Palo Alto, CA 94301

Re: Loan and Security Agreement dated August 11, 2015 (the "Agreement") by and among Mast Therapeutics, Inc. ("Borrower") and Hercules Technology Growth Capital, Inc., as agent ("Company"), and the lenders party thereto (collectively, the "Lender")

In connection with the above referenced Agreement, Borrower hereby authorizes the Company to initiate debit entries for (i) the periodic payments due under the Agreement and (ii) out-of-pocket legal fees and costs incurred by Agent or Lender pursuant to Section 11.11 of the Agreement to Borrower's account indicated below, provided that Agent shall provide Borrower 10 Business Days advanced notice of any such legal fees and costs so that Borrower may confirm that such legal fees and costs are payable in accordance with Section 11.11 of the Agreement. Borrower authorizes the depository institution named below to debit to such account.

DEPOSITORY NAME	BRANCH
CITY	STATE AND ZIP CODE
TRANSIT/ABA NUMBER	ACCOUNT NUMBER

This authority will remain in full force and effect so long as any amounts are due under the Agreement.

MAST THERAPEUTICS, INC.

\_\_\_\_\_  
(Borrower)(Please Print)

By:  
Date:

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**SCHEDULE 1**

**SUBSIDIARIES**

Aires Pharmaceuticals, Inc.

SD Pharmaceuticals, Inc.

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**SCHEDULE 1.1**

**COMMITMENTS**

<b>LENDER</b>	<b>TERM COMMITMENT</b>
Hercules Technology III, L.P.	\$15,000,000
<b>TOTAL COMMITMENTS</b>	<b>\$15,000,000</b>

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**SCHEDULE 1A**

**PERMITTED INDEBTEDNESS**

Indebtedness relating to capital lease equipment:

Lease Agreement with NEC Financial Services, LLC – Mitel phone system

Indebtedness relating to operating lease equipment:

Lease agreement with Konica Minolta – copy machine

Rental agreement with Radiometer America Inc. – transcutaneous oxygen monitors

**SCHEDULE 1C**

**PERMITTED LIENS**

Liens relating to equipment leases:

Lease agreement with NEC Financial Services, LLC – Mitel phone system

Lease agreement with Konica Minolta – copy machine

Rental agreement with Radiometer America Inc. – transcutaneous oxygen monitors

Liens relating to purchase and installation of equipment:

System Integration Agreement with Triton Technology Solutions, Inc. – audio/visual equipment for conference room

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**SCHEDULE 5.3**

**CONSENTS**

None

**SCHEDULE 5.5**

**ACTIONS BEFORE GOVERNMENTAL AUTHORITIES**

None

**SCHEDULE 5.8**

**TAX MATTERS**

None

**SCHEDULE 5.14**

**SUBSIDIARIES**

Aires Pharmaceuticals, Inc.

SD Pharmaceuticals, Inc.

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**SCHEDULE 7.16**

**POST-CLOSING ITEMS**

1. On or before September 12, 2015, a Landlord's Waiver and Consent for 3611 Valley Centre Drive, Suite 500, San Diego, CA 92130 in form reasonably satisfactory to Agent.

## FIRST AMENDMENT TO LOAN AND SECURITY AGREEMENT

THIS FIRST AMENDMENT (this "Amendment"), dated as of September 28, 2015, to the Loan and Security Agreement, dated as of August 11, 2015 (the "Loan Agreement"), is made by and among MAST THERAPEUTICS, INC., a Delaware corporation ("Borrower"), HERCULES TECHNOLOGY GROWTH CAPITAL, INC., a Maryland corporation, as administrative agent ("Agent"), and the lender party hereto ("Lender").

### RECITALS

- A. Borrower, Agent and Lender are parties to the Loan Agreement.
- B. The parties wish to amend the Loan Agreement, as provided herein.
- C. The Loan Agreement may be amended pursuant to Section 11.3(b) thereof by the written agreement of Borrower, Agent and Lender (which, for the avoidance of doubt, is the Required Lender).

### AGREEMENT

NOW, THEREFORE, for valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

**SECTION 1. Defined Terms.** Capitalized terms used but not defined herein (including in the recitals) shall have the meanings assigned to such terms in the Loan Agreement.

**SECTION 2. Amendments to Loan Agreement.** Subject to all of the terms and conditions set forth in this Amendment, the parties hereby agree to the following amendments to the Loan Agreement.

(A) The definition of "Amortization Date" in Section 1.1 of the Loan Agreement is hereby amended and restated in its entirety to read as follows:

“Amortization Date” means June 1, 2016; provided, however, (a) if the First Interest Only Extension Condition is satisfied on or before June 1, 2016, but Borrower has not satisfied the Second Interest Only Extension Condition as of such date, then the Amortization Date shall mean September 1, 2016, and (b) if Borrower has satisfied both the First Interest Only Extension Condition and the Second Interest Only Extension Condition on or before June 1, 2016, then the Amortization Date shall mean March 1, 2017.”

(B) The definition of "Second Advance Milestone" in Section 1.1 of the Loan Agreement is hereby deleted in its entirety.

(C) The definition of "Second Advance Period" in Section 1.1 of the Loan Agreement is hereby deleted in its entirety.

(D) A new definition of "Second Advance Prepayment Conditions" is added to Section 1.1 of the Loan Agreement, such definition to read in its entirety as follows:

“Second Advance Prepayment Conditions” means Borrower’s achievement of each of the following on or before the specified dates: (a) on or before December 31, 2015, treatment of the first patient in Borrower’s planned Phase 2 clinical study of vepoloxamer in patients with heart failure; (b) on or before December 31, 2015, positive data is received from an investigator-sponsored Phase 2 clinical study of AIR001 (Clinicaltrials.gov Identifier: NCT02262078) and another investigator-sponsored Phase 2 clinical study of AIR001 (Clinicaltrials.gov Identifier: NCT01431313) is ongoing; and (c) on or before April 30, 2016, either (A) Borrower’s receipt of unrestricted and unencumbered net cash proceeds in an amount equal to at least \$15,000,000 from either, or a combination of, (i) upfront cash payments to Borrower resulting from strategic corporate partnerships or (ii) the completion by Borrower of one or more Equity Events, provided that, if any such Equity Event relates to Borrower’s offer and sale of Common Stock through an “at the market” offering program, (X) only 50% of any net proceeds received by Borrower after the Closing Date in connection with such offering program shall qualify for the satisfaction of the condition set forth in this clause (c) and (Y) Borrower may only apply an aggregate of \$3,000,000 of net proceeds received by Borrower after the Closing Date with respect to such offering program in satisfaction of the condition set forth in this clause (c), or (B) Borrower’s demonstration of, to the reasonable satisfaction of Agent, positive results in the EPIC Phase 3 study of vepoloxamer in patients with sickle cell disease.”

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(E) The definition of “Second Interest Only Extension Condition” appearing in Section 1.1 of the Loan Agreement is amended and restated in its entirety to read as follows:

““Second Interest Only Extension Condition” means Borrower’s satisfaction of each of the following conditions: (a) no default or Event of Default under any Loan Document shall have occurred and be continuing, (b) Borrower has achieved the conditions set forth in clause (b) of the definition of “First Interest Only Extension Condition”, and (c) Borrower has not prepaid the Second Advance pursuant to Section 2.4(b).”

(F) The definition of “Unfunded Term Loan Amount” appearing in Section 1.1 of the Loan Agreement is hereby deleted in its entirety.

(G) Section 2.1(a)(ii) of the Loan Agreement is hereby amended and restated in its entirety to read as follows:

“(ii) Subject to the terms and conditions of this Agreement, on September 28, 2015 Lender will severally (and not jointly) make, in an amount not to exceed its respective Term Commitment, and Borrower agrees to draw, an additional Advance in an amount equal to \$10,000,000 (the “Second Advance”).

(H) Section 2.4 of the Loan Agreement is hereby amended and restated in its entirety to read as follows:

**“2.4 Prepayment; Second Advance Prepayment Condition.**

(a) At its option upon at least five Business Days prior notice to Agent, Borrower may prepay all, but not less than all, of the outstanding Advances by paying the entire principal balance and all accrued and unpaid interest thereon, together with a prepayment charge in an amount equal to the following percentage of the Advance amounts being prepaid (each, a “Prepayment Charge”): (i) if the Advance amounts are prepaid during any of the first 12 months following the Closing Date, 3.00%; (ii) if the Advance amounts are prepaid during the period commencing after such 12 months following the Closing Date but on or prior to 24 months following the Closing Date, 2.00%; and (iii) if the Advance amounts are prepaid during any period after such 24 months following the Closing Date but prior to the Term Loan Maturity Date, 1.00%. Borrower agrees that the Prepayment Charge is a reasonable calculation of Lender’s lost profits in view of the difficulties and impracticality of determining actual damages resulting from an early repayment of the Advances. Upon the occurrence of a Change in Control, Borrower shall prepay the outstanding amount of all principal and accrued interest through the prepayment date and all unpaid fees and expenses accrued to the date of repayment, together with the applicable Prepayment Charge. For the avoidance of doubt, (i) Borrower may not borrow, and Lender shall not lend, any Advance amounts that are prepaid under this Section 2.4(a), and (ii) Lender shall not be entitled to any Prepayment Charge in the event all or a portion of the Advances are repaid to Lender in connection with the concurrent extension of additional loans by Lender and/or its Affiliates to Borrower.

(b) Unless Borrower has achieved each of the Second Advance Prepayment Conditions on or before the dates applicable to each Second Advance Prepayment Condition, on April 30, 2016, Borrower shall prepay the outstanding amount of all principal and accrued interest in respect of the Second Advance and all unpaid fees and expenses accrued to such date; provided, however, Borrower shall not be required to pay any Prepayment Charge in connection with the required prepayment of the Second Advance pursuant this Section 2.4(b). Borrower’s failure to make the prepayment required under this Section 2.4(b) shall constitute an Event of Default under Section 9.1.”

(I) Section 2.5 of the Loan Agreement is hereby amended and restated in its entirety to read as follows:

“**2.5 End of Term Charge.** On the earliest to occur of (i) the Term Loan Maturity Date, (ii) the date that Borrower prepays all outstanding Secured Obligations, or (iii) the date that the Secured Obligations become due and payable in full, Borrower shall pay Lender an amount equal to \$712,500.”

(J) Section 4.2 of the Loan Agreement is hereby amended and restated in its entirety to read as follows:

“**4.2 Additional Advance.** Lender’s obligation to make the Second Advance is subject to all applicable conditions under this Agreement.”

(K) Schedule 7.16 contemplated by the Loan Agreement is hereby amended and restated in its entirety to read as set forth on Schedule 7.16.1.

**SECTION 3. Conditions to this Amendment.** This Amendment shall become effective only if Borrower has satisfied the following conditions as of the date hereof:

(A) Borrower shall have delivered to Agent an additional facility charge payment of \$37,500;

(B) Borrower shall have delivered to Agent a duly executed amendment to the Warrant Agreement in the form attached hereto as Exhibit A (the “Warrant Amendment”); and

(C) Borrower shall have delivered to Agent a duly executed Advance Request for the Second Advance; provided that Agent and Lender waive the requirement to deliver such Advance Request pursuant to Section 2.1(b) of the Loan Agreement.

**SECTION 4. Effect on Loan Documents.** Except as specifically amended herein and the Warrant Amendment, all Loan Documents shall continue to be in full force and effect and are ratified and confirmed in all respects. The execution, delivery and effectiveness of this Amendment shall not operate as a waiver of any right, power or remedy of any Lender or Agent under any of the Loan Documents, and it shall not constitute a waiver of any provision of the Loan Documents. Any reference to the Loan Agreement in any other Loan Document shall be a reference to the Loan Agreement as amended by this Amendment.

**SECTION 5. Representations and Warranties.** Borrower represents and warrants to Agent and Lender as follows:

(A) Borrower's execution, delivery and performance of this Amendment and the Warrant Amendment, (i) have been duly authorized by all necessary corporate action of Borrower, (ii) will not result in the creation or imposition of any Lien upon the Collateral or the Intellectual Property, other than Permitted Liens and the Liens created by the Loan Documents, (iii) do not violate any provisions of Borrower's Certificate of Incorporation, bylaws, or any law, regulation, order, injunction, judgment, decree or writ to which Borrower is subject, and (iv) except as described on Schedule 5.3 to the Loan Agreement, do not violate any contract or agreement or require the consent or approval of any other Person which has not already been obtained. The individual or individuals executing this Amendment and the Warrant Amendment are duly authorized to do so.

(B) This Amendment and the Warrant Amendment have been duly executed and delivered on Borrower's behalf by its duly authorized officer, and constitutes Borrower's legal, valid and binding obligations, enforceable against Borrower in accordance with their respective terms, subject to bankruptcy, reorganization, insolvency, moratorium and other similar laws affecting the enforcement of creditors' rights generally and the exercise of judicial discretion in accordance with general principles of equity.

**SECTION 6. Governing Law.** This Amendment shall be governed by, and construed in accordance with, the law of the State of California.

**SECTION 7. Counterparts.** This Amendment may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Delivery by facsimile, .pdf or other electronic imaging means of an executed counterpart of a signature page to this Amendment shall be effective as delivery of an original executed counterpart of this Amendment. Agent may also require that any such documents and signatures delivered by facsimile, .pdf or other electronic imaging means be confirmed by a manually signed original thereof; provided that the failure to request or deliver the same shall not limit the effectiveness of any document or signature delivered by facsimile, .pdf or other electronic imaging means.

*[Remainder of page intentionally blank]*

IN WITNESS WHEREOF, the parties hereto have caused this Amendment to be duly executed and delivered by their respective proper and duly authorized officers as of the day and year first above written.

**BORROWER:**

MAST THERAPEUTICS, INC.

By: /s/ Brandi Roberts  
Name: Brandi Roberts  
Title: Chief Financial Officer

**AGENT:**

HERCULES TECHNOLOGY GROWTH CAPITAL, INC.

By: /s/ Ben Bang  
Name: Ben Bang  
Title: Associate General Counsel

**LENDER:**

HERCULES TECHNOLOGY III, L.P.

By: Hercules Technology SBIC Management, LLC, its  
General Partner

By: Hercules Technology Growth Capital, Inc., its  
Manager

By: /s/ Ben Bang  
Name: Ben Bang  
Title: Associate General Counsel

[First Amendment to Loan and Security Agreement]

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**Exhibit A**

**Warrant Amendment**

*(See attached)*

[First Amendment to Loan and Security Agreement]

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**SCHEDULE 7.16.1**

**POST-CLOSING ITEMS**

1. On or before October 31, 2015, a Landlord's Waiver and Consent for 3611 Valley Centre Drive, Suite 500, San Diego, CA 92130 in form reasonably satisfactory to Agent.

THIS WARRANT AND THE SHARES ISSUABLE UPON EXERCISE HEREOF HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT (AS DEFINED BELOW), OR ANY STATE SECURITIES LAWS, AND MAY NOT BE SOLD, OFFERED FOR SALE, PLEDGED, OR HYPOTHECATED IN THE ABSENCE OF AN EFFECTIVE REGISTRATION STATEMENT RELATED THERETO OR, SUBJECT TO SECTION 11, AN OPINION OF COUNSEL (WHICH MAY BE COMPANY COUNSEL) REASONABLY SATISFACTORY TO THE COMPANY THAT SUCH REGISTRATION IS NOT REQUIRED UNDER THE SECURITIES ACT, OR ANY APPLICABLE STATE SECURITIES LAWS.

### WARRANT AGREEMENT

To Purchase Shares of the Common Stock of

**MAST THERAPEUTICS, INC.**

Dated as of August 11, 2015 (the "Effective Date")

WHEREAS, Mast Therapeutics, Inc., a Delaware corporation (the "Company"), on the date hereof, has entered into a Loan and Security Agreement of even date herewith (as amended and in effect from time to time, the "Loan Agreement") with Hercules Technology Growth Capital, Inc., a Maryland corporation, as agent, Hercules Technology III, L.P., a Delaware limited partnership (the "Warrantholder"), and the other lender parties thereto.

WHEREAS, pursuant to the Loan Agreement, and as additional consideration to the Warrantholder for, among other things, its agreements in the Loan Agreement, the Company has agreed to issue to the Warrantholder this Warrant Agreement (the "Agreement"), evidencing the right to purchase (the "Warrant") shares of Common Stock (as defined below).

NOW, THEREFORE, in consideration of the Warrantholder executing and delivering the Loan Agreement and providing the financial accommodations contemplated therein, and in consideration of the mutual covenants and agreements contained herein, the Company and the Warrantholder agree as follows:

#### SECTION 1. GRANT OF THE RIGHT TO PURCHASE COMMON STOCK

(a) For value received, the Company hereby grants to the Warrantholder, and the Warrantholder is entitled, upon the terms and subject to the conditions hereinafter set forth, to subscribe for and purchase, from the Company, up to the number of fully paid and non-assessable shares of Common Stock (as defined below) as determined pursuant to Section 1(b), at a purchase price per share equal to the Exercise Price (as defined below). The number of, and Exercise Price for, such shares are subject to adjustment as provided in Section 8. As used herein, the following terms shall have the following meanings:

"Charter" means the Company's Amended and Restated Certificate of Incorporation, as may be amended and in effect from time to time.

"Common Stock" means the Company's common stock, \$0.001 par value per share.

"Exchange Act" means the Securities Exchange Act of 1934, as amended.

"Exercise Price" means \$0.41.

"Liquid Sale" means the closing of a Merger Event in which the consideration received by the Company and/or its stockholders, as applicable, consists solely of cash and/or Marketable Securities.



“Marketable Securities” in connection with a Merger Event means securities meeting all of the following requirements: (i) the issuer thereof is then subject to the reporting requirements of Section 13 or Section 15(d) of the Exchange Act, and is then current in its filing of all required reports and other information under the Securities Act (as defined below) and the Exchange Act; (ii) the class and series of shares or other security of the issuer that would be received by the Warrantholder in connection with the Merger Event were the Warrantholder to exercise this Warrant on or prior to the closing thereof is then traded on a national securities exchange or over-the-counter market, and (iii) following the closing of such Merger Event, the Warrantholder would not be restricted from publicly re-selling all of the issuer’s shares and/or other securities that would be received by the Warrantholder in such Merger Event were the Warrantholder to exercise this Warrant in full on or prior to the closing of such Merger Event, except to the extent that any such restriction (x) arises solely under federal or state securities laws, rules or regulations, and (y) does not extend beyond six (6) months from the closing of such Merger Event.

“Merger Event” means any of the following: (i) a sale, lease or other transfer of all or substantially all assets of the Company, (ii) any merger or consolidation involving the Company in which the Company is not the surviving entity or in which the outstanding shares of the Company’s capital stock are otherwise converted into or exchanged for shares of capital stock or other securities or property of another entity and in which the holders of a majority of the outstanding shares of capital stock of the Company immediately prior to such merger or consolidation do not hold a majority of the surviving entity or other entity immediately following such merger or consolidation, or (iii) any sale by holders of the outstanding voting equity securities of the Company in a single transaction or series of related transactions of shares constituting a majority of the outstanding combined voting power of the Company.

“Purchase Price” means, with respect to any exercise of this Warrant, an amount equal to the Exercise Price (subject to adjustment from time to time in accordance with the provisions of this Agreement) multiplied by the number of shares of Common Stock as to which this Warrant is then exercised.

“Rule 144” means Rule 144 of the Securities Act, as amended.

“Securities Act” means the Securities Act of 1933, as amended.

“Warrant Coverage” means \$350,000, *plus*, subject to and contingent upon the funding of the Second Advance (as defined in the Loan Agreement), an additional \$175,000.

(b) Number of Shares. This Warrant shall be exercisable for an aggregate number of fully-paid and non-assessable shares of Common Stock equal to the quotient of (a) the Warrant Coverage divided by (b) the Exercise Price, as subject to adjustment from time to time in accordance with the provisions of this Agreement, subject to further adjustment thereafter from time to time in accordance with the provisions of this Agreement.

## **SECTION 2. TERM OF THE AGREEMENT**

The term of this Agreement and the right to purchase Common Stock as granted herein shall commence on the Effective Date and, subject to Section 8(a), shall be exercisable for a period ending upon the fifth anniversary of the Effective Date.

## **SECTION 3. EXERCISE OF THE PURCHASE RIGHTS**

(a) Exercise. The purchase rights set forth in this Agreement are exercisable by the Warrantholder, in whole or in part, at any time, or from time to time, prior to the expiration of the term set forth in Section 2, by tendering to the Company at its principal office a notice of exercise in the form attached hereto as Exhibit I (the “Notice of Exercise”), duly completed and executed. Promptly upon receipt of the Notice of Exercise and the payment of the Purchase Price in accordance with the terms set forth below, and in no event later than three (3) business days thereafter, the Company shall cause its transfer agent to issue to the Warrantholder in book entry form the number of shares of Common Stock purchased, and the Company shall execute the acknowledgment of exercise in the form attached hereto as Exhibit II (the “Acknowledgment of Exercise”) indicating the number of shares which remain subject to future purchases under this Agreement, if any.

The Purchase Price may be paid at the Warrantholder's election either (i) by cash or check, or (ii) by surrender of all or a portion of the Warrant for shares of Common Stock to be exercised under this Agreement and, if applicable, an amended Agreement setting forth the remaining number of shares purchasable hereunder, as determined below (a "Net Issuance"). If the Warrantholder elects a Net Issuance, the Company will issue shares of Common Stock in accordance with the following formula:

$$X = \frac{Y(A-B)}{A}$$

Where: X = the number of shares of Common Stock to be issued to the Warrantholder.

Y = the number of shares of Common Stock requested to be exercised under this Agreement.

A = the current fair market value of one (1) share of Common Stock at the time of exercise.

B = the then-effective Exercise Price.

For purposes of the above calculation, the "current fair market value" of shares of Common Stock shall mean with respect to each share of Common Stock:

- (i) at all times when the Common Stock is traded on a national securities exchange, inter-dealer quotation system or over-the-counter bulletin board service, the average of the closing prices over a five (5) day period ending three days before the day the current fair market value of the securities is being determined;
- (ii) if the exercise is in connection with a Merger Event, the fair market value of a share of Common Stock shall be deemed to be the per share value received by the holders of the outstanding shares of Common Stock pursuant to such Merger Event as determined in accordance with the definitive transaction documents executed among the parties in connection therewith; or
- (iii) in cases other than as described in the foregoing clauses (i) and (ii), the current fair market value of a share of Common Stock shall be determined in good faith by the Company's Board of Directors, unless the Company shall become subject to a Merger Event, in which case the fair market value of shares of Common Stock shall be deemed to be the per share value received by the holders of the Common Stock on a common equivalent basis pursuant to such Merger Event.

Upon partial exercise by either cash or, upon request by the Warrantholder and surrender of all or a portion of this Warrant, Net Issuance, prior to the expiration or earlier termination hereof, the Company shall promptly issue an amended Agreement representing the remaining number of shares purchasable hereunder. All other terms and conditions of such amended Agreement shall be identical to those contained herein, including, but not limited to the Effective Date hereof.

(b) Exercise Prior to Expiration. To the extent this Warrant is not previously exercised as to all shares subject hereto, and if the then-current fair market value of one share of Common Stock is greater than the Exercise Price then in effect, or, in the case of a Liquid Sale, where the value per share of Common Stock (as determined as of the closing of such Liquid Sale in accordance with the definitive agreements executed by the parties in connection with such Merger Event) to be paid to the holders thereof is greater than the Exercise Price then in effect, this Agreement shall be deemed automatically exercised on a Net Issuance basis pursuant to Section 3(a) (even if not surrendered) as of immediately before its expiration determined in accordance with Section 2. For purposes of such automatic exercise, the fair market value of one share of Common Stock upon such expiration shall be determined pursuant to Section 3(a). To the extent this Warrant or any portion hereof is deemed automatically exercised pursuant to this Section 3(b), the Company agrees to promptly notify the Warrantholder of the number of shares of Common Stock, if any, the Warrantholder is to receive by reason of such automatic exercise, and to cause its transfer agent to issue to the Warrantholder in book entry form.

#### **SECTION 4. RESERVATION OF SHARES**

During the term of this Agreement, the Company will at all times have authorized and reserved a sufficient number of shares of its Common Stock to provide for the exercise of the rights to purchase Common Stock as provided for herein.

#### **SECTION 5. NO FRACTIONAL SHARES OR SCRIP**

No fractional shares or scrip representing fractional shares shall be issued upon the exercise of this Warrant, but in lieu of such fractional shares the Company shall make a cash payment therefor upon the basis of the Exercise Price then in effect.

## SECTION 6. NO RIGHTS AS STOCKHOLDER

Without limitation of any provision hereof, the Warrantholder agrees that this Agreement does not entitle the Warrantholder to any voting rights or other rights as a stockholder of the Company prior to the exercise of any of the purchase rights set forth in this Agreement.

## SECTION 7. WARRANTHOLDER REGISTRY

The Company shall maintain a registry showing the name and address of the registered holder of this Agreement. The Warrantholder's initial address, for purposes of such registry, is set forth in [Section 12\(f\)](#). The Warrantholder may change such address by giving written notice of such changed address to the Company.

## SECTION 8. ADJUSTMENT RIGHTS

The Exercise Price and the number of shares of Common Stock purchasable hereunder are subject to adjustment from time to time, as follows:

(a) Merger Event. In connection with a Merger Event that is a Liquid Sale, this Warrant shall, on and after the closing thereof, automatically and without further action on the part of any party or other person, represent the right to receive the consideration payable on or in respect of all shares of Common Stock that are issuable hereunder as of immediately prior to the closing of such Merger Event less the Purchase Price for all such shares of Common Stock (such consideration to include both the consideration payable at the closing of such Merger Event and all deferred consideration payable thereafter, if any, including, but not limited to, payments of amounts deposited at such closing into escrow and payments in the nature of earn-outs, milestone payments or other performance-based payments), and such Merger Event consideration shall be paid to the Warrantholder as and when it is paid to the holders of the outstanding shares of Common Stock. To the extent the consideration to be received by the Warrantholder at the closing of a Merger Event that is a Liquid Sale is less than the Purchase Price, this Warrant shall automatically terminate as of the closing of such Merger Event that is a Liquid Sale. In connection with a Merger Event that is not a Liquid Sale, the Company shall cause the successor or surviving entity to assume this Agreement and the obligations of the Company hereunder on the closing thereof, and thereafter this Warrant shall be exercisable for the same number and type of securities or other property as the Warrantholder would have received in consideration for the shares of Common Stock issuable hereunder had it exercised this Warrant in full as of immediately prior to such closing, at an aggregate Exercise Price no greater than the aggregate Exercise Price in effect as of immediately prior to such closing, and subject to further adjustment from time to time in accordance with the provisions of this Agreement. The provisions of this [Section 8\(a\)](#) shall similarly apply to successive Merger Events.

(b) Reclassification of Shares. Except for Merger Events subject to [Section 8\(a\)](#), if the Company at any time shall, by combination, reclassification, exchange or subdivision of securities or otherwise, change any of the securities as to which purchase rights under this Agreement exist into the same or a different number of securities of any other class or classes of securities, this Agreement shall thereafter represent the right to acquire such number and kind of securities as would have been issuable as the result of such change with respect to the securities which were subject to the purchase rights under this Agreement immediately prior to such combination, reclassification, exchange, subdivision or other change. The provisions of this [Section 8\(b\)](#) shall similarly apply to successive combination, reclassification, exchange, subdivision or other change.

(c) Subdivision or Combination of Shares. If the Company at any time shall combine or subdivide its Common Stock, (i) in the case of a subdivision, the Exercise Price shall be proportionately decreased and the number of shares for which this Warrant is exercisable shall be proportionately increased, or (ii) in the case of a combination, the Exercise Price shall be proportionately increased and the number of shares for which this Warrant is exercisable shall be proportionately decreased.

(d) Dividends. If the Company at any time while this Agreement is outstanding and unexpired shall:

- (i) pay a dividend with respect to the outstanding shares of Common Stock payable in additional shares of Common Stock, then the Exercise Price shall be adjusted, as of the record date applicable to such dividend, to that price determined by multiplying the Exercise Price in effect immediately prior to such date of determination by a fraction (A) the numerator of which shall be the total number of shares of Common Stock outstanding immediately prior to such dividend or distribution, and (B) the denominator of which shall be the total number of shares of Common Stock outstanding immediately after such dividend or distribution, and the number of shares of Common Stock for which this Warrant is exercisable shall be proportionately increased; or
- (ii) make any other dividend or distribution on or with respect to Common Stock, except any dividend or distribution (A) in cash, or (B) specifically provided for in any other clause of this [Section 8](#), then, in each such case, provision shall be made by the Company such that the Warrantholder shall receive upon exercise of this Warrant a proportionate share of any such distribution as though it were the holder of the Common Stock as of the record date fixed for the determination of the shareholders of the Company entitled to receive such distribution.

(e) Notice of Certain Events. If: (i) the Company shall declare any dividend or distribution upon its outstanding Common Stock, payable in stock, cash, property or other securities (provided that the Warrantholder in its capacity as lender under the Loan Agreement consents to such dividend); (ii) the Company shall offer for subscription pro rata to the holders of its Common Stock any additional shares of stock of any class or other rights; (iii) there shall be any Merger Event; or (iv) there shall be any voluntary dissolution, liquidation or winding up of the Company; then, in connection with each such event, the Company shall give the Warrantholder notice thereof at the same time and in the same manner as it gives notice thereof to the holders of outstanding Common Stock.

## **SECTION 9. REPRESENTATIONS, WARRANTIES AND COVENANTS OF THE COMPANY**

(a) Reservation of Common Stock. The Company covenants and agrees that all shares of Common Stock, if any, that may be issued upon the exercise of this Warrant will, upon issuance, be validly issued and outstanding, fully paid and non-assessable. The Company further covenants and agrees that the Company will, at all times during the term hereof, have authorized and reserved, free from preemptive rights, a sufficient number of shares of Common Stock to provide for the exercise of the rights represented by this Warrant. If at any time during the term hereof the number of authorized but unissued shares of Common Stock shall not be sufficient to permit exercise of this Warrant in full, the Company will take such corporate action as may, in the opinion of its counsel, be necessary to increase its authorized but unissued shares of Common Stock to such number of shares as shall be sufficient for such purposes.

(b) Due Authority. The execution and delivery by the Company of this Agreement and the performance of all obligations of the Company hereunder, including the issuance to the Warrantholder of the right to acquire the shares of Common Stock, have been duly authorized by all necessary corporate action on the part of the Company. This Agreement: (1) does not violate the Company's Charter or current bylaws; (2) does not contravene any law or governmental rule, regulation or order applicable to it; and (3) except as could not reasonably be expected to have a Material Adverse Effect (as defined in the Loan Agreement), does not and will not contravene any provision of, or constitute a default under, any indenture, mortgage, contract or other instrument to which it is a party or by which it is bound. This Agreement constitutes a legal, valid and binding agreement of the Company, enforceable in accordance with its terms, except as may be limited by bankruptcy, insolvency, reorganization, moratorium or similar laws relating to or affecting creditors' rights generally (including, without limitation, fraudulent conveyance laws) and by general principles of equity, regardless of whether considered in a proceeding in equity or at law.

(c) Consents and Approvals. No consent or approval of, giving of notice to, registration with, or taking of any other action in respect of any state, federal or other governmental authority or agency is required with respect to the execution, delivery and performance by the Company of its obligations under this Agreement, except (i) for approval of the NYSE MKT to list the shares of Common Stock issuable upon exercise of this Warrant, (ii) the filing of notices pursuant to Regulation D under the Securities Act and (iii) any filing required by applicable state securities law, which filings noted in clauses (i), (ii) and (iii) will be effective by the time required thereby.

(d) Exempt Transaction. Subject to the accuracy of the Warrantholder's representations in Section 10, the issuance of the Common Stock upon exercise of this Warrant will constitute a transaction exempt from (i) the registration requirements of Section 5 of the Securities Act, in reliance upon Section 4(a)(2) thereof, and (ii) the qualification requirements of the applicable state securities laws.

(e) Listing of Shares. The Common Stock is listed for trading on the NYSE MKT as of the Effective Date, and the Company shall use commercially reasonable efforts to maintain such listing (or a listing on another national recognized securities exchange) through the term of this Agreement.

(f) Rule 144 Compliance. The Company shall, at all times prior to the earlier to occur of (x) the date of sale or other disposition by the Warrantholder of this Warrant or all shares of Common Stock issued on exercise of this Warrant, or (y) the expiration or earlier termination of this Agreement if the Warrant has not been exercised in full or in part on such date, use all commercially reasonable efforts to timely file all reports required under the Exchange Act and otherwise timely take all actions necessary to permit the Warrantholder to sell or otherwise dispose of this Warrant and the shares of Common Stock issued on exercise hereof pursuant to Rule 144 and in effect from time to time, provided that the foregoing shall not apply in the event of a Merger Event following which the successor or surviving entity is not subject to the reporting requirements of the Exchange Act. If the Warrantholder proposes to sell Common Stock issuable upon the exercise of this Warrant in compliance with Rule 144, then, upon the Warrantholder's written request to the Company, the Company shall furnish to the Warrantholder, within five (5) business days after receipt of such request, a written statement confirming the status of the Company's compliance with the filing and other requirements of such Rule 144.

## SECTION 10. REPRESENTATIONS AND COVENANTS OF THE WARRANTHOLDER

This Agreement has been entered into by the Company in reliance upon the following representations and covenants of the Warrantholder:

(a) Investment Purpose. This Warrant and the shares issued on exercise hereof will be acquired for investment and not with a view to the sale or distribution of any part thereof in violation of applicable federal and state securities laws, and the Warrantholder has no present intention of selling or engaging in any public distribution of the same except pursuant to a registration or exemption.

(b) Private Issue. The Warrantholder understands (i) that the Common Stock issuable upon exercise of this Warrant is not, as of the Effective Date, registered under the Securities Act or qualified under applicable state securities laws, and (ii) that the Company's reliance on exemption from such registration is predicated on the representations set forth in this Section 10.

(c) Financial Risk. The Warrantholder has such knowledge and experience in financial and business matters as to be capable of evaluating the merits and risks of its investment, and has the ability to bear the economic risks of its investment in the Company.

(d) Accredited Investor. The Warrantholder is an "accredited investor" within the meaning of Rule 501 of Regulation D promulgated under the Securities Act, as presently in effect ("Regulation D").

(e) No Short Sales. The Warrantholder has not at any time on or prior to the Effective Date engaged in any short sales or equivalent transactions in the Common Stock. The Warrantholder agrees that at all times from and after the Effective Date and on or before the expiration or earlier termination of this Agreement, it shall not engage in any short sales or equivalent transactions in the Common Stock.

(f) Risk of No Registration. The Warrantholder understands and agrees that the Company has no obligation under this Warrant or the Loan Agreement to register for resale under the Securities Act this Warrant or the shares of Common Stock issuable upon exercise of this Warrant.

(g) Rule 144 Compliance. If the Warrantholder proposes to sell, assign or otherwise transfer this Warrant (or any portion hereof or any interest herein) or the shares of Common Stock issuable upon the exercise of this Agreement in compliance with Rule 144, the Warrantholder shall furnish, and shall cause its broker to furnish, to the Company written statements in forms reasonably acceptable to the Company, confirming that such transfer will be in compliance with the applicable filing and other requirements of such Rule 144. The Warrantholder understands and agrees that any transfer of this Warrant or the shares of Common Stock issuable upon exercise of this Warrant that might be made by it in reliance upon Rule 144 may be made only in accordance with the terms and conditions of Rule 144, and, upon the reasonable request of the Company, the Warrantholder shall furnish to the Company an opinion of counsel, reasonably satisfactory to the Company, that such transfer of this Warrant or the shares of Common Stock issuable upon exercise of this Warrant will not require registration under the Securities Act or any applicable state securities laws, and can be made in reliance on Rule 144.

## SECTION 11. TRANSFERS

Subject to compliance with applicable federal and state securities laws, this Agreement and all rights hereunder are transferable, in whole or in part, without charge to the holder hereof (except for transfer taxes) upon surrender of this Agreement properly endorsed. Each taker and holder of this Agreement, by taking or holding the same, consents and agrees that this Agreement, when endorsed in blank, shall be deemed negotiable, and that the holder hereof, when this Agreement shall have been so endorsed and its transfer recorded on the Company's books, shall be treated by the Company and all other persons dealing with this Agreement as the absolute owner hereof for any purpose and as the person entitled to exercise the rights represented by this Agreement. The transfer of this Agreement shall be recorded on the books of the Company upon receipt by the Company of a notice of transfer in the form attached hereto as Exhibit III (the "Transfer Notice"), at its principal offices and the payment to the Company of all transfer taxes and other governmental charges imposed on such transfer. Until the Company receives such Transfer Notice, the Company may treat the registered owner hereof as the owner for all purposes. Notwithstanding anything herein or in any legend to the contrary, (i) the Company shall not require an opinion of counsel in connection with any sale, assignment or other transfer, by the Warrantholder of this Warrant (or any portion hereof or any interest herein) to an affiliate (as defined in Regulation D) of the Warrantholder, provided that such affiliate is an "accredited investor" under Regulation D, and (ii) the Company shall not require an opinion of counsel in connection with any assignment or other transfer, in each case without the payment of consideration, by the Warrantholder of any shares of Common Stock issued upon exercise hereof to any such affiliate of the Warrantholder, provided such affiliate is an "accredited investor" under Regulation D.

## SECTION 12. MISCELLANEOUS.

(a) Effective Date. The provisions of this Agreement shall be construed and shall be given effect in all respects as if it had been executed and delivered by the Company on the date hereof. This Agreement shall be binding upon any successors or assigns of the Company.

(b) Remedies. In the event of any default hereunder, the non-defaulting party may proceed to protect and enforce its rights either by suit in equity and/or by action at law, including but not limited to an action for damages as a result of any such default, and/or an action for specific performance for any default where the non-defaulting party will not have an adequate remedy at law and where damages will not be readily ascertainable.

(c) No Impairment of Rights. The Company will not, by amendment of its Charter or through any other means, avoid or seek to avoid the observance or performance of any of the terms of this Agreement, but will at all times in good faith assist in the carrying out of all such terms and in the taking of all such actions as may be necessary or appropriate in order to protect the rights of the Warrantholder against impairment. Notwithstanding the foregoing, nothing in this Section 12(c) shall restrict or impair the Company's right to effect any changes to the rights, preferences, privileges or restrictions associated with the Common Stock so long as such changes do not adversely affect the rights, preferences, privileges or restrictions associated with the shares of Common Stock issuable upon exercise of this Warrant in a manner different from the effect that such changes have generally on the rights, preferences, privileges or restrictions associated with all other shares of Common Stock.

(d) Attorneys' Fees. In any litigation, arbitration or court proceeding between the Company and the Warrantholder relating hereto, the prevailing party shall be entitled to reasonable attorneys' fees and expenses and all costs of proceedings incurred in enforcing this Agreement. For the purposes of this Section 12(d), attorneys' fees shall include without limitation fees incurred in connection with the following: (i) contempt proceedings; (ii) discovery; (iii) any motion, proceeding or other activity of any kind in connection with an insolvency proceeding; (iv) garnishment, levy, and debtor and third party examinations; and (v) post-judgment motions and proceedings of any kind, including without limitation any activity taken to collect or enforce any judgment.

(e) Severability. In the event any one or more of the provisions of this Agreement shall for any reason be held invalid, illegal or unenforceable, the remaining provisions of this Agreement shall be unimpaired, and the invalid, illegal or unenforceable provision shall be replaced by a mutually acceptable valid, legal and enforceable provision, which comes closest to the intention of the parties underlying the invalid, illegal or unenforceable provision.

(f) Notices. Except as otherwise provided herein, any notice, demand, request, consent, approval, declaration, service of process or other communication that is required, contemplated, or permitted under this Agreement or with respect to the subject matter hereof shall be in writing, and shall be deemed to have been validly served, given, delivered, and received upon the earlier of: (a) personal delivery to the party to be notified, (b) when sent by confirmed telex, electronic transmission or facsimile if sent during normal business hours of the recipient, if not, then on the next business day, (c) five days after having been sent by registered or certified mail, return receipt requested, postage prepaid, or (d) one day after deposit with a nationally recognized overnight courier, specifying next day delivery, with written verification of receipt, and shall be addressed to the party to be notified as follows:

If to the Warrantholder:

HERCULES TECHNOLOGY III, L.P.  
Legal Department  
Attention: Deputy General Counsel and Manuel Henriquez  
400 Hamilton Avenue, Suite 310  
Palo Alto, California 94301  
Facsimile: 650-473-9194  
Telephone: 650-289-3060  
Email: legal@herculestech.com

If to the Company:

MAST THERAPEUTICS, INC.  
Attention: Chief Financial Officer  
3611 Valley Centre Drive, Suite 500  
San Diego, CA 92130  
Facsimile: 858-552-0876  
Telephone: 858-552-0866

With a copy to (which shall not constitute notice):

Gunderson Dettmer Stough Villeneuve Franklin & Hachigian, LLP  
Attention: Kirt Shuldberg  
3570 Carmel Mountain Road, Suite 200  
San Diego, CA 92130  
Facsimile: 858-436-8061  
Email: kshuldberg@gunder.com

or to such other address as each party may designate for itself by like notice.

(g) Entire Agreement; Amendments. This Agreement constitutes the entire agreement and understanding of the parties hereto in respect of the subject matter hereof, and supersedes and replaces in their entirety any prior proposals, term sheets, letters, negotiations or other documents or agreements, whether written or oral, with respect to the subject matter hereof. None of the terms of this Agreement may be amended except by an instrument executed by each of the parties hereto.

(h) Headings. The various headings in this Agreement are inserted for convenience only and shall not affect the meaning or interpretation of this Agreement or any provisions hereof.

(i) No Strict Construction. The parties hereto have participated jointly in the negotiation and drafting of this Agreement. In the event an ambiguity or question of intent or interpretation arises, this Agreement shall be construed as if drafted jointly by the parties hereto and no presumption or burden of proof shall arise favoring or disfavoring any party by virtue of the authorship of any provisions of this Agreement.

(j) No Waiver. Except for the requirement that this Warrant be exercised (or be deemed exercised), if at all, during the term of this Agreement, no omission or delay by the Warrantholder at any time to enforce any right or remedy reserved to it, or to require performance of any of the terms, covenants or provisions hereof by the Warrantholder at any time designated, shall be a waiver of any such right or remedy to which the Warrantholder is entitled, nor shall it in any way affect the right of the Warrantholder to enforce such provisions thereafter during the term of this Agreement.

(k) Survival. All agreements, representations and warranties contained in this Agreement or in any document delivered pursuant hereto shall be for the benefit of the Warrantholder and shall survive the execution and delivery of this Agreement and the expiration or other termination of this Agreement.

(l) Governing Law. This Agreement has been negotiated and delivered to the Warrantholder in the State of California, and shall be deemed to have been accepted by the Warrantholder in the State of California. Delivery of Common Stock to the Warrantholder by the Company under this Agreement is due in the State of California. This Agreement shall be governed by, and construed and enforced in accordance with, the laws of the State of California, excluding conflict of laws principles that would cause the application of laws of any other jurisdiction.

(m) Consent to Jurisdiction and Venue. All judicial proceedings arising in or under or related to this Agreement may be brought in any state or federal court of competent jurisdiction located in the State of California. By execution and delivery of this Agreement, each party hereto generally and unconditionally: (a) consents to personal jurisdiction in Santa Clara County, State of California; (b) waives any objection as to jurisdiction or venue in Santa Clara County, State of California; (c) agrees not to assert any defense based on lack of jurisdiction or venue in the aforesaid courts; and (d) irrevocably agrees to be bound by any judgment rendered thereby in connection with this Agreement. Service of process on any party hereto in any action arising out of or relating to this Agreement shall be effective if given in accordance with the requirements for notice set forth in Section 12(f), and shall be deemed effective and received as set forth in Section 12(f). Nothing herein shall affect the right to serve process in any other manner permitted by law or shall limit the right of either party to bring proceedings in the courts of any other jurisdiction.

(n) Mutual Waiver of Jury Trial. Because disputes arising in connection with complex financial transactions are most quickly and economically resolved by an experienced and expert person and the parties wish applicable state and federal laws to apply (rather than arbitration rules), the parties desire that their disputes arising under or in connection with this Agreement be resolved by a judge applying such applicable laws. EACH OF THE COMPANY AND THE WARRANTHOLDER SPECIFICALLY WAIVES ANY RIGHT IT MAY HAVE TO TRIAL BY JURY OF ANY CAUSE OF ACTION, CLAIM, CROSS-CLAIM, COUNTERCLAIM, THIRD PARTY CLAIM OR ANY OTHER CLAIM ASSERTED BY THE COMPANY AGAINST THE WARRANTHOLDER OR ITS ASSIGNEE OR BY THE WARRANTHOLDER OR ITS ASSIGNEE AGAINST THE COMPANY RELATING TO THIS AGREEMENT (COLLECTIVELY, "CLAIMS"). This waiver extends to all such Claims, including Claims that involve Persons other than Company and the Warrantholder; Claims that arise out of or are in any way connected to the relationship between the Company and the Warrantholder; and any Claims for damages, breach of contract, specific performance, or any equitable or legal relief of any kind, arising out of this Agreement.

(o) Arbitration. If the Mutual Waiver of Jury Trial set forth in Section 12(o) is ineffective or unenforceable, the parties agree that all Claims shall be submitted to binding arbitration in accordance with the commercial arbitration rules of JAMS (the "Rules"), such arbitration to occur before one arbitrator, which arbitrator shall be a retired California state judge or a retired Federal court judge. Such proceeding shall be conducted in Santa Clara County, State of California, with California rules of evidence and discovery applicable to such arbitration. The decision of the arbitrator shall be binding on the parties, and shall be final and nonappealable to the maximum extent permitted by law. Any judgment rendered by the arbitrator may be entered in a court of competent jurisdiction and enforced by the prevailing party as a final judgment of such court.

(p) Pre-arbitration Relief. In the event Claims are to be resolved by arbitration, either party may seek from a court of competent jurisdiction identified in Section 12(m), any prejudgment order, writ or other relief and have such prejudgment order, writ or other relief enforced to the fullest extent permitted by law notwithstanding that all Claims are otherwise subject to resolution by binding arbitration.

(q) Counterparts. This Agreement and any amendments, waivers, consents or supplements hereto may be executed in any number of counterparts (including by facsimile or electronic delivery (PDF)), and by different parties hereto in separate counterparts, each of which when so delivered shall be deemed an original, but all of which counterparts shall constitute but one and the same instrument.

(r) Specific Performance. The parties hereto hereby declare that it is impossible to measure in money the damages which will accrue to the Warrantholder by reason of the Company's failure to perform any of the obligations under this Agreement and agree that the terms of this Agreement shall be specifically enforceable by the Warrantholder. If the Warrantholder institutes any action or proceeding to specifically enforce the provisions hereof, any person against whom such action or proceeding is brought hereby waives the claim or defense therein that the Warrantholder has an adequate remedy at law, and such person shall not offer in any such action or proceeding the claim or defense that such remedy at law exists.

(s) Lost, Stolen, Mutilated or Destroyed Warrant. If this Warrant is lost, stolen, mutilated or destroyed, the Company may, on such terms as to indemnity or otherwise as it may reasonably impose (which shall, in the case of a mutilated Warrant, include the surrender thereof), issue a new Warrant of like denomination and tenor as this Warrant so lost, stolen, mutilated or destroyed. Any such new Warrant shall constitute an original contractual obligation of the Company, whether or not the allegedly lost, stolen, mutilated or destroyed Warrant shall be at any time enforceable by anyone.

(t) Legends. To the extent required by applicable laws, this Warrant and the shares of Common Stock issuable hereunder (and the securities issuable, directly or indirectly, upon conversion of such shares of Common Stock, if any) may be imprinted with a restricted securities legend in substantially the following form:

THIS SECURITY HAS NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "ACT"), OR ANY APPLICABLE STATE SECURITIES LAWS, AND MAY NOT BE SOLD, PLEDGED OR OTHERWISE TRANSFERRED WITHOUT AN EFFECTIVE REGISTRATION THEREOF UNDER THE ACT AND ANY APPLICABLE STATE SECURITIES LAWS, OR PURSUANT TO RULE 144 OR AN EXEMPTION FROM THE REGISTRATION REQUIREMENTS OF THE ACT AND ANY APPLICABLE STATE SECURITIES LAWS.

*[Remainder of page intentionally left blank]*



IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by its officers thereunto duly authorized as of the Effective Date.

**COMPANY:**

**MAST THERAPEUTICS, INC.**

By: /s/ Brandi Roberts

Name: Brandi Roberts

Title: Chief Financial Officer

**WARRANTHOLDER:**

**HERCULES TECHNOLOGY III, L.P.,**

**A Delaware limited partnership**

**By: Hercules Technology SBIC Management, LLC, its  
General Partner**

**By: Hercules Technology Growth Capital, Inc., its  
Manager**

By: /s/ Christine Fera

Name: Christine Fera

Title: Director of Contract Originations

*[Signature Page to Warrant]*

**EXHIBIT I**

**NOTICE OF EXERCISE**

To: Mast Therapeutics, Inc.

- (1) The undersigned Warrantholder hereby elects to purchase [ ] shares of the Common Stock of Mast Therapeutics, Inc., pursuant to the terms of the Warrant Agreement dated the August 11, 2015 (the "Agreement") between Mast Therapeutics, Inc. and the Warrantholder, and tenders herewith payment of the Purchase Price in full, together with all applicable transfer taxes, if any. [*INSERT FOR NET ISSUANCE*: elects pursuant to Section 3(a) of the Agreement to effect a Net Issuance.]
- (2) Please issue a certificate or certificates representing said shares of Common Stock in the name of the undersigned or in such other name as is specified below.

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Address)

**WARRANTHOLDER:**

**HERCULES TECHNOLOGY III, L.P.,  
A Delaware limited partnership**

**By: Hercules Technology SBIC Management, LLC, its  
General Partner**

**By: Hercules Technology Growth Capital, Inc., its  
Manager**

By:  
Name:  
Title:

**EXHIBIT II**

**ACKNOWLEDGMENT OF EXERCISE**

The undersigned, Mast Therapeutics, Inc., hereby acknowledges receipt of the "Notice of Exercise" from [ ] to purchase [ ] shares of the Common Stock of Mast Therapeutics, Inc., pursuant to the terms of the Warrant Agreement dated the August 11, 2015, and further acknowledges that [ ] shares remain subject to purchase under the terms of the Warrant.

**COMPANY:**

**MAST THERAPEUTICS, INC.**

By: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date: \_\_\_\_\_

**EXHIBIT III**

**TRANSFER NOTICE**

(To transfer or assign the foregoing Agreement execute this form and supply required information. Do not use this form to purchase shares.)

FOR VALUE RECEIVED, the foregoing Agreement and all rights evidenced thereby are hereby transferred and assigned to

\_\_\_\_\_

whose address is \_\_\_\_\_

Dated: \_\_\_\_\_

Holder's Signature: \_\_\_\_\_

Holder's Address: \_\_\_\_\_

\_\_\_\_\_

Signature Guaranteed: \_\_\_\_\_

NOTE: The signature to this Transfer Notice must correspond with the name as it appears on the face of the Agreement, without alteration or enlargement or any change whatever, and must be guaranteed by a bank or trust company. Officers of corporations and those acting in a fiduciary or other representative capacity should file proper evidence of authority to assign the foregoing Agreement.

**FIRST AMENDMENT TO WARRANT AGREEMENT**

THIS FIRST AMENDMENT (this "Amendment"), dated as of September 28, 2015, to the Warrant Agreement to Purchase Shares of the Common Stock of Mast Therapeutics, Inc., dated as of August 11, 2015 (the "Warrant Agreement"), is made by and between MAST THERAPEUTICS, INC., a Delaware corporation (the "Company"), and HERCULES TECHNOLOGY III, L.P., a Delaware limited partnership (the "Warrantholder").

A. The Company and the Warrantholder desire to amend the Warrant Agreement as set forth herein, such modifications to be effective as of the date hereof.

B. Capitalized terms that are not otherwise defined in this Amendment have the respective meaning set forth in the Warrant Agreement.

**AGREEMENT**

NOW, THEREFORE, for valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

1. The definition of "Warrant Coverage" in Section 1 of the Warrant Agreement is hereby amended and restated in its entirety to read as follows:

“Warrant Coverage” means \$625,000.”

2. Except as specifically amended hereby, the Warrant Agreement shall continue to be in full force and effect and is hereby in all respects ratified and confirmed. The execution, delivery and effectiveness of this Amendment shall not operate as a waiver of any right, power or remedy of Warrantholder under the Warrant Agreement, and it does not constitute a waiver of any provision of the Warrant Agreement.

3. This Amendment shall be governed by, and construed in accordance with, the law of the State of California.

4. This Amendment may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Delivery by facsimile, .pdf or other electronic imaging means of an executed counterpart of a signature page to this Amendment shall be effective as delivery of an original executed counterpart of this Amendment. Warrantholder may also require that any such documents and signatures delivered by facsimile, .pdf or other electronic imaging means be confirmed by a manually signed original thereof; provided that the failure to request or deliver the same shall not limit the effectiveness of any document or signature delivered by facsimile, .pdf or other electronic imaging means.

*[Remainder of page intentionally blank]*

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IN WITNESS WHEREOF, the undersigned have executed this Amendment as of the date first set forth above.

**Company:**

MAST THERAPEUTICS, INC.

By: /s/ Brandi Roberts

Name: Brandi Roberts

Title: Chief Financial Officer

**WARRANTHOLDER:**

HERCULES TECHNOLOGY III, L.P.

By: Hercules Technology SBIC Management,  
LLC, its General Partner

By: Hercules Technology Growth Capital, Inc.,  
its Manager

By: /s/ Ben Bang

Name: Ben Bang

Title: Associate General Counsel

[First Amendment To Warrant Agreement]

**CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO  
SECURITIES EXCHANGE ACT RULES 13a-14(a) AND 15(d)-14(a)  
AS ADOPTED PURSUANT TO  
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Brian M. Culley, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Mast Therapeutics, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
  - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
  - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
  - c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
  - d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
  - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
  - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

November 12, 2015

/s/ Brian M. Culley  
\_\_\_\_\_  
Brian M. Culley  
Chief Executive Officer  
(Principal Executive Officer)

**CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO  
SECURITIES EXCHANGE ACT RULES 13a-14(a) AND 15(d)-14(a)  
AS ADOPTED PURSUANT TO  
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Brandi L. Roberts, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Mast Therapeutics, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
  - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
  - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
  - c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
  - d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
  - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
  - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

November 12, 2015

/s/ Brandi L. Roberts

Brandi L. Roberts

Chief Financial Officer and Senior Vice President  
(Principal Financial and Accounting Officer)



**CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER AND PRINCIPAL FINANCIAL OFFICER PURSUANT TO  
18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO  
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Quarterly Report of Mast Therapeutics, Inc. (the "Company") on Form 10-Q for the quarter ended September 30, 2015, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Brian M. Culley, principal executive officer of the Company, certify pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of his knowledge:

- (i) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and
- (ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

November 12, 2015

/s/ Brian M. Culley  
\_\_\_\_\_  
Brian M. Culley  
Chief Executive Officer  
(Principal Executive Officer)

In connection with the Quarterly Report of Mast Therapeutics, Inc. (the "Company") on Form 10-Q for the quarter ended September 30, 2015, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Brandi L. Roberts, principal financial officer of the Company, certify pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of her knowledge:

- (i) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and
- (ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

November 12, 2015

/s/ Brandi L. Roberts  
\_\_\_\_\_  
Brandi L. Roberts  
Chief Financial Officer and Senior Vice President  
(Principal Financial and Accounting Officer)