Stemline Therapeutics, Inc.
NASDAQ: STML
Jefferies 2015 Healthcare Conference
June 2015
Forward-Looking Statements

This presentation includes statements that are, or may be deemed, “forward-looking statements.” In some cases, these forward-looking statements can be identified by the use of forward-looking terminology, including the terms “believes,” “potentially,” “estimates,” “anticipates,” “expects,” “plans,” “intends,” “may,” “could,” “might,” “will,” “should,” “approximately” or, in each case, their negative or other variations thereon or comparable terminology, although not all forward-looking statements contain these words. They appear in a number of places throughout this presentation and include statements regarding our intentions, beliefs, projections, outlook, analyses or current expectations.

You should read carefully our “Special Cautionary Notice Regarding Forward-Looking Statements” and the factors described in the “Risk Factors” sections of our reports on Form 10-K and Form 10-Q filed with the Securities and Exchange Commission to better understand the risks and uncertainties inherent in our business.
To build a leading biopharmaceutical company focused on greatly improving the lives of cancer patients by developing and commercializing innovative drugs that target cancer stem cells (CSCs) and tumor bulk.
Multiple clinical trials

- **SL-401**
  - 3 trials across 7 indications
    - Blastic plasmacytoid dendritic cell neoplasm (BPDCN) pivotal trial; *Top-line results from lead-in stage reported, pivotal trial ongoing*
    - Early and late stage acute myeloid leukemia (AML)
    - Four high-risk myeloproliferative neoplasms (MPNs)

- **SL-701**
  - Adult second-line glioblastoma (GBM)

Preclinical pipeline nearing IND

- **SL-801**
  - Oral small molecule reversible inhibitor of Exportin-1 (XPO1)
  - Broad preclinical activity in a wide array of tumor types
  - Advancing toward clinic for solid and hematologic malignancies
<table>
<thead>
<tr>
<th>Program</th>
<th>Target</th>
<th>IND</th>
<th>Lead-in</th>
<th>Phase 2</th>
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</thead>
<tbody>
<tr>
<td>SL-401</td>
<td>IL-3R</td>
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<td>BPDCN (r / r) – Pivotal trial</td>
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<td>AML (r / r)</td>
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<td>AML (in 1st CR, MRD+)</td>
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<td></td>
<td>Mastocytosis</td>
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<td>Hypereosinophilic syndrome</td>
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<td>Myelofibrosis</td>
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<td>Chronic myelomonocytic leukemia</td>
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<td>Anticipated</td>
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<tr>
<td>SL-701</td>
<td>IL-13Rα2 EphA2 Survivin</td>
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<td>Adult GBM (2nd line)</td>
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<td>SL-801</td>
<td>XPO1</td>
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<tr>
<td>SL-501, SL-101</td>
<td>IL-3R</td>
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BPDCN, blastic plasmacytoid dendritic cell neoplasm; AML, acute myeloid leukemia; r / r, relapsed / refractory; CR, complete response; MRD, minimal residual disease; GBM, glioblastoma multiforme
Management

Ivan Bergstein, M.D. – Chief Executive Officer
- Founded Stemline, served as CEO since inception, advanced company from concept to clinical stage public company
- Pioneer in the therapeutic targeting of cancer stem cells; filed early CSC patents
- Key member of team that built Access Oncology, Inc.; company acquired by Keryx Biopharmaceuticals (Nasdaq: KERX)

Eric Rowinsky, M.D. – Chief Medical Officer and Head of R&D
- Former Chief Medical Officer of ImClone Systems, Inc.
- Led FDA approval of Erbitux® for head and neck and colorectal cancers and played integral roles in developing and registering many anticancer therapeutics
- Board of directors (Biogen, others)

Ken Hoberman – Chief Operating Officer
- Former VP of Corporate Development, Keryx Biopharmaceuticals
- Led multiple business development transactions and financings
- Originated, in-licensed, and developed Auryxia™ (FDA approved Sept ’14)
Our Differentiated Approach:
Target Both Tumor Bulk and Cancer Stem Cells

Conventional Approach
*Target Tumor Bulk Only*

- Only tumor bulk targeted (CSCs survive)
- CSCs drive tumor regrowth
- Tumor relapse

Stemline’s Approach
*Target Both Tumor Bulk and CSCs*

- Both tumor bulk and CSCs targeted
- Cancer controlled / eliminated
- Improved long-term outcome
IL-3R is overexpressed on CSCs and/or tumor bulk across heme cancers

- AML, chronic myeloid leukemia (CML), acute lymphoid leukemia (ALL)
- Myelodysplastic syndrome (MDS)
- Hodgkin’s and certain non-Hodgkin’s lymphomas (NHL)
- Multiple myeloma
- BPDCN and other rare hematologic malignancies of unmet medical need

**IL-3R overexpression on tumor bulk**

<table>
<thead>
<tr>
<th>AML tumor bulk</th>
<th>Normal marrow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diffusely IL-3R+</td>
<td>Low IL-3R</td>
</tr>
</tbody>
</table>

**IL-3R overexpression on CSCs**

<table>
<thead>
<tr>
<th>AML CSCs</th>
<th>Normal stem cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uniformly IL-3R+</td>
<td>Negative for IL-3R</td>
</tr>
</tbody>
</table>

Jordan, C. Leukemia, 2000
SL-401 Targeted Therapy

Payload ideally suited to kill both tumor bulk and CSCs

- SL-401 kills both rapidly dividing tumor bulk and slow-growing CSCs (payload not cell-cycle dependent)
- SL-401 avoids many drug resistance mechanisms, including multi-drug resistance pumps present on tumor bulk and at high levels on CSCs
- SL-401 spares normal stem cells, which do not express IL-3R
SL-401 Overview

- Novel targeted therapy directed to IL-3R on tumor bulk and CSCs

- Single cycle activity observed in previous Phase 1/2 trial
  - High overall response rate (ORR), with multiples CRs, in BPDCN
  - Durable CRs and overall survival (OS) signal in heavily pretreated AML

- Orphan Drug designation in BPDCN and AML

- Pivotal trial in BPDCN in progress (multi-cycle schedule)
  - Lead-in stage confirms safety and efficacy of previous study; trial ongoing

- Accelerated approval opportunities with market expansion potential
  - BPDCN and rare IL-3R+ malignancies (studies underway)
  - AML (studies underway), myeloma, additional leukemias and lymphomas
BPDCN Disease and Rationale for SL-401

- Blastic plasmacytoid dendritic cell neoplasm (BPDCN) is a rare hematologic malignancy and represents a significant unmet medical need
  - Previous names: blastic NK cell lymphoma; agranular CD4+/CD56+ hematodermic neoplasm
  - Malignancy of plasmacytoid dendritic cells (pDCs) (World Health Organization, 2008)
  - Highly aggressive cancer that involves skin, bone marrow, blood, lymph nodes, spleen; often enters terminal leukemic phase
  - Poor prognosis, no standard of care, traditional cancer therapy ineffective

- Rationale for SL-401: Elevated target expression & robust preclinical activity

BPDCN skin lesions

IL-3R is highly overexpressed (IHC of BPDCN skin lesion)

SL-401: Highly potent (femtomolar IC\textsubscript{50}) against BPDCN

ASH, 2013; Mraz-Gernhard, S. JCO, 2001; Tecchio, C. The Oncologist, 2009
Robust Activity in Prior Phase 1/2 Trial with Single Cycle of SL-401 Supports Pivotal Program in BPDCN

- Overall response rate: 78% (7/9); 5 CRs and 2 PRs
- Median response duration: 5 mo

- **Pre-SL-401**
  - 70-year old male
  - CR 7+ months (ongoing)

- **Post-SL-401**
  - 40-year old male
  - CR 5 months
  - 74-year old male
  - CR 3+ months (ongoing)

Blood publication accompanied by editorial from a senior NIH investigator
- “… the community should rejoice in the publication of a study reporting on major patient responses in a disease that is very difficult to treat with existing agents.”
Stage 1: Lead-in
(Top-line Results)

- 15 patients with either BPDCN or AML treated to date at 7 sites
- 3 doses (7, 9, 12 $\mu$g/kg/day); multi-cycle
- Side effects similar to previous study: vascular leak and transaminitis
- No cumulative side effects observed
  - 10 pts >2 cycles, 4 pts >5 cycles
- Anti-tumor activity to date
  - Major responses, including CRs, in 3/5 BPDCN pts at 12 $\mu$g/kg/day; 
    Patients remain on study
  - Major objective responses also observed at lower doses

Stage 2: BPDCN Expansion

- Single arm, open label
- $\geq$ 1 prior treatment
- 40-45 patients at 12 $\mu$g/kg/day
- Multi-cycle
- Primary endpoint: overall response rate (ORR)
- 7 (open) + approx. 20 new sites
**SL-401: Opportunities in Other Rare IL-3R+ Cancers**

**Chronic eosinophilic leukemia (CEL)**
- **IL-3R expression**: EOL-1 (CEL) IL-3R+ 98.3%
- **SL-401 activity**: EOL-1 (CEL) IC<sub>50</sub>=1 pM

**Hairy cell leukemia (HCL)**
- **IL-3R expression**: MoT (HCL) MoB (HCL) IC<sub>50</sub> low nM

### IL-3R expression on rare cancers

<table>
<thead>
<tr>
<th>Indication</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myelofibrosis (MF)</td>
<td>Pardanani. ASH, 2014</td>
</tr>
<tr>
<td>Chronic Myelomonocytic Leukemia (CMML)</td>
<td>Orazi. Mod Pathol, 2006</td>
</tr>
</tbody>
</table>

*Current STML trial could be foundation for pivotal trials in 4 additional IL3R+ malignancies (SM, HES, MF, CMML)*

ASH, 2014; ASH 2013
Myeloproliferative Neoplasm (MPN) Trial

Stage 1: Lead-in
- Four types of high-risk MPNs*
- 3 doses (7, 9, 12 µg/kg/day)
- Multi-cycle
- 5-10 sites

Stage 2: Expansion
- Four separate arms (one arm for each indication*)
- 15-20 patients each arm
- Single-arm, open label
- Multi-cycle
- Primary endpoint: overall response rate (ORR)
- 15-20 sites

*Mastocytosis, Hypereosinophilic syndrome, Myelofibrosis, and Chronic myelomonocytic leukemia
Rationale for SL-401 in AML (1st CR, MRD+)

Majority of AML patients in 1st CR will relapse

MRD is a predictor of 1st relapse

MRD is CSC-rich

MRD is IL-3R+

AML in $1^{st}$ CR, MRD+ Trial

**Stage 1: Lead-in**
- AML in $1^{st}$ CR, MRD+
- 3 doses (7, 9, 12 $\mu$g/kg/day)
- Multi-cycle
- 5-10 sites

**Stage 2: Expansion**
- AML in $1^{st}$ CR, MRD+
- 25-30 patients
- Single-arm, open label
- Multi-cycle
- Primary endpoint: Conversion of MRD+ to MRD-, disease free survival
- 15-20 sites
SL-401 is active against myeloma as a monotherapy via a unique mechanism.

- IL-3R+ pDCs are elevated in myeloma (MM).
- pDCs potentiate MM growth.
- SL-401 is active against refractory MM.

SL-401 is synergistic with existing therapies.

- SL-401 is synergistic with existing therapies.
- Pomalidomide: Antagonism and synergism.
- Bortezomib: Antagonism and synergism.
- Lenalidomide: Antagonism and synergism.

ASCO, 2014; Chauhan. Cancer Cell, 2009
Collaboration with Dana-Farber
Next Generation IL-3R Targeted Therapies
SL-501: Potent Activity Against AML and CML

- Variant of SL-401 (alteration in IL-3 sequence)
- High affinity for IL-3R
- Elevated potency in vitro and in vivo

**AML**

SL-501 is highly active against both primary AML leukemic blasts and AML CSCs

SL-501 inhibits AML engraftment in immunocompromised mice

**CML**

SL-501 is active against TKI-resistant and -sensitive cell lines

SL-501 induces apoptosis of IL-3R+ CML CSCs

SL-501 prolongs survival of mice engrafted with CML blast crisis xenografts

**Beyond Oncology: IL-3R-Targeted Therapies in Autoimmune Diseases**

### Systemic lupus erythematosus (SLE)

- **Skin lesion from lupus patient**
  - IL-3Rα (CD123) overexpressing pDCs in diseased tissues

### Scleroderma

- **Epidermis**
  - **Dermis**

### Psoriasis

- **Psoriatic plaque**
  - **Normal skin**

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**SLE**

- Removal of pDCs in SLE-prone mice reverses disease pathology
- **Immune complex deposition in kidneys (G=glomeruli)**
  - IgG
  - C3

**Psoriasis**

- Blockade of pDC function inhibits development of skin lesions in xenograft model of human psoriasis

**Circulating autoantibodies**

- dsDNA
- dsRNA

**Normalized signal**

- pDCs: + - + -

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**Blockade or removal of IL-3R+ pDCs improves autoimmune disease pathology in mouse models**

SL-701 Overview

- Immunotherapy that activates immune system to attack multiple targets present on tumor bulk and CSCs
- Earlier version demonstrated clinical activity, including durable CRs and PRs, in adults and children with advanced brain cancer
- Multi-center trial in adult patients with second-line glioblastoma (GBM)
- Orphan drug designation for glioma
SL-701: Targets Overexpressed on GBM Relative to Normal Tissue

**IL-13Rα2**

- Normal brain
- Low-grade astrocytoma (A)
- Anaplastic astrocytoma (AA)
- GBM

Staining intensity:
- None
- Weak
- Moderate
- Strong

% of samples

n = 9 16 13 46

**EphA2**

- Normal brain
- Low-grade astrocytoma (A)
- Anaplastic astrocytoma (AA)
- GBM

Staining intensity:
- None
- Weak
- Moderate
- Strong

% of samples

n = 9 16 13 46

**Survivin**

- Normal brain
- Low-grade astrocytoma (A)
- Anaplastic astrocytoma (AA)
- GBM

% of positive-staining cells

- 0-25%
- 25-50%
- 50-75%
- 75-100%

% of samples

n = 9 12 8

SL-701: Induction of Immune Response in Brain with SL-701 is Associated with Tumor Regression

Pre-therapy (baseline)

Nine weeks post-therapy shows tumor shrinkage

Post-therapy brain biopsy

- Inflammatory response, including abundant cytotoxic (CD8⁺) T cells, in brain tissue
- Indicative of immune response against the brain tumor

Reactive gliosis
Numerous CD68⁺ macrophages
Abundant CD8⁺ T cells

JCO, 2011
**SL-701: Major Objective Responses**

**Durable CR**  
(> 23 month duration)  
**Adult 2\textsuperscript{nd}-line GBM**

**Durable PR**  
(15 month duration)  
**Pediatric radiation-resistant HGG**

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**Results in line with historical precedent for accelerated approval**

<table>
<thead>
<tr>
<th>Study</th>
<th>GBM and other non-brainstem HGG (n=26)</th>
<th>ORR</th>
<th>Response duration (median)</th>
<th>CR</th>
</tr>
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<tbody>
<tr>
<td><strong>Immuno-therapy</strong></td>
<td></td>
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<tr>
<td>Adult GBM (&gt;2\textsuperscript{nd}-line)\textsuperscript{1}</td>
<td>23% (3/13)</td>
<td>7-15 months</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Adult AG (&gt;2\textsuperscript{nd}-line)</td>
<td>22% (2/9)</td>
<td>7-15 months</td>
<td>1</td>
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<tr>
<td>Pediatric non-brainstem HGG (post-chemo/XRT)</td>
<td>25% (1/4)</td>
<td>7-15 months</td>
<td>0</td>
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</tr>
<tr>
<td>Avastin®</td>
<td>GBM (2\textsuperscript{nd}-line)</td>
<td>19.6%-25.9 %</td>
<td>3.9-4.2 months</td>
<td>0</td>
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\textsuperscript{1}2\textsuperscript{nd}-line (n=5); 3\textsuperscript{rd}-line (n=6); 4\textsuperscript{th}-line (n=2)

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AACR, 2012; Okada. JCO, 2011; Cohen. The Oncologist, 2009
SL-701: Overall Survival Signal in Adult ≥ 2nd-Line High Grade Glioma

Kaplan-Meier Plot of Overall Survival
> 2nd line adult high grade glioma
(n = 22 patients)

<table>
<thead>
<tr>
<th></th>
<th>GBM</th>
<th>AG</th>
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<tr>
<td></td>
<td>Immunotherapy</td>
<td>Historical</td>
</tr>
<tr>
<td>Median OS</td>
<td>13 mo</td>
<td>5-7 mo</td>
</tr>
<tr>
<td>6 month OS</td>
<td>80%</td>
<td>38-55%</td>
</tr>
<tr>
<td>12 month OS</td>
<td>55%</td>
<td>14-25%</td>
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Okada. JCO, 2011
SL-701 Trial Design

- Adults with glioblastoma multiforme (GBM), first recurrence
- 80-100 patients
- Co-primary endpoints
  - Objective response rate and overall survival
- 2 Arms
  - SL-701 versus SL-701 + bevacizumab (new arm)
  - Rationale for addition of new arm
    - Bevacizumab is standard of care in recurrent GBM
    - Bevacizumab decreases rate of radiographic disease progression
    - No apparent overlapping toxicities
    - Clinical validation emerging that VEGF may suppress immune stimulation and thus may combine well with immunotherapy approaches
SL-801 Target: XPO1 Nuclear Transport

- XPO1/CRM-1 controls key cellular processes by regulating nuclear-cytoplasmic transport of proteins & RNA
  - Tumor suppressor and activators
- XPO1 overexpressed by a wide range of both solid and liquid cancers
- Cancer cells utilize nuclear transport machinery to sequester key regulatory proteins in the cytoplasm, leading to cell proliferation and resistance to apoptosis
- Inhibition of XPO1 leads to growth arrest and induction of apoptosis
- XPO1 is a clinically validated target in multiple tumor types
SL-801: Novel Oral Small Molecule XPO1 Inhibitor

- Reversible inhibitor of the key nuclear transport protein XPO1
  - Potential for broad therapeutic window, flexible dosing and scheduling
- XPO1 recently shown to be a clinically relevant target
- Preclinical activity, including safety and efficacy in animal models, across wide array of solid and hematologic cancers

Composition of matter patents
IND filing expected this year
Clinical and regulatory paths in solid and liquid tumors

Sakakibara, K. Blood, 2011
Financial Summary
## Financial Summary

As of March 31\textsuperscript{st}, 2015

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>Cash, Cash Equivalents and Investments (mm)</td>
<td>$115.8</td>
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<tr>
<td>Shares Outstanding (mm)</td>
<td>~ 17.9</td>
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