Forward Looking Statements

This presentation contains estimates, projections and other forward-looking statements. Our estimates, projections and other forward-looking statements are based on our management's current assumptions and expectations of future events and trends, which affect or may affect our business, strategy, operations or financial performance. Although we believe that these estimates, projections and other forward-looking statements are based upon reasonable assumptions, they are subject to numerous known and unknown risks and uncertainties and are made in light of information currently available to us. Many important factors, in addition to the factors described in this presentation, may adversely and materially affect our results as indicated in forward-looking statements.

All statements other than statements of historical fact are forward-looking statements. The words “believe,” “may,” “might,” “could,” “will,” “aim,” “estimate,” “continue,” “anticipate,” “intend,” “expect,” “plan,” or the negative of those terms, and similar expressions that convey uncertainty of future events or outcomes are intended to identify estimates, projections and other forward-looking statements. Estimates, projections and other forward-looking statements speak only as of the date they were made, and, except to the extent required by law, we undertake no obligation to update or review any estimate, projection or forward-looking statement. These statements are also subject to a number of material risks and uncertainties that are described more fully in Bellicum’s filings with the Securities and Exchange Commission, including without limitation our annual report on Form 10-K for the year ended December 31, 2015.
Overview
Highly Differentiated Adoptive Cell Therapies

- **Addressing major need for safety and efficacy of T cell therapies**
  - Out-of-control T cells can cause life-threatening toxicities
    - GvHD, CRS, off target, on target/off organ
  - Lack of control over activation/proliferation is challenge in solid tumors

- **“Molecular switches” enable pharmacologic control over cells**
  - Activate, support proliferation or reduce/eliminate T cells
  - Enable approaches and targets that would otherwise be too high risk

- **Platform enabling a diversified, differentiated product pipeline**
  - Hematopoietic stem cell transplantation: Lead program BPX-501 in multiple ongoing clinical trials in US & EU, with potential to shift the HSCT paradigm
  - CAR-T & TCR adoptive cell therapy: Three product candidates for hematologic and solid tumors scheduled to enter clinical development in 2016
**CID Technology Platform**  
**Molecular Switches for Controllable Cell Therapy**

1. Viral transduction transfers the DNA from a vector into the target cell.

2. Vector-derived DNA directs expression of CID and accessory proteins.

3. Rimuducid dimerizes the CID proteins, thus turning on the signaling cascade.

<table>
<thead>
<tr>
<th>Signal</th>
<th>Caspase-9</th>
<th>MyD88 and CD40 (“MC”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>Apoptosis (cell death)</td>
<td>T-cell activation &amp; proliferation; dendritic cell activation</td>
</tr>
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</table>
Highly Differentiated Emerging Product Portfolio
Validating Platforms & Building Foundational Capabilities

**Near Term**

- **BPX-501**
  - Transform HSCT by enabling safe haplo transplant
  - Provide a curative option for non-malignant patients who lack a matched sibling donor
  - Opportunity for near term approval in rare pediatric indications; label expansion to malignant disease
  - Validate CaspaCIDe for complete or titratable control of GvHD
- **BPX-701**
  - Novel, first in class PRAME-targeted TCR for AML/MDS, uveal melanoma and others
  - Validate CaspaCIDe for TCRs
- **BPX-601**
  - Novel, first in class GoCAR-T candidate targeting proprietary, validated target PSCA
  - Validate GoCAR-T for controlling CAR activation and persistence
- **BPX-401**
  - Best-in-class CD19 CAR
  - Validate CaspaCIDe for complete or titratable control of CRS
  - Validate MC co-stimulation

**Mid Term**

- **GoTCR**
  - Establish platform for controlling TCR activation and persistence, and upregulating MHC class I
  - “Go” platform currency for access to best in class target discovery

**Longer Term**

- **Dual Switch**
  - Ultimate controllability for safe and effective CAR & TCR therapy
- **Off-the-Shelf**
  - Validated CaspaCIDe mitigates potential safety risks
  - MC may mitigate exhaustion of T cell banks

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**Bellicum Pharmaceuticals**
BPX-501
Donor T cells with CaspaCIDe Safety Switch
BPX-501: Unmet Medical Need in Allogeneic HSCT
Treatment of Immunodeficiency and GvHD Post-Transplant

- Allo HSCT presents a trade-off between T-cell immunodeficiency and GvHD:

<table>
<thead>
<tr>
<th>HSCT approach</th>
<th>Limiting Risk Factor</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Immunodeficiency leading to:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Engraftment</td>
<td>Infection</td>
</tr>
<tr>
<td>T-cell replete</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>T-cell depleted</td>
<td>×</td>
<td>×</td>
</tr>
</tbody>
</table>

- Combination of BPX-501 and rimiducid is a “replacement T-cell therapy for the treatment of immunodeficiency and GvHD after allogeneic hematopoietic stem cell transplant” (U.S. orphan drug designation)

- Particularly compelling value proposition in haploidentical (haplo) HSCT
  - Haploidentical donor (parent, sibling, child or other close relative with a 50% match) is readily available for most patients in need of an allo HSCT
  - Haplo transplants have not been widely adopted to date because of risk of mortality or morbidity due to GvHD and T cell immunodeficiency
BPX-501 Primary Market Opportunity
Treating Allo HSCT Candidates Who Fail to Find a Suitable Donor

### Allogeneic Transplants by Donor Type

#### U.S.*
- MUD & Cord: 4,546
- Matched (MRD): 2,592
- Haplo: 605
- Untransplanted***: 11,662

#### Europe**
- MUD & Cord: 8,114
- Matched (MRD): 5,609
- Haplo: 1,327
- Untransplanted***: 23,681

### Primary Unmet Need

- **Untransplanted***
  - Almost all patients have a haplo donor, but HSCT is rarely performed because of morbidity and mortality risk due to immunodeficiency and GvHD

- **Haplo**
  - High rates of relapse, and treatment-related morbidity and mortality
  - Immunosuppression for GvHD
  - 3-6 month wait to source a MUD graft

- **MUD & Cord**
  - Accepted but meaningful rates of relapse, TRM and morbidity
  - Immunosuppression for GvHD (prophylaxis)

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* MRD, MUD, cord and haplo transplant procedures from CIBMTR 2012 Activity Report
** MRD, MUD & cord (combined), and haplo transplant procedures from EBMT Summary 2013
*** US HHS - HRSA 2013 Estimate; Europe extrapolated assuming same ratio to transplants performed as U.S.
BPX-501: Enabling Improved Outcomes and Safety in Allo HSCT

αβ T-Depleted Haplo HSCT with BPX-501 T-Cell Replacement

Donor
- Apheresis to collect starting cell population for BPX-501 production
- Donor mobilized, graft collected and αβ T-cell & B cell depleted, then infused

Patient
- Appropriate conditioning regimen ablates host immune system

Day -7
- Conditioning regimen toxicity

Day 0
- Cells shipped to Bellicum, transduced with CaspaCIDe vector, selected to ensure product purity, cryopreserved, returned to site, then infused subject to final product release
- Protocol includes NO GvHD PROPHYLAXIS
- Donor γδ T-cells & NK cells facilitate donor stem cell engraftment and provide GvL effect

Day 7-14
- For uncontrolled GvHD, rimiducid infusion rapidly eliminates BPX-501 cells, with potential rebound without GvHD recurrence
- BPX-501 T-cells facilitate immune cell recovery from engrafted stem cells, control infections, and provide anticipated GvL effect
- • Graft failure (non-engraftment of donor stem cells)
- • Slow immune recovery
- • Infection
- • GvHD
- • Relapse

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BPX-501: Compelling Value Proposition for Haplo HSCT
BPX-501 in combination with αβ TCR depletion

- **BPX-501 + αβ TCR depletion designed to provide:**
  - Curative treatment for primary immune deficiencies, hemoglobinopathies and anemias
  - Improved outcomes for malignant diseases

- Faster Time to Immune Reconstitution
- Reduced Rate of Infection and GVHD*
- Reduced Transplant Related Mortality
- Reduced Hospital Duration and Resource Utilization
- Obviate Long-Term Future Disease Treatment Costs
- Improved Patient Quality of Life Benefits

*(GVHD quickly resolved by rimiducid administration if it does occur)*
BPX-501 Path to Commercialization
Potential Accelerated Launch in Orphan Blood Disorders

- Major unmet medical needs with very limited treatment options
- More than 60 diseases addressable with single product
- Allogeneic HSCT is recognized as a curative treatment
  - 1,796 allo transplants for non-malignant diseases in EU alone in 2013
- No disease relapse endpoint, reducing expected time to data read-out

<table>
<thead>
<tr>
<th>Disease</th>
<th>Europe</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCID</td>
<td>~50-130 cases/year 1/40,000-100,000 births</td>
<td>~40-100 cases/year 1/40,000-100,000 births</td>
</tr>
<tr>
<td>Wiskott-Aldrich Syndrome</td>
<td>~20 cases/year 1/250,000 births (males mostly)</td>
<td>~15 cases/year; ~500 patients 1/250,000 births (males mostly)</td>
</tr>
<tr>
<td>Beta-Thalassemia</td>
<td>~500 cases/year 1/10,000</td>
<td>Unknown (most in certain descent) 1/100,000</td>
</tr>
<tr>
<td>Sickle Cell Disease</td>
<td>~150,000 patients 3/10,000 (prevalence)</td>
<td>4,500 cases/year; ~100,000 patients 1/800 births (at risk)</td>
</tr>
</tbody>
</table>
**BPX-501 Clinical Development**

**BP-004 Clinical Trial Overview**

- Pediatric patients with malignant or non-malignant disease, who do not have a matched donor, but have an eligible haplo donor (typically mother or father)

- **Outcome measures include:**
  - Transplant-related mortality (TRM)
  - Kinetics of immune reconstitution (T cell markers - surrogate)
  - Viral infections, hospitalizations, engraftment, GVHD
  - Need for antiviral treatment, transfusions
  - Disease outcome

- **75 patients enrolled as of March 2016: 63 patients in EU and 12 patients in US**
  - 49 patients treated at lead European site Ospedale Pediatrico Bambino Gesù (>30 days post-transplant; median follow-up 7 months) presented at EBMT 2016
    - 13 ALL + 4 AML + 3 lymphoma patients
    - 24 non-malignant patients including 5 SCID, 5 Fanconi Anemia, 5 Thalassemia Major (ββ0 or β0β0), 4 Wiskott-Aldrich Syndrome, 1 Sickle Cell, and others
    - 5 compassionate use patients (3 refractory AML, 2 metabolic disorders)
BPX-501: Product Characteristics
High Viability and Increased Effector Phenotype in OPBG Products

- BPX-501 median viability >90% post-thaw
- After expansion and transduction, BPX-501 T cells have increased effector/memory phenotype in both CD4 and CD8 T cell populations
BPX-501: Protocol BP-004 Initial OPBG Clinical Data
Top Line Results in 49 Malignant & Non-Malignant Patients

- 0% TRM: No patient has died from transplantation-related complications
- Donor stem cells engrafted in all patients; no secondary graft failure
- BPX-501 T cells expanded and persisted in all patients
  - Enhanced overall immune reconstitution and accelerated recovery
    - Shortened time to functional T cell immune level of 500 cells/µl
  - Expanding BPX-501 T cells contributed to control of infections
    - Active infections in 3 PID patients cleared after BPX-501 infusion
    - Greater expansion in patients with CMV reactivation

![Graph showing CD3+CD19+ cells over time]

![Graph showing CD3+/CD19+ and CMV reactivation]

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BPX-501: Protocol BP-004 Initial OPBG Clinical Data
Non-Malignant Patient Subgroup

- All 24 children with non-malignant diseases are alive and disease-free

Hemoglobin in pts with hemoglobinopathies

Last transfusion (median 7 days, range 5-12 days)

Platelets in patients with WAS

Immune Recovery: SCID patients
Trend toward earlier hospital discharge and reduced rehospitalization versus historical controls (αβTCR depletion without T cell addback):

- Demonstrated case of complete resolution of acute GVHD due to infusion of BPX-501 T cells following infusion of rimiducid
  - Improvement in cGvHD seen in 1/1 malignant patient given rimiducid

Data for 18 pts reported at ASH 2015
BPX-501: Protocol BP-004 Initial OPBG Clinical Data
Leukemia Patient Subgroup

• 16 of 17 patients remain in remission (7 months median follow-up)

• Also, 2 of 3 compassionate use refractory/resistant AML patients alive and disease free 13 and 4 months after monthly x 3 BPX-501 doses each
BPX-501: Program Summary
Positive Outlook on Next Steps in 2016

- BP-004 EU study to be expanded to accommodate the strong pace of patient recruitment
- For malignant diseases, plan to explore escalating doses, and further explore multiple dosing for high risk malignancies
- Regulatory feedback from EMA and FDA
- Multiple additional trials ongoing, including:
  - BP-001 and BP-005 adult equivalent to BP-004 (malignant only)
  - BP-008 relapse setting, with titration of rimiducid
- Transitioning to in-house manufacturing capabilities in US
- Commercial pre-launch planning activities initiated
- Further data to be presented at ASH
## Product Overview: BPX-701
CaspaCIDe-enabled TCR Candidate Targeting Solid Tumors

| Description | CaspaCIDe TCR therapy targeting PRAME (Preferentially Expressed Antigen in Melanoma)  
|            | • License / collaboration with Leiden University Medical Center |
| Market Opportunity | Hematologic and solid tumors expressing PRAME  
|            | • Predominantly expressed in AML, melanomas, sarcomas and neuroblastomas, low to no expression in healthy cells  
|            | • Recognized by KOLs as a potentially important and selective target |
| Preclinical Proof of Principle | High reactivity to PRAME+ tumor cell lines and primary tumor tissues  
|            | • Limited reactivity to normal cell types *in vitro*  
|            | • Elimination of BPX-701 cells in response to rimiducid *in vitro* |
| Progress | Expect to enroll patients in mid-2016  
|            | • Program reviewed at NIH RAC meeting on March 9, 2016  
|            | • Clinical sites identified in EU and US  
|            | • Initial indications: AML/MDS and uveal melanoma |
BPX-701
Control of U266 myeloma growth in vivo

Immune-deficient NSG xenograft model (n=5 per group)

Day 0
2 x 10^6
U266-Luc i.v.

Day 24
1 x 10^7
T cells i.v.

Day 75
Analyze SN and BM (flow cytometry)

Tumor growth (BLI)

Days post tumor injection

Average Radiance (p/sec/cm²/sr)

0 2 4 6 8

10^2 10^3 10^4 10^5 10^6 10^7 10^8

T-cells

NT
BPX-701
| Description | Differentiated CAR-T therapy targeting PSCA  
• Incorporates GoCAR-T technology for rimiducid-driven, antigen-dependent activation and proliferation  
• Withdrawal of rimiducid activation signal for passive safety mechanism |
|---|---|
| Market Opportunity | PSCA expressed in prostate, pancreatic, bladder, esophageal and gastric cancers  
• Currently no approved drug targeting PSCA |
| Preclinical Proof of Principle | • Activation and proliferation require both antigen and rimiducid *in vitro*  
• Rimiducid dosing has led to schedule-dependent T-cell proliferation *in vivo*, with superior anti-tumor efficacy vs. other CAR constructs  
• Remains effective *in vivo* in absence of exogenous cytokine support |
| Progress | Expect to enroll patients in mid-2016  
• Program reviewed at NIH RAC meeting on March 9, 2016  
• Represents CAR-T candidate entry into solid tumor product development  
• Initial indication: Non-resectable pancreatic cancer, with potential future development in prostate cancer |
BPX-601
Rimiducid-dependent costimulation increases IL-2 and anti-tumor efficacy

Day 0
2 x 10^5
HPAC-luc s.c.

Day 7
1 x 10^6
T cells i.v.

Tumor growth (by caliper and IVIS)

Tumor bioluminescence

IL-2 (pg/ml)

Average Radiance (p/s/cm²/s)

Days post-T cell injection

Media
CID
HPAC
HPAC + CID

NT
Go-CAR-T

Go-CAR-T
Go-CAR-T + CID

0
10,000
20,000
30,000
40,000

0
10
20
30
40
50

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**Product Overview: BPX-401 Targeting CD19 with CIDeCAR MC for Enhanced Potency; CaspaCIDe for Titratable Control of CRS**

| Description | Differentiated CAR-T therapy targeting CD19  
• MC co-stimulatory domain for enhanced potency  
• CaspaCIDe switch to “dim” or “turn off” effect based on patient tolerance |

| Market Opportunity | Hematological cancers expressing CD19  
• ALL, CLL and certain types of NHL  
• Risk/benefit profile may expand addressable indications and populations  
  – Patients with higher disease burden or pre-existing conditions  
  – Bulky B-cell malignancies  
  – Earlier line of therapy  
• Potential for superior pharmaco-economics (avoid high grade toxicity) |

| Preclinical Proof of Principle | • Enhanced T-cell proliferation, tumor cell killing and IL-2 production *in vitro*  
• Durable anti-tumor efficacy *in vivo*  
• Rimiducid elimination of BPX-401 cells *in vivo* is rapid and dose dependent |

| Progress | Expect to enroll patients in 2H16 |
Rimiducid is Titratable to Control Cell Number and Cytokine Levels

Bioluminescence imaging of T cells (IVIS) in Raji tumor-bearing animals

Bioluminescence imaging of T cells (IVIS) in Raji tumor-bearing animals

Cytokine levels and bioluminescence imaging following different doses of rimiducid.

IL-6 and TNF-α levels as a function of rimiducid dose.

Bellicum Pharmaceuticals
BPX-401

_in vivo_ function using immune-deficient mice bearing CD19⁺ Raji tumors

**Tumor luminescence**

- **Day 0**
  - Raji-luc i.v.
- **Day 3**
  - T cells i.v.

**Survival**

- **CID**

CD19⁺ Raji

- Radiance (p/s/cm²/sr)
- Days post-T cell injection

- Survival (%)
- Days post-T cell injection

- _P_=0.0001

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_Bellicum Pharmaceuticals_
Financial Highlights

• **Cash and Investments:** Balance of $151.8 million as of March 31, 2016

• **Cash Guidance:**
  – Expect to have approximately $80 to $90 million in cash, cash equivalents and investments at 12/31/16
  – Expect that current cash resources will be sufficient to meet operating requirements through 2017
  – In March 2016, secured $15.0 million in debt financing to support the build-out of U.S. manufacturing facilities

• **Shares Outstanding:** 27.0 million shares of common stock at 3/31/16
## Anticipated Program Milestones

<table>
<thead>
<tr>
<th>Product Candidate</th>
<th>Event</th>
<th>Expected Timing</th>
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</table>
| **BPX-501** (CaspaClDe) | • Additional data disclosed at EBMT  
• End-of-Phase 2 meetings w/EMA and FDA  
• Data updates / ASH Presentation(s) | April 2016  
2Q/3Q 2016  
4Q 2016 |
| **BPX-601** (GoCAR-T) | • Phase 1 study enrollment begins | Mid-2016 |
| **BPX-701** (CaspaClDe TCR) | • Phase 1 study enrollment begins | Mid-2016 |
| **BPX-401** (ClDeCAR) | • Phase 1 study enrollment begins | 2H 2016 |
Summary
Differentiated Adoptive T Cell Therapies

• **Expanding the market for allogeneic HSCT**
  – Haploidentical HSCT with curative outcomes reported in non-malignant disease patients, and encouraging early relapse control in leukemias

• **CAR T cells and TCRs poised to enter clinical trials**

• **Disruptive technologies driving product pipeline**
  – Potentially superior risk/reward proposition for patients and physicians
  – Opens up unserved patient populations
  – Allows development of product candidates that might otherwise be too high risk

• **Mid-stage clinical studies underway**
  – Gene-modified T cell product in clinical trials in US and Europe
  – CAR-T and TCR product candidates leveraging this experience/expertise
Advancing Cell Therapies by giving physicians control over cells inside the body