

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): June 1, 2019

**Bellicum Pharmaceuticals, Inc.**  
(Exact name of registrant as specified in its charter)

Delaware  
(State or other jurisdiction  
of incorporation)

001-36783  
(Commission  
File Number)

20-1450200  
(IRS Employer  
Identification No.)

2130 W. Holcombe Blvd., Ste. 800  
Houston, TX  
(Address of principal executive offices)

77030  
(Zip Code)

Registrant's telephone number, including area code: 832-384-1100

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligations of the registrant under any of the following provisions:

- 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))

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, par value \$0.01 per share	BLCM	The Nasdaq Global Market

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§ 230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§ 240.12b-2 of this chapter).

Emerging growth company  x

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.  x

In this report, “we,” “us” and “our” refer to Bellicum Pharmaceuticals, Inc.

#### Item 7.01 Regulation FD Disclosure.

On June 1, 2019, we issued a press release announcing updated safety and activity data for BPX-601 from a Phase 1/2 study in patients with metastatic pancreatic cancer expressing prostate stem cell antigen. A copy of the press release is attached hereto as Exhibit 99.1.

An updated company slide presentation, which may be given at meetings with institutional investors or analysts, is attached hereto as Exhibit 99.2.

The information contained in this Item 7.01 of this Current Report on Form 8-K, including Exhibits 99.1 and 99.2, is being furnished pursuant to Item 7.01 and shall not be deemed “filed” for purposes of Section 18 of the Exchange Act of 1934, as amended (the “Exchange Act”), or otherwise subject to the liabilities of that section, and it shall not be deemed incorporated by reference in any filing under the Securities Act of 1933, as amended, or under the Exchange Act, whether made before or after the date hereof, except as expressly set forth by specific reference in such filing to this item of this report.

By filing this Current Report on Form 8-K, including Exhibits 99.1 and 99.2, and furnishing this information, we make no admission as to the materiality of any information in this report. The information contained in this report is intended to be considered in the context of our filings with the SEC and other public announcements that we make, by press release or otherwise, from time to time. We undertake no duty or obligation to publicly update or revise the information contained in this report, although we may do so from time to time as our management 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.

#### Item 8.01 Other Events.

On June 1, 2019, we presented a poster containing updated data from the aforementioned BPX-601 Phase 1/2 study at the 2019 American Society for Clinical Oncology (“ASCO”) Annual Meeting. A copy of the poster, titled *Ligand-Inducible, Prostate Stem Cell Antigen (PSCA)-Directed GoCAR-T® Cells in Advanced Solid Tumors: Preliminary Results with Cyclophosphamide (Cy) ± Fludarabine (Flu) Lymphodepletion (LD)*, is attached hereto as Exhibit 99.3. This poster may be presented at future meetings with institutional investors or analysts. We previously presented a draft version of this poster, attached hereto as Exhibit 99.4, at meetings with institutional investors.

#### Item 9.01 Financial Statements and Exhibits.

##### (d) Exhibits

<u>Exhibit No.</u>	<u>Description</u>
99.1	<a href="#">Press release, dated June 1, 2019.</a>
99.2	<a href="#">Slide presentation.</a>
99.3	<a href="#">Poster, titled <i>Ligand-Inducible, Prostate Stem Cell Antigen (PSCA)-Directed GoCAR-T® Cells in Advanced Solid Tumors: Preliminary Results with Cyclophosphamide (Cy) ± Fludarabine (Flu) Lymphodepletion (LD)</i>, presented on June 1, 2019 at ASCO Annual Meeting.</a>
99.4	<a href="#">Draft version of poster, titled <i>Ligand-Inducible, Prostate Stem Cell Antigen (PSCA)-Directed GoCAR-T® Cells in Advanced Solid Tumors: Preliminary Results with Cyclophosphamide (Cy) ± Fludarabine (Flu) Lymphodepletion (LD)</i>.</a>





**Bellicum Pharmaceuticals Provides Interim Data for BPX-601 in  
Patients with Metastatic Pancreatic Cancer for Presentation at ASCO  
Annual Meeting**

*Data provides further evidence that GoCAR-T® technology boosts expansion and persistence of therapeutic T cells in patients*

*T cell expansion and persistence greater in patients who received lymphodepletion with cyclophosphamide plus fludarabine (Flu/Cy) compared to Cy alone*

*Of 13 patients evaluable for efficacy treated with BPX-601 and a single dose of rimiducid, 8 (62%) achieved stable disease, including 3 with tumor shrinkage of 10% to 24%*

*Adverse events were generally consistent with those experienced by advanced cancer patients undergoing cytotoxic chemotherapy and other cancer immunotherapies*

**HOUSTON, June 1, 2019** -- Bellicum Pharmaceuticals, Inc. ([NASDAQ:BELICM](https://www.nasdaq.com/markets/stocks/quote/BELICM)), a leader in developing novel, controllable cellular immunotherapies for cancers and orphan inherited blood disorders, today announced updated safety and activity data for BPX-601 from a Phase 1/2 study in patients with metastatic pancreatic cancer expressing prostate stem cell antigen (PSCA). The most recent cohort of patients enrolled incorporated a standard lymphodepletion conditioning regimen consisting of fludarabine/cyclophosphamide (Flu/Cy) prior to receiving BPX-601 GoCAR-T cells. Updated data from this study-including patients from this Flu/Cy cohort-will be presented during the [2019 American Society for Clinical Oncology \(ASCO\) Annual Meeting on June 1, 2019](https://www.asco.org/2019-american-society-for-clinical-oncology-asco-annual-meeting-on-june-1-2019).

BPX-601, the company's first GoCAR-T® product candidate, incorporates iMC, Bellicum's inducible co-activation domain. iMC, inducible MyD88/CD40 via administration of rimiducid, is designed to provide a powerful boost to T cell proliferation and persistence and enable the CAR-T to override key immune inhibitory mechanisms, including PD-1 and TGF-beta.

"These updated results in patients with advanced pancreatic cancer showed that more intense lymphodepletion with Flu/Cy resulted in increased BPX-601 CAR-T cell expansion and prolonged persistence in patients treated with single-dose rimiducid," said Carlos R. Becerra, M.D., lead study investigator, oncologist, and medical director of the Innovative Clinical Trials Center at Baylor University Medical Center at Dallas. "Evidence of biological activity and stable disease was observed in this ongoing trial in these heavily pretreated patients who desperately need additional treatment options. We consider these results highly encouraging."

"I am excited that additional data from our BPX-601 trial continue to support the potential of our GoCAR-T technology platform. Our data presentation at ASCO supports the safety and early clinical activity of BPX-601, and provides further evidence of the impact of our technology in driving the expansion and persistence of T cells in patients," said Rick Fair, President and CEO of Bellicum Pharmaceuticals. "We have initiated the next step in the study to enroll an additional cohort to evaluate repeat rimiducid dosing to re-activate iMC over time, which is intended to deepen and extend the treatment effect. Initial results from this cohort are expected in late 2019."

**Study Overview and Results**

This Phase 1/2 trial has been designed to enroll patients with PSCA-positive pancreatic cancer to assess the safety, biologic and clinical activity of BPX-601. As of April 23, 2019, the data cut-off date for the current analysis, 18 patients have been treated with BPX-601. The initial 13 patients received BPX-601 following Cy lymphodepletion, and 5 patients in the latest cohort received BPX-601 following Flu/Cy lymphodepletion. Four patients did not receive rimiducid, and 14 patients received a single dose of rimiducid approximately one week following BPX-601. Following is a summary of the results to date:

- Peak Vector Copy Number (VCN) of T cells was enhanced by the administration of rimiducid to activate iMC, increasing cell dose, and lymphodepletion with Flu/Cy
- Rimiducid-dependent increase in serum cytokines and chemokines observed in most patients, particularly those in the Flu/Cy cohort
- T cell persistence of >3 weeks was observed in nine of 17 patients (53%) with a minimum of 28 days of follow-up samples, including all 5 patients (100%) who received Flu/Cy
- Administration of BPX-601 followed by single-dose rimiducid was well tolerated with no dose-limiting toxicities
- Adverse Events (AEs) were generally consistent with those experienced by advanced cancer patients undergoing cytotoxic chemotherapy and other cancer immunotherapies
  - All 18 patients treated with BPX-601 reported at least 1 AE. The most frequent AEs regardless of causality were febrile neutropenia (33%), fatigue (28%), neutropenia (28%), pyrexia (28%), dysuria (22%), hematuria (22%) and nausea (22%).
- The majority of AEs related to BPX-601/rimiducid were mild to moderate in intensity and resolved with or without supportive care. New treatment related adverse events in the Flu/Cy cohort included:
  - One patient experienced Grade 2 cytokine release syndrome (CRS) post-rimiducid infusion, received treatment with a single infusion of IV tocilizumab, and the event resolved the same day
  - One patient experienced Grade 2 encephalopathy post-rimiducid infusion with no concomitant CRS. Symptoms resolved with corticosteroids within 1 week
  - Four patients experienced Grade 1-3 urologic toxicity (dysuria, hematuria, cystitis). Symptoms in all patients resolved with standard supportive care (analgesics, anticholinergics, bladder irrigation)
- Of 13 efficacy-evaluable patients treated with BPX-601 and a single dose of rimiducid, 8 patients (62%) had stable disease, and 3 patients had tumor shrinkage of 10% to 24%
- With median duration of follow-up of 9.1 weeks (range: 2.9 - 30.3 weeks), the median time to follow-on cancer therapy in patients who received subsequent therapy was 16.6 weeks (range: 5.6 - 30.3 weeks)
- In the Flu/Cy cohort, 2 patients with at least the median follow-up of 9.1 weeks had a time to next treatment of >22 weeks which was ongoing at the time of the data cutoff

The poster, titled *Ligand-Inducible, Prostate Stem Cell Antigen (PSCA)-Directed GoCAR-T® Cells in Advanced Solid Tumors: Preliminary Results with Cyclophosphamide (Cy) ± Fludarabine (Flu) Lymphodepletion (LD)*, may be found on the Bellicum website under [Abstracts and Presentations](#).

#### [About BPX-601](#)

BPX-601, the company's first GoCAR-T® product candidate, incorporates iMC, Bellicum's inducible co-activation domain. iMC (inducible MyD88/CD40) is designed to provide a powerful boost to T cell proliferation and persistence and enable the CAR-T to override key immune inhibitory mechanisms, including PD-1 and TGF-beta. BPX-601 is being evaluated as a treatment for solid tumors expressing prostate stem cell antigen (PSCA), including pancreatic, gastric, and prostate cancers.

**About Bellicum Pharmaceuticals**

Bellicum is a clinical stage biopharmaceutical company striving to deliver cures through controllable cell therapies. The company's next-generation product candidates are differentiated by powerful cell signaling technologies designed to produce more effective CAR-T and allogeneic T cell therapies. Bellicum's lead GoCAR-T® candidate, BPX-601, is designed to be a more efficacious CAR-T cell product capable of overriding key immune inhibitory mechanisms. Bellicum's rivo-cel product candidate is an allogeneic polyclonal T cell therapy that has shown promising clinical trial results in reducing leukemia relapse after a stem cell transplant. More information can be found at [www.bellicum.com](http://www.bellicum.com).

**Forward-Looking Statement**

*This press release contains forward-looking statements for purposes of the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Bellicum may, in some cases, use terms such as "potential," "continue," "designed," "expects," "plans," "intends," "may," "will," or other words that convey uncertainty of future events or outcomes to identify these forward-looking statements. Forward-looking statements include statements regarding our intentions, beliefs, projections, outlook, analyses or current expectations concerning, among other things: our research and development activities relating to BPX-601, possible ranges of application and potential safety and curative effects in the treatment of diseases, including as compared to other treatment options and competitive therapies, and the timing and speed of enrollment in clinical trials for BPX-601. Various factors may cause differences between Bellicum's expectations and actual results as discussed in greater detail under the heading "Risk Factors" in Bellicum's filings with the Securities and Exchange Commission, including without limitation our quarterly report on Form 10-Q for the three months ended March 31, 2019 and our annual report on Form 10-K the year ended December 31, 2018. Any forward-looking statements that Bellicum makes in this press release speak only as of the date of this press release. Bellicum assumes no obligation to update our forward-looking statements whether as a result of new information, future events or otherwise, after the date of this press release.*

Source: Bellicum Pharmaceuticals

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A photograph of a young girl with light brown hair, smiling and holding a large, white, fluffy stuffed animal. In the background, a blurred figure of a person in a white lab coat is visible. The image is overlaid with several large, semi-transparent white circles on the right side.

# Investor Presentation

Striving to deliver cures through controllable cell therapy

June 2019

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# Forward Looking Statement

This presentation contains estimates, projections and other forward-looking statements, concerning, among other things: our research and development activities relating to our CaspaCIDE® (“iC9”), GoCAR-T® (incorporating “iMC”) and related technologies; our product candidates including rivo-cel™ (previous BPX-501), BPX-601, BPX-603, BPX-802, and rimiducid; the effectiveness of our CaspaCIDE and GoCAR-T programs and their possible range of application and potential curative effects and safety in the treatment of diseases, including as compared to other treatment options and competitive therapies; the success of our collaborations with academic and commercial partners; the timing, progress of enrollment and success of our clinical trials; and the timing of potential European marketing authorization applications for rivo-cel and rimiducid. 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.

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 any 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, 2018 and our quarterly report on Form 10-Q for the period ended March 31, 2019.

# Investment Summary

## Rivo-cel

Allogeneic polyclonal T-cells for hematologic malignancies and inherited blood disorders (+HSCT)

European pediatric opportunity clinically de-risked

- 249 patients enrolled in Phase 1 / 2 study
- Late interim results presented at ASH in Dec. 2018 trend toward meeting primary endpoint
- Expect topline data in 1H 2019; MAA filings in 2H 2019
- European HQ and leadership team in place for commercialization prep

Global trial underway to broaden label

- Enrolling Phase 2/3 THRIVE study in AML and MDS in patients 12+ years old

## GoCAR-T Pipeline

Controllable CAR-T cells designed to optimize efficacy and safety

BPX-601 GoCAR-T promising early clinical data

- Phase 1 / 2 study enrolling in pancreatic cancer
- Initial safety data on 18 pancreatic cancer patients presented at ASCO in June 2019 indicate attractive safety profile and early clinical activity
- Trial amendment for repeat activation molecule administration to enhance potential clinical response

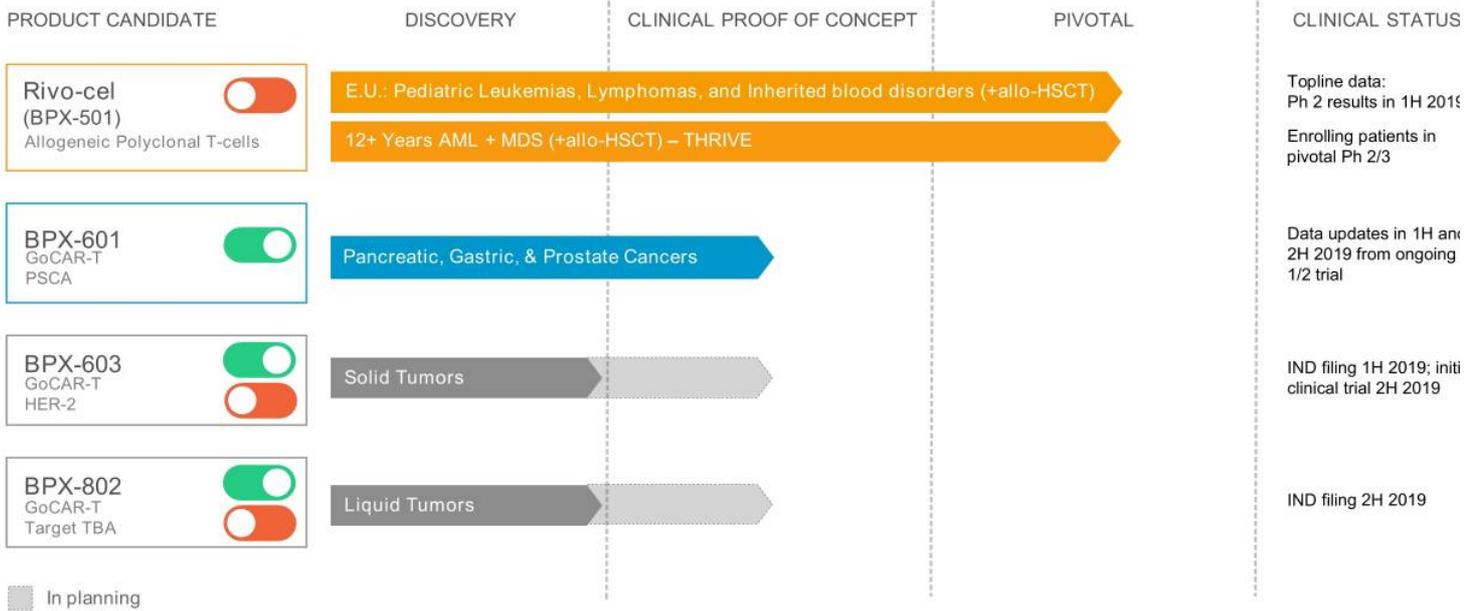
Two dual-switch GoCAR-T candidates to IND in 2019

- BPX-603 targeting HER2 antigen in solid tumors
- BPX-802 targeting liquid tumors, target antigen TBA

Cash, cash equivalents, restricted cash and investment securities of \$78.1MM as of March 31, 2019; Cash runway through

# Development Pipeline: Rivo-cel and GoCAR-T

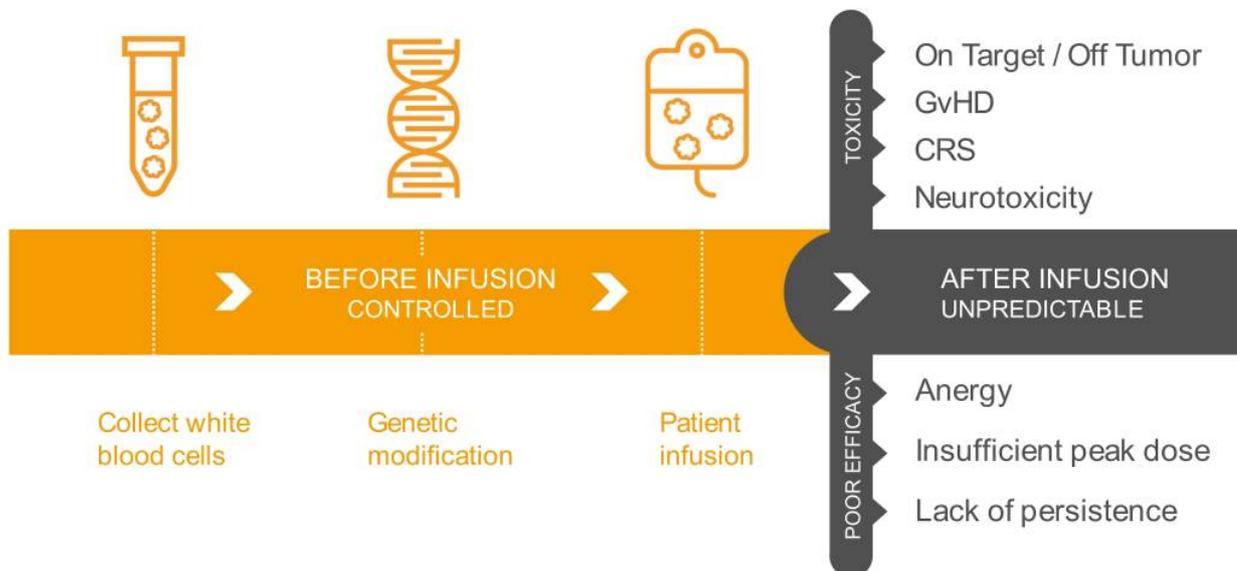
Controllable cell therapies that may represent major advances in liquid and solid tumors



# Technology Overview

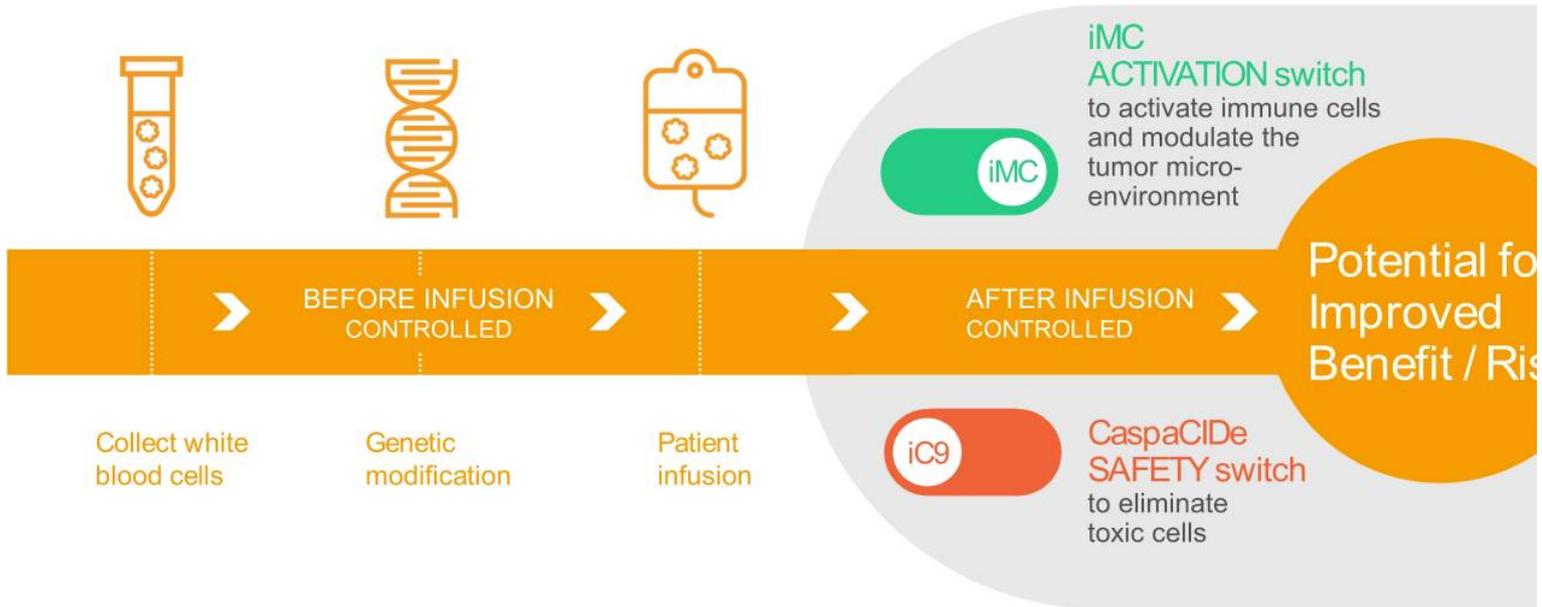
# Most Cell Therapies Only Controlled Before Infusion

Limited ability to expand a narrow therapeutic window



# Bellicum Platform Designed to Enable Control After Infusion

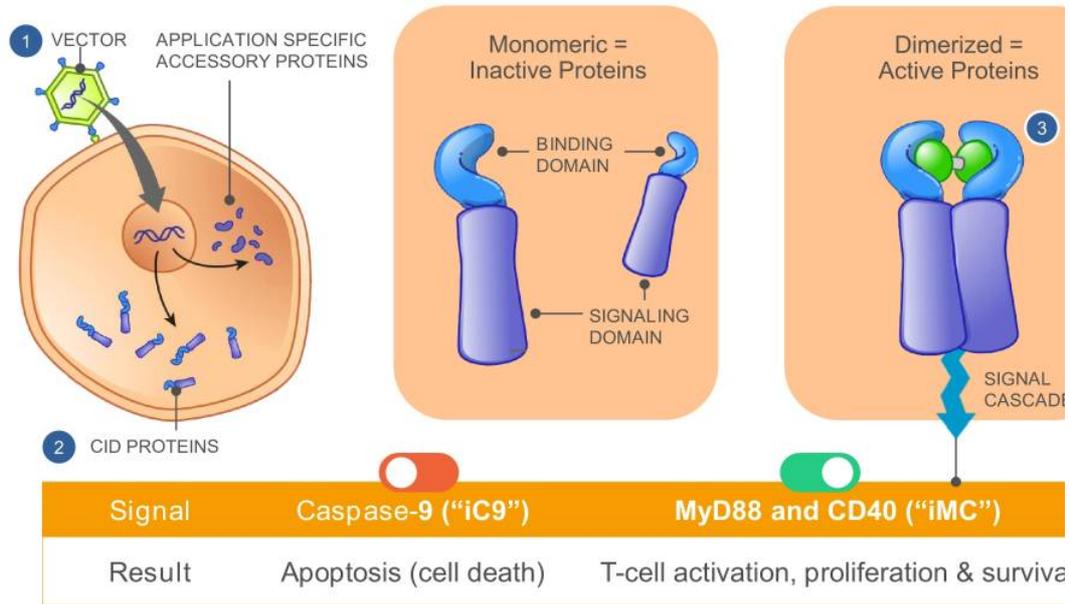
Would provide physicians the ability to expand the therapeutic window in each patient



# Chemical Induction of Dimerization (“CID”) Molecular Switch Platform

Rimiducid infusion activates signaling pathways to control T-cell function

- 1 Viral transduction transfers the DNA from a vector into the target cell nucleus.
- 2 Vector-derived DNA directs expression of CID and accessory proteins.
- 3 Rimiducid dimerizes the CID proteins, thus turning on the signal cascade.



# GoCAR-T Pipeline

# GoCAR-T: Differentiated Approach to Cell Therapy

## Current Challenges in Cell Therapy

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- ⊗ Limited efficacy in solid tumors
  - Inadequate cell proliferation and persistence to sustain efficacy
  - Inability to overcome immune suppressive factors in tumor microenvironment (TME)

- ⊗ Potential safety issues with more potent approaches

## GoCAR-T Benefits

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- ✔ Potential for enhanced efficacy in solid tumors via iMC signaling
  - MyD88 and CD40 are superior co-stimulatory molecules with potential for greater cell expansion and persistence
  - Modulates the tumor microenvironment, overriding common inhibitory pathways (PD-1, PGE2, TGF- $\beta$ )
  - Enhances host immune activity by inducing pro-inflammatory cytokines and chemokines
- ✔ Potential for enhanced safety
  - iMC provides control over timing and frequency of co-activation
  - CaspaCIDE capable of eliminating a majority of CAR-T cells to manage acute toxicities

# BPX-601 GoCAR-T Targeting PSCA

## Product Summary

- Attractive first-in-class solid tumor CAR-T opportunity
- First-in-human experience with iMC
- Initial Phase 1 results presented in June 2019 continue to demonstrate:
  - Safety
  - iMC-driven T cell activation
  - Biologic activity
- Phase 1 enrollment ongoing

## Unmet Need

High unmet need in solid tumors expressing Prostate Stem Cell Antigen (PSCA)

	Annual Incidence (US)	Annual Deaths (US)	% Expressing PSCA
Pancreatic	55k	44k	~60%
Prostate	165k	29k	75-90%
Gastric	26k	11k	76-89%



Incidence and annual deaths: Noone AM, Howlader N, Krapcho M, Miller D, Brest A, Yu M, Ruhi J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2015, National Cancer Institute, Bethesda, MD, [https://seer.cancer.gov/csr/1975\\_2015/](https://seer.cancer.gov/csr/1975_2015/), based on November 2017 SEER data submission, posted to the SEER web site, April 2018.  
PSCA expression: Argani et al, Cancer Res 2001; Reiter et al., PNAS 1998; Abate-Daga et al, HGT 2014; Data on file

# BPX-601: Phase 1 Trial Progression

BP-012 trial in relapsed/refractory pancreatic, gastric, and prostate cancers

	Lead-in	Dose Escalation	Full Conditioning	Efficacy Optimized Regimen
Patient Population	2L to 6L Pancreatic		2L Pancreatic	
BPX-601 Dose x10 <sup>6</sup> cells/kg @ Day 0	1.25	1.25, 2.5, 5.0	5.0	
Conditioning	Cytoxan 1g/m <sup>2</sup> @ Day -3		Cytoxan 0.5g/m <sup>2</sup> Fludarabine 30mg/m <sup>2</sup> @ Days -5, -4, -3	
Rimiducid Dose @ Day 7	None	Single Dose	Single Dose	Scheduled Repeat Dosing
Status	Enrolled & Presented			Pending

Dose escalation designed conservatively to evaluate

- Partial conditioning with monotherapy
- Single dose of rimiducid activate iMC

Recently evaluated impact conditioning

- Standard Flu/Cy regime
- Single dose of rimiducid activate iMC

Next step: efficacy-optimized regimen

- Standard Flu/Cy regime repeat rimiducid dosing
- Data presentation: late

# BPX-601: No Dose Limiting Toxicities Observed

Data presented at ASCO 2019

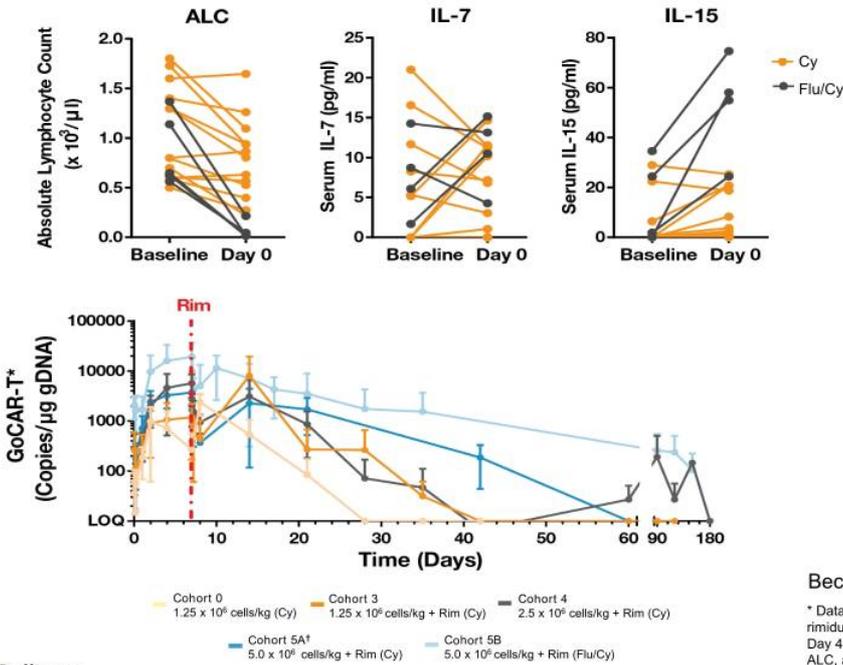
Patients, n (%)	Cohort 0 n = 3	Cohort 3 n = 3	Cohort 4 n = 3	Cohort 5A n = 4	Cohort 5B n = 5	All Patients N = 18
Any AE	3 (100)	3 (100)	3 (100)	4 (100)	5 (100)	18 (100)
Any SAE	2 (67)	1 (33)	0	3 (75)	4 (80)	10 (56)
Grade 3 & 4 TRAEs	0	0	0	0	1 (20)	1 (<1)
AEs in >15% of all patients, n (%)						
Febrile neutropenia	0	0	0	2 (50)	4 (80)	6 (33)
Fatigue	2 (67)	1 (33)	0	2 (50)	0	5 (28)
Neutropenia	0	0	0	1 (25)	4 (80)	5 (28)
Pyrexia	0	0	1 (33)	2 (50)	2 (40)	5 (28)
Dysuria	0	0	0	0	4 (80)	4 (22)
Hematuria	0	0	0	0	4 (80)	4 (22)
Nausea	2 (67)	0	0	0	2 (40)	4 (22)
Abdominal pain	1 (33)	1 (33)	0	0	1 (20)	3 (17)
Abdominal pain upper	0	1 (33)	1 (33)	1 (25)	0	3 (17)
Anemia	0	0	0	1 (25)	2 (40)	3 (17)
Back pain	1 (33)	1 (33)	0	1 (25)	0	3 (17)
Blood bilirubin increased	0	0	0	1 (25)	2 (40)	3 (17)
Hypotension	0	0	2 (67)	1 (25)	0	3 (17)

- No dose limiting toxicities were observed
- Adverse Events (AEs) were generally consistent with cytotoxic chemotherapy or other cancer immunotherapies
- AEs related to BPX-601/rimidine included:
  - One case of Grade 2 cytotoxic release syndrome (CRS)
  - One case of Grade 2 encephalopathy
  - Four cases of Grade 1-3 urologic toxicity (dysuria, hematuria, cystitis)

Becerra et al, ASCO 2019

# BPX-601: iMC-Driven T Cell Expansion & Persistence

## Flu/Cy Lymphodepletion Results in Increased BPX-601 Cell Expansion and Persistence

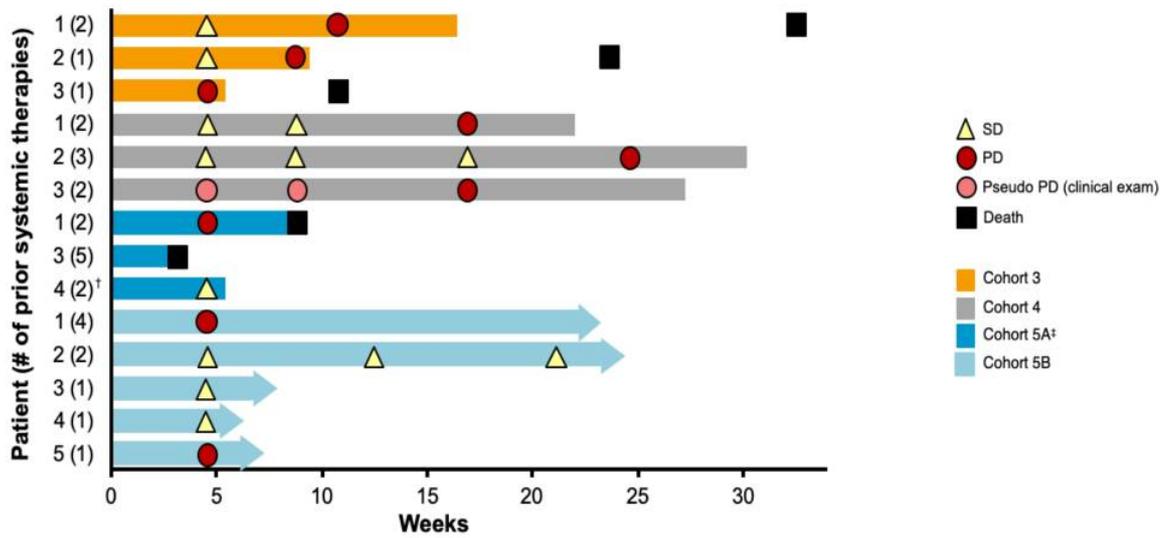


- Peak expansion 4.9-fold higher in Flu/Cy cohort vs Cy alone cohort
- Persistence improves with:
  - Administration of rimiducid to activate iMC
  - Higher cell dose
  - Lymphodepletion with Flu/Cy

Becerra et al, ASCO 2019

\* Data points represent the mean log VCN for each cohort and the dotted red line represents rimiducid administration at Day 7; † Patient 3 in cohort 5A did not have data for time points beyond Day 4 and thus is not included in the summary of cell persistence. ALC, absolute lymphocyte count; Cy, cyclophosphamide; Flu, fludarabine; LD, lymphodepletion; LOQ, limit of quantitation; pts, patients; Rim, rimiducid; VCN, vector copy number.

# BPX-601: Evidence of Anti-Tumor Activity



\* Right arrow cap indicates ongoing treatment-free interval; † Patient withdrew consent for further follow-up; ‡ Patient 2 was not efficacy evaluable due to non-measurable disease at baseline.  
 PD, progressive disease; pseudo, pseudoprogression; SD, stable disease.

- 8 (62%) of 13 evaluable patients treated with BPX-601 and single-dose cyclophosphamide achieved stable disease; 10-24% had tumor shrinkage
- With 9.1 weeks median follow-up (range: 2.5-30.3), median time to next therapy in patients that received subsequent treatment was 16.6 weeks (range 5.6-30.3)
- In Flu/Cy cohort, 2 patients with >median follow-up had time to next treatment >22 weeks (ongoing)

# BPX-603 Dual Switch GoCAR-T Targeting HER2

## Product Summary

- HER2 is a validated tumor antigen and is expressed on numerous solid tumors with high unmet need
- Historical HER2 CAR-T studies have shown modest overall activity and off-tumor / on-target toxicity
- BPX-603 may address these limitations
  - iMC may increase cell proliferation & persistence, modulate the TME, and enhance host immunity
  - CaspaCIDE may mitigate treatment emergent toxicities

## Unmet Need

Indication	Incidence <sup>1</sup>	HER2 <sup>+</sup>	5-year (Stage)
Gastric	28,000	10-30% <sup>3</sup>	<20%
Colorectal	145,000	10% <sup>4</sup>	<15%
Ovarian	22,000	20-30% <sup>5</sup>	<30%
Uterine/ Endometrial	61,000	50-80% <sup>6</sup>	14-69%
Glioblastoma	12,000	20-30% <sup>2</sup>	<20%

<sup>1</sup>National Cancer Database, American Cancer Society, <https://www.cancer.org>, accessed 21 December 2018; <sup>2</sup>Liu et al., Cancer Res 2004; <sup>3</sup>Gravalos et al., Annals Oncol 2008; <sup>4</sup>Tu et al., Exp Ther Med 2018; <sup>5</sup>Berchuck et al., Cancer Res 1990, Bartlett et al., Brit J Cancer 1996; <sup>6</sup>Grushko et al., Gynecologic Oncol 2008

# Historical HER2 Studies: Modest Clinical Outcomes

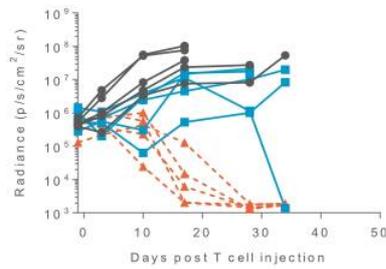
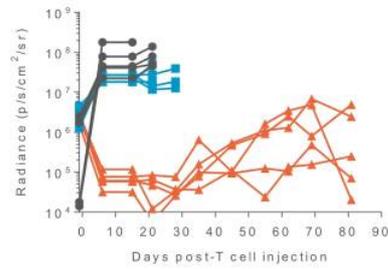
Study Properties	Morgan, 2010	Ahmed, 2015	Feng, 2017	Ahmed, 2017	Hegde, 2019
Construct	4D5-28-BB-z	FRP5-28-z	Her2-BB-z	FRP5-28-z	FRP5-28-z
Indication(s)	Metastatic colon	Sarcomas	CCA and PCa	GBM	Sarcomas
Patient number	1	19	11	17	10
HER2 expression	≥2+ (IHC)	≥1+ (IHC)	>50% positive	≥1+ (IHC)	≥1+ (IHC)
CAR-T dose	10 <sup>10</sup>	10 <sup>4</sup> - 10 <sup>8</sup>	10 <sup>6</sup>	10 <sup>6</sup> - 10 <sup>8</sup>	10 <sup>8</sup>
CAR-T expansion	NE	Negligible	>1,000 copies	Negligible	>10,000 copies
Toxicity	Lung reactivity	No DLTs	Mild AEs	Mild AEs	Mild AEs
Outcome	Grade 5 toxicity	1 PR	1 PR	1 PR	2 CR
Total Responses	2 CR, 3 PR, 5/58 (8.6% ORR)				

# BPX-603 Pre-Clinical Studies Demonstrate Potential Clinical Benefits

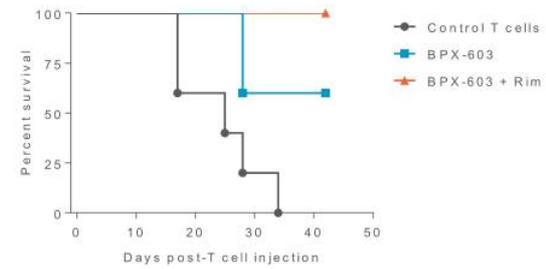
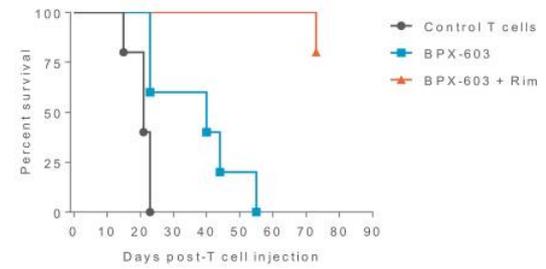
HER2<sup>+</sup> A549  
Lung Carcinoma  
(1x10<sup>4</sup> T cells)

HER2<sup>+</sup> OE19  
Esophageal Carcinoma  
(5x10<sup>6</sup> T cells)

## Tumor growth



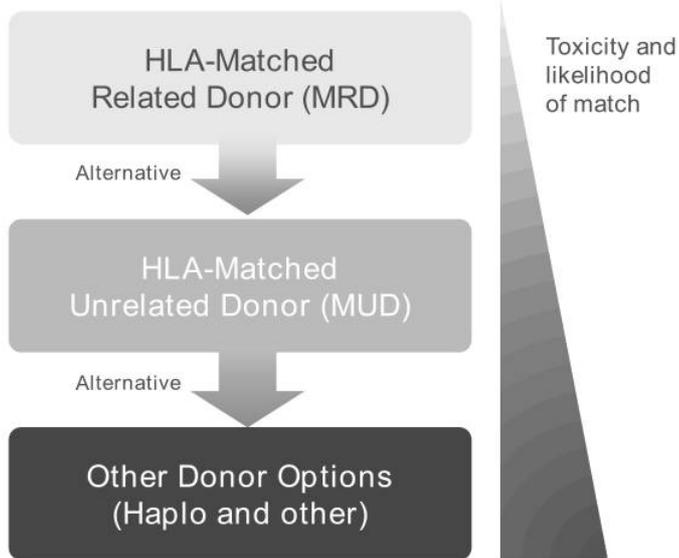
## Survival



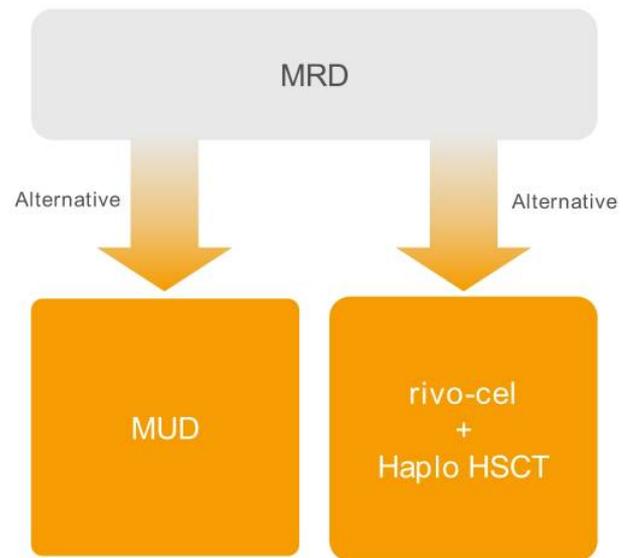
RIVO-CEL

# Rivo-cel: Opportunity To Transform Treatment Paradigm

## Current HSCT Treatment paradigm



## Potential Future HSCT Treatment Paradigm



# BP-004 Study: Basis for European Pediatric Approval

Phase 1/2 study of rivo-cel in pediatric patients following TCR  $\alpha\beta$  depleted allo-HSCT

High risk pediatric malignancies and non-malignant disorders



$\alpha\beta$  T-cell and B-cell depleted haplo-HSCT without GvHD Prophylaxis



Rivo-cel



Rimiducid for patients who develop visceral GvHD or are refractory to SOC treatment

## Enrolled Populations

N = 249 (EU and US Patients)

Malignant (N = 117)	Non-Malignant (N = 132)
Diagnosis	Diagnosis
Acute lymphocytic leukemia (ALL)	Primary Immune Deficiencies
Acute myeloid leukemia (AML)	$\beta$ Thalassemia Major
Other	Other Erythroid Disorders
	Bone Marrow Failure Disorders

## Outcomes

Rivo-cel:

- Event-free survival at 180 days (regulatory endpoint)
  - TRM/NRM, severe GvHD, and life-threatening infections
- Progression-free survival
- Disease status

Rimiducid:

- GvHD response

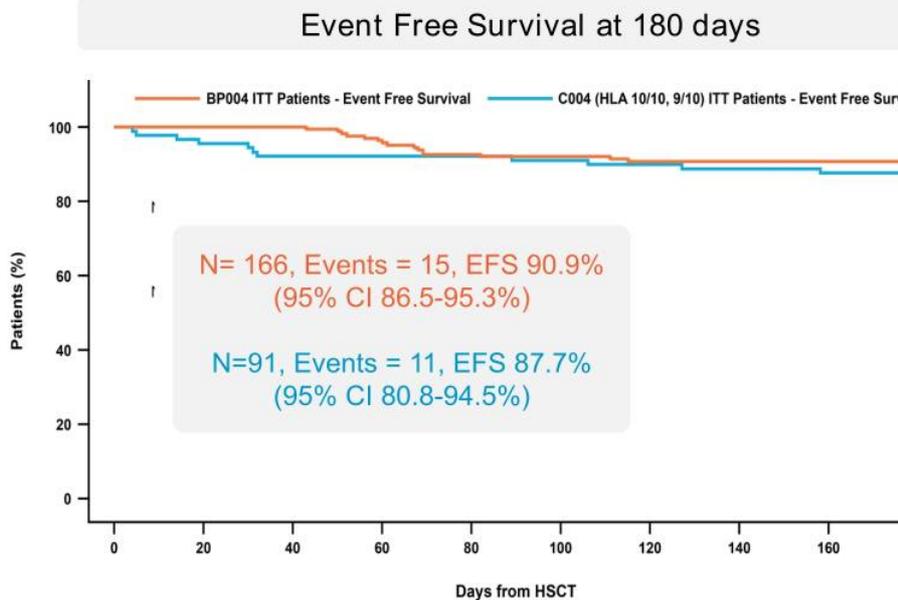


TRM, transplant-related mortality; NRM, non-relapse mortality; GvHD, graft versus host disease; SOC, standard of care; HSCT, hematopoietic stem cell transplantation. ClinicalTrials.gov Identifiers: NCT01744223, NCT02065869.

# Rivo-cel Interim Results Trend Towards Meeting Primary Endpoint

Interim six-month event-free survival comparable to MUD HSCT

- C-004 is an observational trial of pediatric patients with malignant (67%) or non-malignant (33%) disease who underwent a MUD HSCT
- Non-inferiority of rivo-cel EFS at 180 days to MUD HSCT is required for EMA approval
- Full analysis with statistical comparisons of patients who received rivo-cel or a MUD HSCT planned for 2019



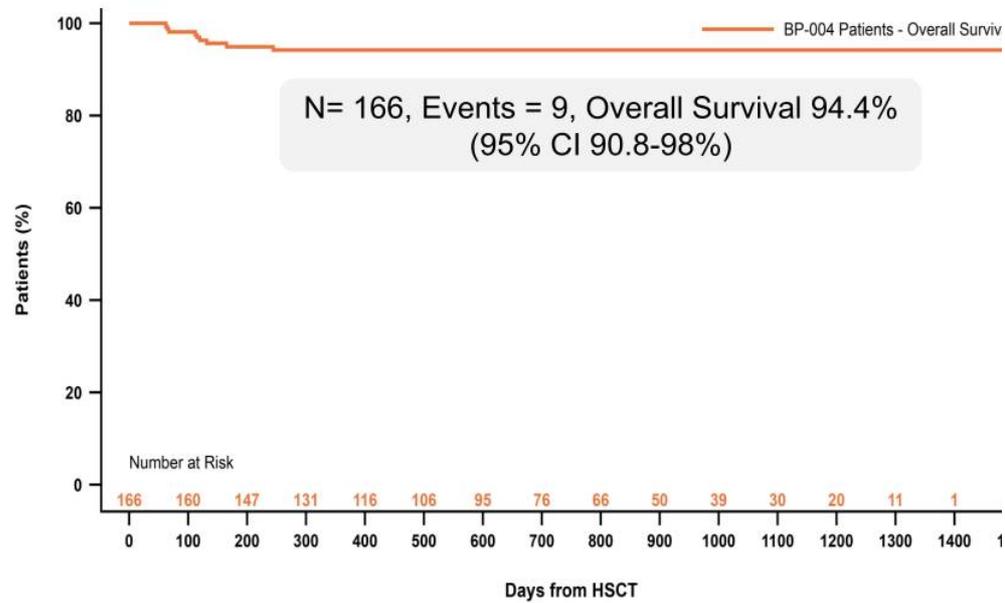
EFS, event free survival; MUD, matched unrelated donor; HSCT, Hematopoietic Stem Cell Transplantation  
Data presented at 60th ASH Annual Meeting – December, 2018

# Rivo-cel: High Rates of Disease-Free and Overall Survival

Interim survival results

With median follow-up of 20.3 months (0.5 – 47.4 months):

- Relapse-free survival 82.9% in malignant patients
- Disease-free survival 95.2% in non-malignant patients



# Rivo-cel: High Rates of GvHD Response to Rimiducid

Interim results of response in patients refractory to standard of care treatment

## Methods & Evaluable Population

Patients who developed visceral GvHD or were refractory to SOC treatment were eligible to receive  $\geq 1$  dose (up to 3 at 48 hour intervals) of rimiducid (0.4 mg/kg)

Of 238 GvHD-evaluable patients:

- 35.7% (85/238) experienced any grade acute or chronic GvHD
- 28.2% (24/85) of patients with GvHD received rimiducid

## Efficacy Results

Best overall response of 70% 7 days post-rimiducid

- 9 CR and 7 PR
- Median time to response of 1 day (1 - 4 days)

Four patients in PR or not evaluable at day 7 achieved CR within 30 days post-rimiducid

## Translational Results

Reduction in rivo-cel serum level observed in all patients receiving rimiducid<sup>1</sup>

Rimiducid eliminates the most highly activated rivo-cel T cells which express the highest level of iC9<sup>2</sup>, leaving remaining cells to re-expand

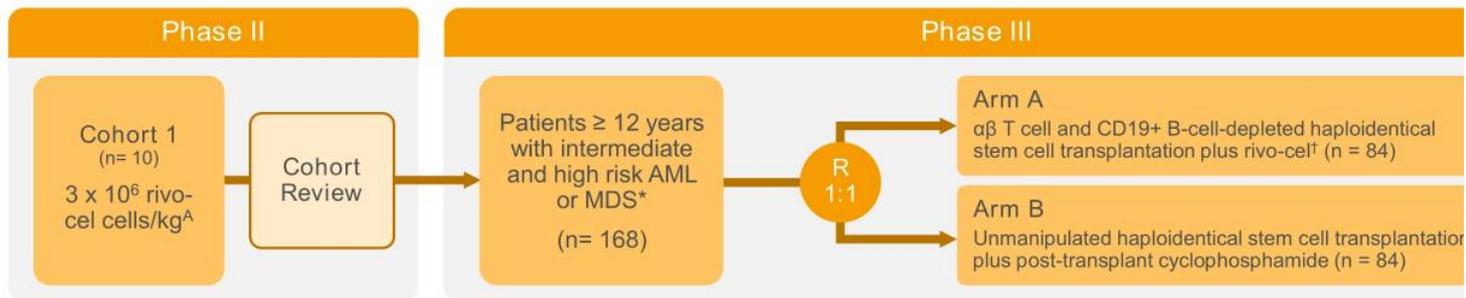
- 79% (11/14) malignant patients receiving rimiducid remain relapse free



GvHD: acute graft versus host disease; SOC, Standard of Care; PR, Partial Response; CR, Complete Response  
1. N = 10 with translational data at time of interim.  
2. Zhou et al. ASH 2018, a3496

# THRIVE: Registrational Trial in Adults & Adolescents

Phase 2/3 study of rivo-cel in intermediate and high risk AML & MDS in patients 12+ years old



## Primary Outcome

Overall Survival

## Secondary Outcomes

- Graft-versus host disease and relapse-free survival (GRFS) at time from randomization until Grade 3-4 acute GvHD, chronic GvHD requiring systemic immunosuppression, disease relapse or death, whichever comes first
- Relapse free survival (RFS)
- Non-relapse mortality (NRM)
- Time to resolution of GvHD after administration of rimiducid

A If dose level 1 exceeds the MTD, alternative dose levels (dose level -1: 1 x 10<sup>6</sup> BPX-501 cells/kg) will be explored

† No GvHD prophylaxis will be given. Rimiducid will be administered to inactivate rivo-genecleucel (rivo-cel) in the event of GVHD not responsive to standard of care treatment

Updated 8 Nov 2018. Clinicaltrials.gov identifier: NCT03699475

# Rivo-cel Addresses Key Shortcomings

Rivo-cel addresses shortcomings of stem cell transplants to treat hematological malignancies and inherited blood disorders

		Rivo-cel Target Market			Rivo-cel +HSCT	
% of Current Market		Matched Related Donor (MRD) 25-30%	Matched Unrelated Donor (MUD) ~50%	Haplo and Other ~20-25%		
Leading Causes of Mortality and Morbidity	Disease Relapse	●	●	●	✓	●
	Infection	●	●	●	✓	●
	GvHD	●	●	●	✓	●
Likelihood to Find Donor		Low	Low-Medium	High	✓	High
Time to Identify Donor		Short	Long	Short	✓	Short

# Rivo-cel: Significant Market Opportunity

## Potential List Price

## Patient Population

## Market Opportunity

## Additional Opportur

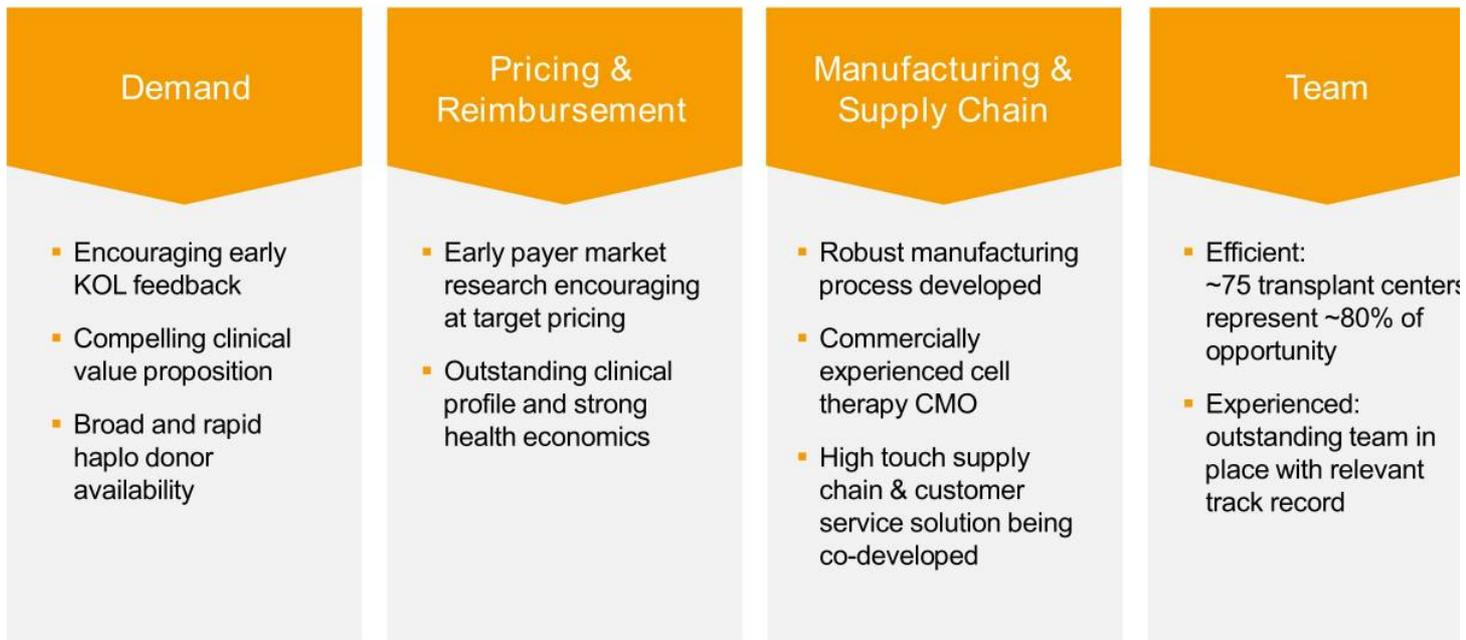


- Geographic expansion
  - U.S. Pediatric
  - Asia
- Patient population growth
- Expansion of HSCT eligibility
- Development in other malignancies



\*As of 2016. EBMT Transplant Activity Survey; CIBMTR Current Uses & Outcomes of HCT; internal company analysis  
Market share expectations represented by green (strong) and yellow (moderate)

# Rivo-cel: Significant Opportunity for EU Pediatric Launch



# Anticipated 2019 and 2020 Key Program Milestones

	1H'19	2H'19	2020
BPX-601	<p>Presentations of updated Phase 1 results (Flu/Cy regimen) at ASCO</p> <p>Amend BP-012 to allow for repeat dosing of rimiducid to reactivate iMC</p>	<p>Presentation of updated Phase 1 results (repeat rimiducid dosing)</p>	<p>Updated Phase 1 and Phase 2 results</p>
CAR-T PIPELINE	<p>IND submission for BPX-603</p>	<p>First patient treated in BPX-603 Phase 1 trial</p> <p>IND submission for BPX-802</p>	<p>BPX-603 Phase 1 data</p> <p>BPX-802 Phase 1 data</p>
Rivo-cel	<p>Final analyses of BP-004 and C/CP-004 trials</p>	<p>MAA submissions for rivo-cel and rimiducid for pediatric patients</p>	<p>Potential MAA Approval</p> <p>THRIVE Phase 2 data</p>

# Investment Summary

## Rivo-cel

Allogeneic polyclonal T-cells for hematologic malignancies and inherited blood disorders (+HSCT)

European pediatric opportunity clinically de-risked

- 249 patients enrolled in Phase 1 / 2 study
- Late interim results presented at ASH in Dec. 2018 trend toward meeting primary endpoint
- Expect topline data in 1H 2019; MAA filings in 2H 2019
- European HQ and leadership team in place for commercialization prep

Global trial underway to broaden label

- Enrolling Phase 2/3 THRIVE study in AML and MDS in patients 12+ years old

## GoCAR-T Pipeline

Controllable CAR-T cells designed to optimize efficacy and safety

BPX-601 GoCAR-T promising early clinical data

- Phase 1 / 2 study enrolling in pancreatic cancer
- Initial safety data on 18 pancreatic cancer patients presented at ASCO in June 2019 indicate attractive safety profile and early clinical activity
- Trial amendment for repeat activation molecule administration to enhance potential clinical response

Two dual-switch GoCAR-T candidates to IND in 2019

- BPX-603 targeting HER2 antigen in solid tumors
- BPX-802 targeting liquid tumors, target antigen TBA

Cash, cash equivalents, restricted cash and investment securities of \$78.1MM as of March 31, 2019; Cash runway through









