May 20, 2024

Jasper Therapeutics: Briquilimab in Asthma

NASDAQ: JSPR

JASPER THERAPEUTICS

Safe Harbor Statements

Forward-Looking Statements

This investor presentation and any accompanying oral presentation (together, this “Presentation”) contain forward-looking statements. All statements other than statements of historical fact contained in this Presentation, including statements regarding the future opportunities and prospects of Jasper Therapeutics, Inc. (together with its subsidiary, "Jasper" or the "Company"), including milestones, potential regulatory filings and the anticipated timing thereof, patient enrollment, future timelines, business strategy, and plans and objectives for future operations, are forward-looking statements. Jasper has based these forward-looking statements on its estimates and assumptions and its current expectations and projections about future events. These forward-looking statements are subject to a number of risks, uncertainties and assumptions, including those contained in the "Risk Factors" section of the Company's Annual Report on Form 10-K for the year ended December 31, 2023, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K that the Company has subsequently filed or may subsequently file with the SEC. In light of these risks, uncertainties and assumptions, the forward-looking events and circumstances discussed in this Presentation are inherently uncertain and may not occur, and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements. Accordingly, you should not rely upon forward-looking statements as predictions of future events. Jasper undertakes no obligation to update publicly or revise any forward-looking statements for any reason after the date of this Presentation or to conform these statements to actual results or to changes in Jasper's expectations.

Industry and Market Data

Certain data in this Presentation was obtained from various external sources, and neither the Company nor its affiliates, advisers or representatives has verified such data with independent sources. Accordingly, neither the Company nor any of its affiliates, advisers or representatives makes any representations as to the accuracy or completeness of that data or undertakes any obligation to update such data after the date of this Presentation. Such data involves risks and uncertainties and is subject to change based on various factors.

Trademarks

The trademarks included herein are the property of the owners thereof and are used for reference purposes only. Such use should not be construed as an endorsement of the products or services of the Company.

Briquilimab is an investigative drug and is not approved for any indication

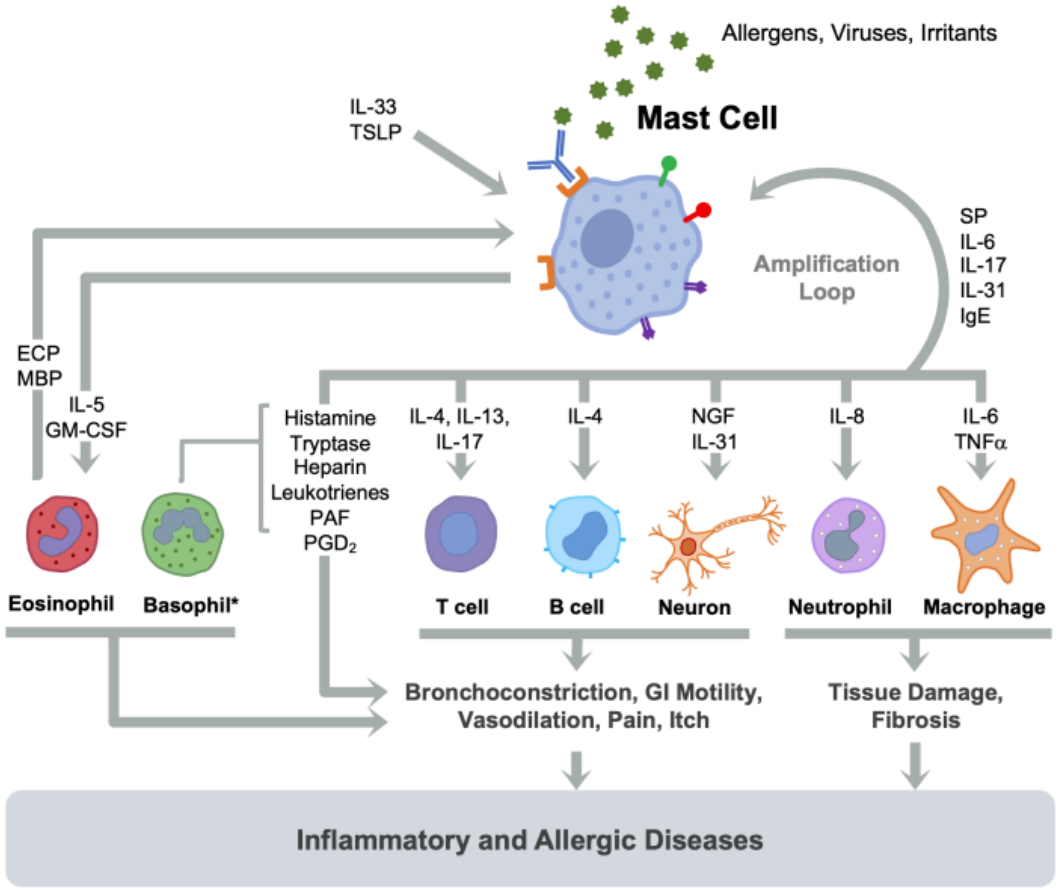
Today's agenda and presenters

Topic	Presenter	Title (Affiliation)
Jasper Introduction	Ronald Martell	Chief Executive Officer (Jasper)
The Biology of Mast Cells in Asthma & Briquilimab Preclinical Data	Wendy Pang, MD, PhD	Senior Vice President, Research & Translational Medicine (Jasper)
Current Treatments & Unmet Need in Asthma	Joshua Boyce, MD	Professor (Harvard Medical School); Chief, Division of Allergy & Clinical Immunology (Brigham and Women's)
Briquilimab Clinical Development	Edwin Tucker, MD, MRCP	Chief Medical Officer (Jasper)
Closing Remarks	Ronald Martell	Chief Executive Officer (Jasper)

JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

Mast cells are potent drivers of inflammatory response in the skin, lungs and gut



Metz et al. Allergy (2023)

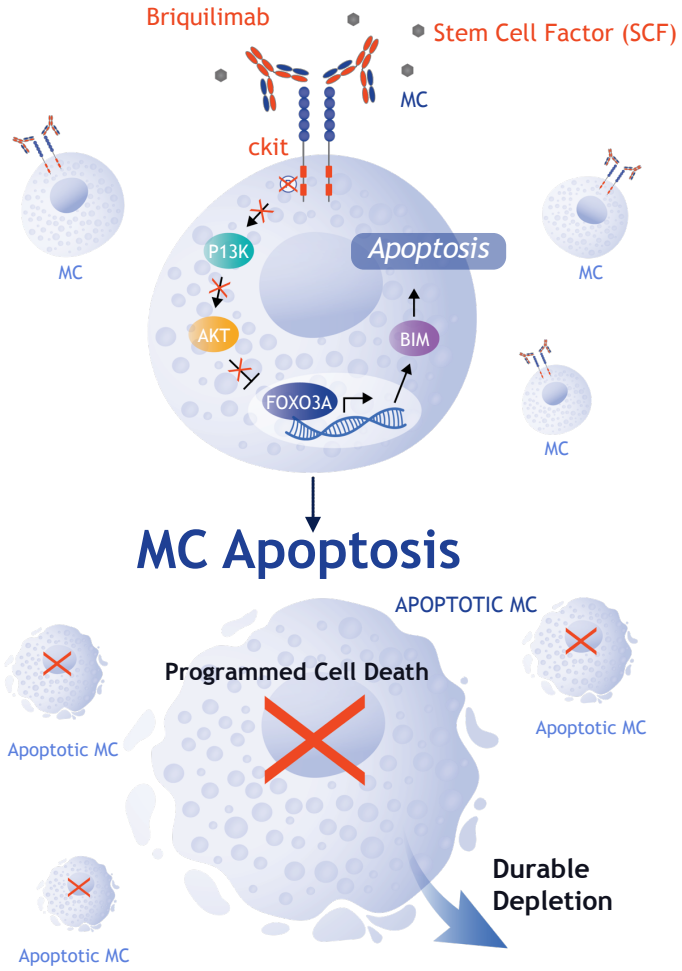
- Mast cells are primitive immune cells involved in protection against venom and parasitic infection
- Mast cells are triggered by allergens, viruses and other irritants that degranulate and release pro-inflammatory compounds implicated in large number of immunologic diseases
- Limited function or need for mast cells in modern settings

JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

Depletion of mast cells with briquilimab, an anti c-Kit monoclonal antibody, is a novel approach with potential to deliver safe and durable disease control

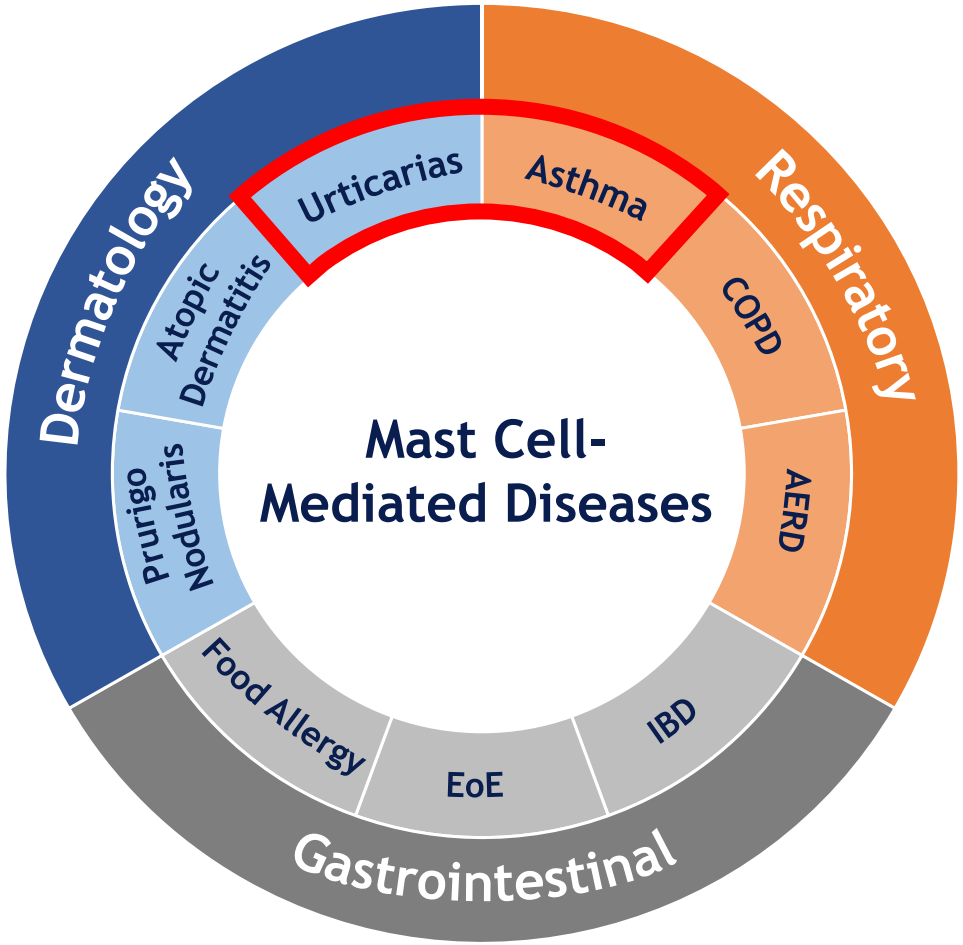
- Briquilimab is an aglycosylated IgG1 anti c-Kit antibody with high affinity to c-Kit
- Briquilimab blocks c-Kit signaling at the SCF ligand binding site on the receptor and triggers apoptosis
- Mast cell recovery in the skin takes 3 months or longer[1], potentially leading to durable disease control



1 Maurer et al, GA2LEN Global Urticaria Forum - Berlin, December 6, 2022

Briquilimab is an investigative drug and is not approved for any indication

Mast cells play a central role in many diseases, presenting numerous potential opportunities for briquilimab in immunology and inflammation



Currently targeted indications

Dermatology	Other
Chronic Spontaneous Urticaria	Allergic Conjunctivitis
Chronic Inducible Urticaria	Age-Related Macular Degeneration (AMD)
Allergic Contact Dermatitis	Alpha-1 Antitrypsin Deficiency
Alopecia Areata	Alzheimer's Disease
Atopic Dermatitis	Angioedema
Bullous Pemphigoid	Celiac Disease, Dermatitis Herpetiformis
Prurigo Nodularis	Chronic GvHD
Psoriasis	Cystitis
Rosacea	Endometriosis
Respiratory	Fibromyalgia
Asthma	Hereditary Alpha Tryptasemia (HaT)
Allergic Rhinitis	Idiopathic Anaphylaxis
Aspirin Exacerbated Respiratory Disease (AERD)	Insulin-Dependent Diabetes Mellitus
Chronic Obstructive Pulmonary Disease (COPD)	Mast Cell Activation Syndrome (MCAS)
Chronic Rhinosinusitis with Nasal Polyps (CRSwNP)	Mast Cell Leukemia
Idiopathic Pulmonary Fibrosis	Mastocytosis (KIT negative)
Gastrointestinal	Migraine
Eosinophilic Esophagitis (EoE)	Multiple Sclerosis
Food Allergy & Oral Immunotherapy	Pancreatitis (acute/chronic)
IBD (Crohn's, Ulcerative Colitis)	Rheumatoid Arthritis
Irritable Bowel Syndrome (IBS)	Sickle Cell Disease (Sickle Crisis)

JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

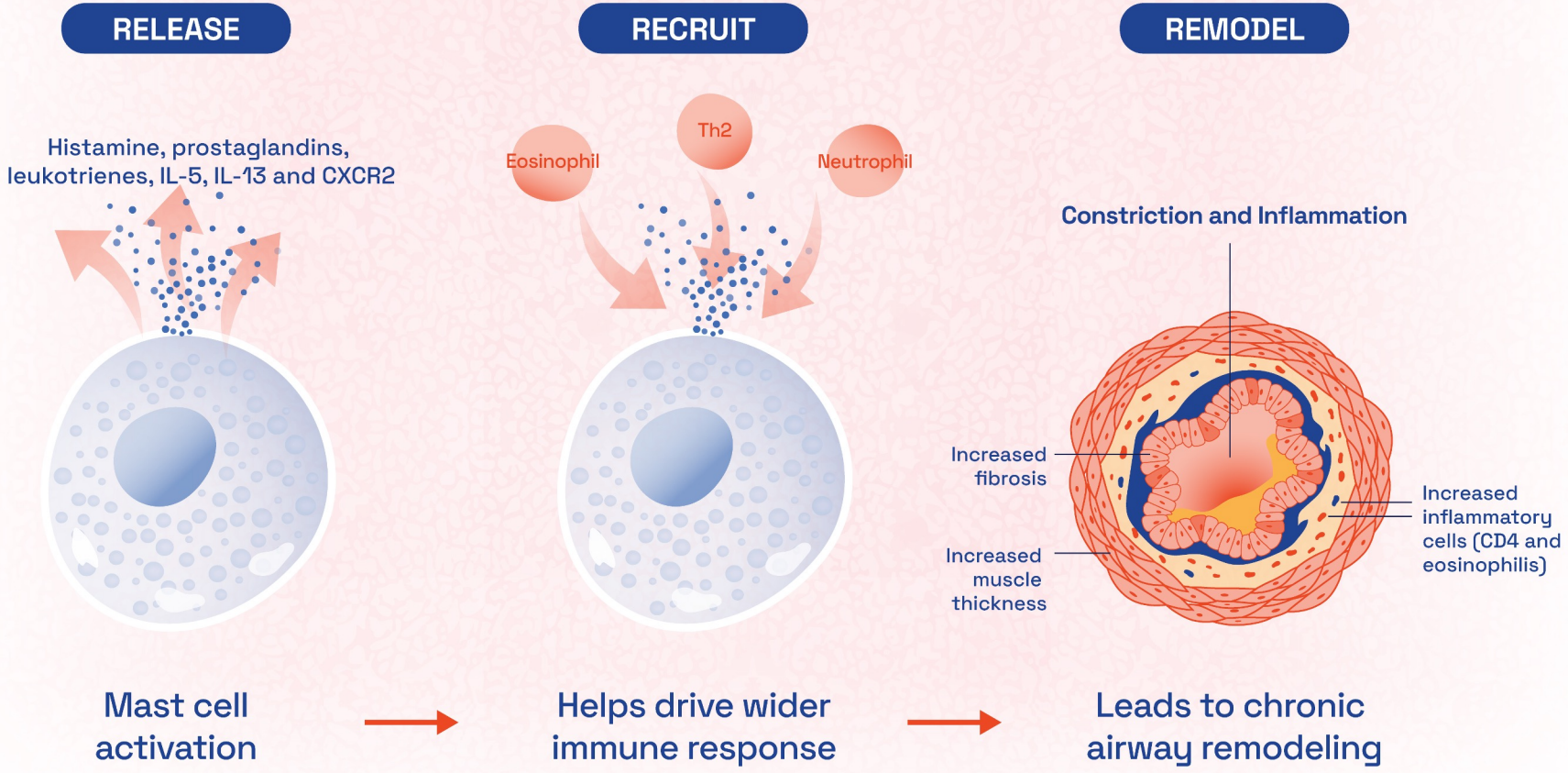
Wendy Pang, MD, PhD

The Biology of Mast Cells in Asthma & Briquilimab Preclinical Data

JASPER THERAPEUTICS

Mast cells play a critical role in allergic inflammation and tissue remodeling in asthma

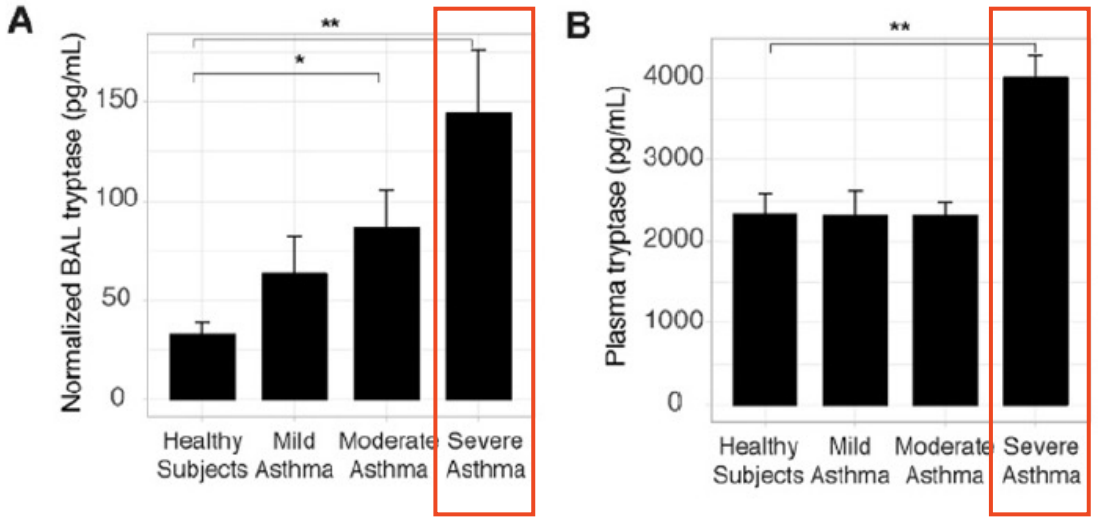
- Mast cells are distributed throughout multiple compartments in the lung[1]
- Mast cells release mediators and recruit other cell types into the airway that drive inflammation throughout all phases of the asthmatic response[2]



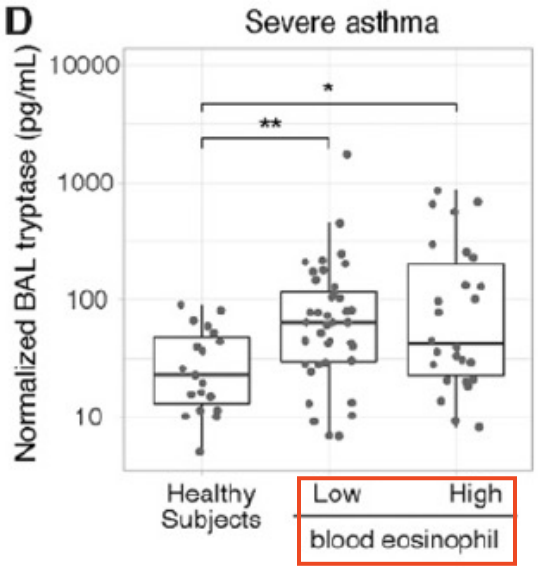
1 Méndez-Enríquez E, Hallgren J. Mast cells and their progenitors in allergic asthma. Front Immunol. 2019;10:442022.
2 Galli SJ, Tsai M, Piliponsky AM. The development of allergic inflammation. Nature. 2008;454(7203):445-454.

Tryptase is elevated in the lungs of severe asthma patients independent of type 2 inflammation

Tryptase in bronchoalveolar lavage (BAL) and plasma are significantly elevated in severe asthma[1]



Elevated tryptase in severe asthma is independent of type 2 inflammation[1]



*p < 0.05, **p < 0.01, ***p < 0.001

Note: BAL was performed in human asthma patients and tryptase levels were measured (anti-tryptase antibody developed by Genentech).

1 Maun HR, Jackman JK, Choy DF, et al. An allosteric anti-tryptase antibody for the treatment of mast cell-mediated severe asthma. Cell. 2019;179(2):417-431.e19.

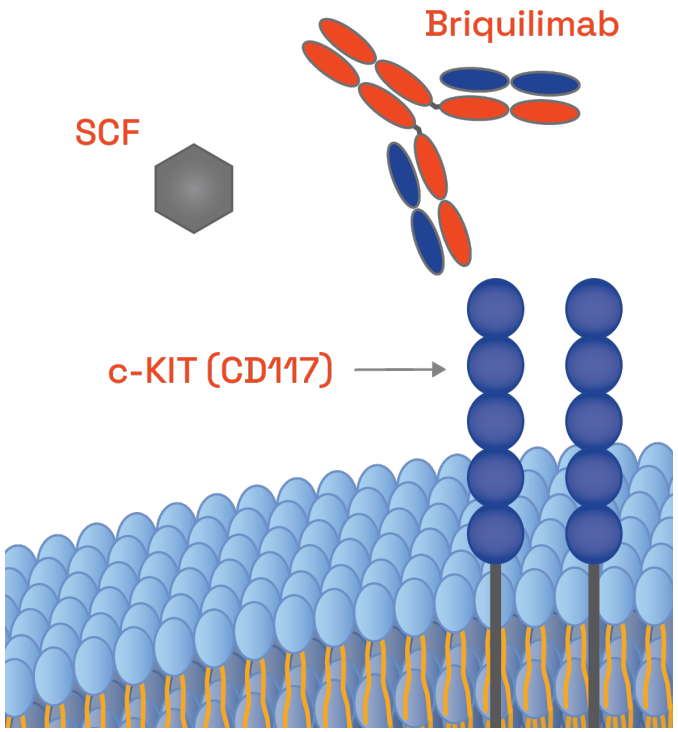
JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

Briquilimab is a monoclonal antibody optimally designed to directly block c-Kit signaling and trigger mast cell apoptosis

Briquilimab

Blocks SCF binding to c-KIT (CD117) to potently inhibit receptor signaling



Design

- Full length, humanized IgG1
- Targets receptor binding pocket
- Aglycosylated via N297Q mutation
- No FcRn engineering

Key In-Vitro Data

- Kd < 5pM affinity to human c-Kit
- Briquilimab completely blocks SCF binding (Biacore Ki ~70pM)
- Human mast cell survival bioassay IC50 ~12.5nM
- No c-Kit agonist activity
- Does not bind to Fc gamma I, II or III receptors (no ADCC)

Human Data

- PK clearance allows for restoration of c-Kit signaling on other c-Kit expressing cells after mast cells are depleted
- Well tolerated as demonstrated across 10 ongoing and completed trials

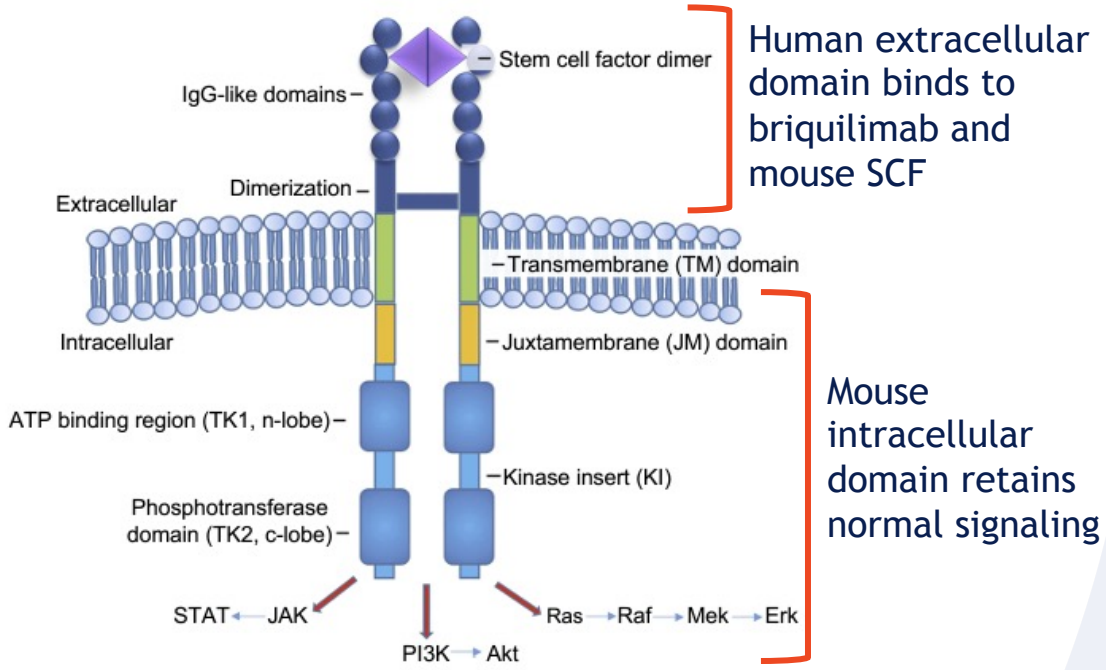
JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

Jasper's c-Kit Mouse™ enables direct in vivo disease model testing to support briquilimab's significant mast cell franchise opportunity

- c-Kit antibodies designed against human receptor do not bind to wild type mouse c-Kit, thereby limiting disease model testing
- Jasper's proprietary transgenic mouse allows for direct in vivo testing of briquilimab
  - Transgenic mouse with human c-Kit ectodomain and mouse c-Kit intracellular domain allows for briquilimab binding leading to mast cell apoptosis
- Jasper c-Kit Mouse™ allows briquilimab to be tested across numerous immunology and inflammation disease models

Jasper c-Kit Mouse™

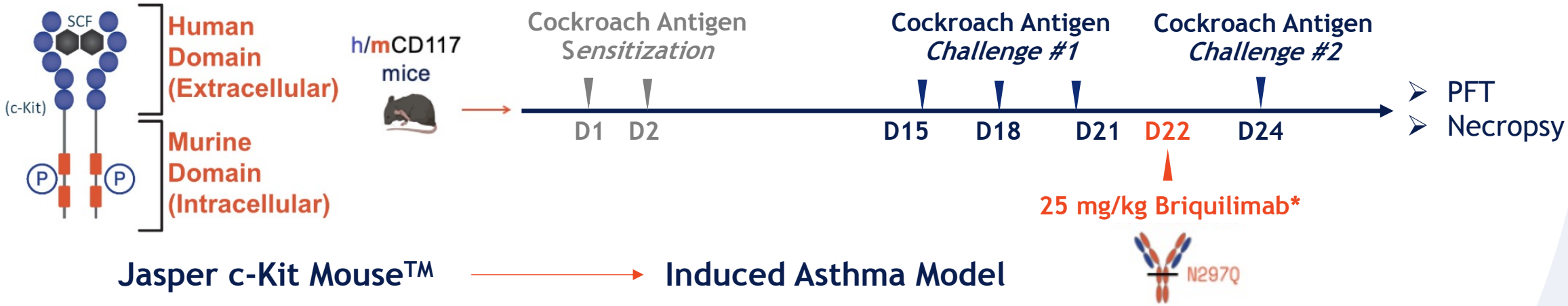


Briquilimab is an investigative drug and is not approved for any indication

Single dose of briquilimab studied in a therapeutic model of allergen induced asthma in Jasper's c-Kit Mouse™

The cockroach antigen-induced model is a prevalent preclinical tool for asthma as it exhibits several major features of disease, including airway hyperresponsiveness to methacholine, airway inflammation and remodeling

Study Design[1]:



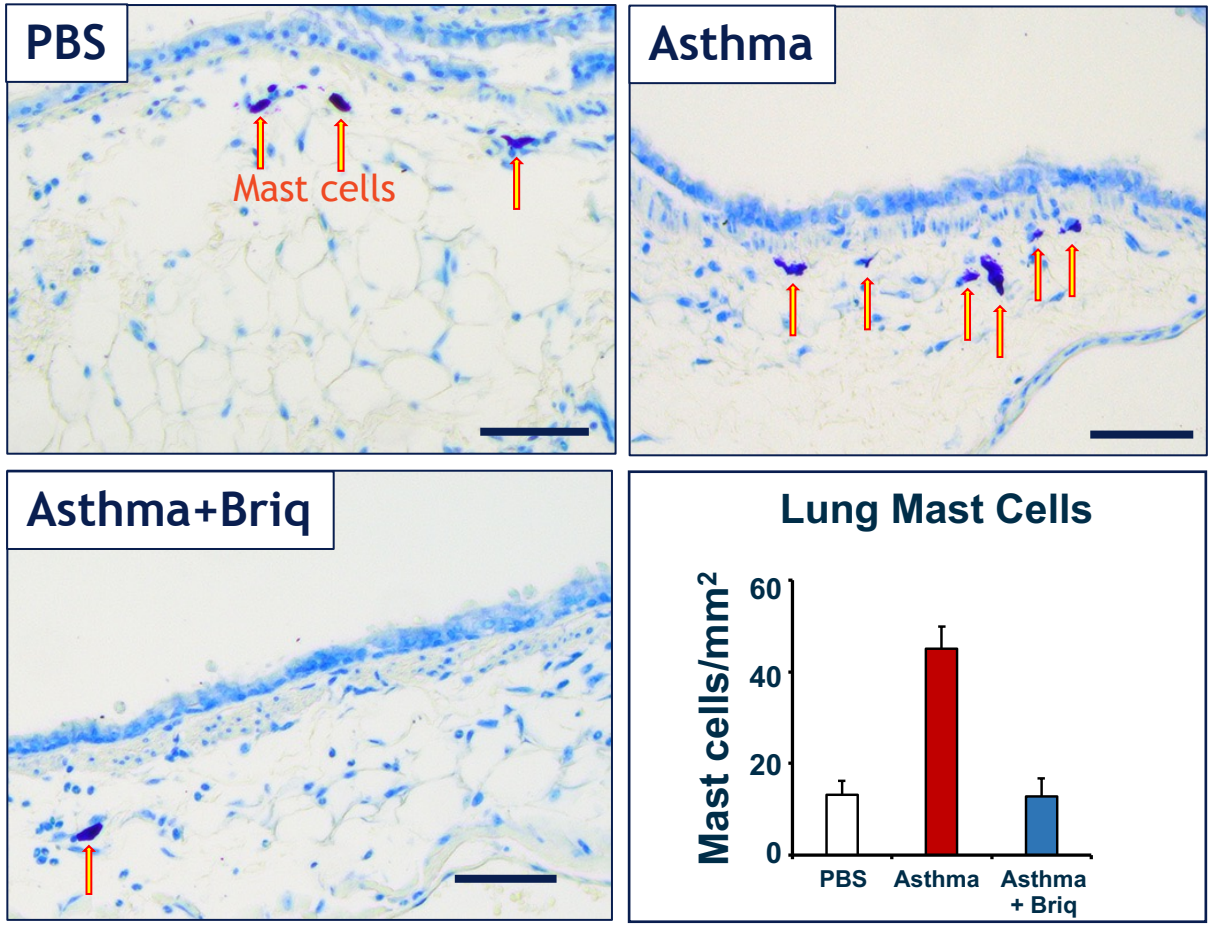
* 25 mg/kg briquilimab dose in h/mCD117 mice corresponds to ~2 mg/kg in human, as determined through allometric scaling.

1 Yu, M, et al. "Briquilimab, an Anti-CD117 (c-Kit) Antibody, Prevents Cockroach Allergen-Induced Allergic Asthma in Mice Expressing Chimeric Human and Mouse CD117.", AAAAI February 23-26, 2024.

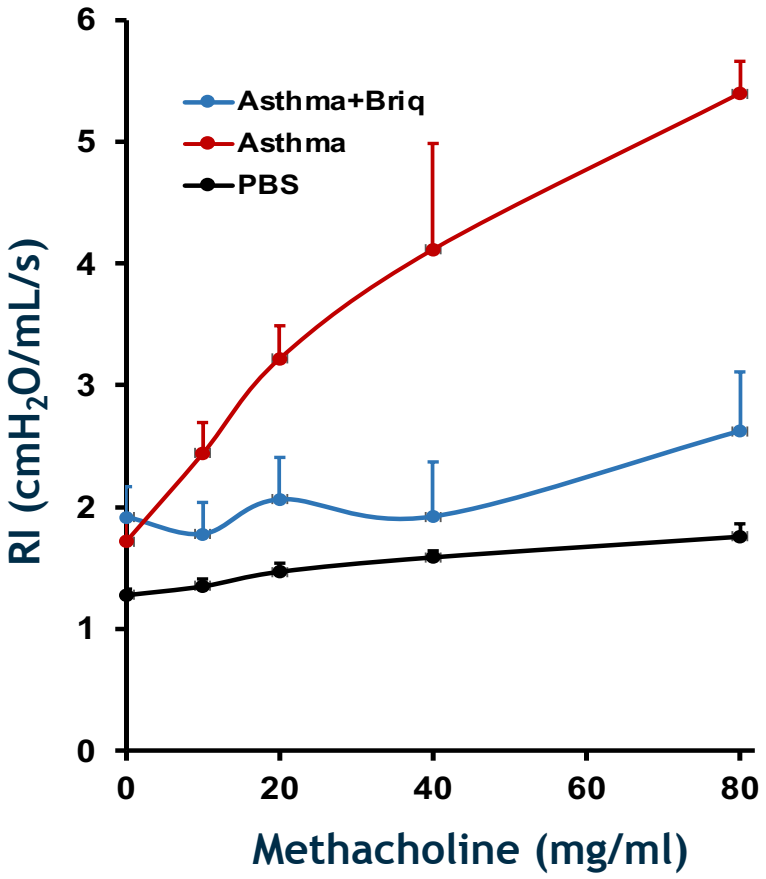
Briquilimab is an investigative drug and is not approved for any indication

Single dose of briquilimab depleted lung mast cells and reduced asthmatic response to methacholine in h/mCD117 mice

Lung Mast Cells[1]



Pulmonary Resistance[1]

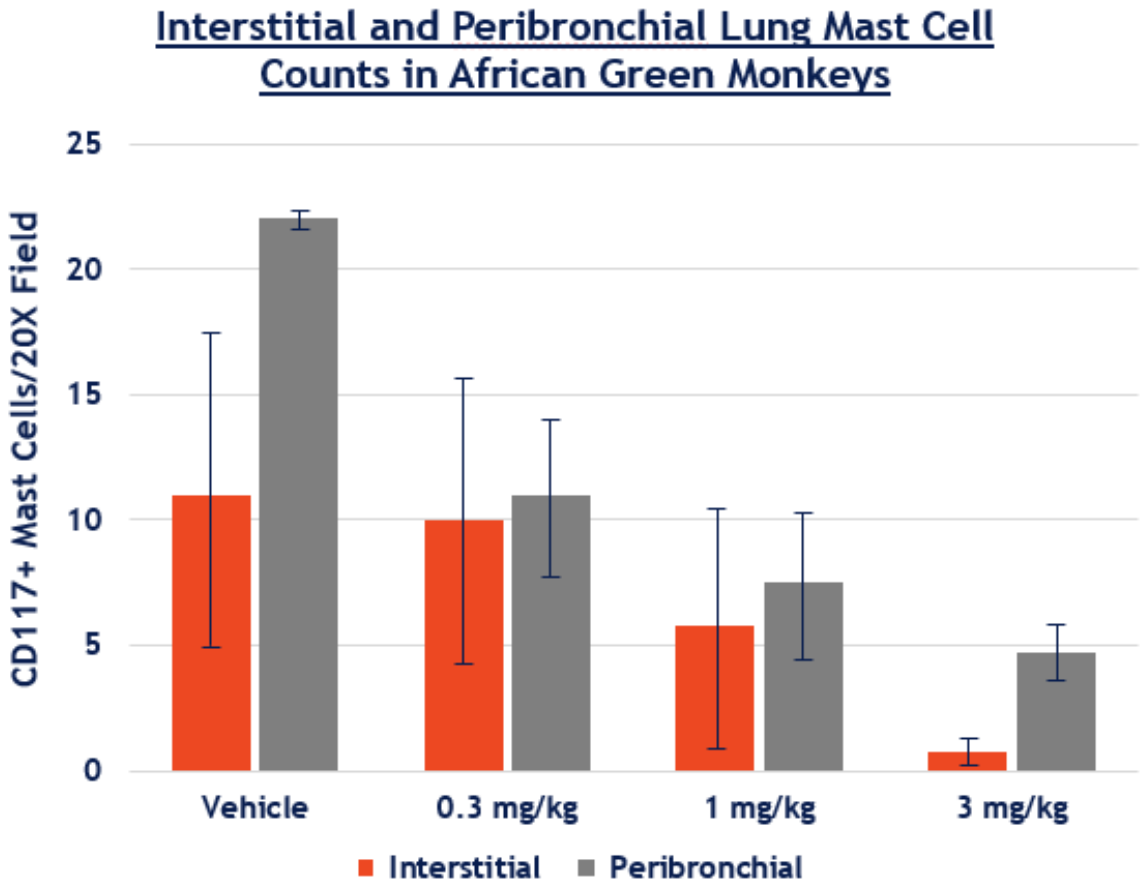


PBS: Phosphate buffered saline

1 Yu, M, et al. "Briquilimab, an Anti-CD117 (c-Kit) Antibody, Prevents Cockroach Allergen-Induced Allergic Asthma in Mice Expressing Chimeric Human and Mouse CD117.", AAAAI February 23-26, 2024.

Briquilimab is an investigative drug and is not approved for any indication

Briquilimab drives dose-dependent depletion of lung mast cells in primates



- Mast cells visualized by CD117 immunohistochemistry in lung samples at Day 28 after weekly dosing of briquilimab[1]*
- Briquilimab significantly **depleted both interstitial and peribronchial lung mast cells** versus control

*Vehicle control (n=2), 0.3 mg/kg (n=4), 1.0 mg/kg (n=3), 3.0 mg/kg (n=2)

1 Jasper internal data.

Briquilimab is an investigative drug and is not approved for any indication

Joshua Boyce, MD

- Chief, Division of Allergy and Clinical Immunology, Brigham and Women's Hospital
- Albert L. Sheffer Professor of Medicine in the Field of Allergic Disease at Harvard Medical School
- Effect of KIT Inhibition by Imatinib on Airway Mast Cells in Patients with Severe Refractory Asthma (KIA) trial investigator

JASPER THERAPEUTICS

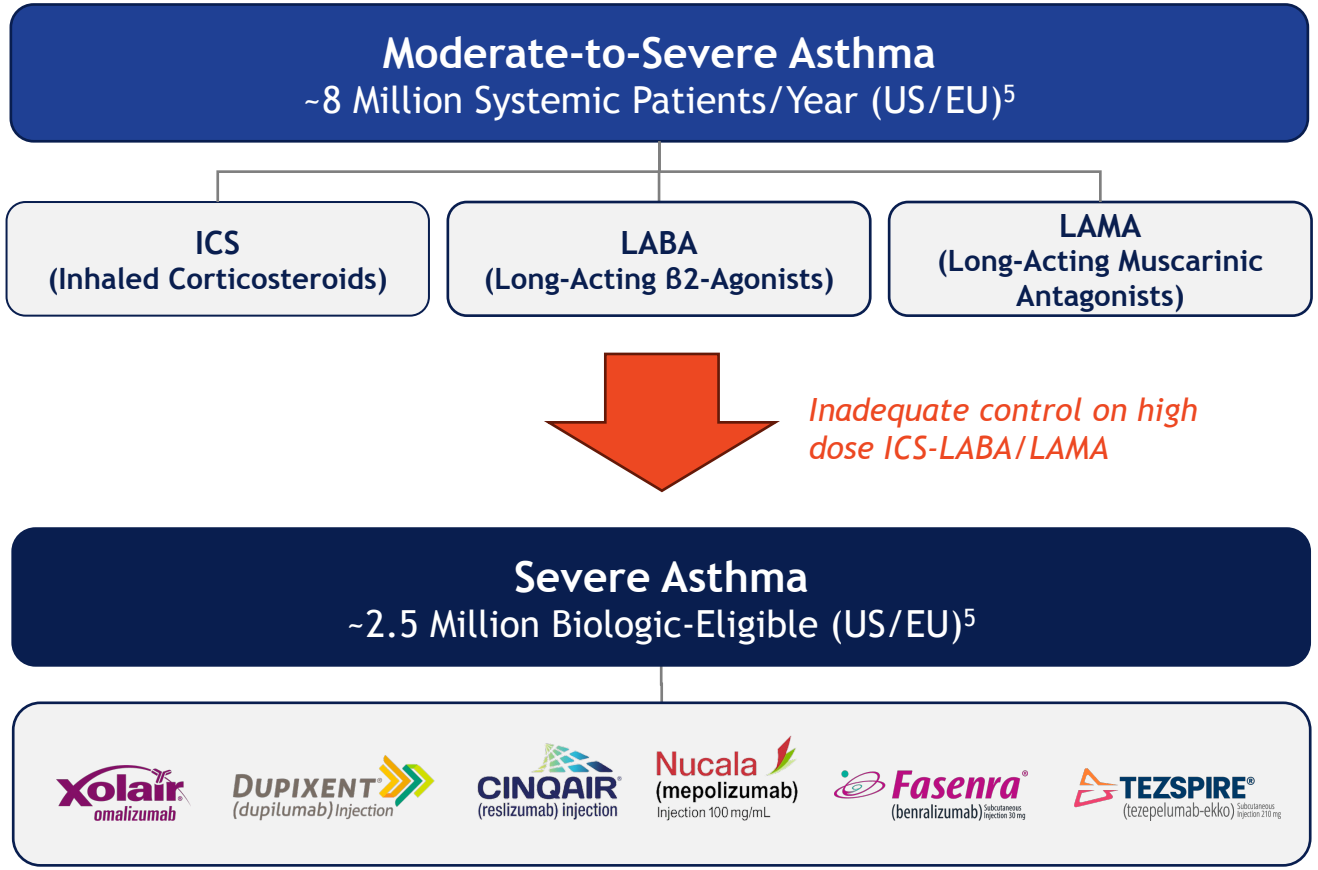
Briquilimab is an investigative drug and is not approved for any indication

Joshua Boyce, MD

Current Treatments & Unmet Need in Asthma

JASPER THERAPEUTICS

Biologic therapies have revolutionized the treatment of severe asthmatics with inadequate response to ICS/LABA/LAMAs



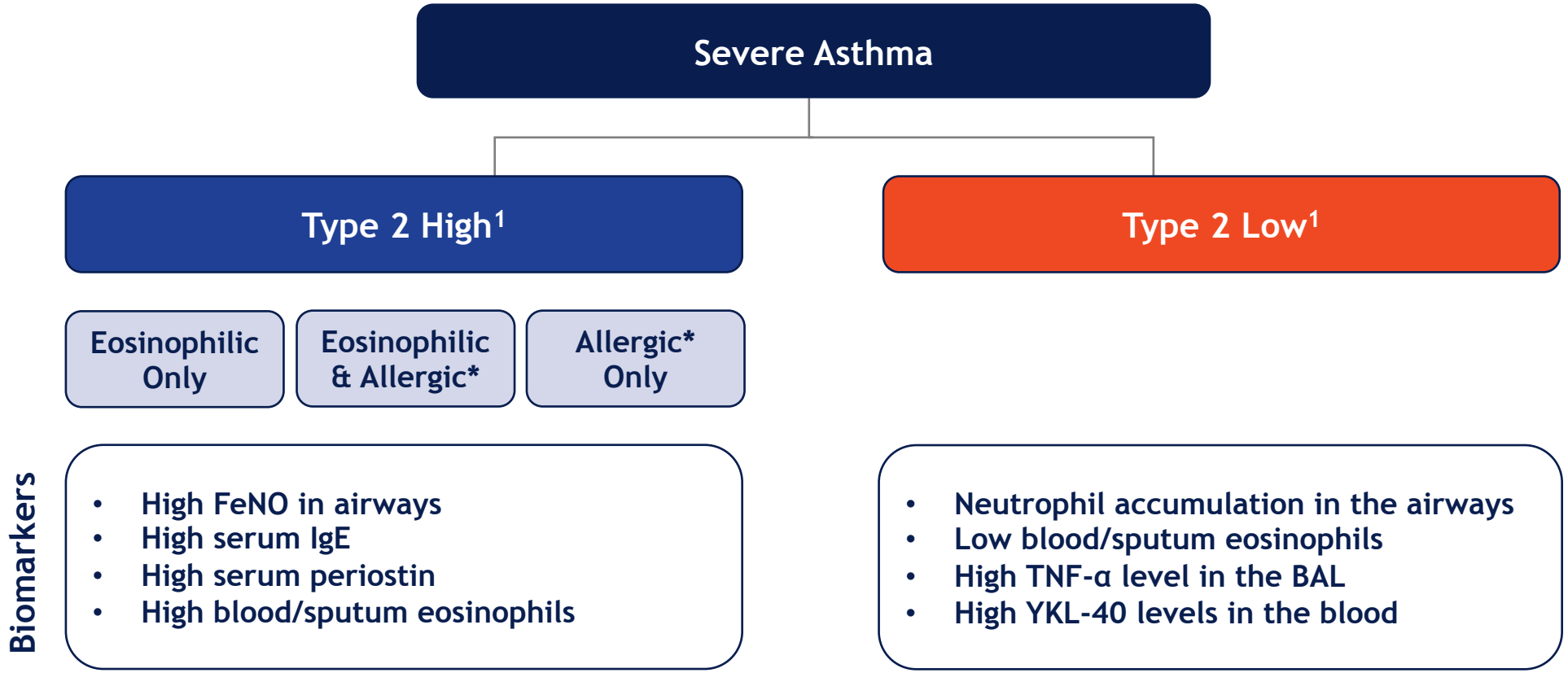
- Severe asthma is a potentially life-threatening inflammatory disorder characterized by **persistent asthma symptoms, despite use of high doses of ICS and LABA/LAMA**[1]
- Asthma severity increases with age and the **median age of severe asthma is 45-60 years**[2,3]
- ~300,000 patients currently receive biologic therapies in the US & EU[4]

1 2022 GINA Main Report, Global Initiative for Asthma – GINA.
2 Rönnebjerg L, Axelsson M, Kankaanranta H, et al. Severe asthma in a general population study: prevalence and clinical characteristics. J Asthma Allergy. 2021;14:1105-1115.
3 Zein JG, Dweik RA, Comhair SA, et al. Asthma is more severe in older adults. PLoS One. 2015;10(7):e0133490.
4 TD Cowen Analyst Research 2023 (Sanofi).
5 GlobalData.

JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

Selection of biologic therapy in severe asthma is based on disease biomarkers



*Demonstrated skin test or in vitro reactivity to a perennial aeroallergen

1 Theofani E, Tsitsopoulou A, Morianos I, Semitekolou M. Severe asthmatic responses: the impact of tslp. International Journal of Molecular Sciences. 2023;24(8):7581.

Briquilimab is an investigative drug and is not approved for any indication

Patients with allergic or type 2 low asthma have limited treatment choices compared to patients with eosinophilic disease

Severe Asthma

	Type 2 High			Type 2 Low
Asthma Endotype[1]	**Eosinophilic Only**	**Eosinophilic & Allergic**	**Allergic Only**	**Type 2 Low**
% of Total Moderate-to-Severe Asthma Patients[2,3]	**~30% of patients**	**~15% of patients**	**~25% of patients**	**~30% of patients**
FDA Approved Therapies[4]	✓ Nucala (IL-5) - 2015 ✓ Cinqair (IL-5) – 2016 ✓ Fasenra (IL-5) – 2017 ✓ Dupixent (IL-4/IL-13) – 2018 ✓ Tezspire (TSLP) - 2021	✓ Xolair (IgE) – 2003 ✓ Nucala (IL-5) - 2015 ✓ Cinqair (IL-5) - 2016 ✓ Fasenra (IL-5) - 2017 ✓ Dupixent (IL-4/IL-13) – 2018 ✓ Tezspire (TSLP) - 2021	✓ Xolair (IgE) - 2003 ✓ Tezspire (TSLP) - 2021	✓ Tezspire (TSLP) - 2021

>50% of patients have limited treatment options

1 2022 GINA Main Report, Global Initiative for Asthma – GINA.
2 TD Cowen Respiratory Outlook 2024 (Sanofi/Regeneron/AstraZeneca).
3 Jasper Primary Research 2024.
4 Drug product prescribing information.

JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

Most asthma biologics have endotype-based label restrictions*

	Xolair (IgE)	Nucala (IL-5)	Fasenra (IL-5)	Dupixent (IL-4/13)	Tezspire (TSLP)
Labeled Indication[1]	**Moderate-to-severe asthma** with a **positive skin test** or **in vitro reactivity**	**Severe asthma** with an **eosinophilic phenotype** (>150 cells/ml)	**Severe asthma** with an **eosinophilic phenotype** (>150 cells/ml)	**Moderate-to-severe asthma** with an **eosinophilic phenotype** (>150 cells/ml) or **OCS dependent**	**Severe asthma**
Dosing Regimen[1]	SC (Q2W or Q4W)	SC (Q4W)	SC (Q4W, Q8W)	SC (Q2W)	SC (Q4W)
Annualized Exacerbation Risk Reduction (AERR) [1]	41%-44% @W52	52% @W52	28%-51% @W52	46%-47% @W52	56%-71% @W52

*Cinqair (reslizumab) is an anti-IL-5 mAb FDA approved for severe eosinophilic asthma. Not included in the table due to its intravenous route of administration and very little physician uptake.

1 Drug product prescribing information.

Briquilimab is an investigative drug and is not approved for any indication

Imatinib Phase 2: c-Kit inhibition with a TKI improved airway response in patients with severe asthma challenged with methacholine

KIT Inhibition by Imatinib in Patients with Severe Refractory Asthma (KIA)[1]

- Phase 2 randomized, double-blind, placebo-controlled trial in patients with poorly controlled severe asthma
- Conducted at seven academic centers in the US from Nov. 2010 to July 2015
- Imatinib significantly improved airway response to methacholine challenge and reduced serum tryptase when compared to placebo
- In patients with severe asthma, imatinib also decreased mast-cell counts and BAL tryptase levels in the lungs

Airway Hyperresponsiveness

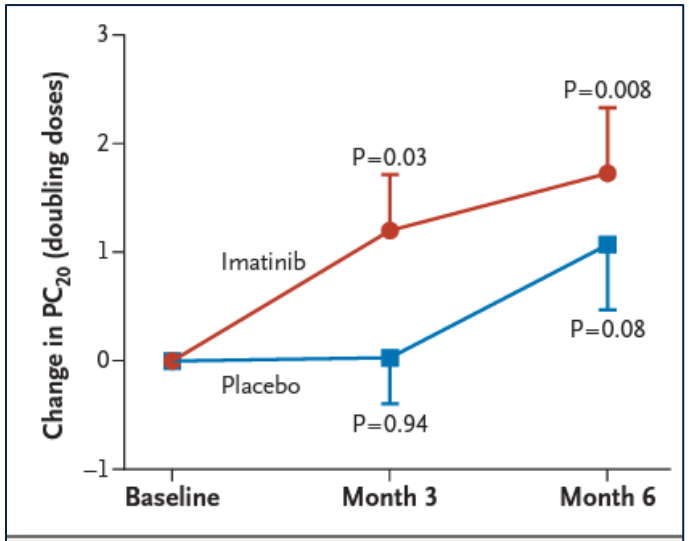


Figure 2. Change in Airway Methacholine Reactivity.

Serum Tryptase

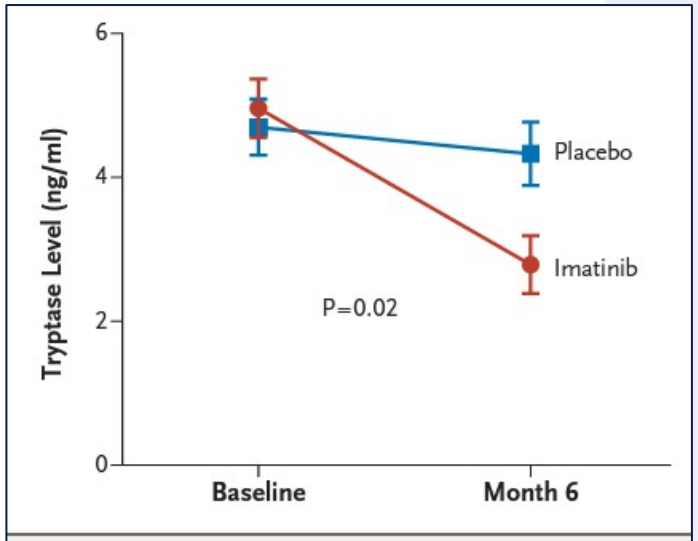


Figure 3. Total Tryptase Levels in Serum.

*"These results suggest that **KIT-dependent processes and mast cells contribute to the pathobiology** of severe asthma"*

1 Cahill KN, Katz HR, Cui J, et al. Kit inhibition by imatinib in patients with severe refractory asthma. N Engl J Med. 2017;376(20):1911-1920.

Masitinib Phase 3: c-Kit inhibition with a TKI led to reduction of severe asthma exacerbations vs. placebo but was limited by off-target GI toxicity[1]

	Exposure	SAER	Rate Ratio [95% CI]	Reduction[a]	P-value
Primary population (primary analysis)					
Masitinib (240)	13.7 months	0.34	0.65 [0.47, 0.90]	35%	0.010
Placebo (115)	13.8 months	0.48			
Eosinophil (≥150 cell/μL) subgroup (primary analysis)					
Masitinib (181)	13.2 months	0.34	0.62 [0.42, 0.91]	38%	0.016
Placebo (87)	13.4 months	0.51			
Intention-to-treat (sensitivity analysis)					
Masitinib (279)	13.1 months	0.34	0.67 [0.49, 0.93]	33%	0.016
Placebo (140)	12.8 months	0.44			
Full analysis set (sensitivity analysis)					
Masitinib (269)	13.2 months	0.34	0.67 [0.49, 0.92]	33%	0.015
Placebo (133)	13.1 months	0.45			

Notes: n: number of patients in analysis. [a]Reduction in the severe asthma exacerbation rate relative to placebo.
Abbreviations: SAER, severe asthma exacerbation rate (annualized rate adjusted for the overall time on treatment); CI, confidence interval.

1 Davidescu L, Ursol G, Korzh O, et al. Efficacy and safety of masitinib in corticosteroid-dependent severe asthma: a randomized placebo-controlled trial. J Asthma Allergy. 2022;15:737-747.

NIH PreCISE Phase 2: c-Kit inhibition with a TKI in severe asthma is an active area of ongoing clinical interest

Study Details[1]:

- PreCISE is an NIH-funded research study to evaluate several novel interventions (shown below) in 600 patients with severe asthma
- Three study phases: (1) screening/treatment assignment based on biomarkers, (2) double-blind placebo-controlled cross-over, and (3) multiperiod cross-over with different treatments
- Study is fully enrolled with data anticipated Q1 2025

Study Arms*:

TABLE I. Compounds and targeted subgroups

Compound	Drug target	Targeted subgroup
Imatinib	C-Kit	Eos < 300/μL
Clazakizumab	IL-6	IL-6 > 3.1 ng/mL
MCTs	Metabolic pathways	FENO > 15 ppb
Broncho-Vaxom	Microbiome	Eos > 300/μL
Itacitinib	JAK1/3	Eos > 300/μL or FENO > 25 ppb

*Based on KIA study, "In the imatinib group, decreases in airway hyperresponsiveness were inversely correlated with baseline peripheral-blood eosinophil counts (r^2=0.218, P=0.03)."

1 Georas SN, Wright RJ, Ivanova A, et al. The precision interventions for severe and/or exacerbation-prone (Precise) asthma network: an overview of network organization, procedures, and interventions. J Allergy Clin Immunol. 2022;149(2):488-516.e9.

JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

Severe asthma patients have significant unmet needs that may be broadly addressed by c-Kit inhibition

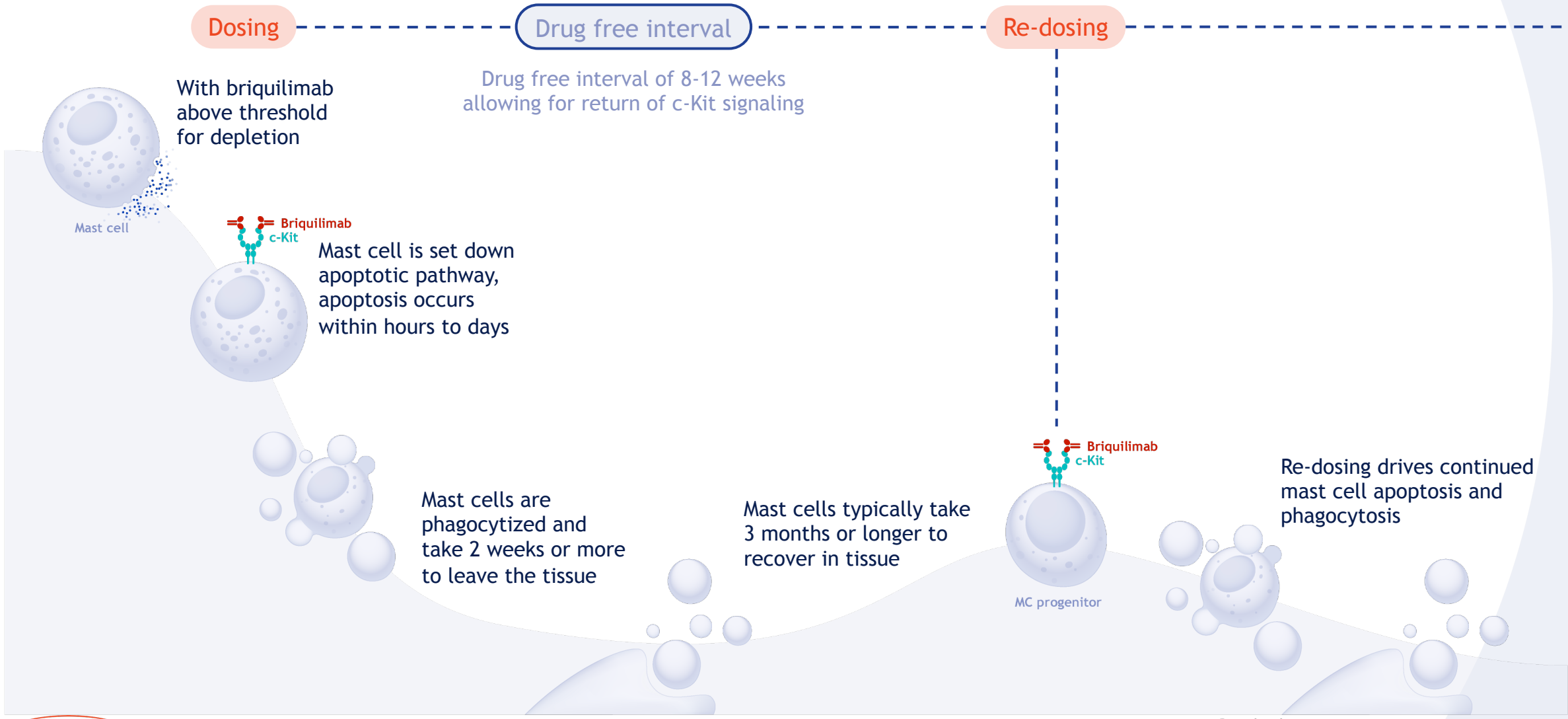
- New treatments are needed for patients with severe asthma
- Preclinical evidence that targeting the mast cell reduces asthmatic response
- Imatinib and masitinib clinical evidence that c-Kit inhibition improves airway response and reduces exacerbations across severe asthma endotypes
- Mast cell depletion may lead to broad therapeutic benefit in asthma patients across endotypes
- Asthma challenge study design is an appropriate proof-of-concept to evaluate the clinical potential of briquilimab

Edwin Tucker, MD, MRCP

Briquilimab Clinical Development

JASPER THERAPEUTICS

Briquilimab design and characteristics enable optimal biologic dosing and could minimize unwanted effects of c-Kit inhibition



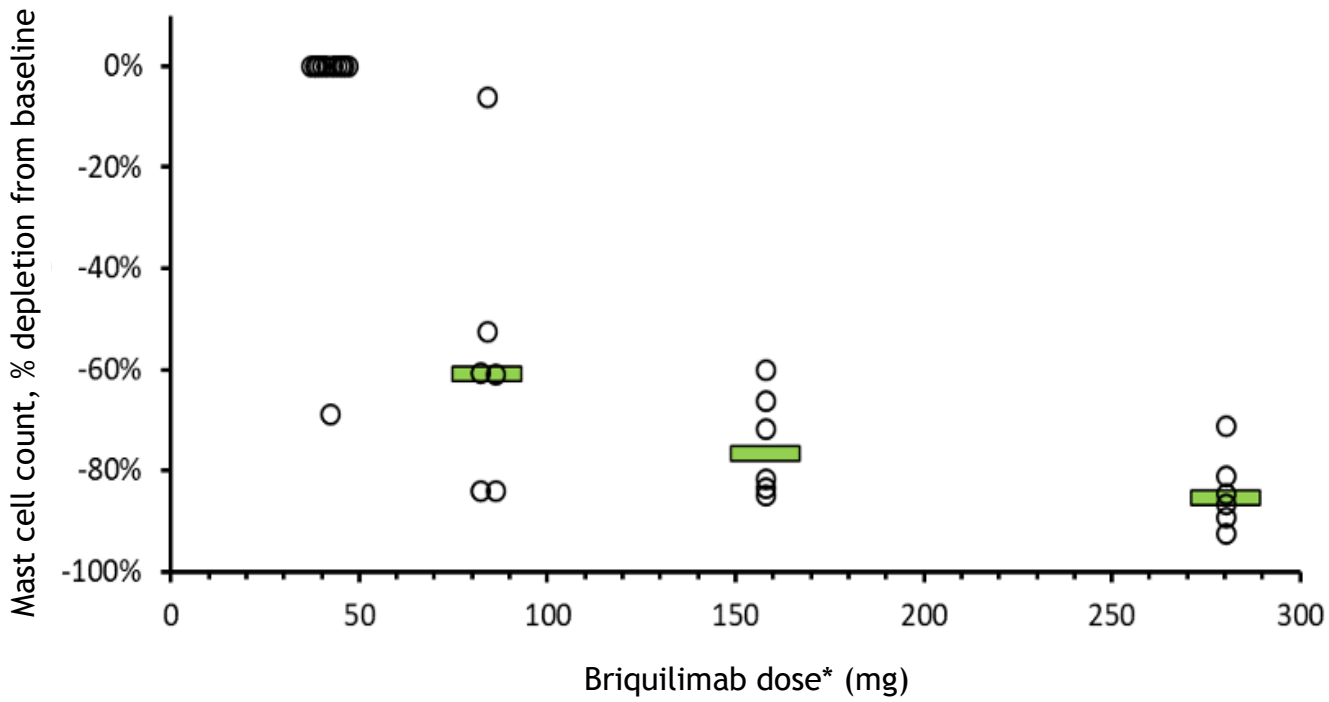
JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

Briquilimab significantly depletes mast cells

- A single subcutaneous dose of briquilimab potently depletes mast cells in the skin of healthy volunteers
- Depletion is demonstrated in as early as 7 days
- Depletion is consistently observed across rodents, NHPs, and humans

Skin mast cell depletion 4 weeks after single dose (≥42 mg)[1]
Briquilimab Healthy Volunteer Phase 1 Subcutaneous Study



*Skin biopsies were used to count mast cells.
1 Jasper internal data (Phase 1a, healthy volunteer study).

Briquilimab is an investigative drug and is not approved for any indication

Briquilimab studies in CSU & CIndU will provide initial data in mast cell indications

BEACON TRIAL

Chronic Spontaneous Urticaria (Phase 1b/2a)

Key Design Features

- Patients with inadequate response to omalizumab
- Multiple dose, testing 8/12-week dosing intervals
- UAS7 @ W12

Timing

- **FPI:** November 2023
- **Enrollment:** Ongoing
- **Data expected:** 3Q 2024

SPOTLIGHT TRIAL

Chronic Inducible Urticaria (Phase 1b/2a)

Key Design Features

- Cold Urticaria & Symptomatic Dermographism
- Single dose
- Provocation test @ W12

Timing

- **FPI:** March 2024
- **Enrollment:** Ongoing
- **Data expected:** 2H 2024

Briquilimab Phase 1b/2a asthma challenge study

Study Goal: demonstrate proof-of-concept in asthma with a therapeutic dose of subcutaneous briquilimab to inform future trials

Key Objectives:

- Demonstration of safety and efficacy in a new immunology and inflammation indication
- Challenge study has a high predictive value for success of future trials
- Assess the early and late asthmatic response and airway hyperresponsiveness following briquilimab administration
- Study design intended to be efficient, enabling rapid advancement of clinical program

Status: FPI targeted in Q4 2024

JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

Ronald Martell

Closing Remarks

JASPER THERAPEUTICS

Mast cell depletion offers a novel therapeutic approach for asthma

Mast cell depletion: briquilimab has demonstrated the ability to deplete mast cells throughout multiple tissue types

Early and late phase response: early phase in asthma is driven by mast cell degranulation, which may also drive the late phase recruitment of other cell types to the lung

Airway remodeling: reduction of inflammation by mast cell depletion may reduce excess inflammation and epithelial remodeling

Durability and convenience: mast cell depletion may lead to durable effect based on long periods of mast cell recovery lasting weeks to months

Broad response: c-Kit targeting may have an impact across multiple asthma endotypes

JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication

Jasper: Advancing briquilimab in multiple large indications

Several significant data readouts expected in 2024

c-Kit inhibition – a clinically validated mechanism driving depletion of mast cells

- Has potential to address diseases impacting millions of patients

Briquilimab – a potent and differentiated c-Kit inhibitor

- Drives mast cell depletion while potentially minimizing unwanted adverse effects
- Evaluating less-frequent dosing aligned with duration of mast cell depletion

Briquilimab – franchise potential in mast cell diseases

- CSU: Phase 1b/2a BEACON study enrolling (initial data expected 3Q 2024)
- CIndU: Phase 1b/2a SPOTLIGHT study enrolling (initial data expected 2H 2024)
- Asthma: Enrollment in Phase 1b/2a study expected to commence 4Q 2024
- Additional mast cell indications under evaluation

JASPER THERAPEUTICS

Briquilimab is an investigative drug and is not approved for any indication