

Preliminary Safety and Activity in a Phase 1 study of BLU-285, a Potent, Highly-Selective Inhibitor of KIT D816V in Advanced Systemic Mastocytosis (SM)

Mark Drummond¹, Daniel DeAngelo², Michael Deininger³, Deepti Radia⁴,
Albert Quiery⁵, Elizabeth Hexner⁶, Hongliang Shi⁷, Terri Alvarez-Diez⁷,
Erica Evans⁷, Mary Ellen Healy⁷, Beni Wolf⁷, Srdan Verstovsek⁸

¹Beatson West of Scotland Cancer Centre, NHS Greater Glasgow and Clyde, Glasgow, United Kingdom;
²Dana-Farber Cancer Institute, Boston, MA; ³Division of Hematology and Hematologic Malignancies,
Huntsman Cancer Institute, The University of Utah, Salt Lake City, UT; ⁴Guy's & St Thomas NHS Trust,
London, United Kingdom; ⁵University of Michigan, Ann Arbor, MI; ⁶Abramson Cancer Center of the
University of Pennsylvania, Philadelphia, PA; ⁷Blueprint Medicines, Cambridge, MA; ⁸Department of
Leukemia, The University of Texas MD Anderson Cancer Center, Houston, TX

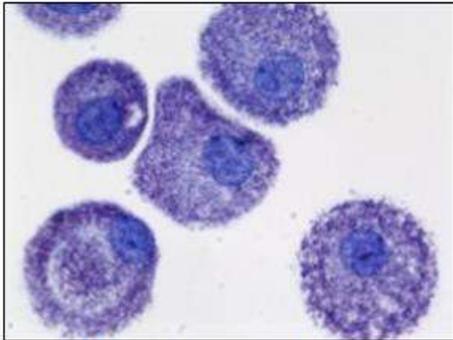
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Advanced Systemic Mastocytosis

- Mast cell neoplasm with poor prognosis and no effective treatments
 - Aggressive Systemic Mastocytosis (ASM); SM with associated hematologic neoplasm (SM-AHN); mast cell leukemia (MCL)
- KIT mutation D816V is a key driver in ~90-95% of patients¹

Mast cell accumulation and organ infiltration

Blood*



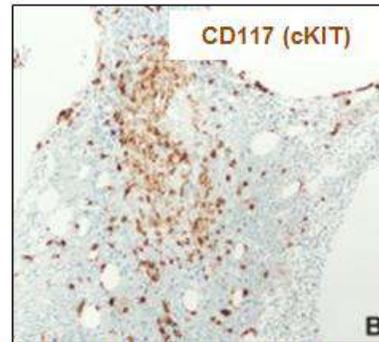
MC degranulation
MC mediator Sx
↑tryptase

Skin[§]



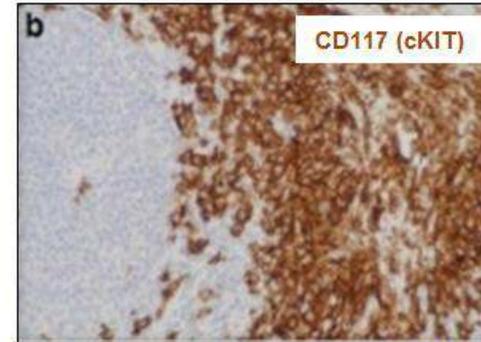
Urticaria pigmentosa

Bone and bone marrow*



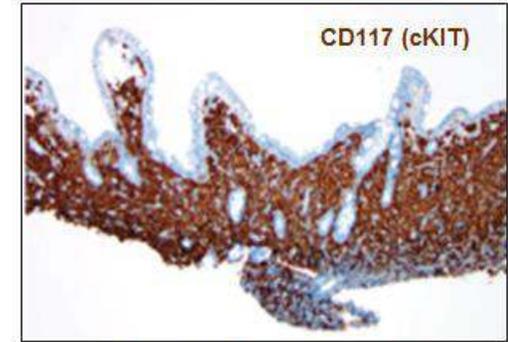
Osteolytic bone lesions
Cytopenias

Liver and spleen[†]



Liver function abnormalities,
Ascites, or Hypersplenism

GI tract[‡]



Hypoalbuminemia
Weight loss

C-findings

MC, mast cell; MCL, mast cell leukemia; SM, systemic mastocytosis; C- findings, clinical findings

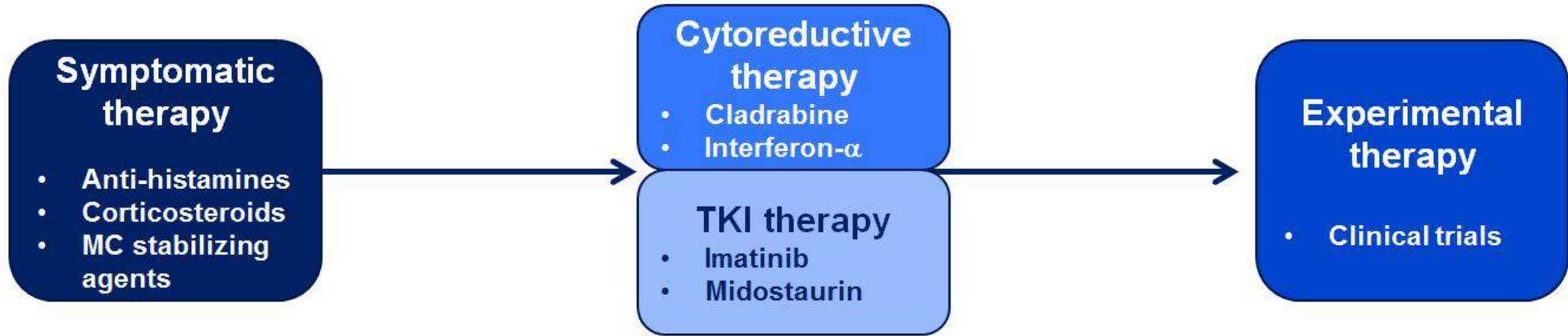
¹Garcia-Montero AC et al (2006)

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Advanced SM has High Medical Need

Current therapy does not eradicate KIT D816V



Advanced SM subtype	Life expectancy (months)
ASM	~41
SM-AHN	~24
MCL	~2

¹Lim KH et al (2009)

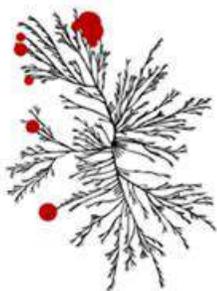
- ↓ **Life expectancy with current therapy¹**
- **Morbidity via C-findings**
 - Cytopenias
 - Osteolytic bone lesions
 - Hepatomegaly with liver dysfunction
 - Hypersplenism
 - Malabsorption with weight loss

BLU-285: Potent, Highly Selective KIT D816V Inhibition

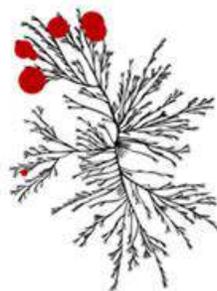
Biochemical profiles

	KIT D816V	
	IC ₅₀ (nM)	K _D (nM)
BLU-285	0.27	0.6
imatinib	8,150	> 10K
masitinib	> 10K	> 10K
midostaurin	2.8	3.4

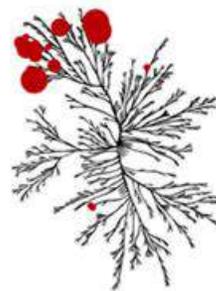
BLU-285



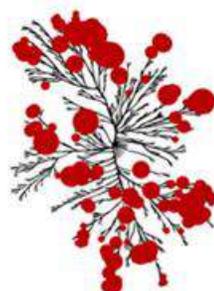
imatinib



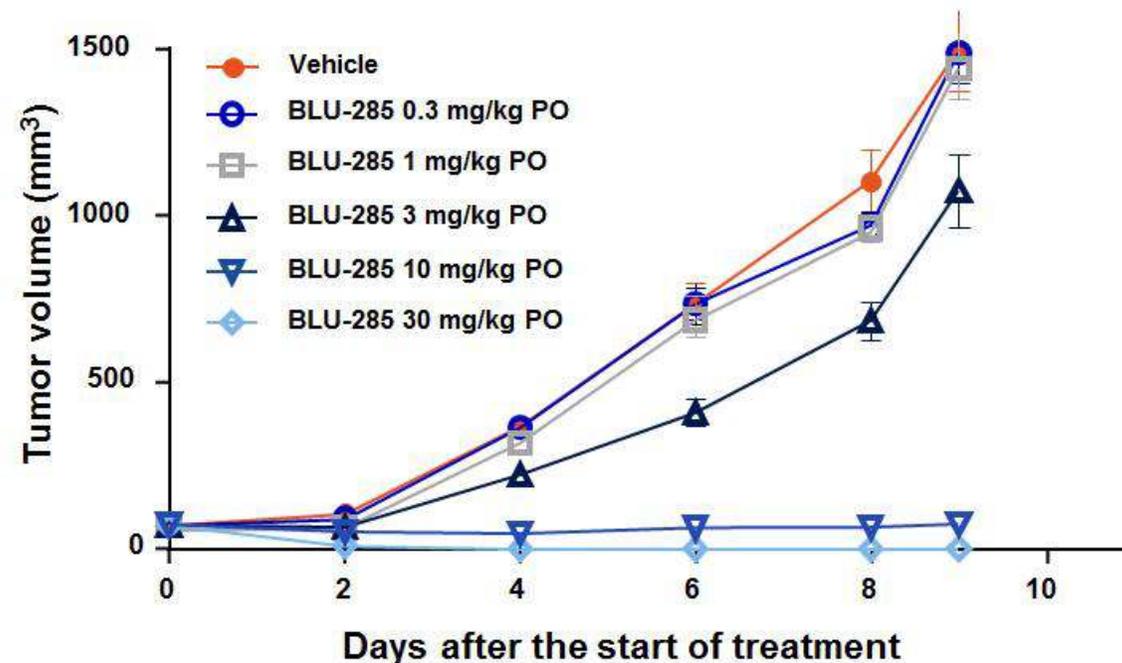
masitinib



midostaurin



Anti-tumor activity in KIT-driven mastocytoma model¹



Model driven by KIT mutation equivalent to human KIT D816 mutation

IC₅₀, half maximal inhibitory concentration; K_D, dissociation constant; PO, orally

¹Evans E et al (2014)

Kinome illustration reproduced courtesy of Cell Signaling Technology, Inc. (www.cellsignal.com)

Key Entry Criteria

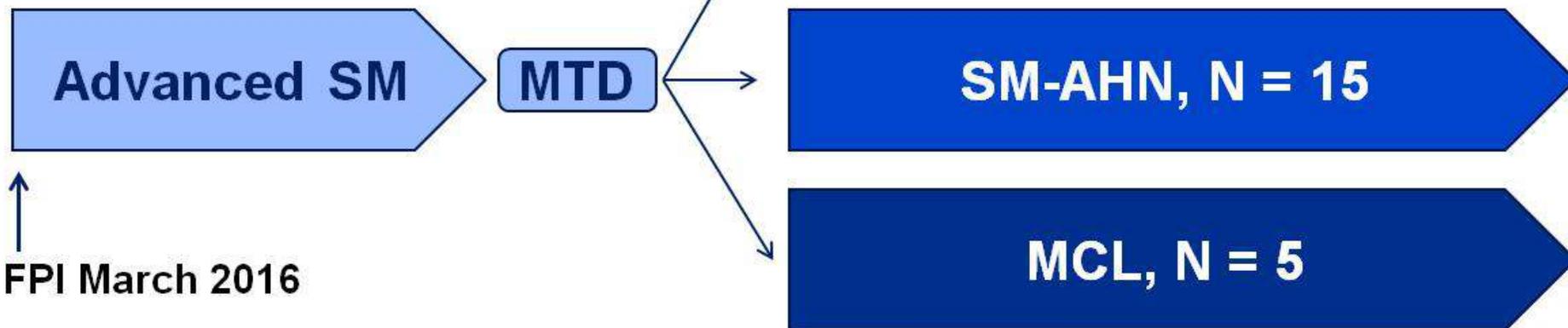
- Any of the following diagnoses:
 - Aggressive Systemic Mastocytosis (ASM)¹
 - SM with associated hematologic disorder (SM-AHN)¹ with ≥ 1 C-finding
 - Mast Cell Leukemia (MCL)¹
 - Relapsed or refractory myeloid malignancy (dose escalation only)²
- Age ≥ 18
- ECOG performance status 0–3
- Platelet count $\geq 25 \times 10^9$ /L
- ANC $\geq 0.5 \times 10^9$ /L
- Adequate hepatic and renal function

BLU-285 Phase 1 Objectives and Design

Enrolling

3 + 3 dose escalation

- MTD and safety profile
- PK, PD, anti-neoplastic activity
- D816V allele burden



Dose expansion

- Response rate per IWG-MRT-ECNM criteria¹
- D816V allele burden
- Advanced SM- PRO

BLU-285 continuous once-daily oral dosing

Demography and Baseline Patient Characteristics

Parameter (all data are preliminary as of 11 November 2016 cutoff)	All patients, N = 12
Disease subtype per local assessment, n (%)	
ASM	8 (67)
MCL	1 (8)
SM-AHN (all AHN are CMML)	3 (25)
KIT D816V mutation, n (%)	11 (92) ¹
ECOG performance status, n (%)	
0	2 (17)
1	10 (83)
Prior anti-neoplastic therapy, n (%)	6 (50) ²
Number of C-findings median (range)	1 (1–3)
Cytopenias, n (%)	6 (50)
Osteolytic bone lesions	2 (17)
Hepatomegaly with liver dysfunction	2 (17)
Hypersplenism	5 (42)
Malabsorption with weight loss	4 (33)
Urticaria Pigmentosa / Other SM-related skin rash, n (%)	8 (67)

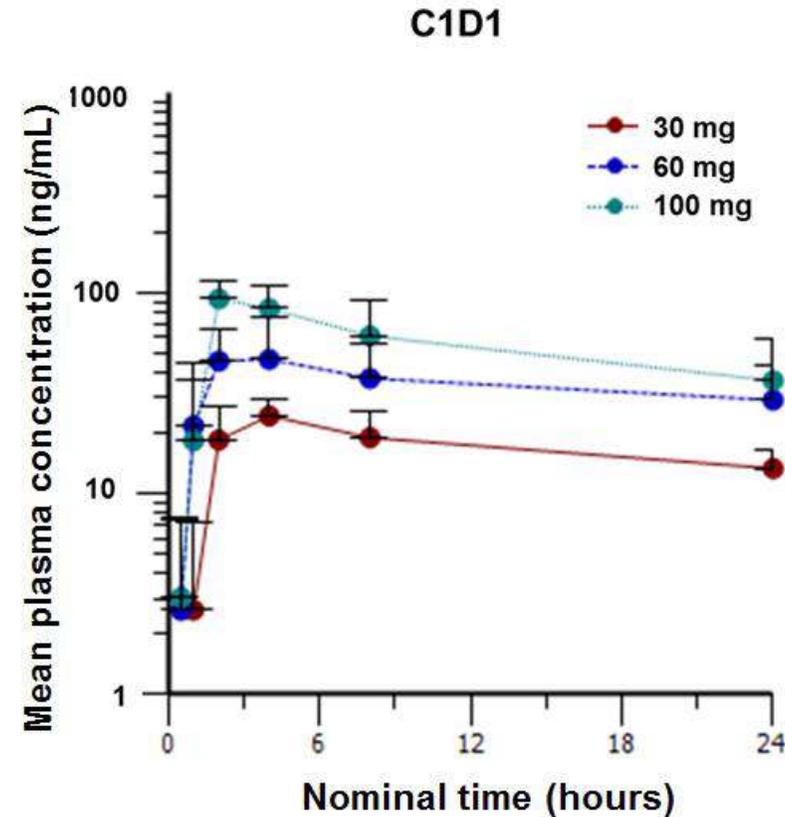
SM-CMML, systemic mastocytosis with chronic myelomonocytic leukemia; pt, patient

¹One pt had no detectable KIT D816V mutation in blood or bone marrow; ²2 pts had midostaurin; 1pt had cladribine; 1 pt had Pegasys;

1 pt had interferon alpha-2; 1 pt had hydroxyurea and 5-azacitidine

Initial Dose Escalation and PK Results

BLU-285 mg/day	Patients treated N = 12	DLT
30	3	0
60	6	1
100	3	0
130	Enrolling	



- Dose-dependent increase in exposure
- Rapid absorption: t_{max} 2–4 hours
- Half-life > 19 hours supports QD dosing

Adverse Events

Non-hematological adverse events ≥ 2 patients (safety population, N = 12)

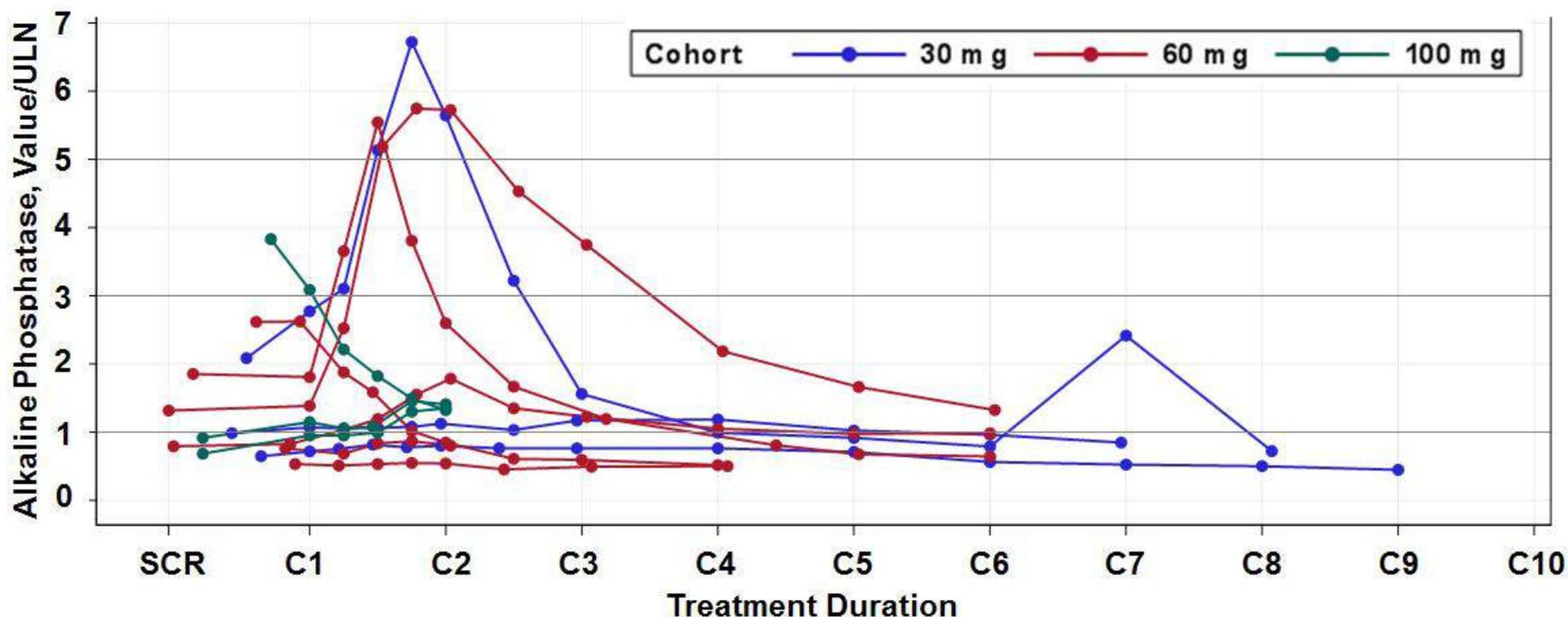
Adverse event	Any grade n (%)	Grade 3 n (%)
Fatigue	4 (33)	0
↑ Alkaline Phosphatase	3 (25)	3 (25)
Diarrhea	2 (17)	0
Dizziness	2 (17)	0
Headache	2 (17)	0
Nausea	2 (17)	0
Pruritus	2 (17)	0

Hematological adverse events (safety population, N = 12)

Adverse event	Any grade n (%)	Grade 3 n (%)
Anemia	3 (25)	0
Thrombocytopenia	2 (17)	1 (8)
Neutropenia	0	0

- Most AEs were CTCAE Grade 1 or 2
- No Grade 4 or 5 treatment-related events and no dose reductions required for toxicity
- 1 DLT : Grade 3 alkaline phosphatase elevation
- MTD has not been reached

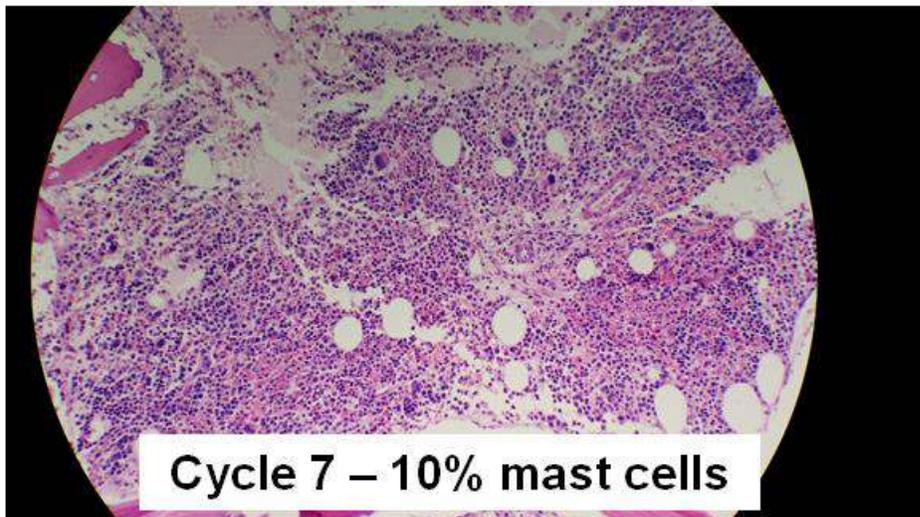
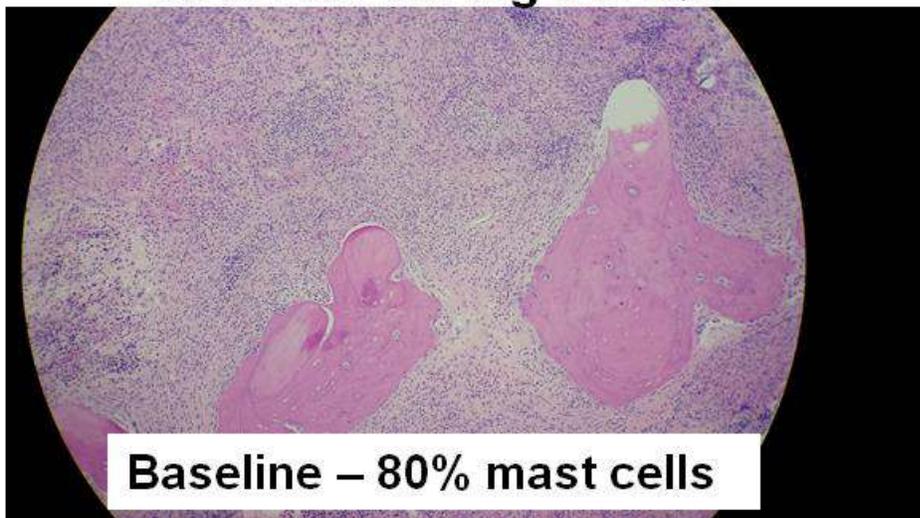
Alkaline Phosphatase Elevation is Likely a PD Effect on Bone Marrow Mast Cells



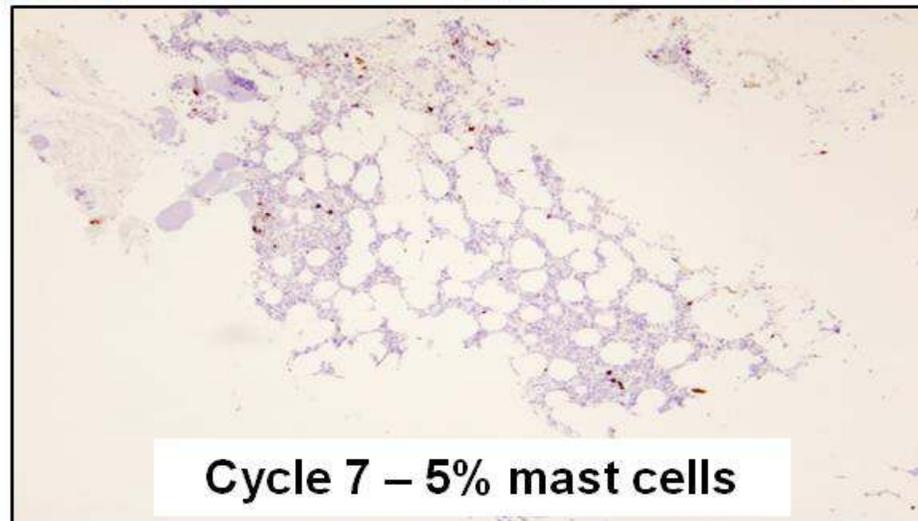
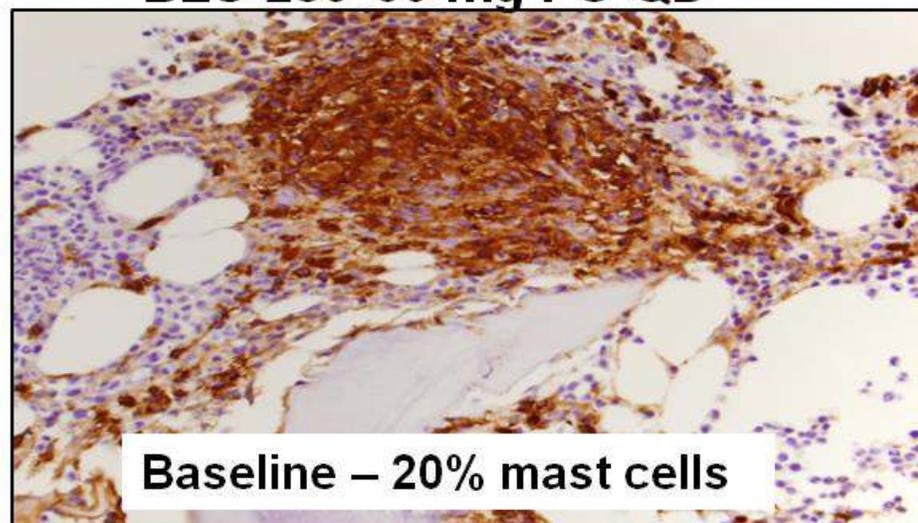
- Asymptomatic, transient Grade 3 alkaline phosphatase elevation occurred in the 3 patients with highest baseline bone marrow (BM) MC burden
- No associated transaminase or bilirubin elevation
- Confirmed bone origin in 1 patient (2 others not assessed)
- May represent a PD effect on BM MCs
- Protocol amended to consider only Grade 4 alkaline phosphatase elevation a DLT

BLU-285 Markedly Reduces Bone Marrow Mast Cells

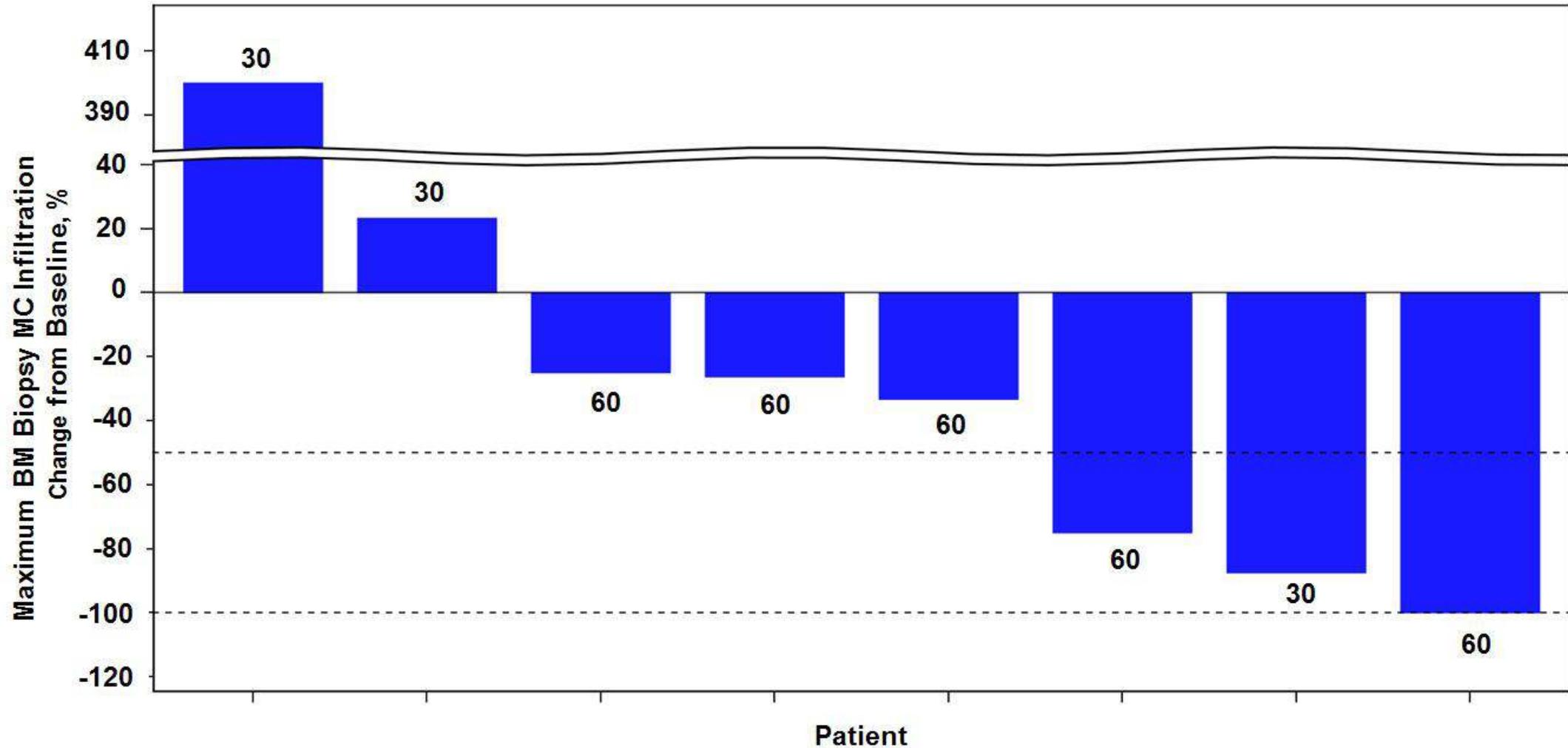
Aggressive Systemic Mastocytosis
BLU-285 30 mg PO QD



Aggressive Systemic Mastocytosis
BLU-285 60 mg PO QD*



Decreased BM Mast Cells in 6 of 8 Patients

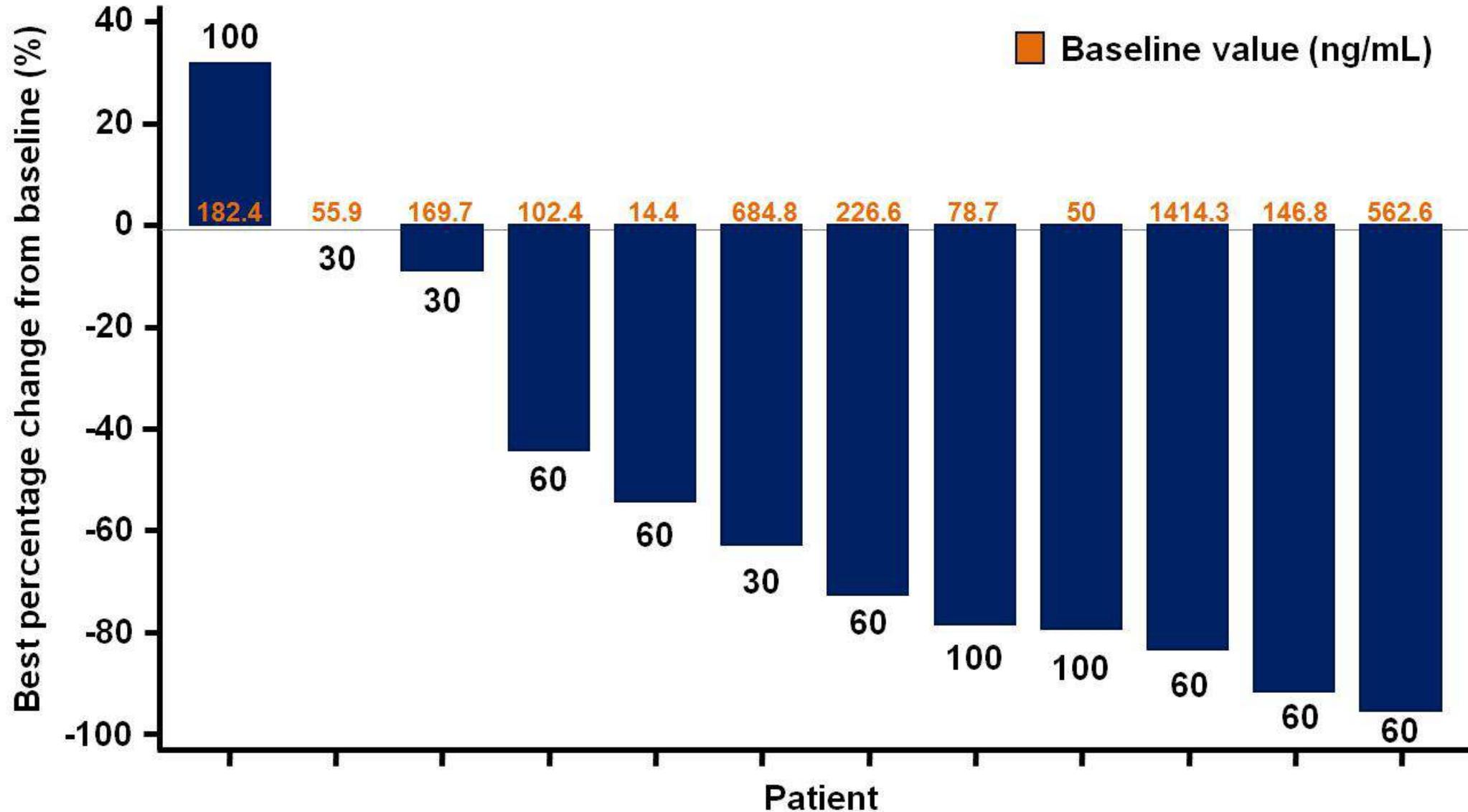


BM, bone marrow

NB: The values above/below the bars denote the dose level (mg) QD received by each patient

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Decreased Tryptase in 10 of 12 Patients

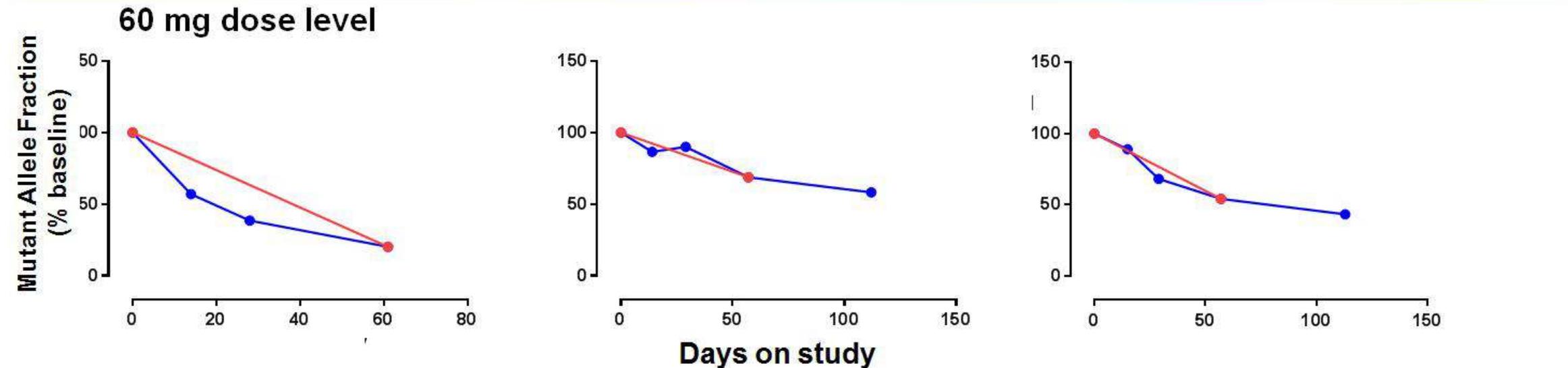
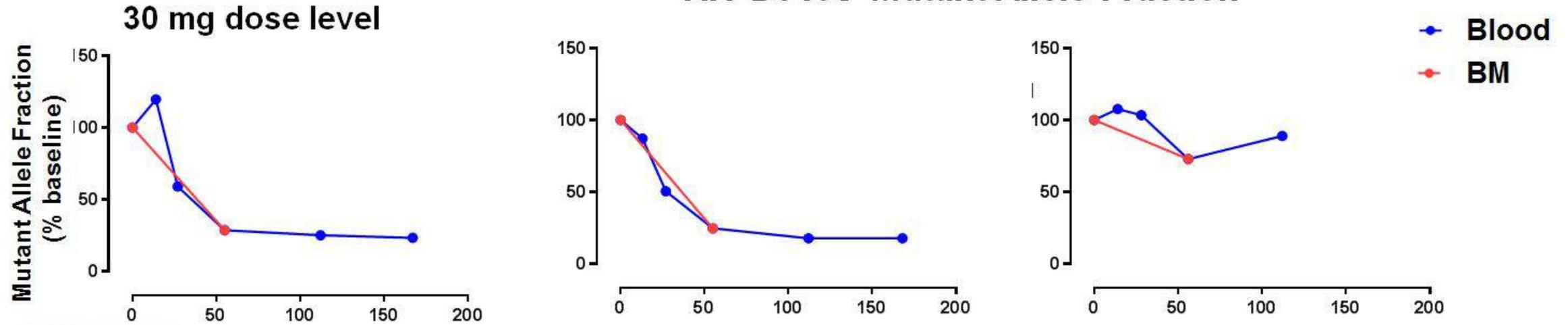


NB: The values above/below the bars denote the dose level (mg) QD received by each patient

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Molecular Response in Blood and BM

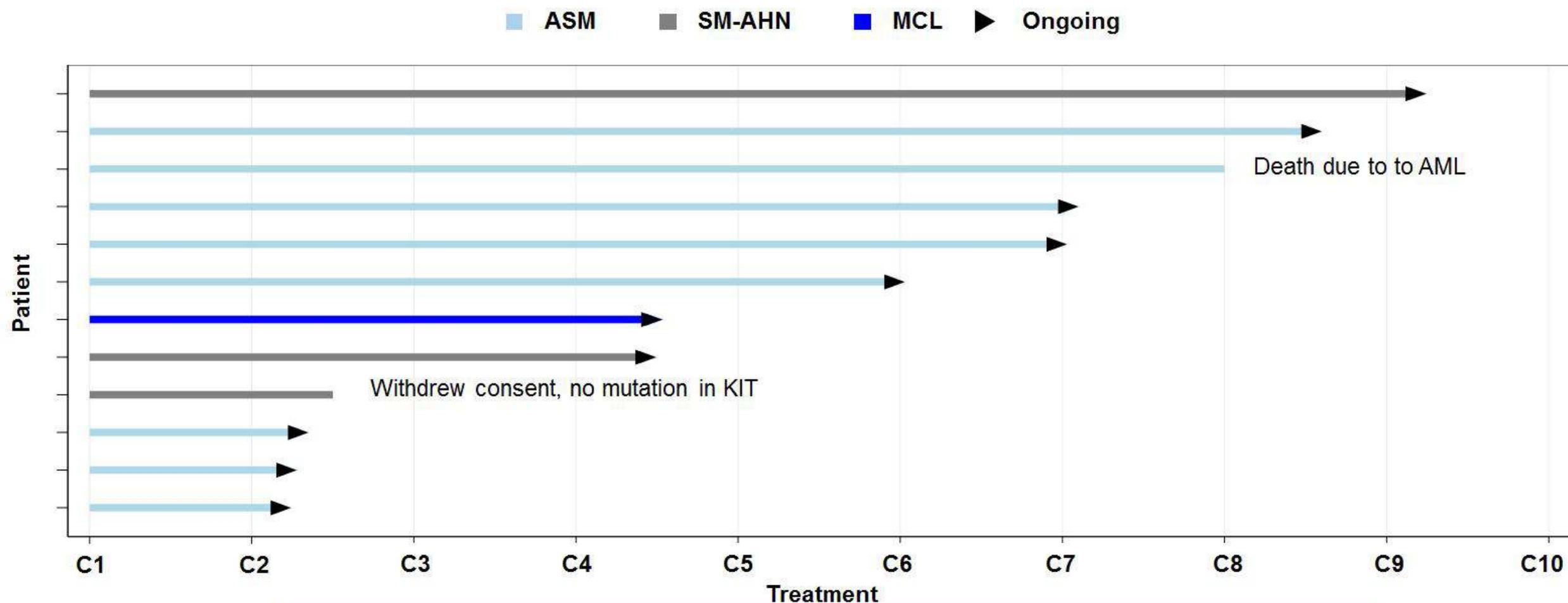
KIT D816V Mutant Allele Fraction



Decreased Malabsorption and Rash

- Maximum weight gain from baseline (n =12):
 - Increase median 4.3 kg, range -0.5 – 12.9 kg
 - % increase median 4.7%, range -0.5 – 19.2%
- Maximum albumin gain from baseline (n = 12):
 - Increase median 0.45 g/dL, range 0 – 1.4 g/dL
 - % increase median 10.7%, range 0 – 40.0%
- Rash improved per investigator assessment in all 5 patients with Urticaria Pigmentosa for whom data are available

BLU-285 Duration on Study



10 (83%) patients remain on study, range 1 – 8.1 months

Summary

- BLU-285 has demonstrated encouraging clinical activity in advanced SM with marked decreases in mast cell burden and improved patient symptoms
- Data support the hypothesis that KIT D816V is a key disease driver in SM
- Half-life > 19 hours supports QD dosing
- BLU-285 has been well tolerated over a dose range of 30 to 100 mg - dose escalation (currently at 130 mg QD)
- BLU-285 deserves continued investigation in advanced SM, and further investigation in other KIT-driven diseases; Phase 1 study of BLU-285 in GIST is ongoing

Acknowledgments

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 - Gartnavel General Hospital, Beatson West of Scotland Cancer Center
 - Abramson Cancer Center at the University of Pennsylvania
 - University of Michigan Comprehensive Cancer Center
 - Dana-Farber Cancer Institute
 - University of Utah, Huntsman Cancer Institute
 - MD Anderson Cancer Center
 - University of Colorado
 - Stanford University

Permissions

- **Slide 3 images:**

- **Blood, Bone and Bone Marrow**

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- **Skin**

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- **Liver and spleen**

Annals of Hematology, Isolated splenomegaly as the only presentation of systemic mastocytosis, 92, 2013, pg. 1574 Figure 1, Nischala Ammannagari, Sara Grethlein, James J. Longhi, and John M. Fisk, Copyright Springer-Verlag Berlin Heidelberg 2013, With permission from Springer

- **GI tract**

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