UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 8-K

CURRENT REPORT

Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934

Date of Report (Date of earliest event reported): March 7, 2016

Mast Therapeutics, Inc.

(Exact name of Registrant as Specified in Its Charter)

Delaware	**001-32157**	**84-1318182**
(State or Other Jurisdiction of Incorporation)	**(Commission File Number)**	**(IRS Employer Identification No.)**

3611 Valley Centre Drive, Suite 500, San Diego, CA	**92130**
(Address of Principal Executive Offices)	**(Zip Code)**

Registrant's Telephone Number, Including Area Code: (858) 552-0866

Not Applicable
(Former Name or Former Address, if Changed Since Last Report)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions (see General Instructions A.2. below):

☐ Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)

☐ Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)

☐ Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))

☐ Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Item 7.01 Regulation FD Disclosure.

The information furnished in Exhibit 99.1 to this report, which relates to Mast Therapeutics, Inc. (the "Company") and its development programs, may be presented from time to time by the Company at various investor and analyst meetings, including at the Cowen and Company 36th Annual Health Care Conference on March 7, 2016.

Item 9.01 Financial Statements and Exhibits.

(d) Exhibits.

The list of exhibits called for by this Item is incorporated by reference to the Exhibit Index immediately following the signature page of this report.

In accordance with General Instruction B.2. of Form 8-K, the information in Item 7.01 of this report and Exhibit 99.1 hereto shall not be deemed "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), or otherwise subject to the liability of that section, nor shall it be deemed incorporated by reference in any of the Company's filings under the Securities Act of 1933, as amended, or the Exchange Act, whether made before or after the date hereof, regardless of any incorporation language in such a filing, except as expressly set forth by specific reference in such a filing.

By filing this report and furnishing the information contained in Exhibit 99.1 attached hereto, the Company makes no admission as to the materiality of any information in this report. The information contained in Exhibit 99.1 hereto is summary information that is intended to be considered in the context of the Company's filings with the U.S. Securities and Exchange Commission (the "SEC"), including its Annual Report on Form 10-K filed on March 24, 2015, Quarterly Report on Form 10-Q filed on November 12, 2015, and other public announcements that the Company makes, by press release or otherwise, from time to time. The Company undertakes no duty or obligation to publicly update or revise the information contained in this report, although it may do so from time to time as it believes is appropriate. Any such updating may be made through the filing of other reports or documents with the SEC, through press releases, or through other public disclosure.

Forward-Looking Statements

The Company cautions you that statements included in this report, including in Exhibit 99.1 attached hereto, that are not a description of historical facts are forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 that are based on the Company's current expectations and assumptions. Such forward-looking statements may be identified by the use of forward-looking words such as "intend," "plan," anticipate," "believe," "expect," among others, and include, but are not limited to, statements regarding the Company's development, regulatory and commercialization strategies and plans for its investigational drugs, vepoloxamer (also known as MST-188) and AIR001, as well as the timing of activities and events related to those plans, including commencement and completion of clinical studies, announcements of study results, submission of applications to regulatory authorities for marketing approval and product launch, and prospects for clinical, regulatory and commercial success. Among the factors that could cause or contribute to material differences between the Company's actual results and the expectations indicated by the forward-looking statements are risks and uncertainties that include, but are not limited to: the inherent uncertainty of outcomes in ongoing and future studies of the Company's product candidates and the risk that its product candidates may not demonstrate adequate safety, efficacy or tolerability in one or more such studies, including vepoloxamer in the ongoing EPIC study; delays in the commencement or completion of clinical studies, including the Phase 2 study of vepoloxamer in heart failure, and the ongoing and planned Phase 2 studies of AIR001, including as a result of difficulties in obtaining regulatory agency agreement on clinical development plans or clinical study design, opening trial sites, enrolling study subjects, manufacturing sufficient quantities of clinical trial material, completing manufacturing process development activities, being subject to a "clinical hold," and/or suspension or termination of a clinical study, including due to patient safety concerns or lack of funding; delays in clinical study closeouts, including blinded data review and quality assurance procedures, that may delay announcement of study results; risks associated with the fact that the Company is not the sponsor of the ongoing or currently planned Phase 2 studies of AIR001 in heart failure and has no control over the protocol for or conduct of the studies, including whether the ongoing study will be completed or the planned study be commenced on anticipated timelines, or at all; the risk that, even if the EPIC study achieves statistical significance in the primary endpoint, the FDA or another regulatory authority may determine it does not demonstrate sufficient magnitude of clinical relevance or provide adequate safety and tolerability data to provide the basis for submission of a new drug application; the potential for institutional review boards or the FDA or other regulatory agencies to require additional clinical or nonclinical studies prior to initiation of a planned clinical study; 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 Company's dependence on third parties to assist with important aspects of development of its product candidates, including conduct of its clinical studies and supply and manufacture of clinical trial material, and, if approved, commercial product and the risk that such third parties may fail to perform as expected; the risk that the Company may be required to repay its outstanding debt obligations on an accelerated basis and/or at a time that could be harmful to its financial

condition and/or ability to pursue its business strategy; risk associated with the Company's ability to manage operating expenses and/or obtain additional funding to support its operations, if needed, on a timely basis or on acceptable terms, or at all; the potential for the Company to delay, reduce or discontinue current and/or planned development activities, including clinical studies or partner its product candidates at inopportune times if it is unable to raise sufficient additional capital as needed; the risk that the FDA and regulatory agencies outside of the U.S. do not grant marketing approval of a product candidate, on a timely basis, or at all; the risk that, even if the Company successfully develops and obtains regulatory approval for a product candidate, it may not realize commercial success and may never achieve profitability; the risk that the Company is not able to obtain and maintain effective patent coverage and other market exclusivity protections for its products, if approved, without infringing the proprietary rights of others; and other risks and uncertainties more fully described in the Company's periodic filings with the SEC and press releases.

You are cautioned not to place undue reliance on forward-looking statements, which speak only as of the date they are made. Mast Therapeutics does not intend to revise or update any forward-looking statement set forth in this report to reflect events or circumstances arising after the date hereof, except as may be required by law. This caution is made under the safe harbor provisions of Section 21E of the Securities Exchange Act of 1934, as amended, and Section 27A of the Securities Act of 1933, as amended.

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 hereunto duly authorized.

Mast Therapeutics, Inc.

Date: March 7, 2016

By: */s/ Brandi L. Roberts*
Brandi L. Roberts
Chief Financial Officer and Senior Vice President

Exhibit Index

Exhibit Number	Description
99.1	Mast Therapeutics, Inc. corporate presentation, March 7, 2016

Exhibit 99.1

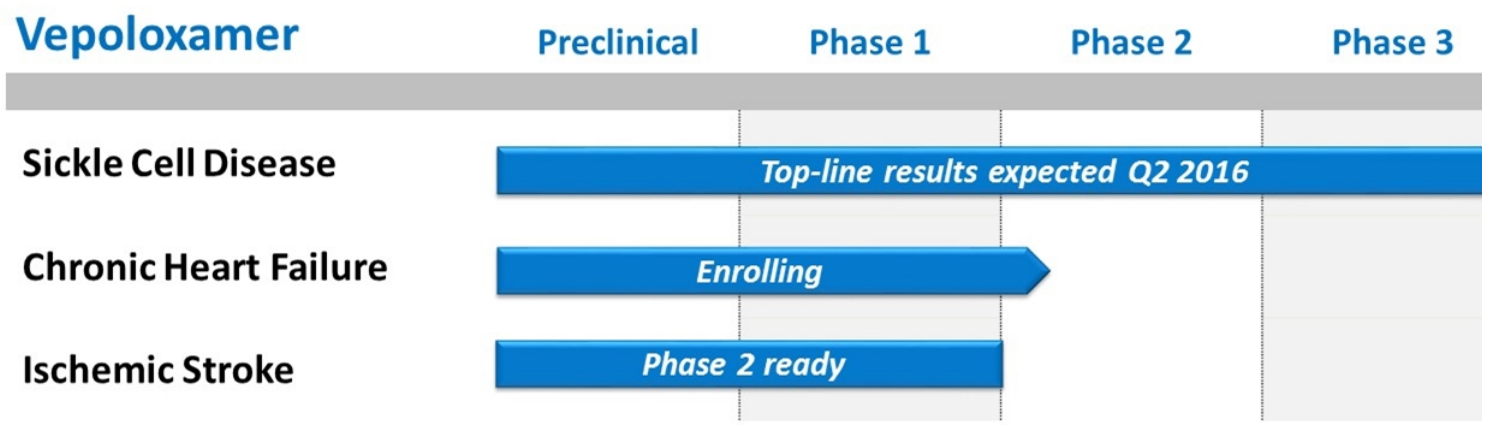
Corporate Overview
March 7, 2016

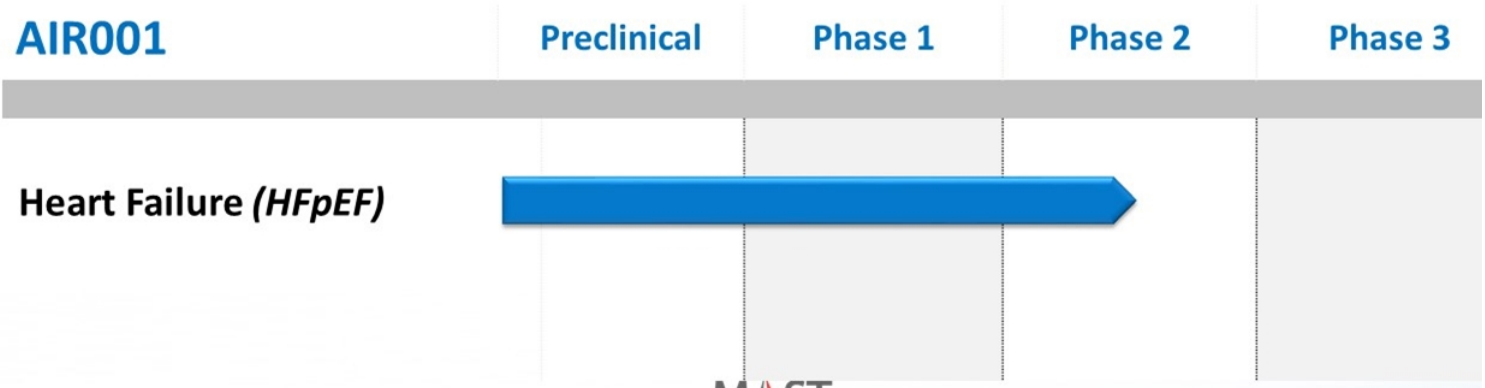
Safe Harbor Statement

This presentation includes forward-looking statements about our business prospects, financial position, ar development of vepoloxamer and AIR001 for therapeutic use in humans. Any statement that is not a statement historical fact should be considered a forward-looking statement. Because forward-looking statements relate the future, they are subject to inherent risks, uncertainties and changes in circumstances that are difficult predict. Actual events or performance may differ materially from our expectations indicated by these forwar looking statements due to a number of factors, including, but not limited to, results of our pending and futu clinical studies, the timeline for clinical and manufacturing activities and regulatory approval; our dependency o third parties to conduct our clinical studies and manufacture our clinical trial material; our ability to rais additional capital, as needed; our ability to repay outstanding debt as payments come due; our ability to establis and protect proprietary rights related to our product candidates; and other risks and uncertainties more ful described in our press releases and our filings with the SEC, including our quarterly reports on Form 10-Q file with the SEC on August 12, 2015 and November 12, 2015.

We caution you not to place undue reliance on any of these forward-looking statements, which speak only as the date of this presentation. We do not intend to update any forward-looking statement included in th presentation to reflect events or circumstances arising after the date of the presentation, except as may b required by law.

Product Candidate Pipeline



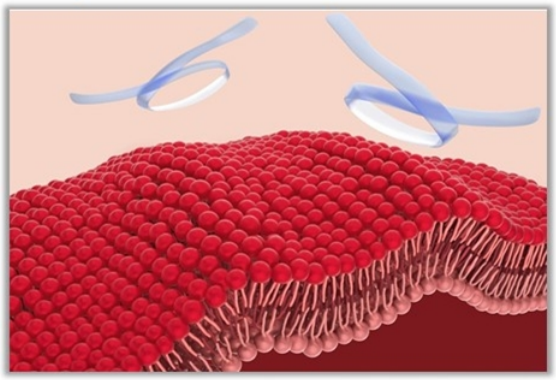


MAST THERAPEUTICS, INC.
NYSE MKT: MSTX

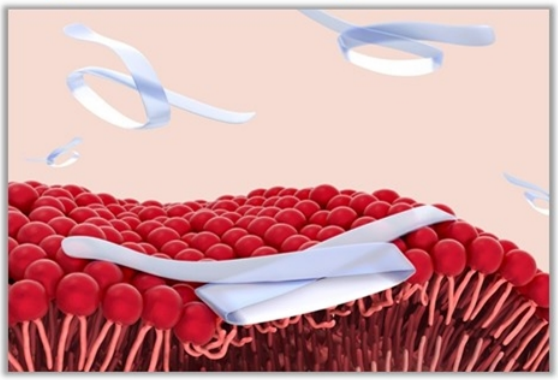
Vepoloxamer: A Novel Biophysical Agent

- **Corrects imbalances in surface tension, an underlying feature of multiple diseases**
- **Biophysical mechanism of action offers lower development risk**
  - Targets damaged tissue; little or no activity in healthy tissue
  - Not metabolized; no active metabolites to track, no difference in fast vs slow metabolizers, less susceptible to drug-drug interactions
  - Less susceptible to genetic variation; independent of receptors, etc.

Healthy Cell Membrane = Vepoloxamer Inactive



Damaged Cell Membrane = Vepoloxamer Bound



Pathologies and Conditions Related to Imbalances in Surface Tension

Surface Tension Pathologies
Elevated blood viscosity
Cellular aggregation
Cellular adhesion
Loss of membrane barrier function / repair capacity
Dysfunctional coagulation

- Sickle Cell Disease
- Chronic & Acute Heart Failure
- Ischemic Stroke

Vepoloxamer in Sickle Cell Disease

Objective: Improve blood flow to prevent ischemic injury and shorten duration of crisis

Phase 3 Study – Enrollment Complete

Overview of Sickle Cell Disease

- **A chronic genetic disorder and rare (orphan) disease**
  - Affects 90,000 – 100,000 people in the U.S. and is characterized by severe deformation of red blood cells
- **Hallmark of disease is a "vaso-occlusive crisis" (VOC)**
  - Exceedingly painful condition and a leading cause of hospitalization
  - 80-100k hospitalizations annually in the U.S. with average hospital stay of 4-5 days
- **Current treatment is palliative**
  - Consisting of hydration and IV opioids
  - Does not treat underlying pathophysiology of the disease
  - No VOC interventional therapy available
- **Significant unmet need**
  - No approved agents to shorten duration or severity of crisis
  - Shorter life expectancy due to ischemic injury (~45y)

Sources: Life-expectancy: Hassell, K. Am J Prev Med 2010; 38(4S): S512-521; Utilization data calculated from data in Brousseau, D., et al., Acute Care Utilization and Rehospitalizations for Sickle Cell Disease. Apr 7 2010 and HCUP 2010-2012; SCD prevalent pop: Brousseau DC, Panepinto JA, Nimmer M, Hoffmann RG. The number of people with sickle-cell disease in the United States: national and state estimates Hematol 2010;85:77-8; Steinberg, M.H., Management of Sickle Cell Disease, New Eng J Med; 1999; Vol 340, No 13; Platt, et al., Mortality in Sickle Cell Disease (N Engl J Med 1994;330:1639-44)

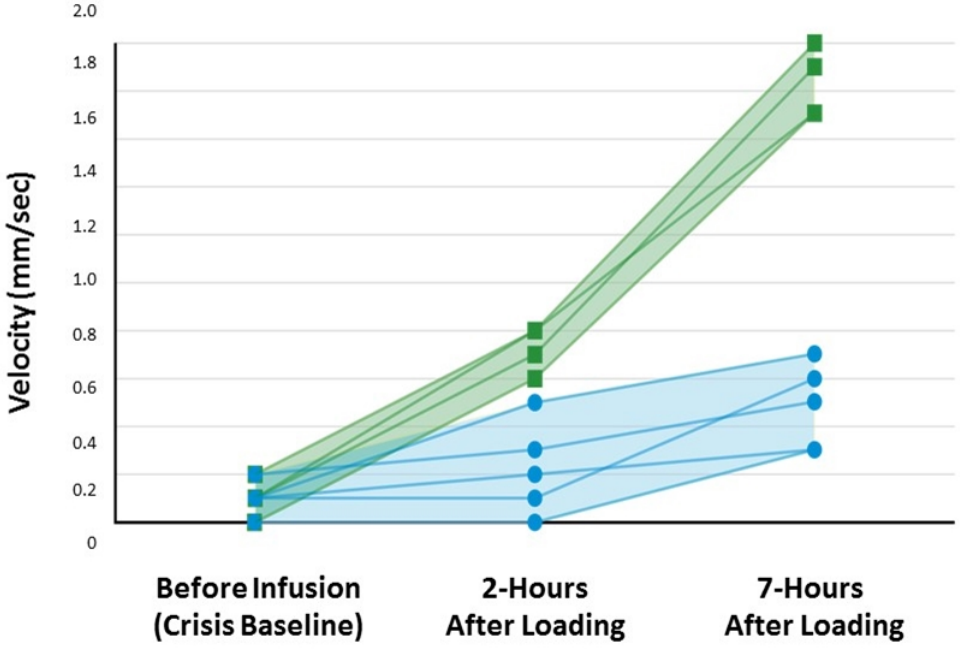
Vepoloxamer in Sickle Cell Disease (SCD)

- **The underlying pathology in vaso-occlusive crisis (VOC) is diminished blood flow**
- **Vepoloxamer improves blood flow by addressing multiple pathological mechanisms:**
  - Adhesion
  - Hemolysis
  - Aggregation
  - Viscosity

Objective of treatment with vepoloxamer: Improve blood flow to prevent ischemic injury and shorten the duration of crisis

Vepoloxamer Improved Blood Flow in Sickle Ce Patients

Vepoloxamer improved microvascular blood flow in sickle cell disease patients during vaso-occlusive crisis (prior Phase 3 sub-study)



Double blind assessment of red cell velocity (mm/s) measured in nine sickle cell patients with vaso-occlusive crisis (p = .00003)

MAST THERAPEUTICS, INC.
NYSE MKT: MSTX

Source: J. Investig. Med. 2004;52(6):40

Vepoloxamer Development History

- **Over 100 nonclinical studies completed**
- **Phase 2 SCD – statistically significant shorter crisis and less opioid use**
- **Phase 2 ACS* – ~50% shorter hospitalization stay vs. historical control**
- **Phase 3 SCD – shorter duration of crisis (p-value = 0.07)**

Lessons learned and applied to Mast's Phase 3 study "EPIC":

1. Vepoloxamer has activity in SCD
2. Study design is key to success (prior endpoint poorly designed)
3. Key FDA feedback:
   - Utilize a clinically meaningful endpoint
   - Use as objective an endpoint as possible
   - Avoid use of pain scores due to variability
   - Provide a plan to minimize data loss

(*Acute chest syndrome, a serious complication of sickle cell cris

The Phase 3 "EPIC" Study

Evaluation of Purified Poloxamer 188 In Vaso-Occlusive Crisis

- **Largest placebo-controlled study in sickle cell disease ever conducted**
- **Double-Blind, Placebo-Controlled, International (~75 sites)**
  - 388 patients, randomized 1:1 to standard of care +/- vepoloxamer
  - 1hr loading dose followed by 47h continuous infusion
- **Primary Endpoint**
  - Duration of crisis (time of randomization to last dose of parenteral opioid)
- **Secondary Endpoints**
  - Re-hospitalization for VOC within 14 days
  - Occurrence of acute chest syndrome within 120 hours of randomization
- **Other Assessments**
  - Safety
  - Duration of hospitalization
  - Biomarkers
  - Opioid utilization
  - Sub-study outcomes

EPIC Study: Primary Endpoint

- **Duration of vaso-occlusive crisis**

- **Definition: time from randomization to last dose of parenteral opioid**

- **Advantages:**
  - Aligns with FDA recommendations
    - Sensitive and specific data collection
    - Objective
    - Minimal data loss
  - Medical expert support
  - Clinically meaningful to experts in the field

- **Powering:**
  - 90% power to detect a 17% difference in treatment arms with a statistical significance level of p=0.05

EPIC Study: Demographic Characteristics

- **Age**
  - Average = 15 years
  - Range = 4 to 46 years
  - Patients over 18 = 29%
- **Use of Hydroxyurea (HU) = >60%**
- **Patients enrolled from U.S. = ~60%**
- **Sites that enrolled at least one patient = >80%**
- **Why are these demographics encouraging?**
  - In a prior study, patients under the age of 16 had a benefit of 22 hours ($p = 0.01$) and those on HU had a benefit of 16 hours ($p = 0.02$).

EPIC Study: Safety

- **DSMB Evaluations**
  - Independent, unblinded DSMB (4 clinicians and 1 statistician)
  - Meetings at 25, 58, 145 and 250 patients

- **DSMB meeting held at 250 patients**
  - No unexpected safety signals identified
  - DSMB members deemed no additional meetings were necessary

EPIC Study: Summary

- **Patient enrollment complete**
- **Top-line data anticipated Q2 2016**
- **U.S. patients = ~60%**
- **Average patient age = 15**
- **Hydroxyurea use = >60%**
- **At 250 patients (blinded analysis):**
  - Average duration of crisis & coefficient of variation consistent with statistical assumptions in study design
  - Minimal regional variability (U.S. vs ex-U.S.)

EPIC Study: Defining Success

- **FDA approval is based on a benefit/risk assessment**
  - Endpoints from controlled clinical trials must establish "substantial evidence" of efficacy (e.g. a statistically significant effect)

- **How is statistical significance analyzed?**
  - p-value < 0.01 = best outcome
  - p-value = 0.01 - 0.05 = good outcome

  Next step = pre-NDA meeting

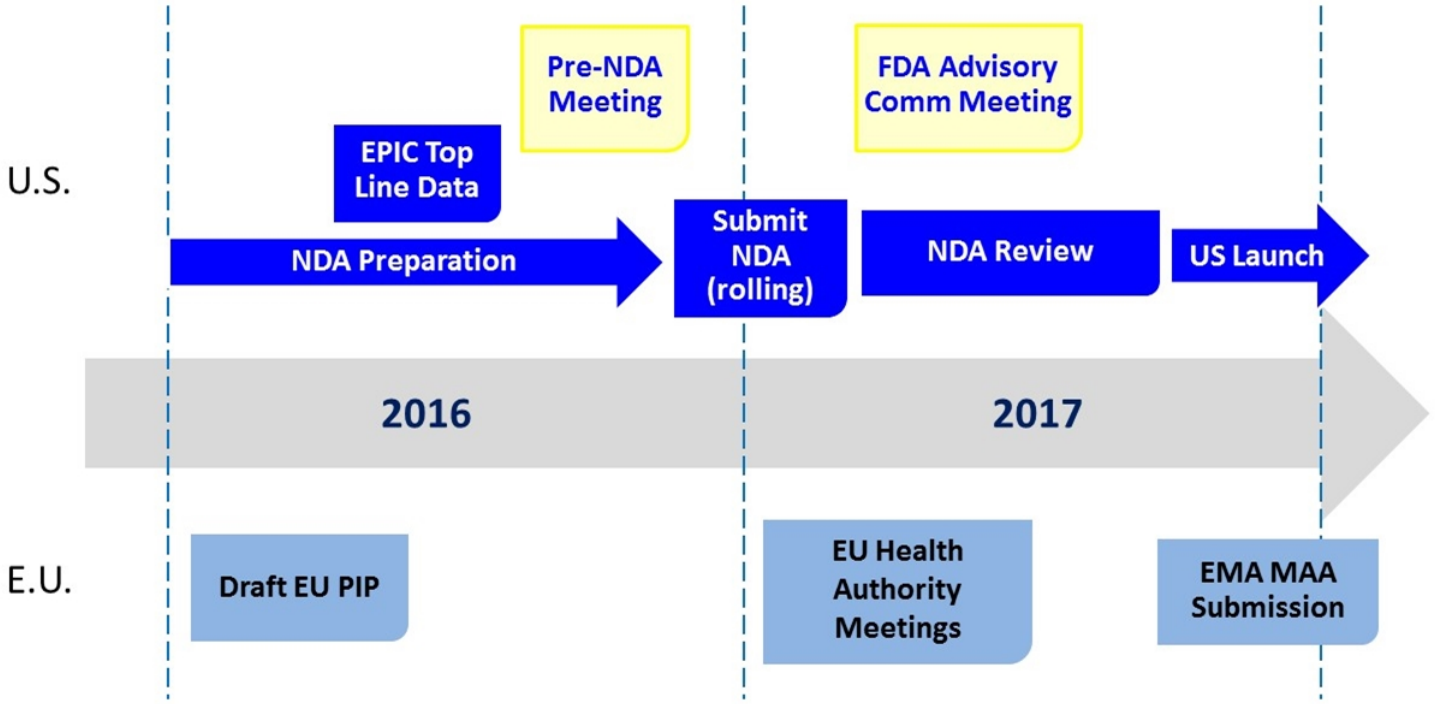
  - p-value > 0.05 = likely insufficient to support an NDA

- **What supporting evidence can be provided?**
  - Secondary endpoints
  - Pharmacodynamic endpoints (laboratory biomarkers)
  - Data from additional studies
    - Prior phase 2/3 trials
    - Ongoing repeat-dose (EPIC-E) and special population studies

Vepoloxamer in SCD: Regulatory Consideration

- **Significant unmet need – no disease-modifying therapy for ongoing crisis**
- **Support among medical / advocacy / patient communities**
- **Orphan Drug Designation**
- **Fast Track Designation**
- **SCD is part of FDA "Patient-Focused Drug Development Initiative"**
- **Healthcare disparity concerns**
- **NDA-supportive clinical studies:**
  - Thorough QT study - complete
  - Special population study - enrolling
  - Repeat-administration study – enrolling
    - ✓ One patient has already received three doses of vepoloxamer

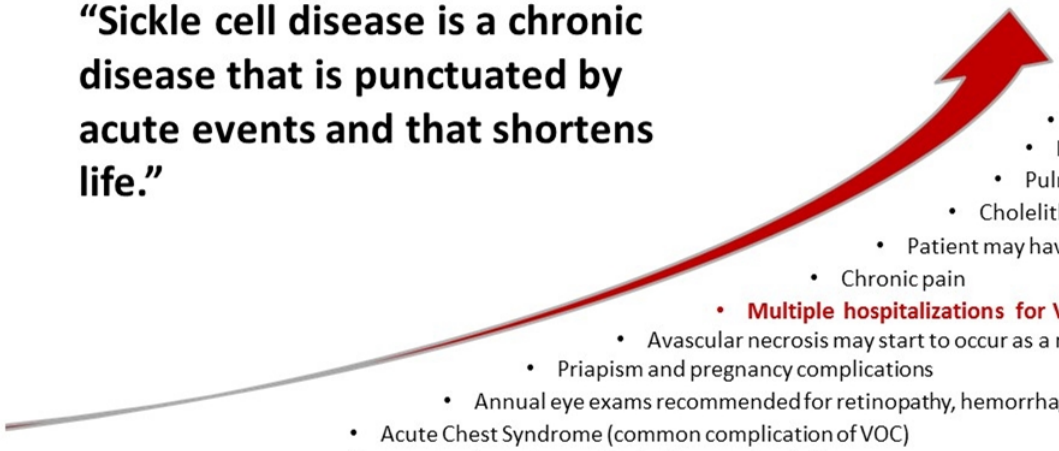
Vepoloxamer in SCD: Key Regulatory Activities



Vepoloxamer Commercial Opportunity

SCD: A Lifetime of Complications

"Sickle cell disease is a chronic disease that is punctuated by acute events and that shortens life."



- Premature death
- Multiple organ damage and failure
- Acute papillary necrosis of the kidneys
- Leg ulcers
- Pulmonary hypertension
- Cholelithiasis (gallstones)
- Patient may have early signs of renal disease
- Chronic pain
- **Multiple hospitalizations for VOC per year**
- Avascular necrosis may start to occur as a result of ischemia
- Priapism and pregnancy complications
- Annual eye exams recommended for retinopathy, hemorrhages, and retinal detachments
- Acute Chest Syndrome (common complication of VOC)
- Transfusions may begin for cerebral infarction (stroke)
- Splenectomy (usually before age 8)
- Daily penicillin prophylaxis (through age 5)
- Diagnosis (at birth)

Infant | Childhood | Adolescent | Transition | Young Adult | Adult | Mature Adult | Senior

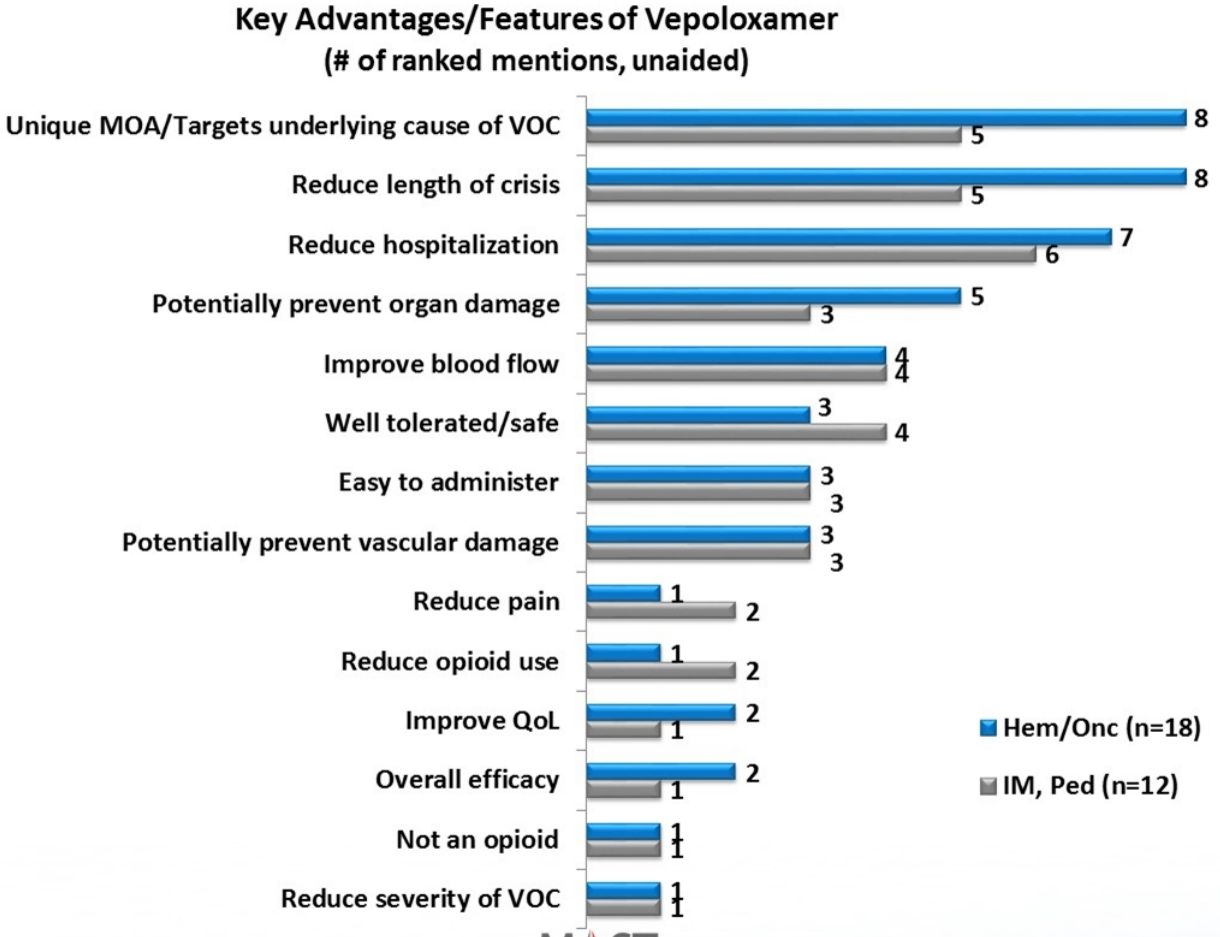
Source: Martin H. Steinberg, M.D., Management of Sickle Cell Disease, New Eng J Med; 1999; Vol 340, No 13

Vaso-Occlusive Crisis is the Hallmark of SCD

- **80-100k hospitalizations annually in the U.S.**
- **Current treatment is palliative**
  - **Consisting of hydration and IV opioids**
  - **Does not treat underlying pathophysiology of the disease**
  - **No VOC interventional therapy available**
- **Hospitalized on average for approximately 4-5 days**
- **40% of patients will have acute chest syndrome complication**
- **12-41% are re-hospitalized within 30 days of hospital discharge**
- **Shorter life expectancy due to ischemic injury (~45y)**

Sources: Life-expectancy: Hassell, K. Am J Prev Med 2010; 38(4S): S512-521; Utilization data calculated from data in Brousseau, D., et al., Acute Care Utilization and Rehospitalizations for Sickle Cell Disease JAMA Apr 7 2010 and HCUP 2010-2012; SCD prevalent pop: Brousseau DC, Panepinto JA, Nimmer M, Hoffmann RG. The number of people with sickle-cell disease in the United States: national and state estimates. Am J Hematol 2010;85:77-8; Steinberg, M.H., Management of Sickle Cell Disease, New Eng J Med; 1999; Vol 340, No 13; Platt, et al., Mortality in Sickle Cell Disease (N Engl J Med 1994;330:1639-44)

Market Research: Expected Features and Potential Benefit Align with Unmet Needs for VOC Treatment

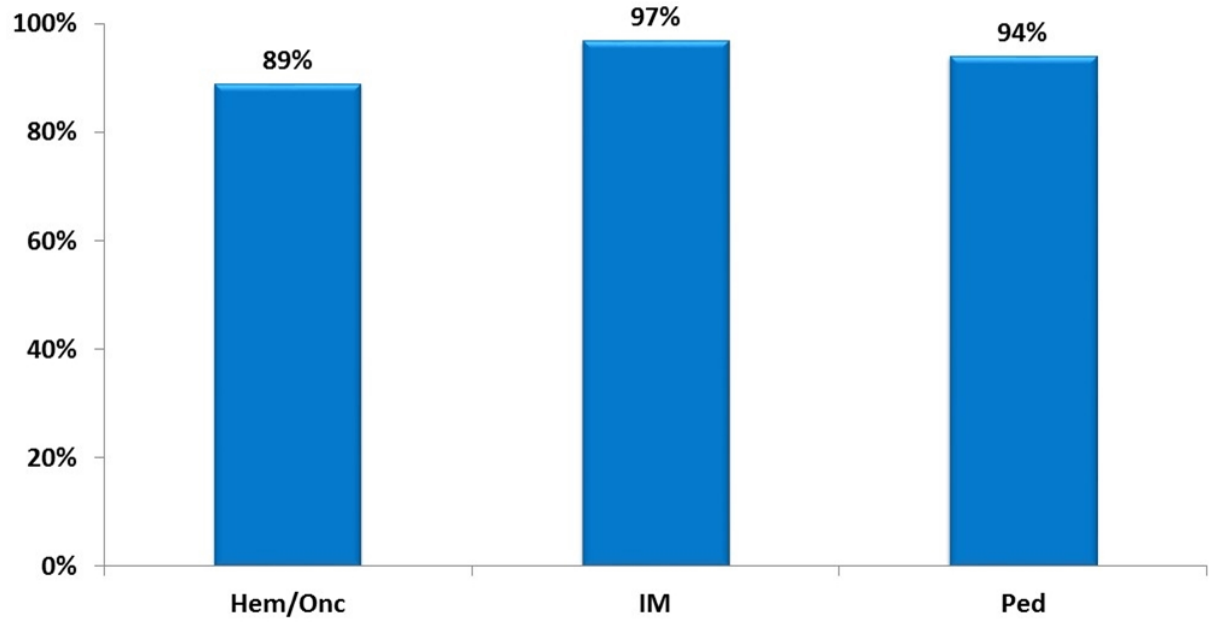


Source: RDS Consulting Group Research Report, 2015

Market Research: Physicians Report a High Percent of Patients to be Treated with Vepoloxamer at Peak

Average % of Patients Treated with Vepoloxamer at Peak

n=30



MDs expect quick uptake and time to peak (~6 months)

Source: RDS Consulting Group Research Report, 2015, n=30

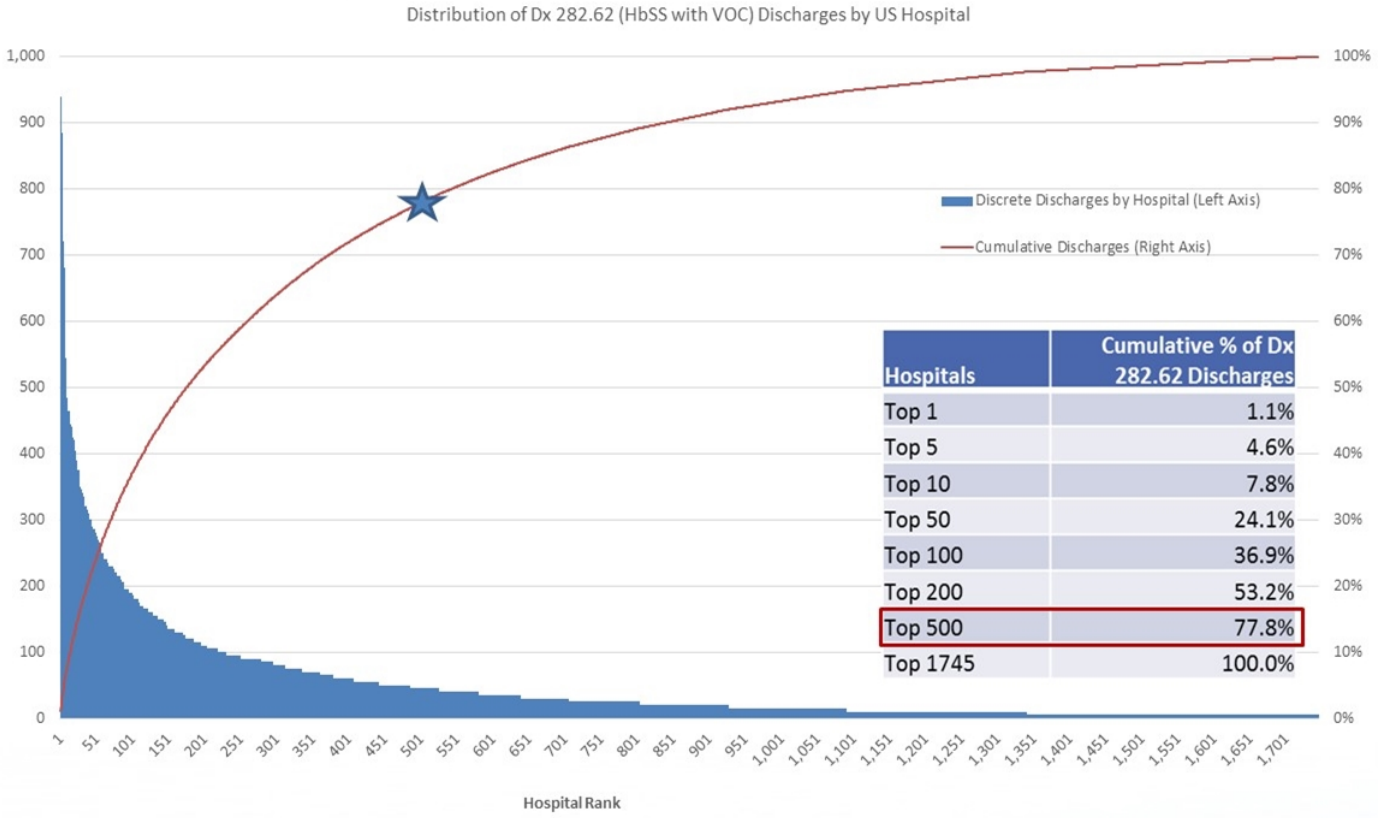
Development Landscape in SCD

Vepoloxamer has the potential to be the first and only treatment to reduce the duration of an ongoing VOC

Stage	VOC Intervention	VOC Reduction	SCD Corrective Treatment
Marketed		Hydroxyurea	BMT
Phase 3	vepoloxamer rivipansel	L-Glutamine	
Phase 2		Aes-103 SANGUINATE Sevuparin SelG1 GBT440	
Phase 1		NiCord NKTT120 PF-04447943 SCD-101	LentiGlobin Other gene therapy

Concentration of SCD Treatment in the U.S. Offers an Attractive Commercial Opportunity

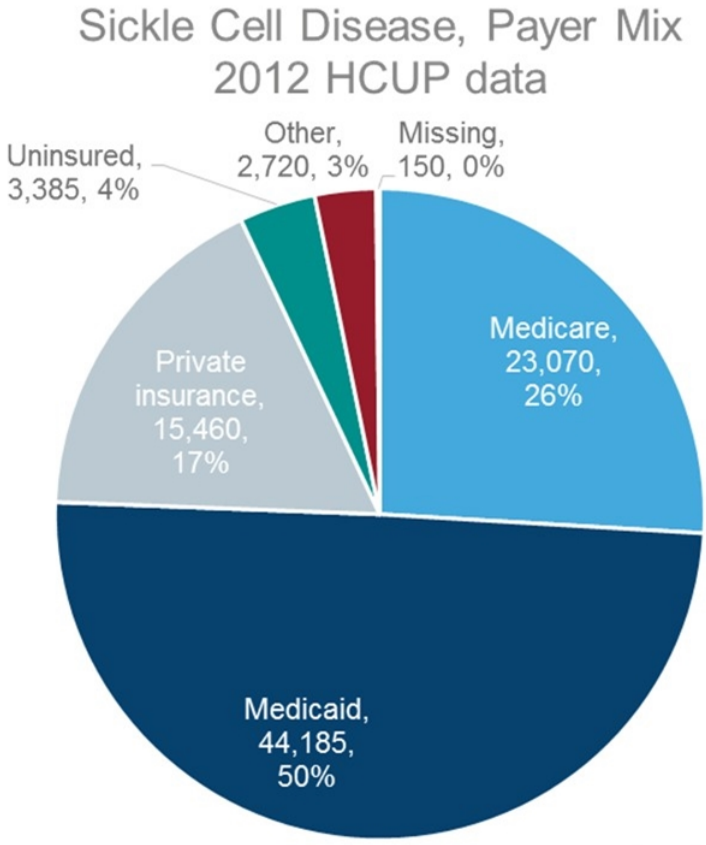
- **Top 500 U.S. hospitals treat nearly 80% of SCD patients in crisis**
- **Effective field promotion with small hospital sales force (~30)**



Hospitals	Cumulative % of Dx 282.62 Discharges
Top 1	1.1%
Top 5	4.6%
Top 10	7.8%
Top 50	24.1%
Top 100	36.9%
Top 200	53.2%
Top 500	77.8%
Top 1745	100.0%

Source: Analysis of HCUP NIS 2013 data; Dx 282.62 is 89.7% of all VOCs.

U.S. Sickle Cell Disease Hospital Payer Mix



- **Inpatient prospective payment system (IPPS)**
- **Patients with public insurance have minimal share of costs**
- **Medicaid plans may seek additional funding via CHIP, per diem rates, or modified FFS rates**
- **Vepoloxamer expected to meet criteria for additional Medicare payment (NTAP)**

Source: ADVI analysis, 2015

Significant Potential Outside the U.S.

- **Over 12 million patients worldwide**

- **Europe**
  - Approximately 40,000 patients
  - >50% reside in two countries: UK and France
  - Most patients concentrated in large metro areas: Paris and London

- **MENA**
  - Over 850,000 with SCD
  - Many treatment centers provide care on par with standard of the U.S. and E.U.

Sources: Hassell KL. Population estimates of sickle cell disease in the U.S. *Am J Prev Med* 2010;38(4 Suppl):S512-21; Data on file, Mast Therapeutics 2015; VOI Consulting analysis, 2015

Vepoloxamer Positioned for Success in SCD

- **Novel therapy for a genetic disease with high unmet needs**
  - Unique and relevant mechanism of action
  - No approved disease-modifying therapies available for VOC intervention
- **Significant first-to-market advantage in multiple territories**
  - Clinical development >2 years ahead of other SCD programs
  - Orphan Drug Designation in U.S. and E.U.
- **Concentrated market**
  - Top 500 U.S. hospitals treat nearly 80% of SCD patients in crisis
  - 96% of SCD patients in the U.S. have insurance coverage
- **Research supports rapid adoption & significant market penetration**
  - Ranked 4.4 out of 5 as a "breakthrough medical innovation" by pharmacy directors at key SCD institutions
  - KOLs and community physicians express high intent to use

Development of Vepoloxamer in Heart Failure

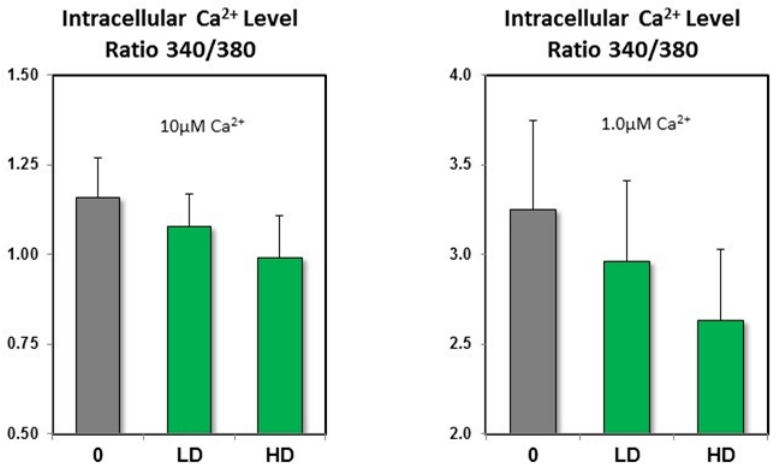
Objective: Restore Membrane Integrity To Improve Cardiac Performance

Phase 2 Study Ongoing

Development Rationale in Heart Failure

- **Elevated wall tension in a dilated (e.g. failing) heart impairs normal membrane repair activity**
- **Permeabilized membranes allow *unregulated calcium influx* and cardiac troponin leak**

Cardiomyocytes Isolated from Animals with Advanced Heart Failure Exhibit Reduced Intracellular Calcium



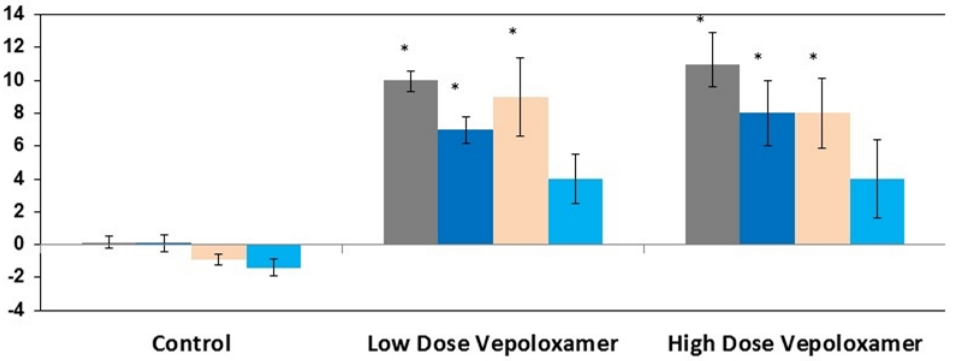
LD = 1.5 mg/mL vepoloxamer
HD = 4.5 mg/mL vepoloxamer

Heart Failure Model Results

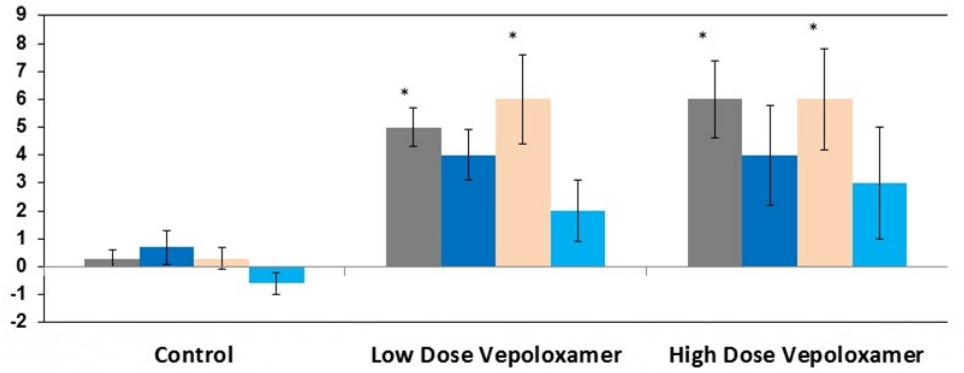
- **Functional improvement (single administration)**
  - Vepoloxamer elicited improvements in Left Ventricle (LV) systolic and diastolic function that persisted for up to 2 weeks
  - Ejection fraction (EF) and stroke volume (SV) increased
- **Biomarkers (single administration)**
  - Functional improvements supported by significant reductions of NT-pro BNP fo up to 2 weeks
  - Membrane sealing supported by significant reductions in plasma troponin for up to 2 weeks
  - Data suggests vepoloxamer can preserve cardiomyocytes by limiting calcium entry into the cell
- **Results support clinical development of vepoloxamer for the treatment of acute and chronic heart failure**

Heart Failure Model – Functional Improvement (sing administration)

Δ LV Ejection Fraction (%)



Δ Stroke Volume (mL)



2 Hours Post
24 Hours Post
1 Week Post
2 Weeks Post

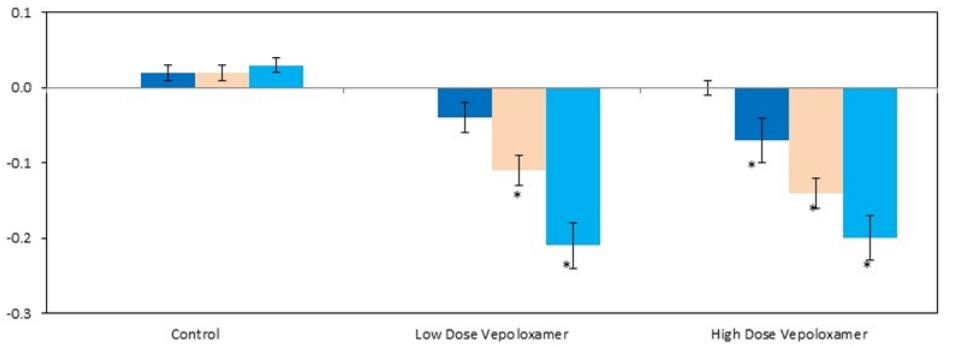
* p < 0.05 vs. Control

- Vepoloxamer elicited improvements in LV systolic and diastolic function that lasted for up to 2 weeks

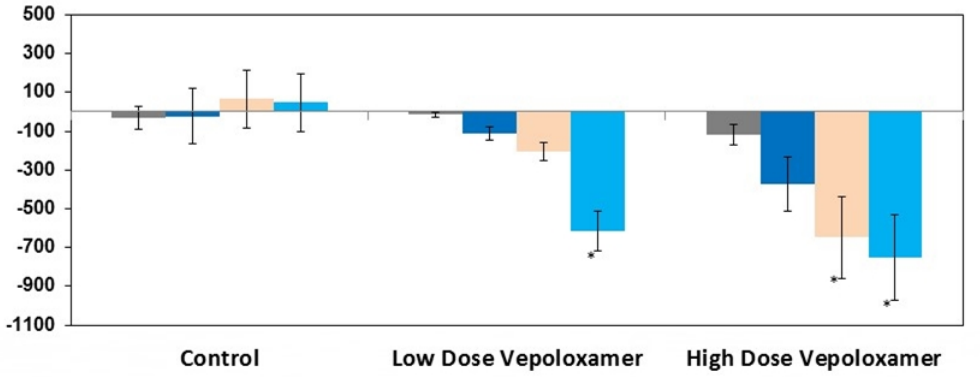
Study conducted by: Hani N. Sabbah, Henry Ford Health System

Heart Failure Model – Biomarkers (single administration)

Δ Plasma Troponin-I (ng/mL)



Δ nt-pro BNP (pg/mL)



2 Hours Post
24 Hours Post
1 Week Post
2 Weeks Post

* p < 0.05 vs. Control

- Troponin data suggests vepoloxamer can preserve cardiomyocyte by limiting calcium entr into the cell.
- Functional improvemer supported by significan reductions of NT-proBN for up to 2 weeks.

Study conducted by: Hani N. Sabbah, Henry Ford Health System

Heart Failure Phase 2 Study Design

- **Randomized, double-blind, placebo-controlled, multi-center Phase 2 study in chronic heart failure ongoing**

- **N=150 patients, 3 dose arms, single 3-hour administration**

- **Efficacy assessments:**
  - Cardiac function
  - Biomarkers
  - Exercise tolerance

- **Study is testing a new formulation of vepoloxamer designed to be more suitable for a heart failure patient population**
  - Patent applications filed on formulation and methods of use in heart failure

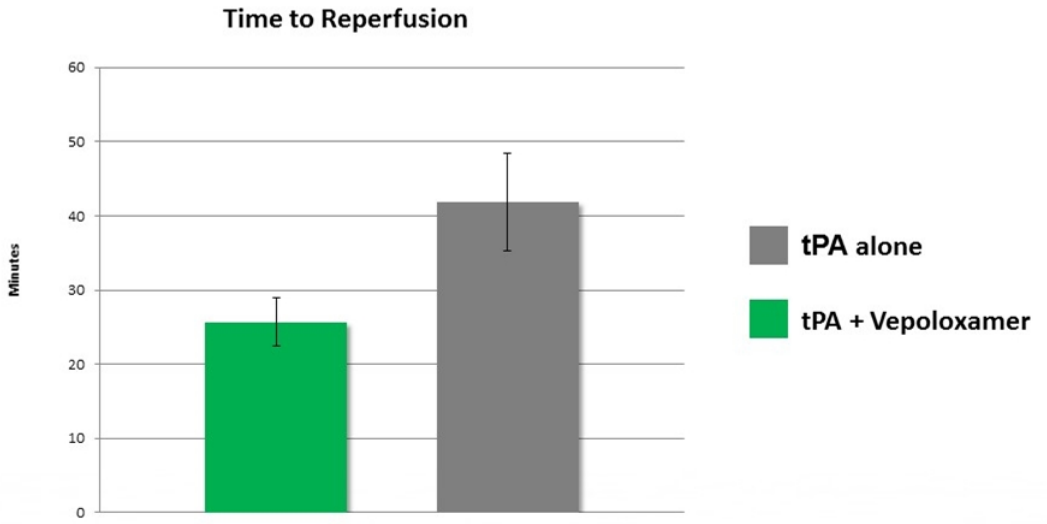
Development of Vepoloxamer in Ischemic Strok

Objective: Accelerate reperfusion and reduce reperfusion injury

Phase 2a Ready

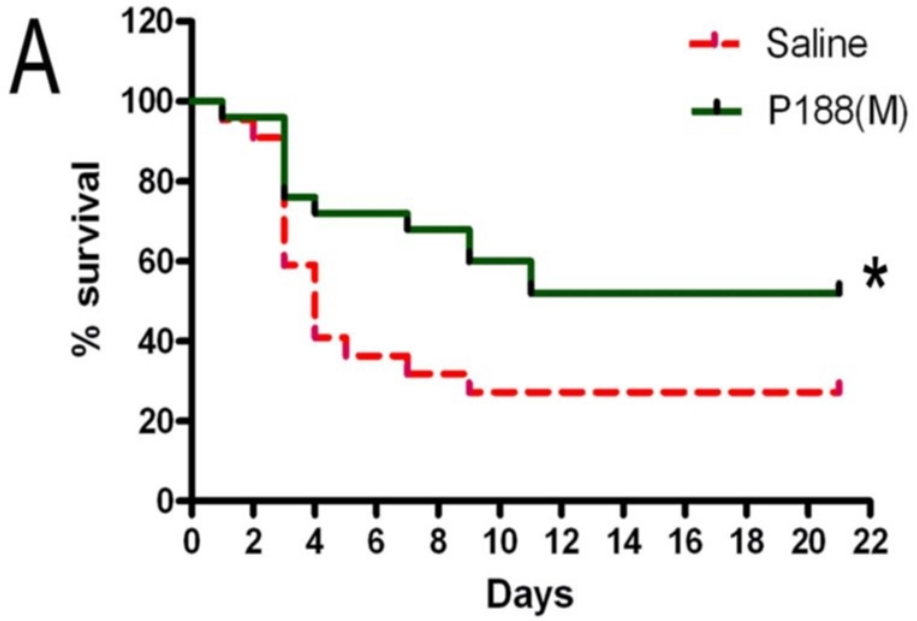
Vepoloxamer in Ischemic Stroke

- **In stroke, restoring blood flow is critical ("time is tissue")**
  - Vepoloxamer improves blood flow as a stand-alone agent
  - In combination with a thrombolytic, vepoloxamer shortens time to thrombolysis b up to 40%
  - Seals and protects ischemia-injured tissue
    - Neuronal tissue
    - Blood brain barrier integrity



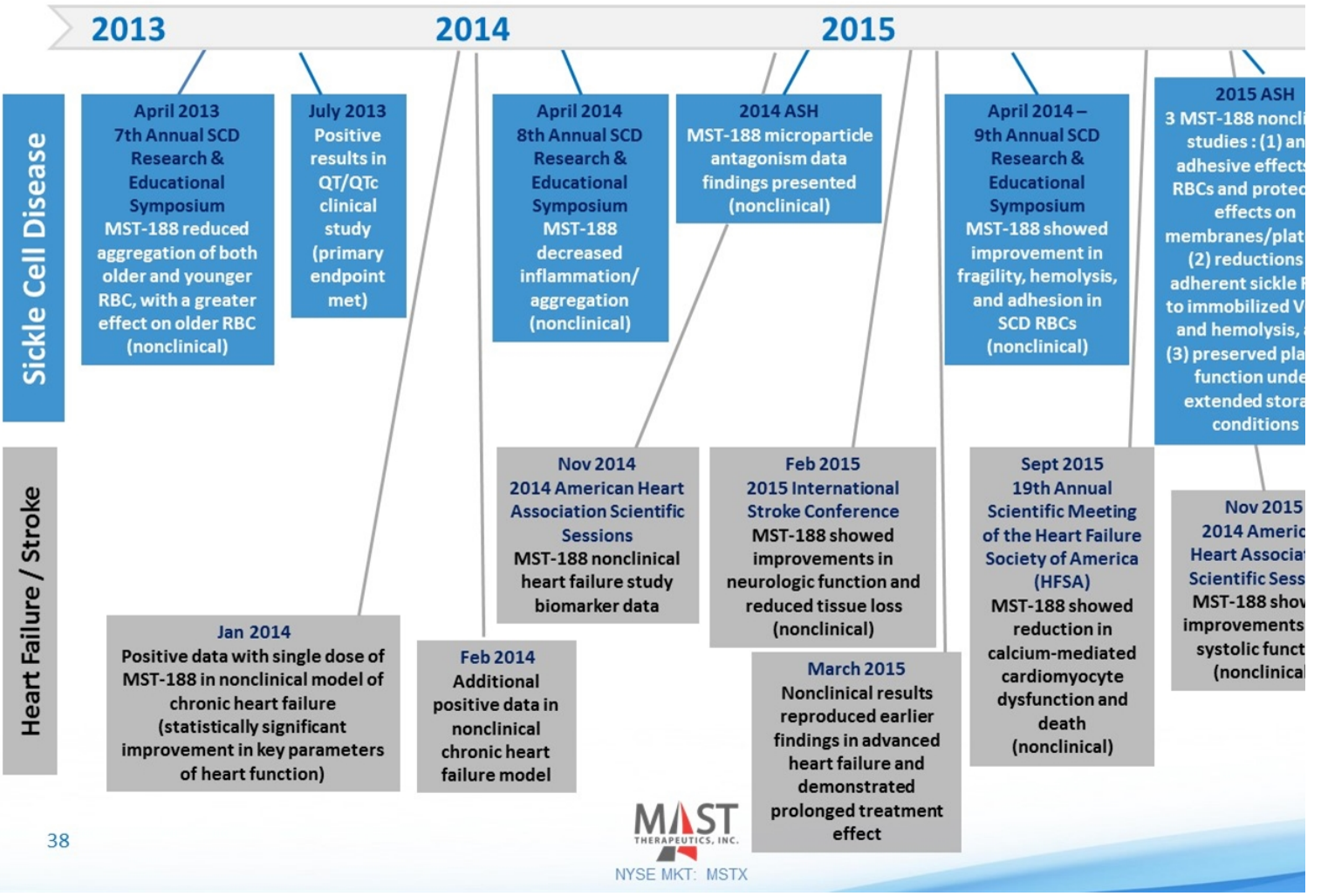
Vepoloxamer Alone or with tPA Improves Outcomes in Experimental Stroke Models

- **Two hour occlusion of MCA with silicon coated nylon suture**
- **Only 27% of control mice survived vs. 52% of mice treated with poloxamer 188* (n=51)**



PLOS ONE 2013 (8) 4: e61641
* Vepoloxamer is purified poloxamer 188

Data Generated by MAST After Acquisition of Vepoloxamer



MAST THERAPEUTICS, INC.
NYSE MKT: MSTX

Vepoloxamer Market Exclusivity

Form of Protection	Indication	Status
Orphan Drug Designation (Market Exclusivity)	SCD	Granted (US/EU)
Patents – Composition of matter	SCD, HF, IS	Filed, pending w/w
Patents – New formulation	HF	Provisional filed
Patents – Methods of use	SCD, HF, IS	Filed, pending w/w
Data Exclusivity	SCD, HF, IS	Eligible (US/EU)
Trade Secret & Know-How	SCD, HF, IS	Varies

SCD = sickle cell disease
HF = heart failure
IS = ischemic stroke

Development of AIR001 in Heart Failure

Objective: Improve exercise tolerance and hemodynamics in HFpEF patients

Multiple Phase 2 Studies

AIR001 Overview

- **AIR001 is nitrite* for intermittent inhalation**
  - Delivered via proprietary handheld nebulizer
  - Activity includes dilation of blood vessels and reduced inflammation
    - Not limited to role as nitric oxide donor as nitrite has direct mitochondrial oxygen-sparing activity
  - Hemodynamic benefits include reductions in:
    - Pulmonary capillary wedge pressure
    - Right atrial pressure
    - Mean pulmonary arterial pressure
  - Safety data available in 124 subjects (well-tolerated)

* Note: Nitrite is a different molecule and has separate activity compared to organonitrates or nitric oxide.

AIR001 Clinical Data

- **Three Phase 1 studies**
  - Established Maximum Tolerated Dose (MTD)
  - Acute improvements in hypoxia-induced pulmonary hypertension
  - No drug-drug interaction with sildenafil
- **Phase 2a study in PAH (n=29)**
  - Well-tolerated; no treatment-related serious adverse events
  - Improvements seen in median pulmonary vascular resistance (PVR) and median distances in 6-minute walk test
  - Methemoglobin levels remained normal (<1.5%)
- **Phase 2a study in HFpEF (n=30)**
  - Met primary endpoint; statistically significant decrease in pulmonary capillary wedge pressure during exercise compared to placebo
  - Well-tolerated; no treatment-related serious adverse events

AIR001 Clinical Development Plan

- **Heart Failure with Preserved Ejection Fraction (HFpEF)**
  - Responsible for ~50% of heart failure hospitalizations
  - No approved medications

- **Supporting ongoing institutional-sponsored Phase 2a study**
  - Evaluating hemodynamic effects – interim data expected mid-2016

- **AIR001 recently selected by the Heart Failure Clinical Research Network fo Phase 2 study in HFpEF**
  - n=100
  - Multicenter, randomized, double-blind, placebo-controlled
  - Initiation expected Q3 2016

MSTX Financial Overview

- **Cash/investments at 12/31/2015: ~$41 million**
- **Public offering closed 2/16/2015: Net proceeds of $7.3 million**
- **Principal debt balance: $15 million**
  - $10 million prepayment on 7/31/16 if EPIC data not positive
- **Market capitalization: $56 million***
- **Shares outstanding: ~ 193 million***
- **Average daily volume (3 mo.): ~ 1.4 million***

* As of March

Management Team and Board of Directors

Management Team

Brian Culley, CEO	Immusol, UC San Diego, Neurocrine, Scripps Research In
Ed Parsley, CMO	Aires, Pfizer, CSL, Encysive, U. Texas Medical
Brandi Roberts, CFO	Alphatec, Artes, Stratagene, Pfizer, PwC
Martin Emanuele, SVP Development	DaVita, SynthRx, Kemia, Avanir, DuPont
Greg Gorgas, SVP Commercial	Theragence, Biogen Idec, Chiron, Cetus, Upjohn Co.
Mark Longer, VP Regulatory	AstraZeneca, Amylin, Pfizer

Board of Directors

NEW	Matthew Pauls, CEO	StrongBridge Biopharma
NEW	Peter Greenleaf, CEO	Sucampo Pharmaceuticals
	Lew Shuster, CEO	Shuster Capital
	Howard Dittrich, EIR, CMO	Frazier Healthcare Partners
	David Ramsay, CFO (ret.)	Halozyme

Near-Term News and Events

- Q4 & FYE 2015 financial results & update
- Q1 2016 financial results & update
- Interim results from initial cohort in ongoing AIR001 Phase 2a study
- Top-line results from Phase 3 EPIC study
- Completion of enrollment in vepoloxamer Phase 1 special population PK study

Key Takeaways and Investment Highlights

- **Mast is the leader in sickle cell disease**
  - Potential first-in-class therapy in an orphan disease with an unmet need
  - Enrollment complete in pivotal Phase 3; data expected in Q2 2016
  - More than 2 years ahead of nearest competitor
  - Extensive patient-focused activity:
    - Created the leading SCD app, VOICE Crisis Alert (>3000 downloads)
    - Created the (4th Annual) SCD Drug Development Conference
    - Sponsor and volunteer to charity events, SCD radio show, etc.
- **Vepoloxamer has potential in other serious vascular diseases, including heart failure and stroke**
- **Encouraging clinical data emerging from AIR001 for heart failure**
  - Met primary endpoint in 30-patient randomized blinded trial
  - Selected by HFN as subject of 100-patient Phase 2 study in HFpEF (INDIE-HFpEF)


MAST
THERAPEUTICS, INC.