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): October 7, 2015

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 2.02 Results of Operations and Financial Condition.

On October 7, 2015, Mast Therapeutics, Inc. (the "Company") announced that its cash, cash equivalents and investment securities were approximately $50 million as of September 30, 2015.

In accordance with General Instruction B.2. of Form 8-K, the information in Item 2.02 of this report 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 (the "Securities Act"), 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.

Item 8.01 Other Events.

The information attached as Exhibit 99.1 to this report relating to the Company and its development programs may be presented from time to time by the Company at various investor and analyst meetings, including on October 7, 2015 at the Company's Analyst & Investor Day.

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.

By filing this report, including 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 August 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 that are based on the Company's current expectations and assumptions. Such forward-looking statements 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 and nonclinical studies, 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 uncertainty of outcomes in ongoing and future studies of its 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 EPIC study, the planned Phase 2 study of vepoloxamer in heart failure, and the ongoing Phase 2a 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; 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 risk that, even if clinical studies are successful, the FDA or another regulatory agency may determine they are not sufficient to support a new drug application; 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 reliance on contract research organizations (CROs), contract manufacturing organizations (CMOs), and other third parties to assist in the conduct of important aspects of development of its product candidates, including clinical studies, manufacturing, and regulatory activities for its product candidates and that such third parties may fail to perform as expected; the Company's ability to obtain, as needed, additional funding on a timely

basis or on acceptable terms, or at all; the risk that the Company may be required to repay its outstanding debt obligations at a time that could be harmful to its financial condition and/or business strategy; the potential for the Company to delay, reduce or discontinue current and/or planned development activities, including clinical studies, partner its product candidates at inopportune times or pursue less expensive but higher-risk and/or lower return development paths 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 a product candidate in one or more indications, it may not realize commercial success and may never achieve profitability; the risk that the Company is not able to adequately protect its intellectual property rights, through patents or otherwise, and prevent competitors from duplicating or developing equivalent versions of its product candidates or that the use or manufacture of its products or product candidates infringe 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 Exchange Act and Section 27A of the Securities Act.

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: October 7, 2015

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, October 7, 2015

Exhibit 99.1

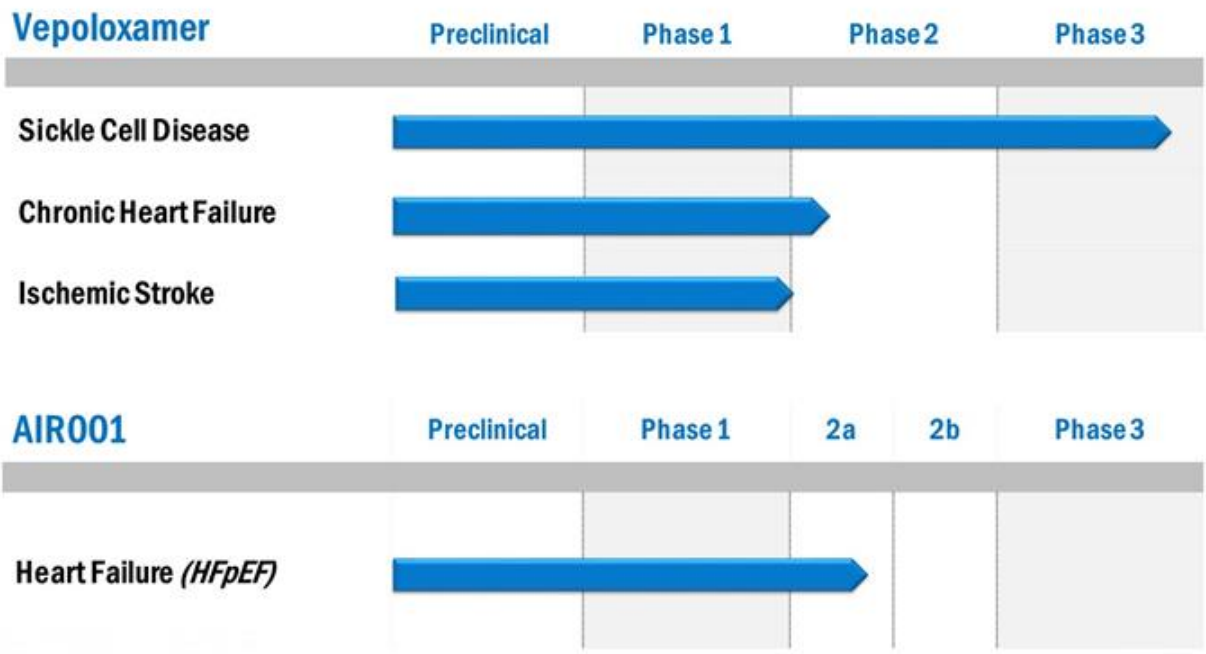
Investor & Analyst Day
October 7, 2015

Forward Looking Statements

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

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

Product Candidate Pipeline



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Vepoloxamer: A Novel Proprietary 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.

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
- Heart Failure
- Ischemic Stroke
- Other Diseases

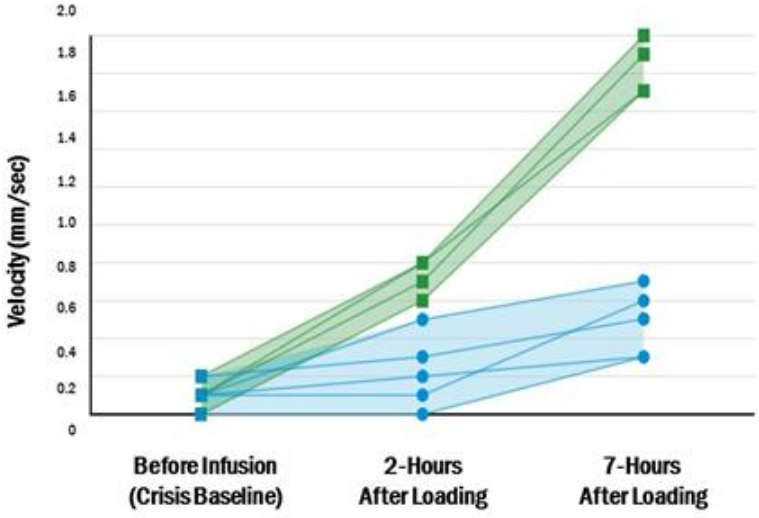
Vepoloxamer in Sickle Cell Disease (SCD)

- 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 Improves Blood Flow

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



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

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Source: J. Investig. Med. 2004;52(6):402-6

Development of Vepoloxamer in Sickle Cell Disease

Vepoloxamer Development History

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

The EPIC Study

Evaluation of Purified Poloxamer 188 In Vaso-Occlusive Crisis

- **Double-Blind, Placebo-Controlled, Multicenter**
  - 388 patients, randomized to standard of care +/- vepoloxamer
- **Primary Endpoint**
  - Duration of crisis from 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 requirements
  - Sub-study outcomes

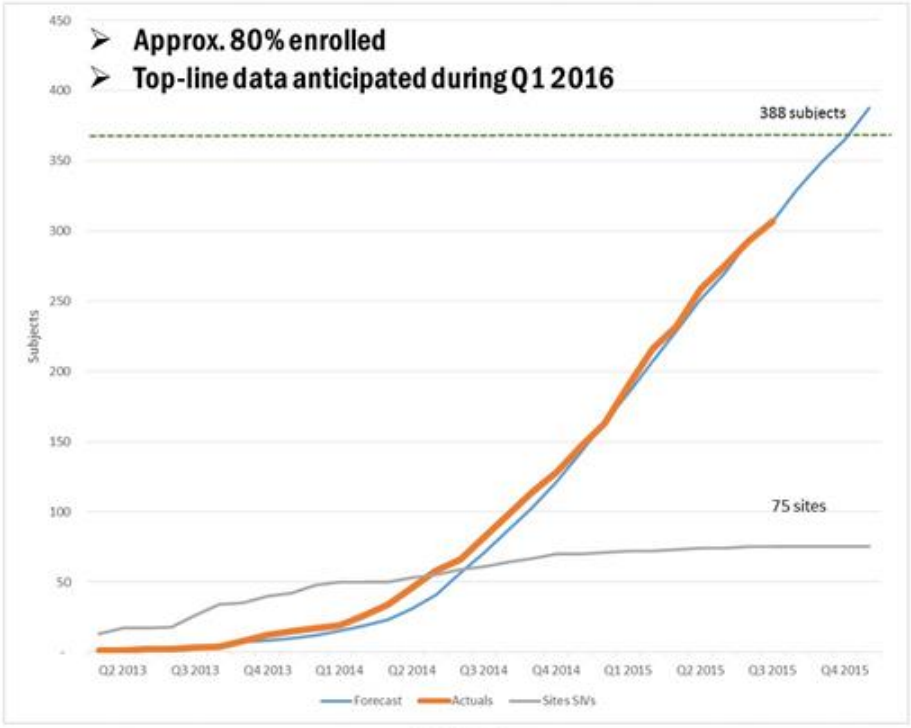
EPIC Study: Primary Endpoint

- **Duration of vaso-occlusive crisis**
- **Definition: time from randomization to last dose of parenteral opioid**
- **Advantages:**
  - Aligns with FDA recommendations and guidance
    - Sensitive and specific data collection
    - Objective
    - Minimal data loss
  - Medical expert support
  - Clinically meaningful

EPIC Study: Enrollment Progress

(as of September 30, 2015)

- Approx. 80% enrolled
- Top-line data anticipated during Q1 2016



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EPIC Study: Demographic Characteristics*

(As of September 30, 2015)

- **Age**
  - Average = 15 years
  - Range = 4 to 46 years
  - Patients over 18 = 28%
- **Use of Hydroxyurea (HU) = 61%**
- **U.S. patients > 50%**
- **~80% of all sites have enrolled at least one patient**
- **Why are these demographics encouraging?**
  - In the prior study, patients under the age of 16 had a benefit of 22 hours (p=.01) and those on HU had a benefit of 16 hours (p = .02).

*Per database entry

Interim Statistical Considerations for The EPIC Study

Bruce A. Barton, Ph.D.
Research Professor, Biostatistics
U Mass Medical School
October 7, 2015

Interim Statistical Considerations for EPIC

- Review original assumptions of sample size in EPIC protocol and the performance of these assumptions
- Review variability of primary efficacy outcome measurement across regions
- Reviews performed WITHOUT treatment group information to preserve statistical integrity of trial
- Reviews conducted on initial 250 subjects

Sample Size Assumptions

- Protocol sample size for EPIC was set at a total of 388 patients (194/treatment group) based on the following assumptions about the primary outcome (time from randomization to last dose of parenteral opioid analgesic):
  - Mean duration: 96 hours (placebo)
  - Standard Deviation (S.D.) for duration: 51 hours (placebo)

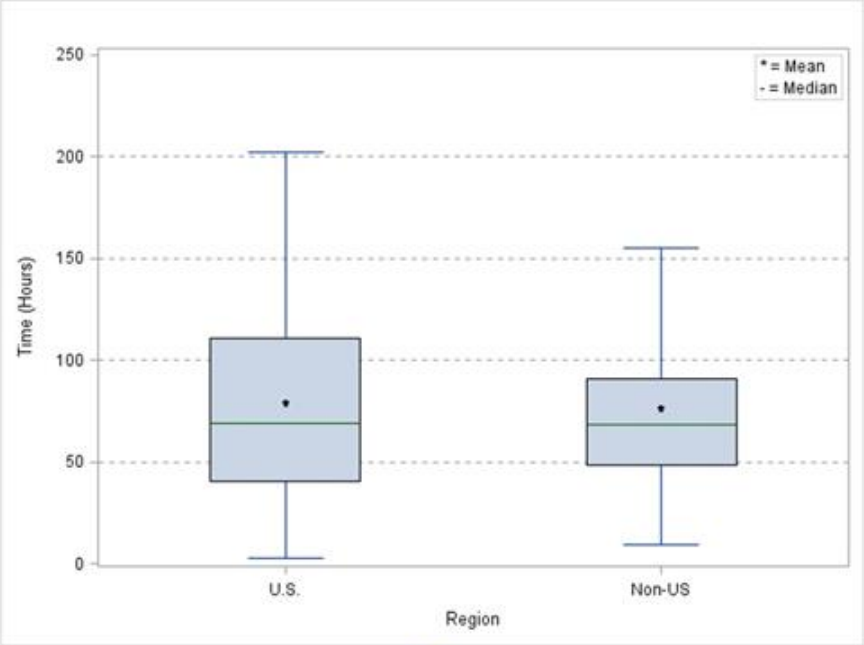
Sample Size Assumptions

- Without treatment group information, look for "consistency" between current data and assumptions for initial sample size
- Major factor is the S.D. – that determines ability to detect differences
- At two-thirds of recruitment (250 subjects), mean duration across ALL subjects is 79 hours with a S.D. of 47 hours
- S.D. of 47 hours is almost exactly what was assumed in the protocol
- Conclusion: initial estimate of sample size is consistent with current data

Analysis of Variability Among Regions

- With clinical sites in numerous (i.e., non-U.S.) geographic regions, there could be increased variability due to systematic regional differences in treatment of pain crises
- What does the primary outcome look like at this point for ALL subjects across regions?

Boxplot for Time from Randomization to Last Parenteral Opioid Dose by Region



University of Massachusetts Medical School
UMASS

Boxplot Interpretation

- Each box and its "whiskers" represents the distribution of times within that group of clinics
- The '*' in each box is the mean (average)
- The line inside the box is the median
- The bottom border of the box itself is the 25th percentile and the top is the 75th percentiles of the times
- The bottom whiskers is the minimum time and the top is the maximum

Analysis of Variability Among Regions

- Conclusion: The non-U.S. regions have substantial overlap with the U.S. for the primary outcome – means, medians, and S.D. almost identical
  - Because of small sample size in other countries/regions, the effect of any single non-U.S. site or country on the main analysis will be minimal and can be investigated after the initial complete intent-to-treat (ITT) analysis using a regional sensitivity analysis

Conclusions about Interim Blinded Statistical Assessments for EPIC

- Current data support sample size estimates and confirm the study is performing to preconceived assumptions
- Current data support similar variability for primary outcome across U.S./non-U.S. regions and expect minimal impact on main study (ITT) analysis

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 safety signals identified
  - DSMB members deemed no additional meetings were necessary

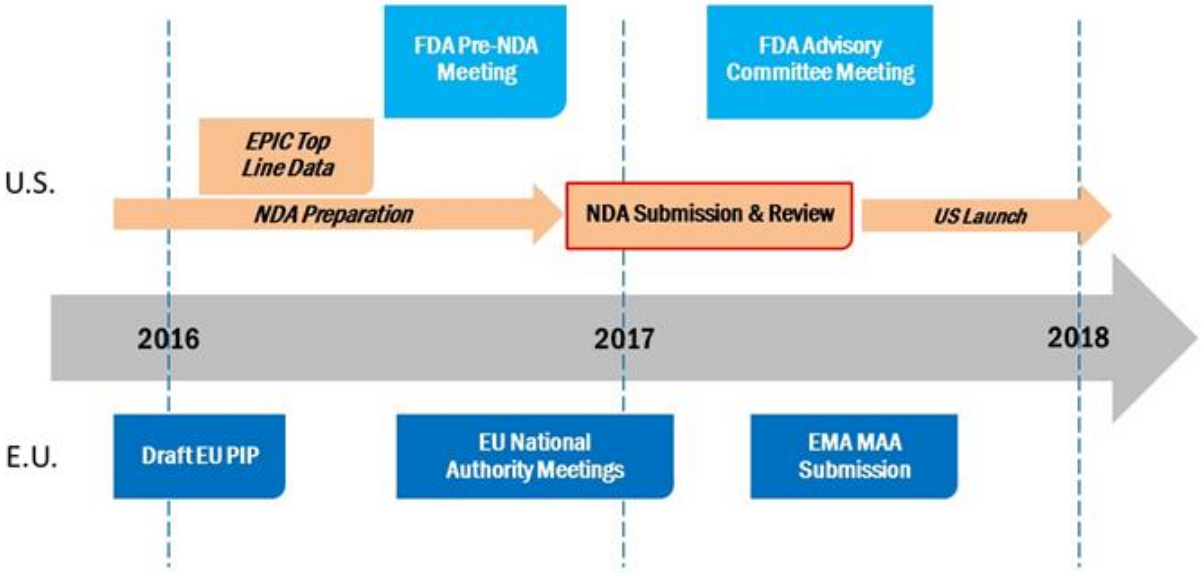
EPIC Study: Summary

- Enrollment on track
- Safety assumptions as predicted
- Age consistent with expectations
- HU use higher than expected
- Study design assumptions consistent with original plan (patient #s, avg. duration of crisis, coefficient of variation)
- Minimal regional variability

Vepoloxamer in SCD: Regulatory Considerations

- Significant unmet need – still no disease-modifying therapy for ongoing VOC
- Support among medical / advocacy / 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
  - Repeat-administration study - ongoing
  - Special populations study - planned

Vepoloxamer in SCD: Key Regulatory Activities



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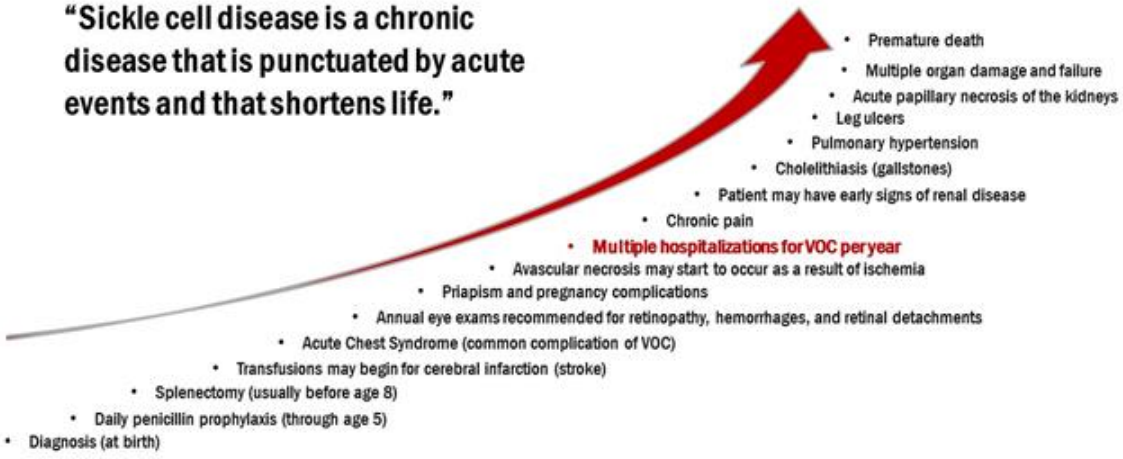
Sickle Cell Disease

Commercial Opportunity and Strategy

SCD: A Lifetime of Complications

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



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

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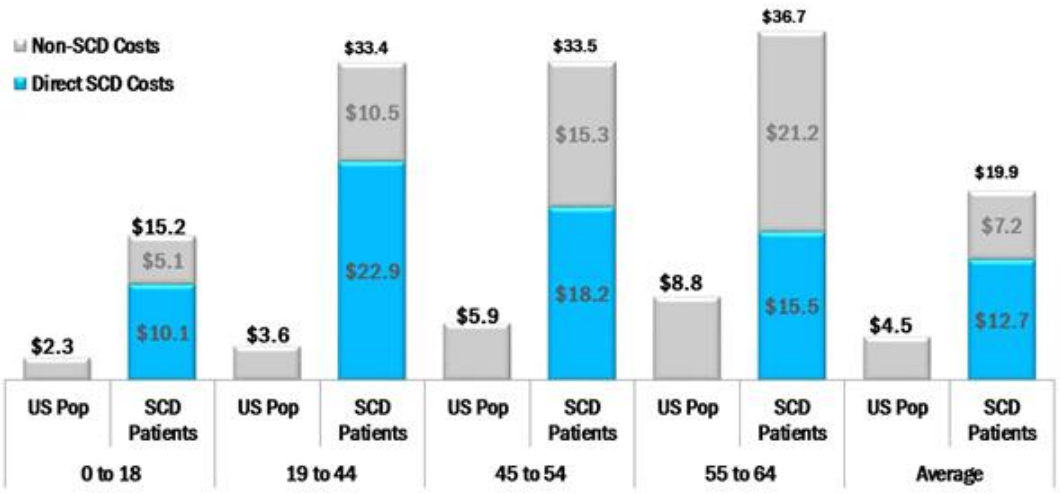
Significant Costs to Treat SCD

Average Annual Cost of Care: U.S. Population v. SCD Patients (2011 $ in Thousands)



Sources: U.S. average - Health Care Cost and Utilization Report: 2011. Health Care Cost Institutes Sep 2012; SCD costs: Kaul, T., et al., The cost of health care for children and adults with sickle cell disease. American Journal of Hematology 84:323-327, 2009.

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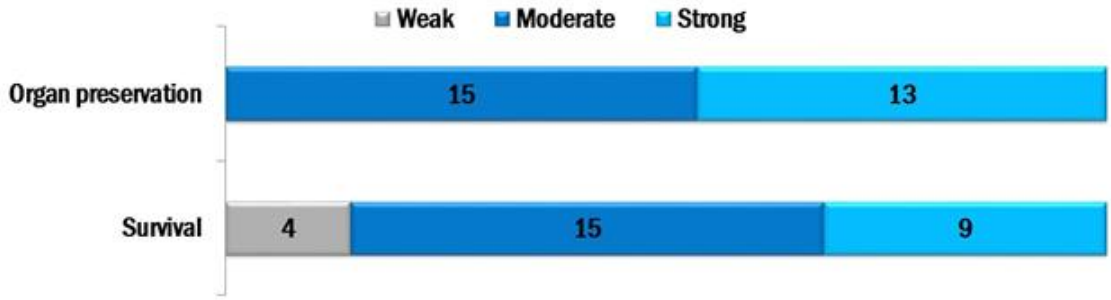
Vaso-Occlusive Crisis is the Hallmark of SCD

- 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 Engl J Med, 1999, Vol 340, No 13; Platt, et al., Mortality in Sickle Cell Disease (N Engl J Med 1994;330:1639-44)

Physicians Report a High Correlation of VOC with Organ Damage and Mortality

Frequency, Severity, and Duration of VOC Correlates with Morbidity and Mortality (# of mentions)



"My older patients have more organ issues than my younger patients" - IM

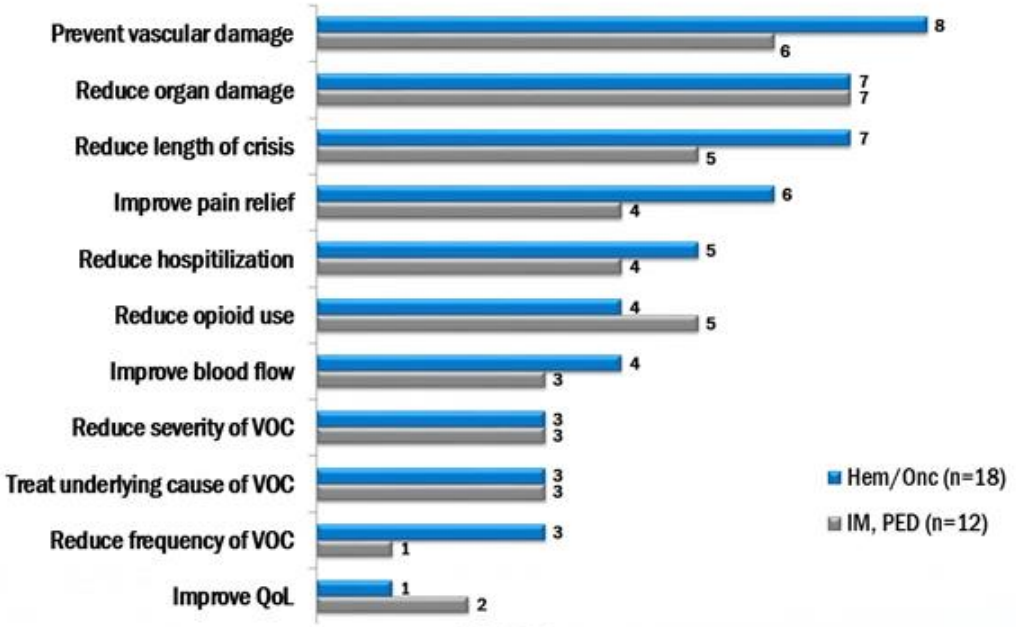
"It's like a heart attack- the longer you have pain, more damage is done and higher risk of dying" - Hem/Onc

"Each crisis chips away at the organs" - Hem/Onc

Source: RDS Consulting Group Research Report, 2015, n=30
Reference: Telen, M.J., Elmariah, H. et al., Factors Associated with Survival in a Contemporary Adult Sickle Cell Disease Cohort, *Am J Hematology* 2014 May; 89(5):530-535

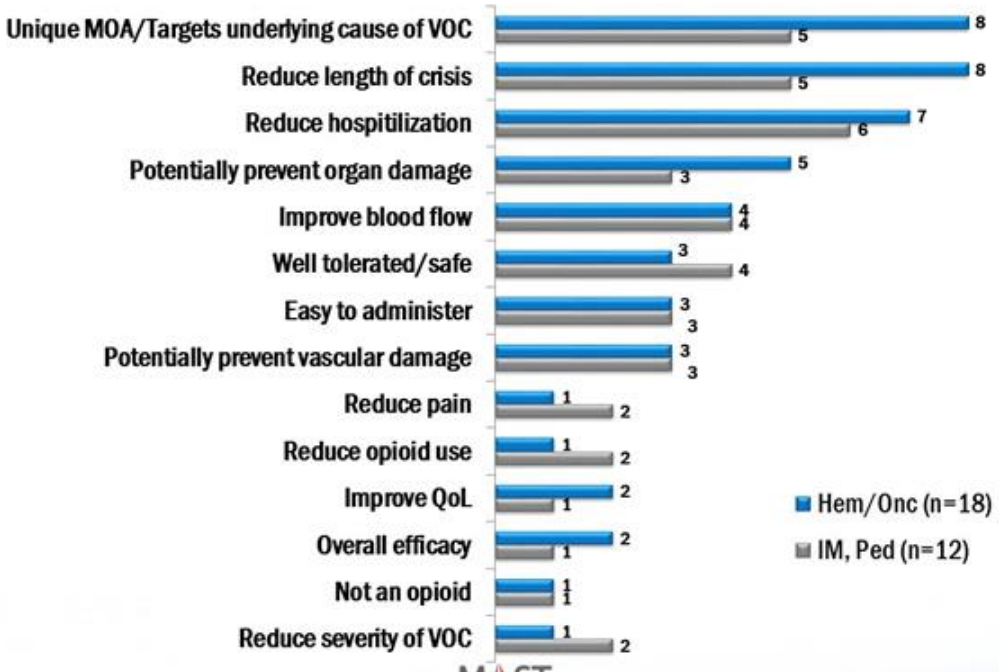
Physicians Recognize the Value of a New Treatment that Would Reduce the Duration of VOC

Desired Benefits of 'Ideal' Treatment for VOC
(# of mentions, unaided)



Source: RDS Consulting Group Research Report, 2015

Expected Features and Potential Benefits Align with Unmet Needs for VOC Treatment



Source: RDS Consulting Group Research Report, 2015

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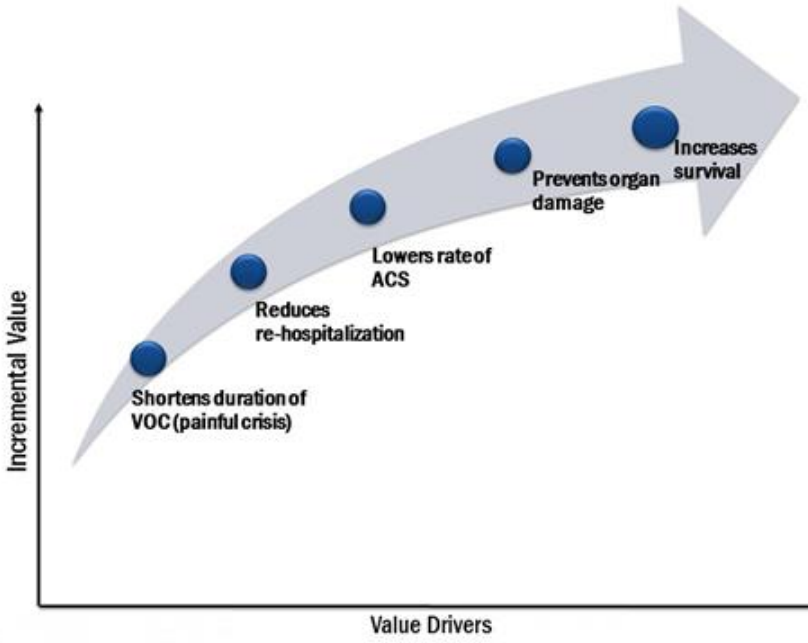
Potential to Drive Value According to Multiple Near-Term Outcomes & Long-Term Expectations



Launch platform:

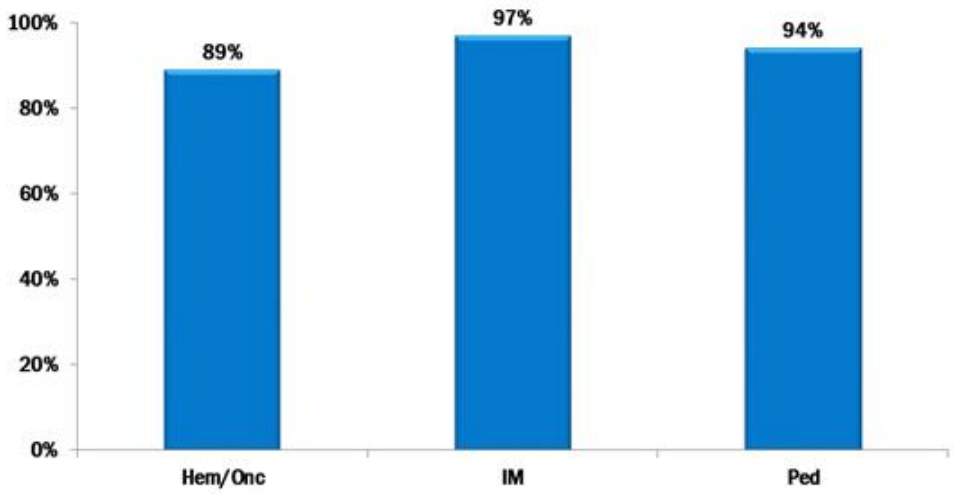
- New treatment approach specific for VOC
- Reduction in acute care and associated costs
- Faster improvement and shorter stays

Long-term potential:

- Association with reduced vascular damage, improved organ preservation and survival

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

Average % of Patients Treated with Vepoloxamer at Peak



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

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

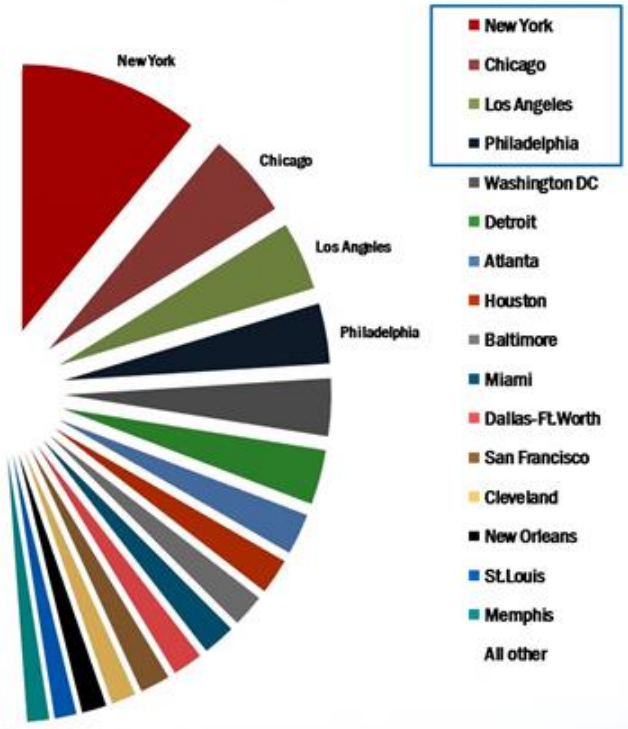
Development Landscape in SCD

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 Prasugrel	
Phase 2		Aes-103 SANGUINATE Sevuparin SelG1	
Phase 1		GBT440 NiCord NKTT120 PF-04447943 SCD-101	LentiGlobin

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

- ~50% of SCD patients in the U.S. are treated in the top 16 metropolitan areas
- Top four metropolitan areas account for 24% of the market
- <200 hospitals in the U.S. serve the majority of SCD patients
- Target audience: Hematologist, hospitalist, other physicians who routinely care for SCD
- Effective field promotion with small hospital sales force (~30)



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

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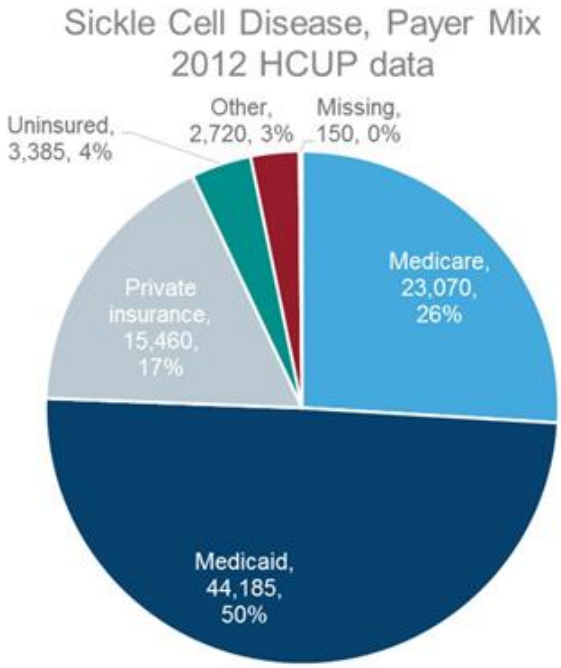
U.S. Sickle Cell Disease Hospital Payer Mix



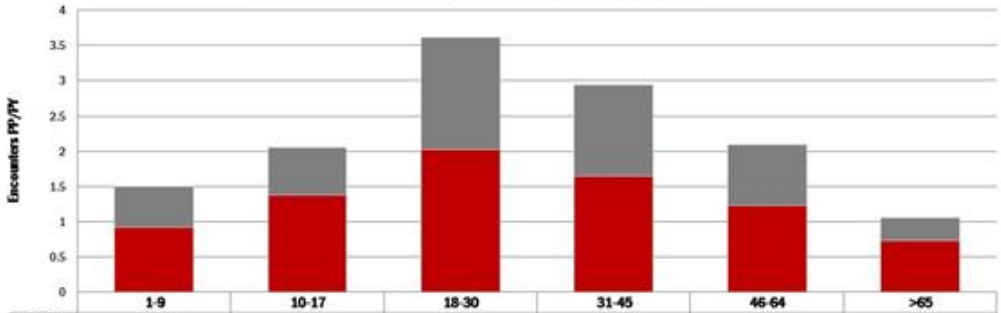
- Inpatient prospective payment system (IPPS)
- Patients with public insurance have minimal share of costs
- Medicaid plans may seek additional funding via CHIP, per diem rates, or modified FFS rates
- Vepoloxamer expected to meet criteria for additional Medicare payment (NTAP)

Source: ADVI analysis, 2015

Vepoloxamer's Adoption & Growth Guided by the Development Strategy

1. For IP stays, initial regulatory success driven by The EPIC Study
2. For ED setting, early intervention trial
3. Expand use in other SCD complications

Rate of Acute Care Encounters by Age for Patients with Sickle Cell Disease in the U.S.



	1-9	10-17	18-30	31-45	46-64	>65
ED Visits	0.59	0.68	1.59	1.29	0.86	0.33
IP Stays	0.91	1.37	2.02	1.65	1.23	0.72

Source: D.C. Brousseau, MD, MS, et al. Acute Care Utilization and Rehospitalizations for Sickle Cell Disease. JAMA. April 7 2010 - Vol. 303, No. 13

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Significant Potential Outside the U.S.

- **Over 12 million patients worldwide**

- **Europe**
  - Approximately 40,000 patients
  - 54% reside in two countries: UK and France
  - Most patients concentrated in large metro areas: Paris and Londo

- **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.
  - Initial market entry in the U.S. expected 2H 2017
  - Expansion opportunity
    - Planning E.U. launch in 2019
    - Partner MENA region and ROW

- **Concentrated market**
  - 50% of U.S. SCD patients live in 16 metropolitan areas
  - 96% of SCD patients in the U.S. have insurance coverage

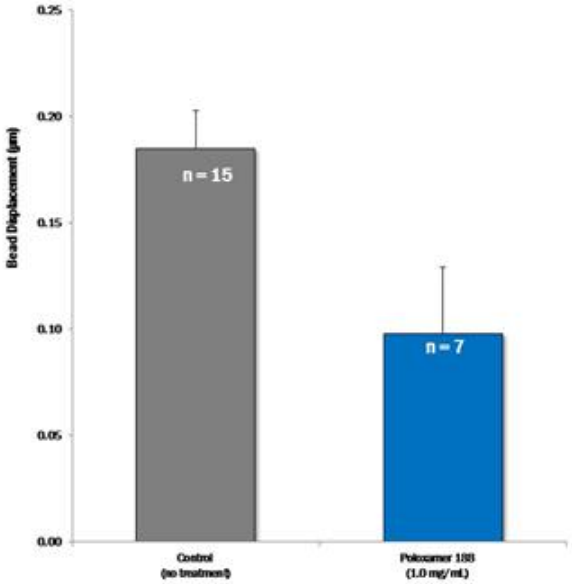
- **Research supports rapid adoption & significant market penetration**
  - Ranked 4.4 out of 5 as a "breakthrough medical innovation" by pharmacy directors at key SCD institutions
  - KOLs and community physicians express high intent to use

Development of Vepoloxamer in Heart Failure

Objective: Restore Membrane Integrity To Improve Cardiac Performance

Development Rationale in Heart Failure

- Elevated wall tension in dilated (failing) heart impairs normal membrane repair process
- Permeabilized membranes allow unregulated calcium influx and cardiac troponin leak
- Vepoloxamer reduces surface tension, facilitating membrane repair and inhibiting unregulated calcium entry



Effect of poloxamer 188* on cell surface tension (bead displacement). Cells treated with 1.0 mg/mL poloxamer 188 had significantly reduced membrane tension.

*Vepoloxamer is purified poloxamer 188.

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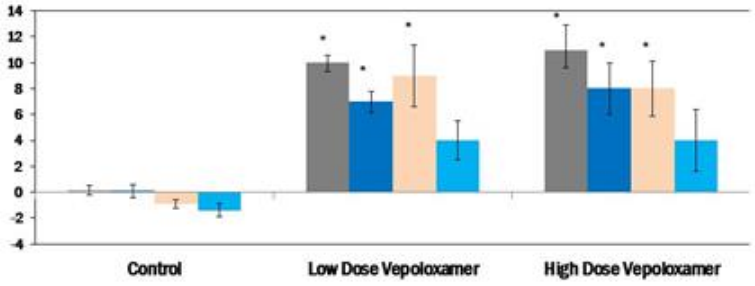
Heart Failure Model – Functional Improvement (single administration)

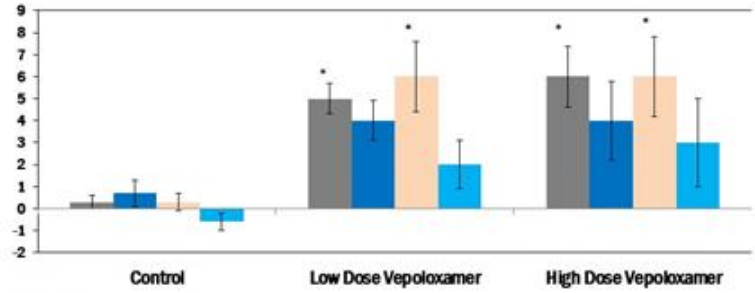
Δ LV Ejection Fraction (%)



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

* $p < 0.05$ vs. Control

Δ Stroke Volume (mL)



- Vepoloxamer elicited improvements in LV systolic and diastolic function that lasted for at least one week

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

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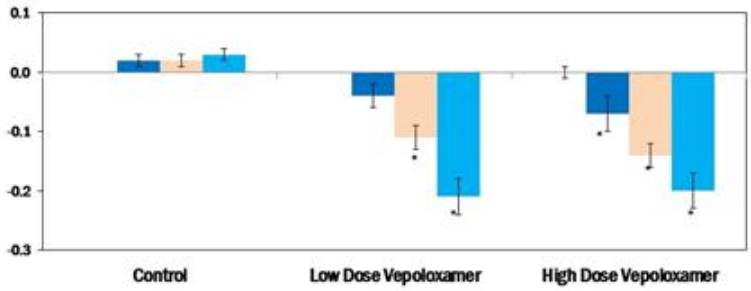
Heart Failure Model – Biomarkers (single administration)

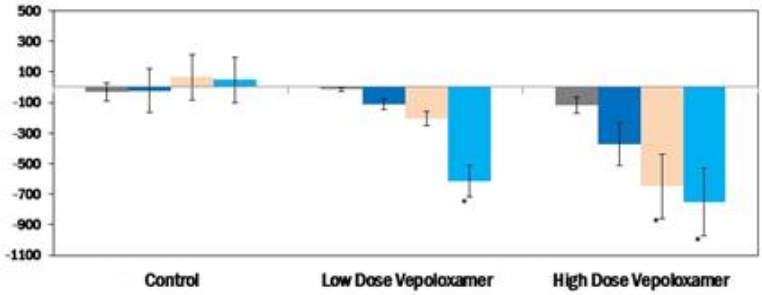
Δ Plasma Troponin-I (ng/mL)



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

* $p < 0.05$ vs. Control

Δ nt-pro BNP (pg/mL)



- Troponin data suggests vepoloxamer can preserve cardiomyocytes by limiting calcium entry into the cell.
- Functional improvements supported by significant reductions of NT-proBNP for up to 2 weeks.

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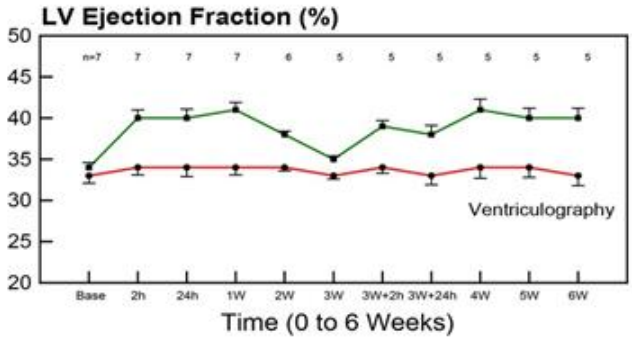
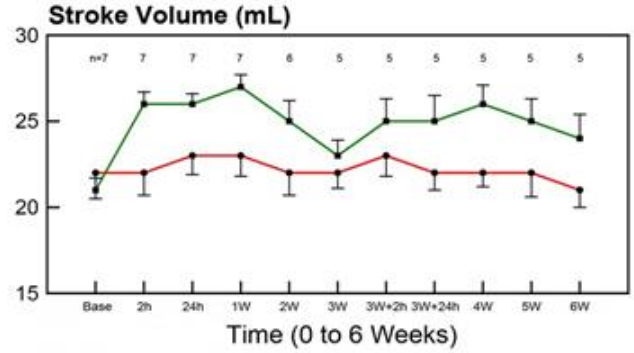
Heart Failure Model – Repeat Administration





Vepoloxamer
Placebo Control

- Repeat administration of vepoloxamer (0 and 3 wks) elicited improvements in LV systolic and diastolic function that were sustained for at least 6 weeks

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

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Heart Failure Phase 2 Study Design

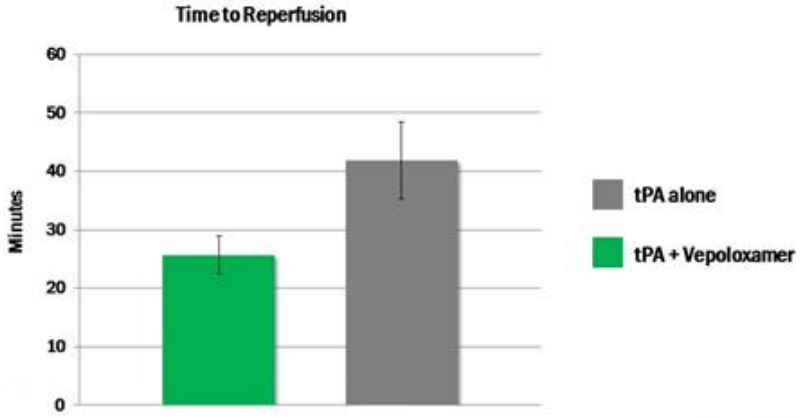
- Randomized, double-blind, placebo-controlled, multi-center Phase 2 study in chronic heart failure
- 150 patients, 3 dose arms, single dose (3-hour IV administration)
- Efficacy assessments:
  - Biomarkers
  - Cardiac function
- Anticipated start: October 2015

Development of Vepoloxamer in Ischemic Stroke

Objective: Accelerate time to reperfusion and reduce reperfusion injury

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 by up to 40%
  - Seals and protects ischemia-injured tissue
    - Neuronal tissue
    - Blood brain barrier integrity



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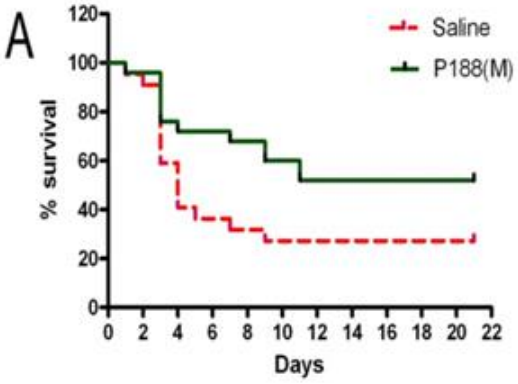
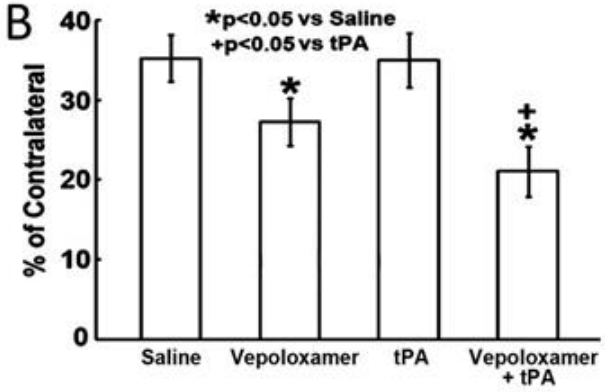
Vepoloxamer Alone or with tPA Improves Outcomes in Experimental Stroke Models

2 hr. occlusion of MCA with silicon coated nylon suture

Only 27% of control mice survived vs. 52% of mice treated with poloxamer 188* (n=51)



Delayed intervention MCA thrombotic occlusion model. Contralateral brain tissue salvage at day 7 post injury (n=10)



PLOS ONE 2013 (8) 4: e61641

* Vepoloxamer is purified poloxamer 188

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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 hemodynamics and exercise tolerance in HFpEF patients

AIR001 Overview

- **AIR001 is nitrite* for intermittent inhalation**
  - Delivered via a proprietary handheld nebulizer
  - Activity includes dilation of blood vessels and reduced inflammation
  - Hemodynamic benefits include reductions in:
    - Pulmonary capillary wedge pressure
    - Right atrial pressure
    - Mean pulmonary arterial pressure
  - Safety data available in 124 subjects (well-tolerated) including exposures beyond 52 weeks

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

AIR001 Clinical Data

- **Three Phase 1 studies**
  - Established MTD
  - Acute improvements in hypoxia-induced pulmonary hypertension
  - No drug-drug interaction with sildenafil
- **One Phase 2 study**
  - 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%)

AIR001 Clinical Development

- **Heart Failure with Preserved Ejection Fraction (HFpEF)**
  - Responsible for ~50% of heart failure hospitalizations
  - 80% develop pulmonary hypertension
  - No approved medications

- **Supporting two institutional-sponsored Phase 2a studies to:**
  - Evaluate hemodynamic effects of AIR001
  - Evaluate acute effects versus placebo on submaximal oxygen consumption and exercise hemodynamics

- **Initial observations from ongoing Phase 2a studies are encouraging**

- **If Phase 2a studies are positive, planning a Phase 2b study in HFpEF in 2016**

Financial Overview

MSTX Financial Overview

- Cash/investments at 9/30/2015: ~$50M
- Market capitalization: ~ $95 million*
- Shares outstanding: ~ 164 million*
- Average daily volume (3 mo.): ~ 900,000

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* As of September 30, 2015

Major Planned Activities

Vepoloxamer Commercial/Regulatory
Completion of EPIC enrollment
SCD NDA Preparation
SCD US Launch
SCD EU Launch

Clinical
Vepoloxamer Phase 2 HF study
Vepoloxamer Phase 2 Stroke study
AIR001 Phase 2 HF study
Vepoloxamer SCD Label-Expansion studies

3 Year Plan

- **Assumes vepoloxamer on the market in 2017, becoming standard of care in SCD**
- **Areas of focus:**
  - Regulatory
    - U.S. NDA preparations
    - E.U. MAA preparations
  - Commercial Operations
    - Launch preparation, pricing studies
    - Identify third party logistic (3PL) partner
    - Hire approximately 50-60 commercial professionals (including 30 person sales force)
  - Manufacturing
    - Complete registration batches/launch material
    - Evaluate backup manufacturing vendors
    - Identify economy of scale opportunities to lower COGS with existing clinical manufacturers

Financing Update

- **Debt agreement with Hercules Technology Growth Capital**
  - $15M facility
  - Extensive due diligence completed
  - Amendment completed September 28
    - Capital raise requirement moved from 12/31/15 to 4/30/16 and removed if EPIC data positive

- **ATM Agreement with Cowen & Co.**
  - $30M facility
  - No shares sold since May 2015

Mast Therapeutics: Key Takeaways

- EPIC average age is 15, majority of patients are from U.S., and hydroxyurea use is ~60%
- Blinded statistical analysis suggests EPIC is performing as it was designed
- No safety signals after 250 patients and no further DSMB meetings needed
- Vepoloxamer has the potential to be the first-in-class disease-modifying therapy for SCD
- Concentration of patients in the U.S. and E.U. provides an attractive market opportunity
- Vepoloxamer has potential in serious vascular diseases, such as heart failure and stroke
- Encouraging observations in ongoing AIR001 studies support further development in HFpEF


MAST
THERAPEUTICS, INC.

Executive Team Backgrounds

Brian Culley, CEO

Mast CEO since 2010

- **MA in biochemistry & molecular biology, MBA**
- **Experience:**
  - 6 years CEO
  - 8 years Business Development
  - 7 years bench scientist (*Neurocrine Biosciences, The Scripps Research Inst.*)
- **Acquisitions:**
  - Aires (*AIR001*)
  - SynthRx (*vepoloxamer*)
  - SD Pharma (*multiple assets*)
- **Key Accomplishments:**
  - Grew dormant 2-person company into leading sickle cell company with staff of ~30 and ongoing pivotal Phase 3 trial.
  - Acquired private company which was accounted for as "bargain purchase", subsequently announced positive interim data from multiple Phase 2 studies.

Marty Emanuele, SVP Development

Joined Mast in 2011

- **PhD (Pharmacology & Experimental Therapeutics), MBA**
- **Overall experience:**
  - **30 years Pharma / Biotech (20+ Sr. Executive Management)**
  - **15 years Research & Development**
    - Awarded NIH and FDA grants as primary investigator
    - Awarded 4 U.S. patents as primary inventor (including poloxamer 188); numerous pending and co-inventor patents
    - Led R&D teams resulting in 4 original (NCE) INDs
    - Key participant on 2 successful NDAs
    - Member of the global executive steering / development committees for joint development programs with Merck, Burroughs Wellcome, Astra Zeneca, and Novartis
  - **15 years Corporate / Business Development**
    - Led numerous out-license / partnership / product acquisition transactions including several with leading global pharmas (Merck, Astra Zeneca, Novartis, GSK)
      - Total deal values over $1 billion
    - Finalist (Script Deal of the Year) (Avanir – Astra Zeneca license)
    - Conceived and implemented the DaVita BioBank (the then largest commercial biorepository in the world)
    - Co-Founder of SynthRx (vepoloxamer)

Ed Parsley, CMO

Joined Mast in 2014

- **Doctor of Osteopathic Medicine and Surgery; Pulmonary, Critical Care, Sleep, and Internal Medicine certifications**
- **Overall experience:**
  - **10 years Pharma/Biotech; 20+ years patient care**
  - **Clinical Development**
    - Clinical trial design and execution across multiple indications; including PAH, heart failure, renal failure, primary pulmonary hypertension of the newborn
    - CMO Mast Therapeutics responsible for trial design and execution of pivotal Phase 3 study (EPIC) in SCD; Phase 2 studies in heart failure and pulmonary hypertension associated with HF
    - Leadership role across Pfizer's pulmonary hypertension portfolio, including Revatio® (sildenafil); Thelin®(sitaxsentan); Sutent®(sunitinib)
    - Key participant in NDAs and CTDs for sildenafil and sitaxsentan
    - Leadership role in multiple DSMBs, Medical Monitor over 12 trials
  - **Pharmacovigilence**
    - Performed global PV for both marketed and investigational compounds, including regulatory submissions
    - Developed and wrote targeted white papers/safety reviews
  - **Medical Affairs**
    - Led global medical affairs teams
    - Experience in marketing orphan drugs

Bruce Barton, Statistician

Joined Mast as a consultant in 2015

- **PhD in Biostatistics**
- **Current positions:**
  - Research Professor, UMass Medical School's Department of Quantitative Health Sciences, Division of Biostatistics (5+ years)
  - Director, Quantitative Methods Core (5+ years)
  - Adjunct Professor, Johns Hopkins Univ., Tufts University Vet School
- **Prior positions: Maryland Medical Research Institute, Senior/Principal Statistician (30 yrs)**
- **Experience:**
  - 40+ years experience in medical research, esp. clinical trials
  - 20+ studies as PI of Statistical/Data Center for clinical trials
  - Studies of SCD: hydroxyurea (MSH, MSH Follow-up), transfusions for silent strokes in children (SITT), early study of poloxamer 188, studies of new compound to treat SCD with biopharm company
  - Involved in 5 FDA applications

Greg Gorgas, SVP Commercial

Joined Mast in 2011

- **MBA**
- **Overall experience:**
  - ~30 years of successful commercial leadership
  - Global marketing, business development, sales, operations
  - Built commercial infrastructure for several companies
  - 4 first-in-class product launches, including Rituxan® (rituximab)
  - 11 product launches across multiple disease categories (hematology, cardiovascular, oncology, infectious disease, etc.)
  - P&L responsibility
- **Company experience:**
  - Biogen Idec
  - Chiron Therapeutics (Cetus Oncology)
  - The Upjohn Company
- **M&A related experience:**
  - Commercial lead in >$1B in transactions

Brandi Roberts, CFO

Joined Mast in 2011

- **CPA, MBA**
- **Overall experience:**
  - ~20 years of accounting and finance experience
  - 17 years of life sciences experience, including 7 years at Agouron/Pfizer
- **Revenue related experience:**
  - Stratagene/Agilent
  - Artes Medical
  - Alphatec Spine
- **M&A related experience:**
  - Agouron/Pfizer (Warner-Lambert, Pfizer, SUGEN, IDUN)
  - Stratagene/Agilent
  - Alphatec Spine (Scient'x)
  - Mast (SynthRx, Aires)

Mark Longer, VP Regulatory

Joined Mast in 2015

- **PhD, Pharmaceutical Sciences; Post-doc in biochemistry**
- **Drug Development and Regulatory experience:**
  - 25 years of industry experience in PhRMA and biotech, including 18 years in the Regulatory Affairs functions with Agouron/Pfizer, Amylin, and Ardea/AstraZeneca
- **Therapeutic area and successful product registration leadership experience:**
  - Metabolic:
    - Byetta® (exenatide); Symlin® (pramlintide);
    - Bydureon® and Bydureon Pen (exenatide once-weekly);
    - Myalept® (metreleptin)
  - Virology: Viracept® (nelfinavir)
  - Oncology: Sutent® (sunitinib)
  - Ophthalmology: Macugen® (pegaptanib)
  - Gastroenterology: Fulyzaq® (crofelemer)
  - Inflammatory: Zurampic™ (lesinurad)*

* NDA and MAA under review