2020 Blueprint
global business strategy

JANUARY 7, 2019

Forward-looking statements

This presentation contains forward-looking statements as defined in the Private Securities Litigation Reform Act of 1995, as amended. The words “may,” “will,” “could,” “would,” “should,” “expect,” “plan,” “anticipate,” “intend,” “believe,” “estimate,” “predict,” “project,” “potential,” “continue,” “target” and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. In this presentation, forward-looking statements include, without limitation, statements about plans and timelines for the development of avapritinib, BLU-554, BLU-667 and BLU-782 and the ability of Blueprint Medicines Corporation (the “Company”) to implement those development plans; the potential benefits of Blueprint Medicines’ current and future drug candidates in treating patients; Blueprint Medicines’ “2020 Blueprint” strategy, key goals and anticipated milestones through 2020; plans and timelines for marketed products and marketing applications in the United States and Europe, therapeutic candidates in clinical development and research programs; expectations regarding the Company’s existing cash, cash equivalents and investments and the future financial performance of the Company; and the Company’s strategy, business plans and focus. The Company has based these forward-looking statements on management’s current expectations, assumptions, estimates and projections. While the Company believes these expectations, assumptions, estimates and projections are reasonable, such forward-looking statements are only predictions and involve known and unknown risks, uncertainties and other important factors, many of which are beyond the Company’s control and may cause actual results, performance or achievements to differ materially from those expressed or implied by any forward-looking statements. These risks and uncertainties include, without limitation, risks and uncertainties related to the delay of any current or planned clinical trials or the development of the Company's drug candidates, including avapritinib, BLU-554, BLU-667 and BLU-782; the Company's advancement of multiple early-stage efforts; the Company's ability to successfully demonstrate the efficacy and safety of its drug candidates; the preclinical and clinical results for the Company's drug candidates, which may not support further development of such drug candidates; actions or decisions of regulatory agencies or authorities, which may affect the initiation, timing and progress of clinical trials; the Company’s ability to obtain, maintain and enforce patent and other intellectual property protection for any drug candidates it is developing; the Company's ability to develop and commercialize companion diagnostic tests for its current and future drug candidates, including companion diagnostic tests for BLU-554 for FGFR4-driven hepatocellular carcinoma, avapritinib for PDGFRα D842V-driven GIST and BLU-667 for RET-driven non-small cell lung cancer (“NSCLC”); and the success of the Company’s current and future collaborations, including its cancer immunotherapy collaboration with F. Hoffmann-La Roche Ltd and Hoffmann-La Roche Inc. and its collaboration with CStone Pharmaceuticals.

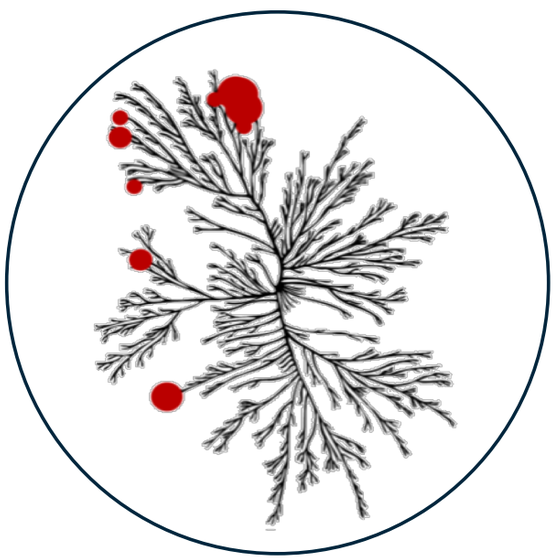
These and other risks and uncertainties are described in greater detail under “Risk Factors” in the Company’s Quarterly Report on Form 10-Q for the quarter ended September 30, 2018, as filed with the Securities and Exchange Commission (“SEC”) on October 31, 2018, and any other filings the Company has made or may make with the SEC in the future. The Company cannot guarantee future results, outcomes, levels of activity, performance, developments, or achievements, and there can be no assurance that the Company’s expectations, intentions, anticipations, beliefs, or projections will result or be achieved or accomplished. The forward-looking statements in this presentation are made only as of the date hereof, and except as required by law, the Company undertakes no obligation to update any forward-looking statements contained in this presentation as a result of new information, future events or otherwise.

This presentation also contains estimates, projections and other statistical data made by independent parties and by the Company relating to market size and growth and other data about the Company’s industry. These data involve a number of assumptions and limitations, and you are cautioned not to give undue weight to such estimates. In addition, projections, assumptions and estimates of the Company’s future performance and the future performance of the markets in which the Company operates are necessarily subject to a high degree of uncertainty and risk.

Precision therapies for people with cancer and rare diseases

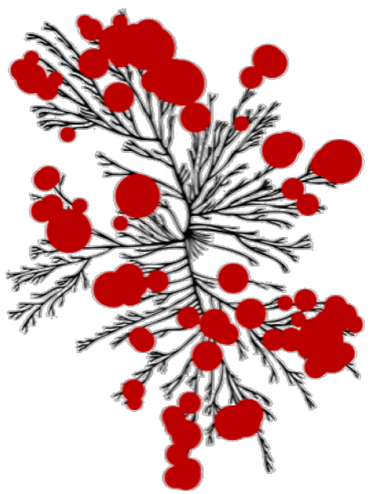
A NEW WAY OF LOOKING AT KINASE MEDICINES

SELECTIVE



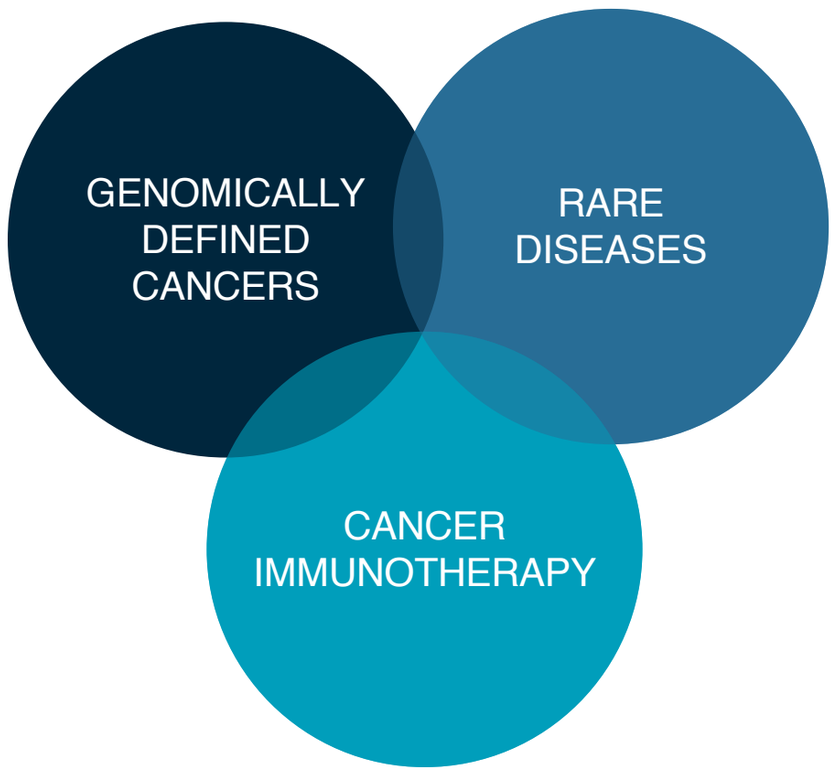
avapritinib

NON-SELECTIVE



Rydapt® (midostaurin)

WITH A FOCUS ON CORE AREAS OF EXPERTISE



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The promise of precision therapy throughout the development cycle

RATIONAL DRUG DESIGN
selectively targets genetic drivers of disease

EFFICIENT CLINICAL DEVELOPMENT with small trials and focused investment

DRAMATICALLY IMPROVED OUTCOMES in selected patients, even in early trials

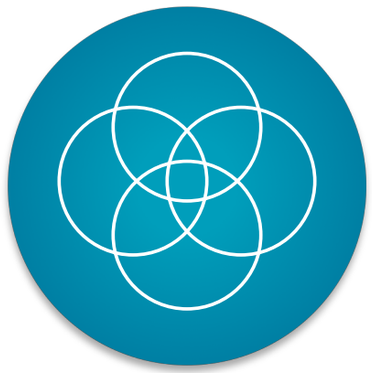
DEMONSTRABLE VALUE
to patients, HCPs, payers and healthcare systems

HCP, healthcare professional

Our vision for a sustainable precision therapy company

Rapid, reproducible product development

Robust scientific platform reproducibly designing potent and selective kinase medicines



Disciplined portfolio management focusing on therapeutic area leadership and novel targets

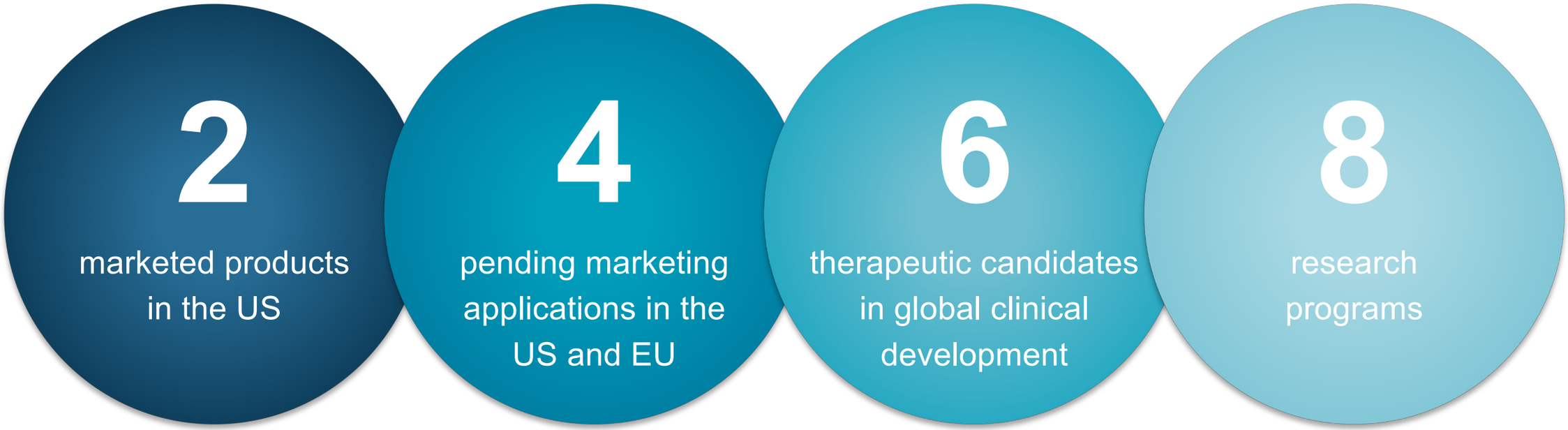
Effective and nimble commercial organization delivering medicines to patients globally

Reinvestment of revenue to sustain constant innovation cycle

blueprint™ MEDICINES

Our “2020 Blueprint” strategy to make this vision a reality

ANTICIPATED ACHIEVEMENTS BY YEAR-END 2020



Global commercial footprint, with 2 marketed products in the US and 1 marketed product in the EU

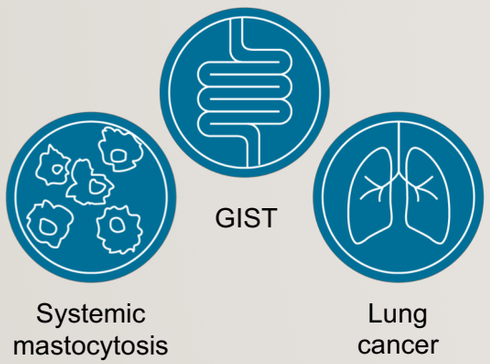
blueprint™ MEDICINES

7 registration-enabling trials to build on first potential avapritinib approval

PROGRAM	TRIAL NAME	TARGET INDICATIONS
ONGOING		
Avapritinib	**NAVIGATOR**	PDGFRA Exon 18 mutant GIST and 4L GIST
	VOYAGER	3L GIST
	PATHFINDER	Advanced systemic mastocytosis
	PIONEER	Indolent systemic mastocytosis
BLU-667	**ARROW**	2L RET-fusion NSCLC and 2L RET-mutant MTC
PLANNED INITIATION IN 2H 2019		
Avapritinib	**COMPASS-2L**	2L GIST
BLU-667	---	1L RET-fusion NSCLC

2L, second-line; 3L, third-line; 4L, fourth-line; GIST, gastrointestinal stromal tumors; MTC, medullary thyroid cancer; NSCLC, non-small cell lung cancer; SM, systemic mastocytosis.

Research areas of focus leverage robust scientific platform, clinical expertise and planned commercial profile



Leadership in therapeutic areas of focus

Cancer immunotherapy under Roche collaboration

Novel genetic drivers

Plan to disclose up to 2 new targets at R&D day in 2019

Rapidly advancing pipeline of investigational precision therapies

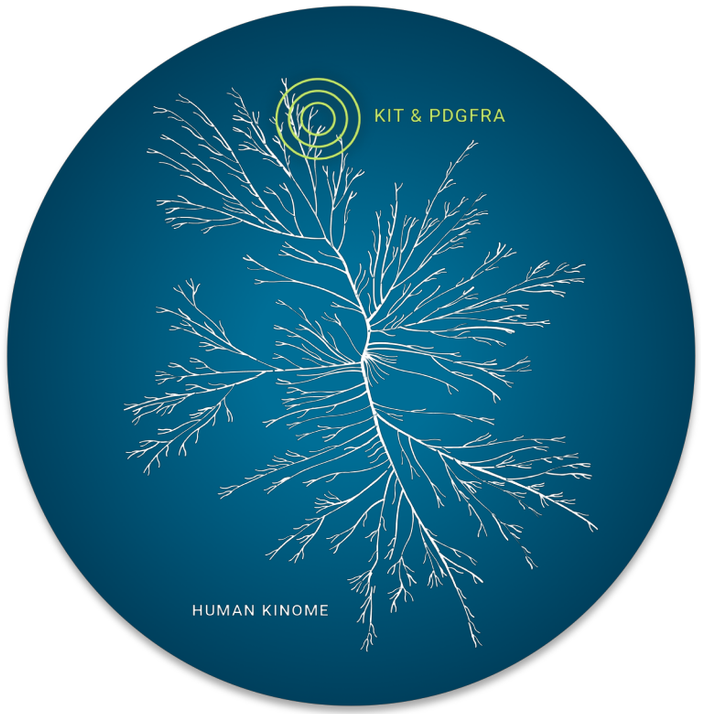
DRUG CANDIDATE (TARGET)	DISCOVERY	EARLY CLINICAL DEVELOPMENT	LATE CLINICAL DEVELOPMENT	REGULATORY SUBMISSION	APPROVED	COMMERCIAL RIGHTS
Avapritinib (KIT & PDGFRA)	PDGFRA Exon 18 mutant GIST [1]			NDA planned 1H 2019		
	4L GIST [1]			NDA planned 1H 2019		
	3L GIST [1]			NDA planned 2020		
	2L GIST [1]		trial planned 2H 2019			
	Advanced SM			NDA planned 2020		
	Indolent and smoldering SM					
BLU-667 (RET)	2L RET-fusion NSCLC [1]			NDA planned 1H 2020		
	1L RET-fusion NSCLC [1] – trial planned 2H 2019					
	EGFR-m NSCLC (+osimertinib) [1] – trial planned 2H 2019					
	2L RET-mutant MTC [1]			NDA planned 1H 2020		
	Other RET-altered solid tumors [1]					
BLU-554 (FGFR4)	Advanced HCC					
	Advanced HCC (+CS-1001) – trial planned 2H 2019					
BLU-782 (ALK2)	FOP [2] – trial planned Q1 2019					
4 undisclosed targets						
Immunokinase targets	Up to 5 cancer immunotherapy programs; development stage undisclosed					

EGFR-m, EGFR mutant; FOP, fibrodysplasia ossificans progressiva; HCC, hepatocellular carcinoma. [1] Unresectable or metastatic disease. [2] Phase 1 trial in healthy volunteers.

* CStone Pharmaceuticals has exclusive rights to develop and commercialize avapritinib, BLU-554 and BLU-667 in Mainland China, Hong Kong, Macau and Taiwan. Blueprint Medicines retains all rights in the rest of the world.

** Blueprint Medicines has U.S. commercial rights for up to two programs. Roche has worldwide commercialization rights for up to three programs and ex-U.S. commercialization rights for up to two programs.

Avapritinib: an investigational precision therapy with broad commercial potential



Avapritinib

KIT and PDGFRA inhibitor

DEVELOPMENT STATUS

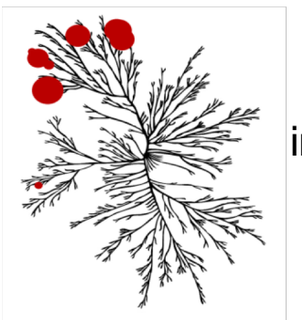
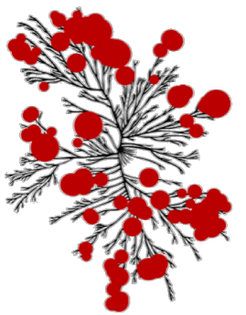
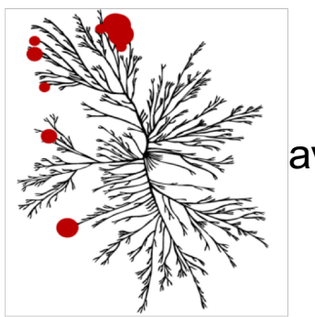
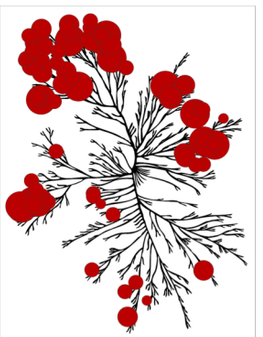
- Plan to submit NDA for PDGFRA Exon 18 mutant GIST and 4L GIST in 1H 2019
  - ORR and DOR per central radiology are primary endpoints for registration
- 5 ongoing or planned registration-enabling studies for avapritinib in multiple GIST and SM populations

POTENTIAL COMMERCIAL PROFILE

- Blueprint Medicines retains global commercial rights, excluding Greater China*
- ~30,000 patients across relevant GIST and SM populations in major markets**
- Scalable commercial footprint initially focused on driving patient identification and treatment through engagement with recognized centers of excellence

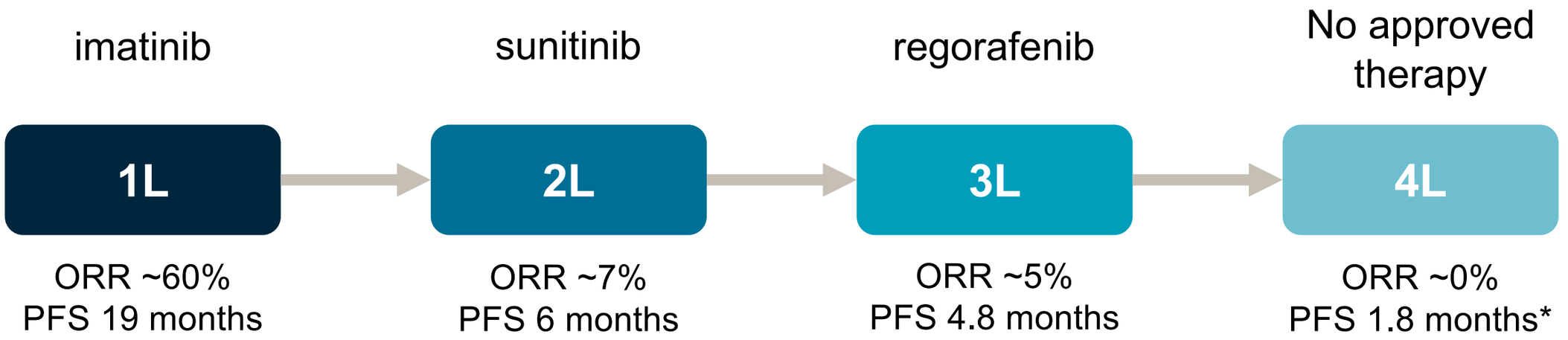
*CStone Pharmaceuticals has exclusive rights to develop and commercialize avapritinib in Mainland China, Hong Kong, Macau and Taiwan.
**Represents estimated number of patients with PDGFRA-driven GIST; 2L, 3L, 4L KIT-driven GIST; and advanced, smoldering and indolent SM in major markets (US, France, Germany, Italy, Spain, the United Kingdom and Japan).
DOR, duration of response; NDA, new drug application; ORR, overall response rate.
Kinome illustration reproduced courtesy of Cell Signaling Technology, Inc. (www.cellsignal.com) (CSTI). The foregoing website is maintained by CSTI, and Blueprint Medicines is not responsible for its content.

Avapritinib is a potentially transformative selective KIT/PDGFRA inhibitor

	PRECISION THERAPIES	MULTI-KINASE THERAPIES			
Approved	 imatinib	 sunitinib	 regorafenib	 midostaurin	
Investigational	 avapritinib	 DCC-2618			

Kinome illustration reproduced courtesy of Cell Signaling Technology, Inc. (www.cellsignal.com) (CSTI). The foregoing website is maintained by CSTI, and Blueprint Medicines is not responsible for its content.
All compounds were screened at 3 uM concentration against a panel of 392 wild type kinase constructs using the KINOME*scan* assay platform at DiscoveRx Corporation. The size of the circle indicates binding potency. The bigger the circle, the more potently the compound binds to the particular kinase.

Beyond imatinib, there are no highly effective therapies for advanced GIST



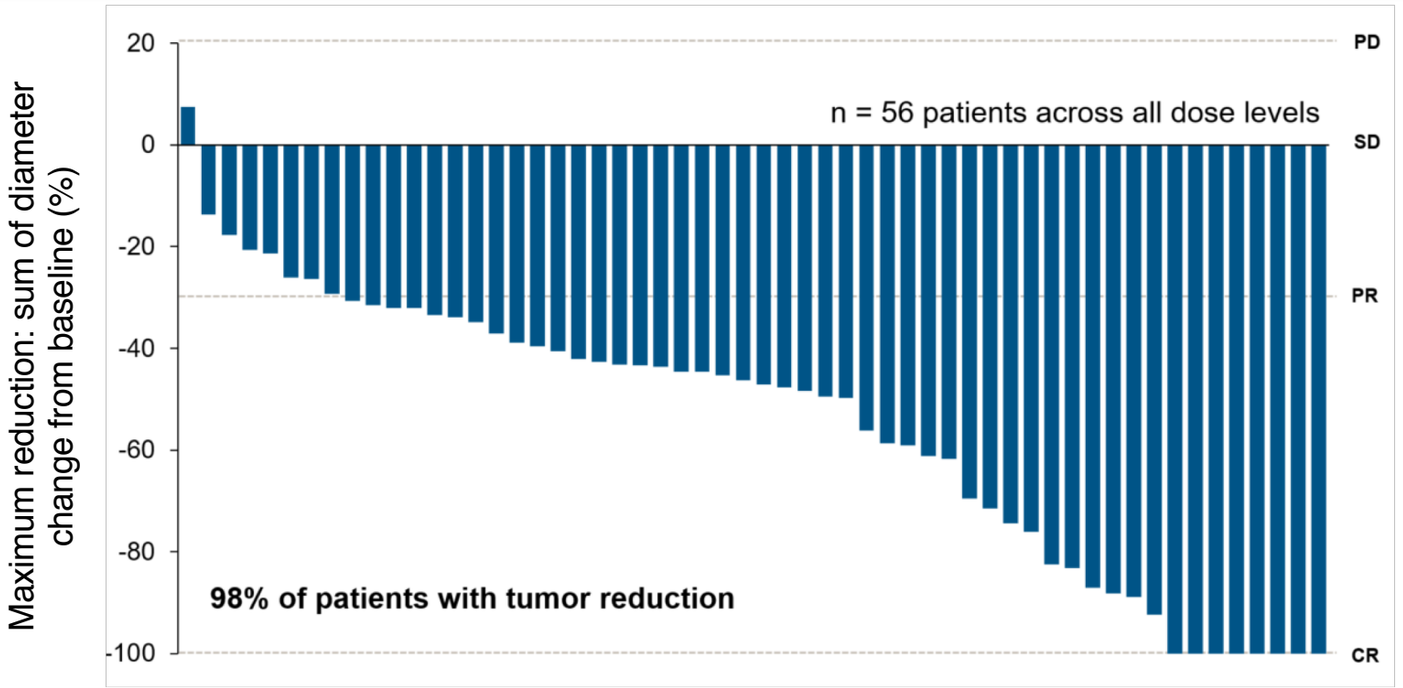
- All approved agents are ineffective against PDGFRα D842V GIST -

Genetic drivers	PDGFRA D842V ~5-6%	KIT ~80%

PFS, progression free survival.
* Imatinib re-challenged.

High response and clinical benefit rates in PDGFRα D842V-mutant GIST

CTOS 2018 ANNUAL MEETING[1]



Best response, % (n) per central radiology mRECIST 1.1	
ORR	84% (47)
CR/PR*	9% (5) / 75% (42)
SD	16% (9)
CBR†	96% (54)

- Median DOR not reached
- 76.3% 12-month DOR rate

TOP-LINE DATA[2]

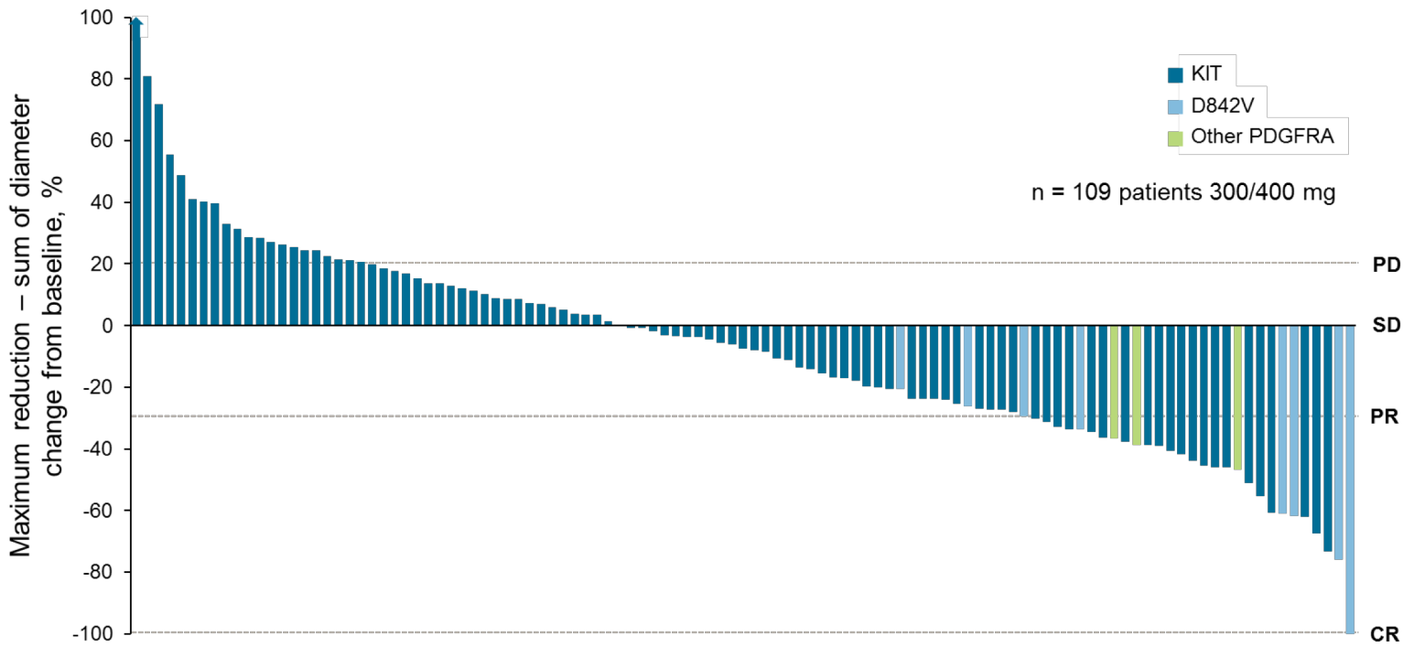
PDGFRA Exon 18 mutant GIST (n=43; 300-400 mg)

- 86% ORR (1 response pending confirmation)
- Median DOR not reached

[1] Data previously presented in November 2018 at the CTOS Annual Meeting. Data cutoff: October 15, 2018.
[2] Top-line data will be used to support planned NDA submission in 1H 2019. Data cutoff: November 16, 2018. Median PFS not reached.
* 4 PR pending confirmation. Patients who have had ≥1 post-baseline radiographic assessment. Response evaluable includes all doses. † PR + SD lasting ≥4 months.
CBR, clinical benefit rate; CR, complete response; mRECIST, modified Response Evaluation Criteria in Solid Tumors; PD, progressive disease; PR, partial response; QD, once daily; SD, stable disease.

~20% ORR in ≥4L KIT-driven GIST patients

CTOS 2018 ANNUAL MEETING[1]



Best response, % (n) per central radiology mRECIST 1.1	
ORR	20% (22)
CR/PR*	1% (1) / 19% (21)
SD	46% (50)
CBR†	40% (44)

- 7.2 months median DOR

TOP-LINE DATA[2]
≥4L GIST (n=111; 300-400 mg)

- 22% ORR (1 response pending confirmation)
- 10.2 months median DOR

[1] Data previously presented in November 2018 at the CTOS Annual Meeting. Data cutoff: October 15, 2018.
[2] Top-line data will be used to support planned NDA submission in 1H 2019. Data cutoff: November 16, 2018. Median PFS (central radiology) same as reported at CTOS 2018 Annual Meeting. Population included 8 (7%) patients harboring PDGFRα D842V mutation, consistent with expected real-world ≥4L GIST population.
* 1 PR pending confirmation. Patients who have had ≥1 post-baseline radiographic assessment. Response evaluable includes 300 mg QD and 400 mg QD.
† PR + SD lasting ≥4 months

Avapritinib is well-tolerated in patients with GIST

CTOS 2018 ANNUAL MEETING[1]

Treatment-Emergent Adverse Events (Safety Population; N = 231)					
Adverse event (AE), % (n)	**Any Grade**	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**
Nausea	61% (142)	46% (106)	13% (30)	3% (6)	0
Fatigue	55% (127)	21% (48)	28% (64)	6% (15)	0
Anemia	46% (107)	5% (11)	15% (35)	25% (58)	1% (3)
Periorbital edema	40% (93)	34% (79)	6% (13)	<1% (1)	0
Diarrhea	39% (90)	22% (50)	13% (30)	4% (10)	0
Vomiting	38% (88)	30% (69)	6% (14)	2% (5)	0
Decreased appetite	35% (82)	23% (54)	9% (20)	3% (8)	0
Peripheral edema	33% (77)	23% (53)	10% (22)	<1% (2)	0
Increased lacrimation	31% (72)	28% (64)	3% (8)	0	0
Memory impairment*	26% (60)	19% (45)	6% (15)	0	0
Constipation	23% (53)	14% (32)	8% (18)	<1% (2)	<1% (1)
Face edema	23% (53)	19% (43)	4% (9)	<1% (1)	0
Hair color changes	21% (49)	20% (46)	<1% (2)	<1% (1)	0
Dizziness	20% (47)	16% (38)	3% (8)	<1% (1)	0

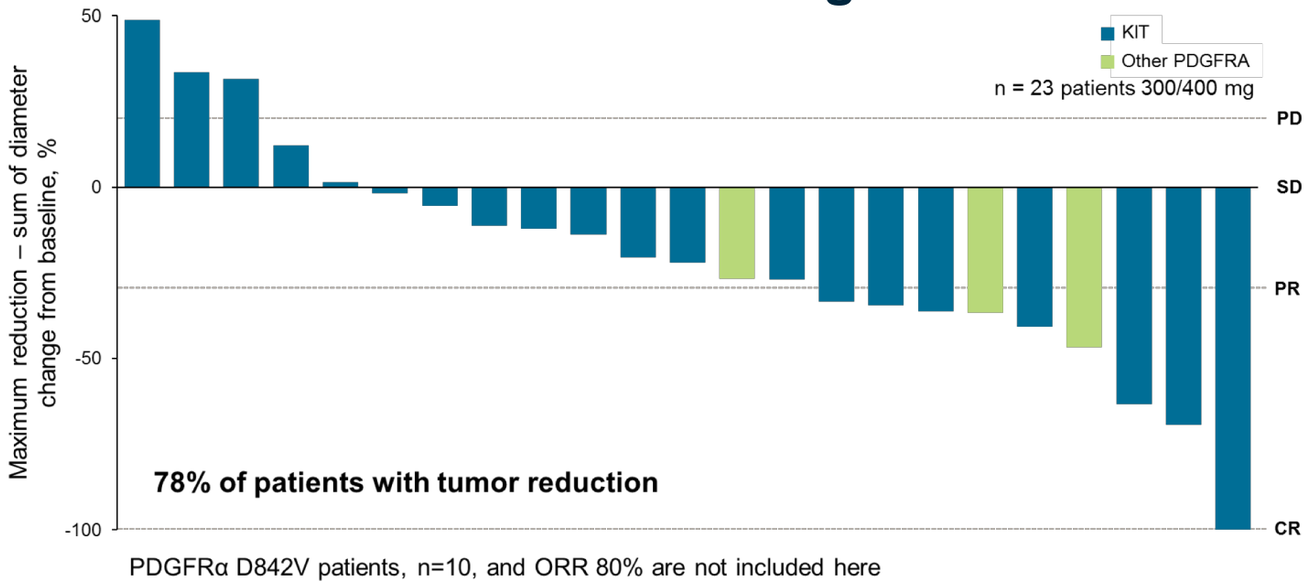
- Most AEs were Grade 1 or 2
- No treatment-related Grade 5 AEs
- 8.7% (20) of patients discontinued due to related AEs
- Grade 3-4 treatment-related AEs ≥2%: anemia, fatigue, hypophosphatemia, increased bilirubin, decreased white blood count/neutropenia, and diarrhea

Top-line safety results consistent with data previously reported at CTOS 2018 Annual Meeting[2]

[1] Data previously presented in November 2018 at the CTOS Annual Meeting. Data cutoff: October 15, 2018.
[2] Top-line data will be used to support planned NDA submission in 1H 2019. Data cutoff: November 16, 2018.
* The most commonly reported cognitive AE.

Preliminary Phase 1 data in 3L/4L regorafenib-naïve GIST de-risk ongoing Phase 3 VOYAGER trial

Preliminary 26% ORR for avapritinib[1] versus 5% ORR for regorafenib[2]



PDGFRα D842V patients, n=10, and ORR 80% are not included here

VOYAGER

3L/4L GIST R, 1:1

- avapritinib
- regorafenib

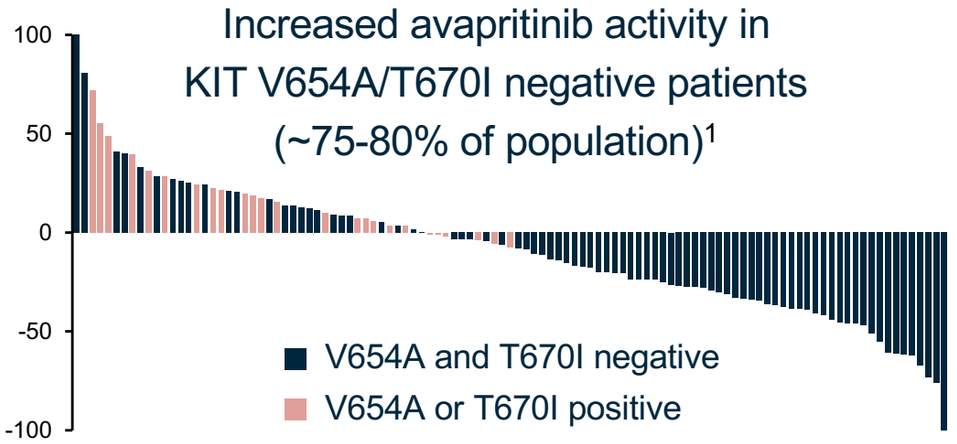
Primary endpoint: PFS

Anticipate completion of VOYAGER trial enrollment in 2H 2019

[1] Data previously presented in November 2018 at the CTOS Annual Meeting. Data cutoff: October 15, 2018.
[2] Regorafenib data in FDA-approved product insert.
R, randomized.

Preliminary Phase 1 data support design of Phase 3 COMPASS-2L trial in genotype-selected 2L GIST population

Phase 1 ctDNA analysis



In 2L GIST, sunitinib has shown activity against KIT V654A and T670I mutations

COMPASS-2L

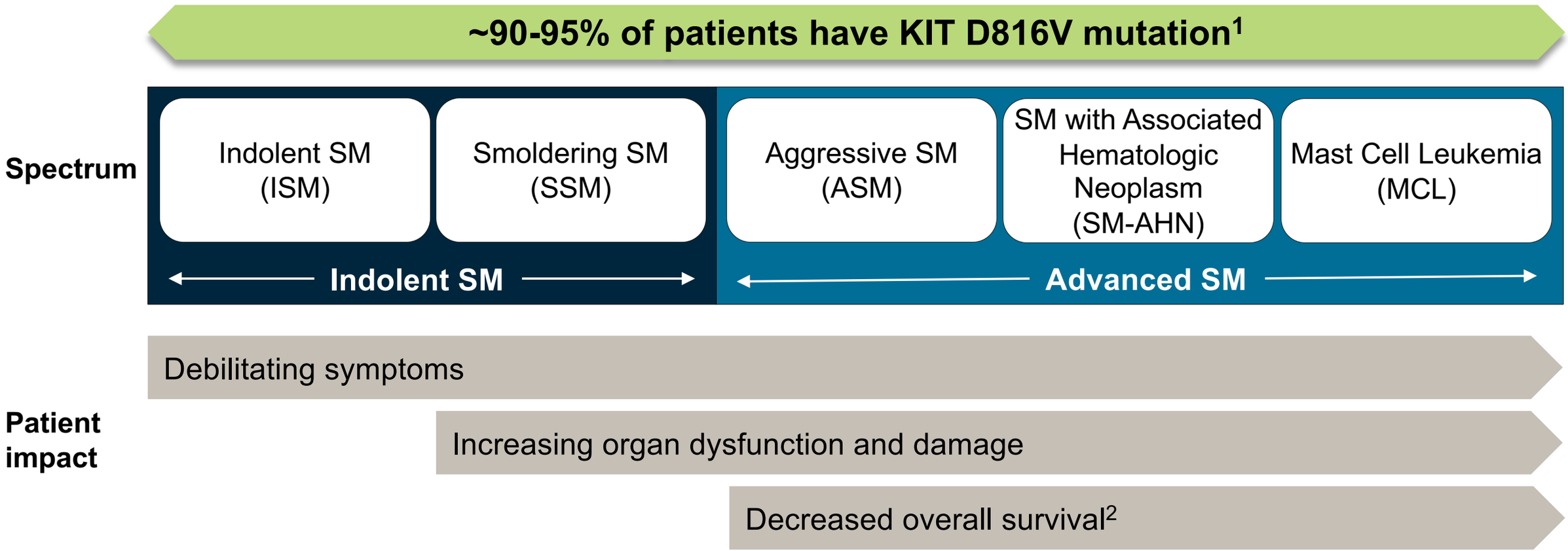
Primary endpoint: PFS

Plan to initiate COMPASS-2L trial in 2H 2019

ctDNA, circulating tumor DNA.

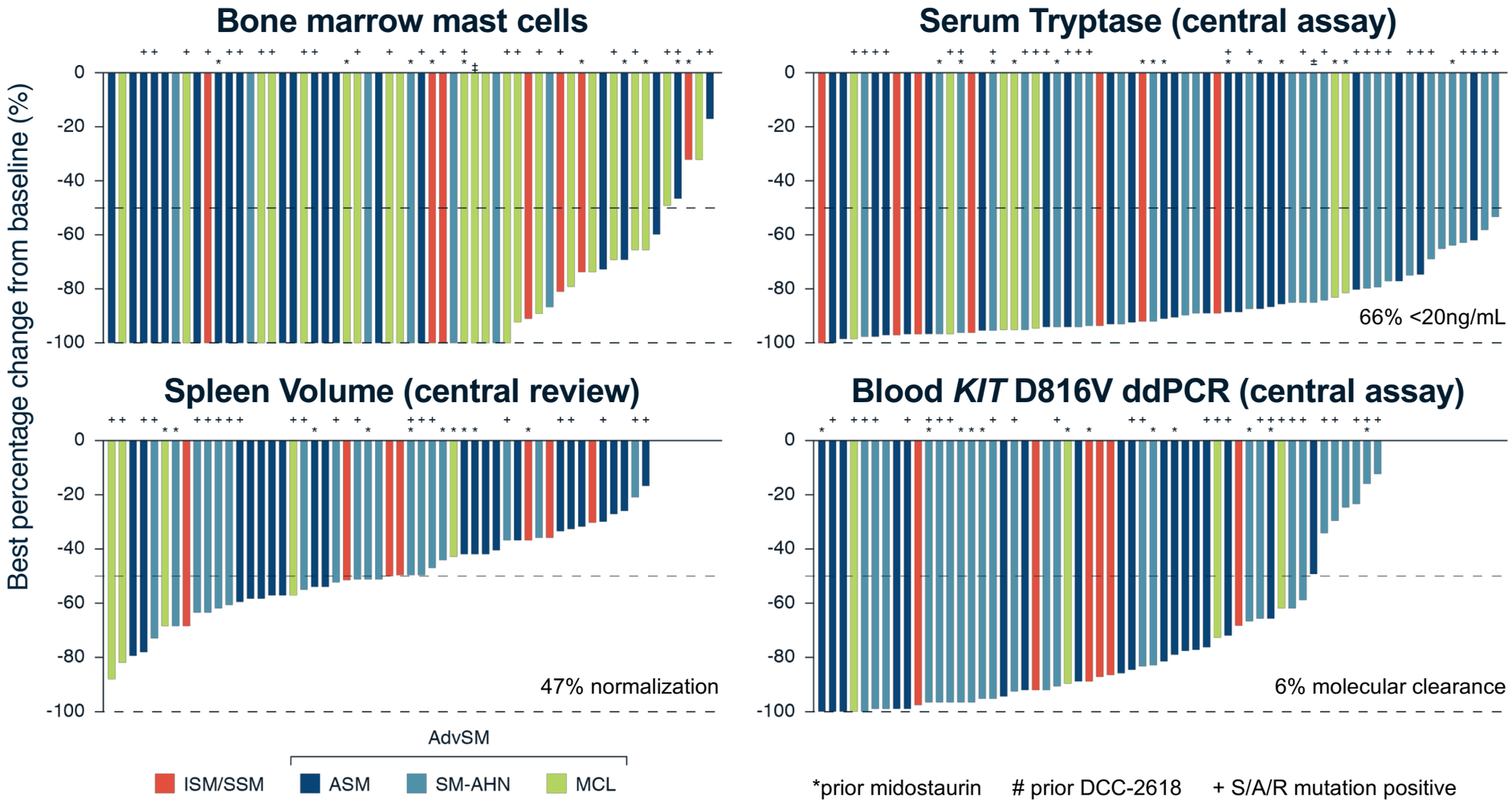
[1] Data previously presented in November 2018 at the CTOS Annual Meeting. Data cutoff: October 15, 2018. ctDNA analysis in ≥4L population.

Avapritinib is the only highly selective KIT D816V inhibitor in development for systemic mastocytosis



[1] Garcia-Montero AC et al, 2006.
[2] Based on published natural history data.

Clinical activity in all evaluable patients: decline in mast cell burden across all disease subtypes, regardless of prior therapy or co-mutation status



Data previously presented in December 2018 at the ASH Annual Meeting. Data cutoff: September 30, 2018.

Responses per IWG criteria are durable and deepen over time

Best response* n (%)	All doses (n=29)	≤200mg[1] QD (n=10)
ORR (CR + CRh + PR + CI)	**24 (83%)**	**9 (90%)**
Complete response (CR)	3 (10%)	3 (30%)
CR, partial hematologic recovery[2] (CRh)	4 (14%)	2 (20%)
Partial response (PR)	14 (48%)	3 (30%)
Clinical improvement (CI)	3 (10%)	1 (10%)
Stable disease (SD)	5 (17%)	1 (10%)
Progressive disease (PD)	0	0

- Ongoing treatment durations of up to 31 months (range 1+ to 31+ months)
- Median duration of response (DOR) not reached (median follow up 14 months)
- 76% 12-month DOR rate
- Median time to response is 2 months
- Median time to CR/CRh is 9 months

IWG criteria have regulatory precedent, with comparable 28% ORR for midostaurin

Data previously presented in December 2018 at the ASH Annual Meeting. Data cutoff: September 30, 2018.

[1] Started at ≤200mg QD. 90% have not dose escalated above 200mg as of the data cutoff date.

[2] CRh: Requires all criteria for CR be met and response duration must be ≥12 weeks (to be confirmed); however, patient may have residual cytopenias. The following are required for CRh: ANC > 0.5 × 10^9/L with normal differential (absence of neoplastic MCs and blasts < 1%) *and* Platelet count > 50 × 10^9/L *and* Hgb level > 8.0 g/dL.

*Pending confirmation: 3 transitioning from confirmed response to a deeper response, 3 transitioning from SD to first response.

Avapritinib is well-tolerated in patients with systemic mastocytosis

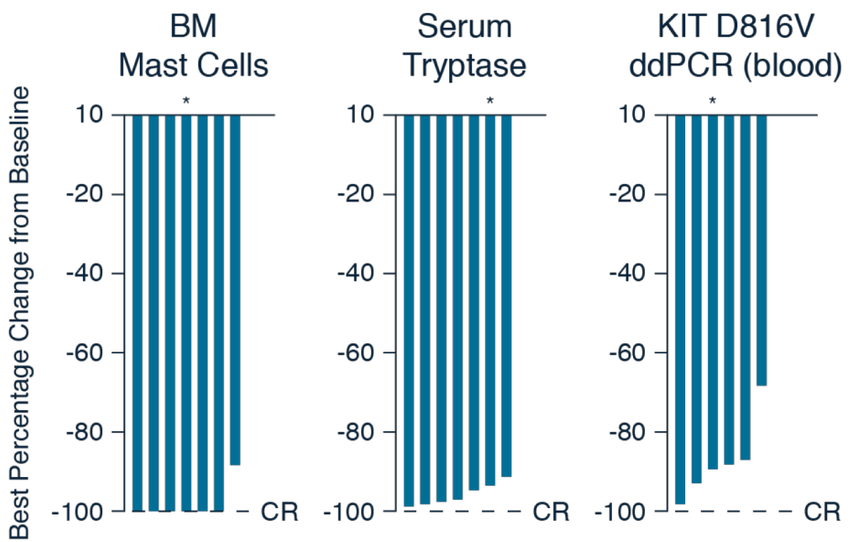
Treatment-Emergent Adverse Events (Safety Population; N = 67)		
Non-hematologic AEs >15%, % (n)	**Any Grade**	**Grade 3/4**
Periorbital edema	45 (67)	3 (4)
Fatigue	25 (37)	5 (7)
Nausea	24 (36)	3 (4)
Diarrhea	23 (34)	1 (1)
Peripheral Edema	23 (34)	0
Vomiting	19 (28)	2 (2)
Cognitive effects	19 (28)	1 (1)
Hair color changes	17 (25)	1 (1)
Arthralgia	13 (19)	1 (1)
Dizziness	13 (19)	1 (1)
Abdominal pain	12 (18)	1 (1)
Hematologic AEs >10%, % (n)	**Any Grade**	**Grade 3/4**
Anemia	35 (52)	18 (26)
Thrombocytopenia	21 (31)	12 (17)
Neutropenia	8 (12)	7 (10)

- Most AEs were grade 1 or 2
- No treatment-related grade 5 AEs
- 4% (3/67) of patients discontinued due to treatment-related AEs
  - Refractory ascites, encephalopathy and intracranial bleed
- 66% (44/67) of patients had ≥grade 3 treatment-related AEs and dose reduced
  - Most commonly hematologic AEs, typically in patients with prior cytopenias
  - Most dose reductions occurred at
  - ≥300mg QD
- 78% (52/67) remain on treatment as of data cutoff

Data previously presented in December 2018 at the ASH Annual Meeting. Data cutoff: September 30, 2018.

Preliminary Phase 1 data highlight the potential of avapritinib in ISM/SSM

Evaluable ISM/SSM patients in Phase 1 EXPLORER trial



* prior midostaurin

PIONEER

Part 1: Dose-finding

25 mg QD

50 mg QD

100 mg QD

RP2D R, 1:1

Part 2: Efficacy

avapritinib

placebo

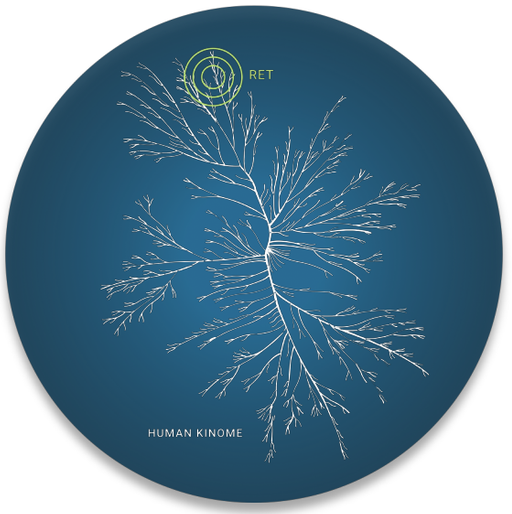
Part 3: Extension

Open-label extension

First PIONEER trial site is open, with initiation of patient screening anticipated in January 2019

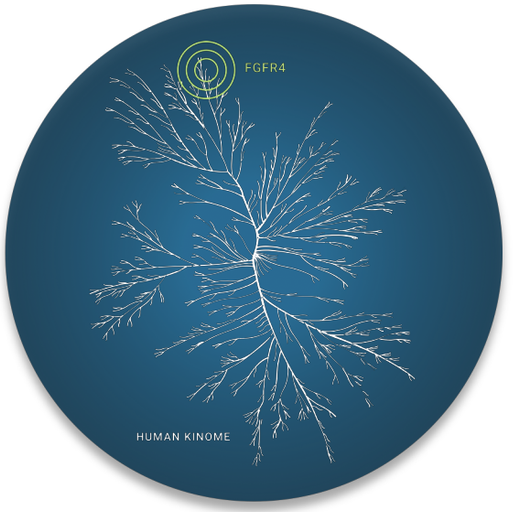
Data previously presented in December 2018 at the ASH Annual Meeting. Data cutoff: September 30, 2018.
BM, bone marrow; ISM, indolent systemic mastocytosis; RP2D, recommended Phase 2 dose;
SSM, smoldering systemic mastocytosis.

Growing portfolio of highly selective investigational kinase medicines



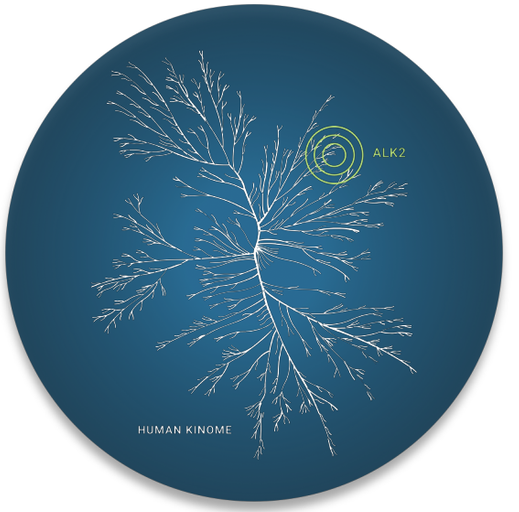
BLU-667
RET inhibitor

Non-small cell lung cancer
Medullary thyroid cancer
Other RET-altered solid tumors



BLU-554
FGFR4 inhibitor

Hepatocellular carcinoma



BLU-782
ALK2 inhibitor

Fibrodysplasia ossificans progressiva

Kinome illustration reproduced courtesy of Cell Signaling Technology, Inc. (www.cellsignal.com) (CSTI).
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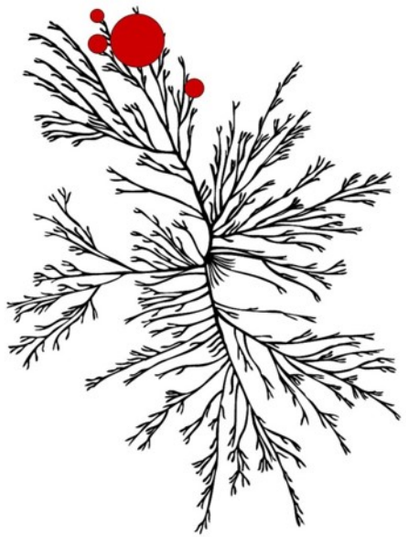
BLU-667 is designed to treat RET-altered cancers

High kinome selectivity for RET[1,2]



More potent and selective than multi-kinase inhibitors[1,2]

	Wild-type RET	RET V804L Gatekeeper resistance	RET V804M Gatekeeper resistance	RET M918T Mutation	CCDC6-RET Fusion	VEGFR2 Anti-target
BLU-667	0.4	0.3	0.4	0.4	0.4	35
Cabozantinib	11	45	162	8	34	2
Vandetinib	4	3597	726	7	20	4

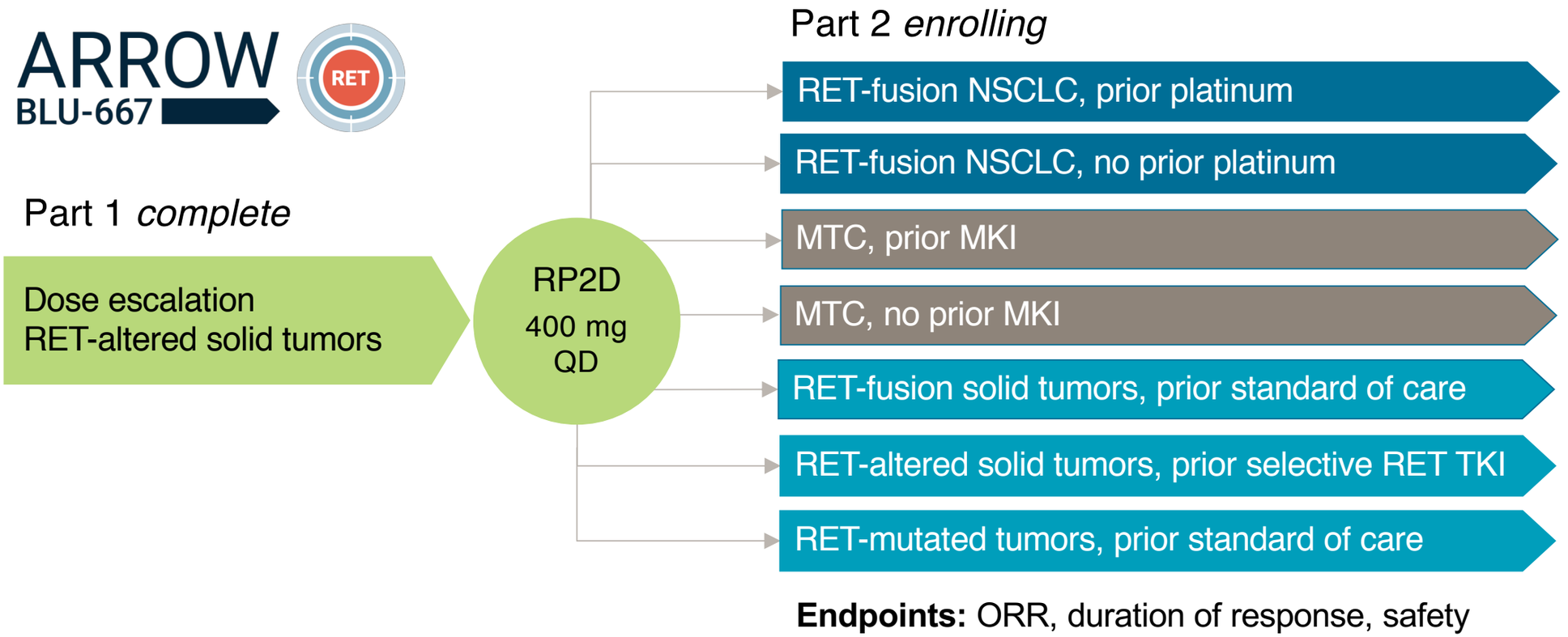
- BLU-667 is 88-fold more selective for RET than VEGFR2
- BLU-667 is 20-fold more selective for RET than JAK1

RET opportunity in major markets

~10,000 NSCLC patients[3]	~800 MTC patients[3]	Low variable frequency across multiple solid tumors

IC_{50}, half maximal inhibitory concentration.
Kinome illustration reproduced courtesy of Cell Signaling Technology, Inc. (CSTI) (www.cellsignal.com). The foregoing website is maintained by CSTI, and Blueprint Medicines is not responsible for its content.
[1] Data previously presented in April 2018 at AACR Annual Meeting. Data cutoff: April 6, 2018. [2] Subbiah V et al. *Cancer Discov*. 2018;8(7):836-849. [3] Epidemiology based on estimated incidence for NSCLC (across treatment lines) and estimated prevalence for MTC in major markets (US, France, Germany, Italy, Spain, the United Kingdom and Japan).

Plan to submit NDA for 2L RET-fusion NSCLC and 2L RET-mutant MTC in 1H 2020

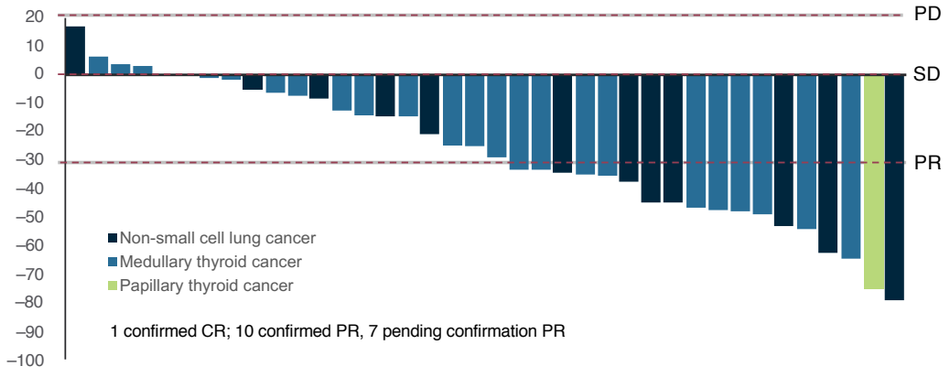


- Plan to complete enrollment of 2L RET-fusion NSCLC and 2L RET-mutant MTC patient cohorts in 1H 2019
- Plan to initiate Phase 3 trial in 1L RET-fusion NSCLC in 2H 2019

MKI, multi-kinase inhibitor; TKI, tyrosine kinase inhibitor

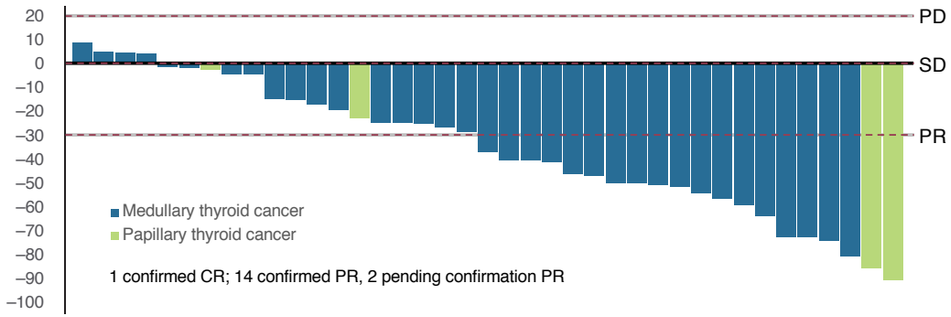
Data have strengthened as patients treated at RP2D

AACR
April 2018[1]



- 84% of patients with tumor shrinkage (NSCLC, MTC and PTC)
- 53% ORR in RET-fusion NSCLC and PTC patients
- 40% ORR in RET-mutant MTC patients

ATA
October 2018[2]



- 90% of patients with tumor shrinkage (MTC and PTC)
- 62% response rate in RET-mutant MTC patients at 300/400 mg QD for ≥24 weeks
- All responders and all patients treated at 400 mg QD remain on therapy as of data cutoff

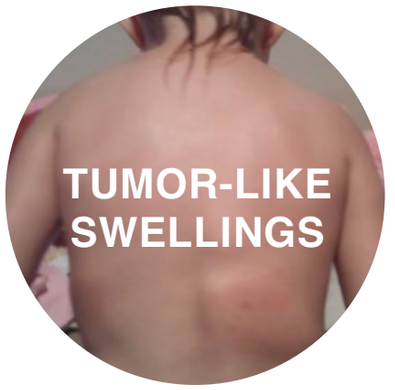
Safety population (N=69)[2]

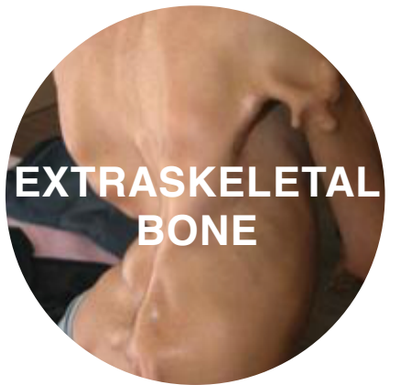
- Most AEs reported by investigators were Grade 1
- Treatment-related Grade ≥3 AEs in ≥2 patients included anemia, hypertension, decreased white blood cell count, diarrhea and neutropenia
- Only 2 discontinuations due to a treatment-related AE

AACR, American Association for Cancer Research Annual Meeting; ATA, American Thyroid Association Annual Meeting; PTC, papillary thyroid cancer.
[1] Data previously presented at AACR Annual Meeting in April 2018. Data cutoff: April 6, 2018.
[2] Data previously presented at ATA Annual Meeting in October 2018. Patients enrolled as of May 9, 2018 with follow-up as of Sep 14, 2018. Safety population includes patients with NSCLC, MTC and PTC.

BLU-782 is designed to target mutant ALK2, the underlying cause of fibrodysplasia ossificans progressiva

- Causes abnormal transformation of skeletal muscle, ligaments and tendons into bone
- Beginning in childhood, disease manifestations include painful disease flare-ups, locking of joints, progressive loss of mobility and respiratory dysfunction
- Premature death typically occurs in middle age due to cardiorespiratory complications
- There are no approved therapies

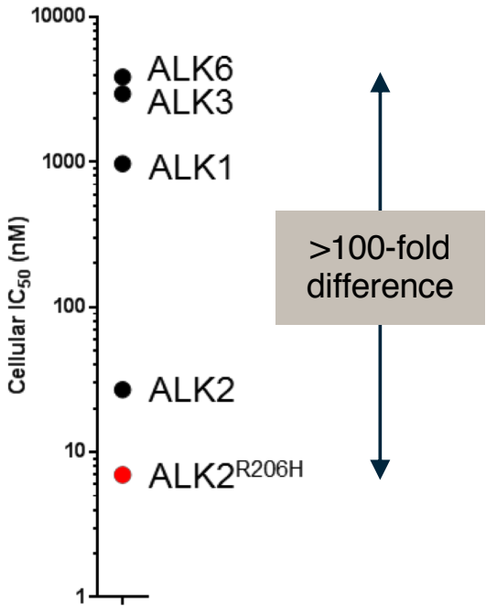




IND application cleared by FDA; plan to initiate Phase 1 healthy volunteer trial in Q1 2019

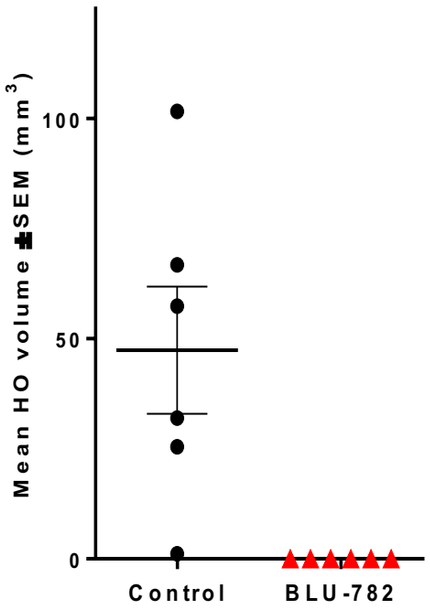
Foundational preclinical data support plans for clinical development of BLU-782 in FOP

Highly selective for mutant ALK2



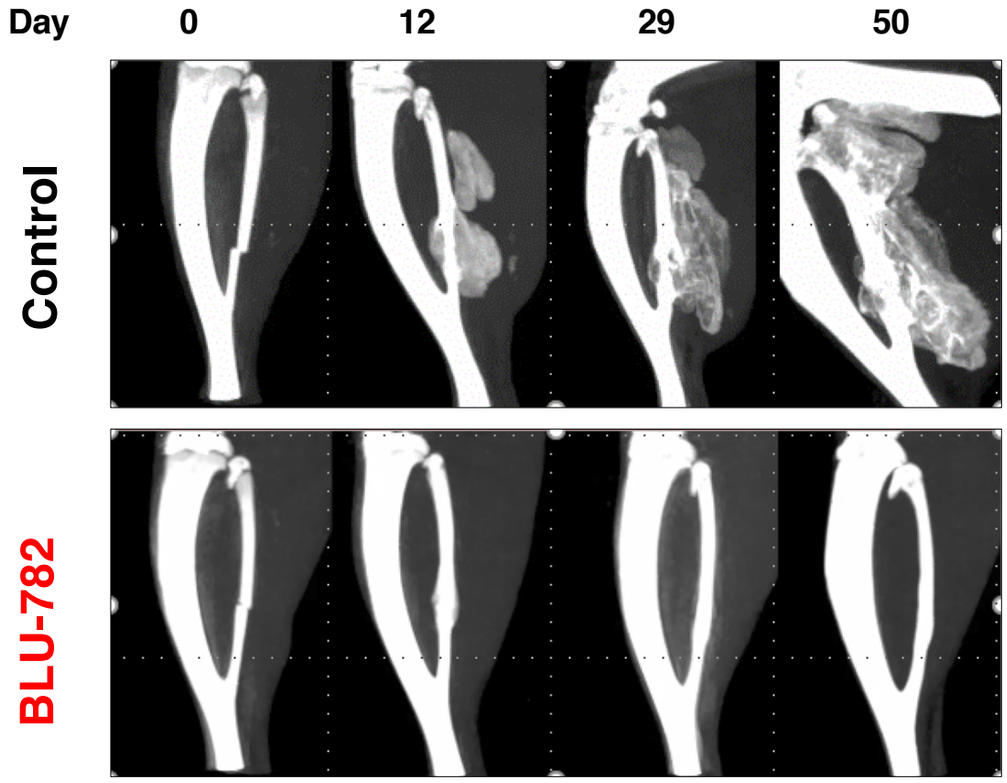
Cellular assay

Prevents injury-induced HO*



Micro CT at Day 17

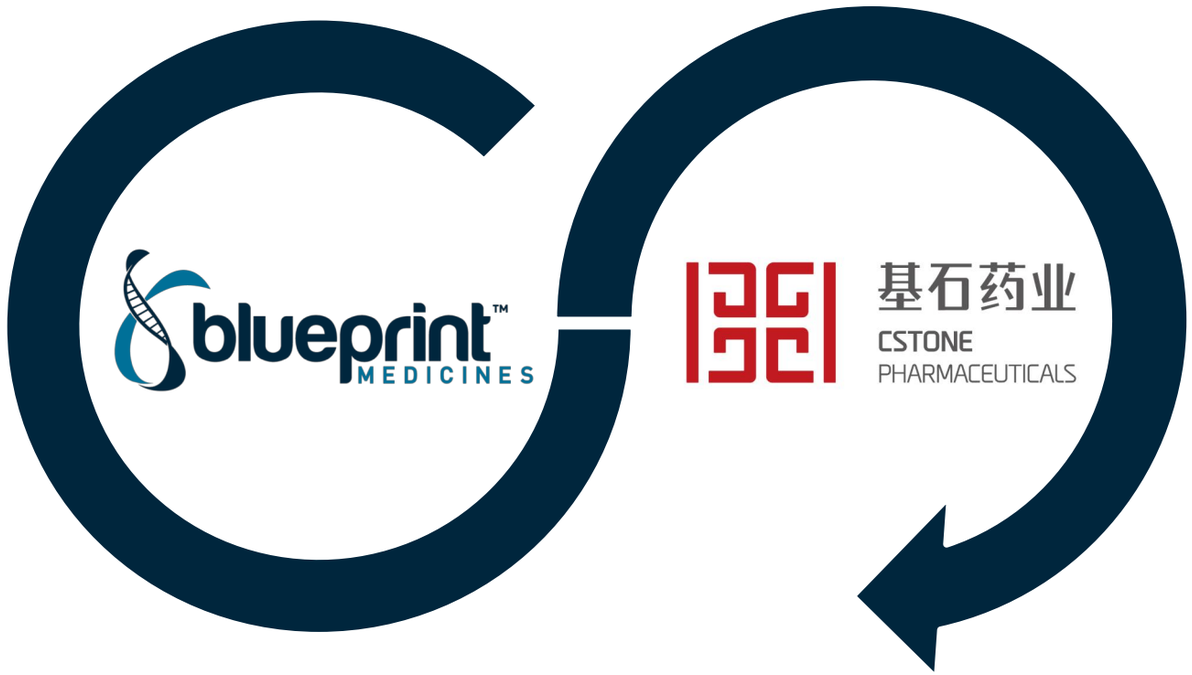
Prevents surgery-induced HO*



Data previously presented at ASBMR Annual Meeting in September 2018.
* Injury- and surgery-induced HO studies conducted in an ALK2 R2016H mouse model.
CT, computed tomography; HO, heterotopic ossification.

Strategic collaboration accelerates BLU-554 clinical development program

- Leader in targeted kinase medicines
- Three clinical programs with demonstrated
- proof-of-concept
- Retain all rights in
- the rest of the world



- Deep development experience and network in China
- Growing oncology portfolio including immunotherapies
- Exclusive rights in Greater China[1]

Plan to initiate BLU-554 monotherapy and combination trials in China by mid-2019 and in 2H 2019, respectively

[1] Greater China consists of Mainland China, Hong Kong, Macau and Taiwan.

Strong financial position entering 2019

Balance Sheet *(unaudited)*	**9/30/2018**	**12/31/2017**
Cash, Cash Equivalents and Investments	$559.6M	$673.4M

	Three Months Ended	
Statement of Operations *(unaudited)*	**9/30/2018**	**9/30/2017**
Collaboration Revenue	$1.1M	$8.1M
Research & Development Expenses	$64.6M	$39.3M
General & Administrative Expenses	$12.0M	$7.4M
Net Loss	$(72.7)M	$(37.7)M

Based on current operating plans, expect existing cash balance will fund operations into the 2H of 2020*

*Excludes any potential option fees and milestone payments under the Roche and CStone collaborations

**Shares outstanding as of 9/30/2018: 43.9 million (basic) and 48.4 million (fully diluted).

Summary of anticipated corporate milestones for 2019-2020

Program	Milestone	Anticipated Timing
Avapritinib – GIST	Submit NDA for PDGFRA Exon 18 mutant GIST and 4L GIST	1H 2019
	Present data from Phase 1 NAVIGATOR trial supporting planned NDA for PDGFRA Exon 18 mutant GIST and 4L GIST	1H 2019
	Complete enrollment of Phase 3 VOYAGER trial in 3L GIST	2H 2019
	Initiate Phase 3 COMPASS-2L precision medicine trial in 2L GIST	2H 2019
	Submit NDA for 3L GIST	2020
Avapritinib – SM	Present updated data from Phase 1 EXPLORER trial in advanced SM	1H 2019
	Present initial data from Phase 2 PIONEER trial in indolent and smoldering SM	2H 2019
	Complete enrollment of Phase 2 PATHFINDER trial in advanced SM	2H 2019
	Submit NDA for advanced SM	2020
BLU-667 – RET	Present updated data from Phase 1 ARROW trial in RET-altered NSCLC, MTC and other advanced solid tumors	1H 2019
	Complete enrollment of previously treated RET-altered NSCLC and MTC cohorts in Phase 1 ARROW trial	1H 2019
	Initiate Phase 3 trial in 1L RET-fusion NSCLC	2H 2019
	Initiate Phase 2 trial of BLU-667 and osimertinib in EGFR-mutant NSCLC harboring an acquired RET alteration	2H 2019
	Submit NDA for 2L RET-fusion NSCLC and 2L RET-mutant MTC	1H 2020
BLU-554 – HCC	Initiate enrollment in China in ongoing global Phase 1 trial of BLU-554 under collaboration with CStone Pharmaceuticals	Mid-2019
	Initiate Phase 1 combination trial of BLU-554 and CS-1001, CStone Pharmaceuticals' anti-PD-L1 inhibitor, in China	2H 2019
BLU-782 – FOP	Initiate Phase 1 trial in healthy volunteers	Q1 2019
	Initiate Phase 2 trial in patients with FOP	1H 2020
Research portfolio	Provide a research portfolio update, including disclosure of up to 2 new targets, at an R&D day	2019
	Nominate at least one new wholly-owned discovery program	2019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