



Rare Respiratory Pipeline Interim Clinical Update

December 2024



Forward Looking Statements and Disclosures

Forward Looking Statements

This presentation and the accompanying oral presentation that are collectively referred to as this presentation contain forward-looking statements that involve substantial risks and uncertainties. Any statements about future expectations, plans and prospects for Krystal Biotech, Inc. (the “Company”), including but not limited to statements about the Company’s HSV-1-based platform being able to safely and effectively deliver and express genetic cargo when administered to the lung via repeated inhalation; the initial positive clinical data from the Company’s rare respiratory disease programs, KB408 and KB407 and the implications thereof for the Company’s broader pipeline targeting diseases of the lung; the prevalence and incidence of AATD and cystic fibrosis; the Company’s intention to accelerate its clinical study of KB408 and simultaneously enroll confirmatory patients in Cohort 2 and open Cohort 3 to explore safety and gene delivery at the top dose; the Company’s belief that the positive initial data from the KB408 study demonstrates a clinically relevant dosing range; the targeted patient segments for KB407 and the estimated number of patients in such segments; the Company’s plans to share molecular data from the KB407 program in 1H 2025; and other statements containing the words “anticipate”, “believe”, “estimate”, “expect”, “intend”, “may”, “plan”, “predict”, “project”, “target”, “potential”, “likely”, “will”, “would”, “could”, “should”, “continue” and similar expressions, constitute forward-looking statements within the meaning of The Private Securities Litigation Reform Act of 1995. Actual results may differ materially from those indicated by such forward-looking statements as a result of various important factors, including: uncertainties associated with regulatory review of manufacturing processes and clinical trials and the content and timing of decisions made by regulatory authorities; the uncertainties inherent in the initiation and conduct of clinical trials; availability and timing of data from clinical trials and utility of such data; and such other important factors as are set forth in the Company’s filings with the U.S. Securities and Exchange Commission. The forward-looking statements included in this presentation represent the Company’s views as of the date of this presentation and should not be relied upon as representing the Company’s views as of any subsequent date.

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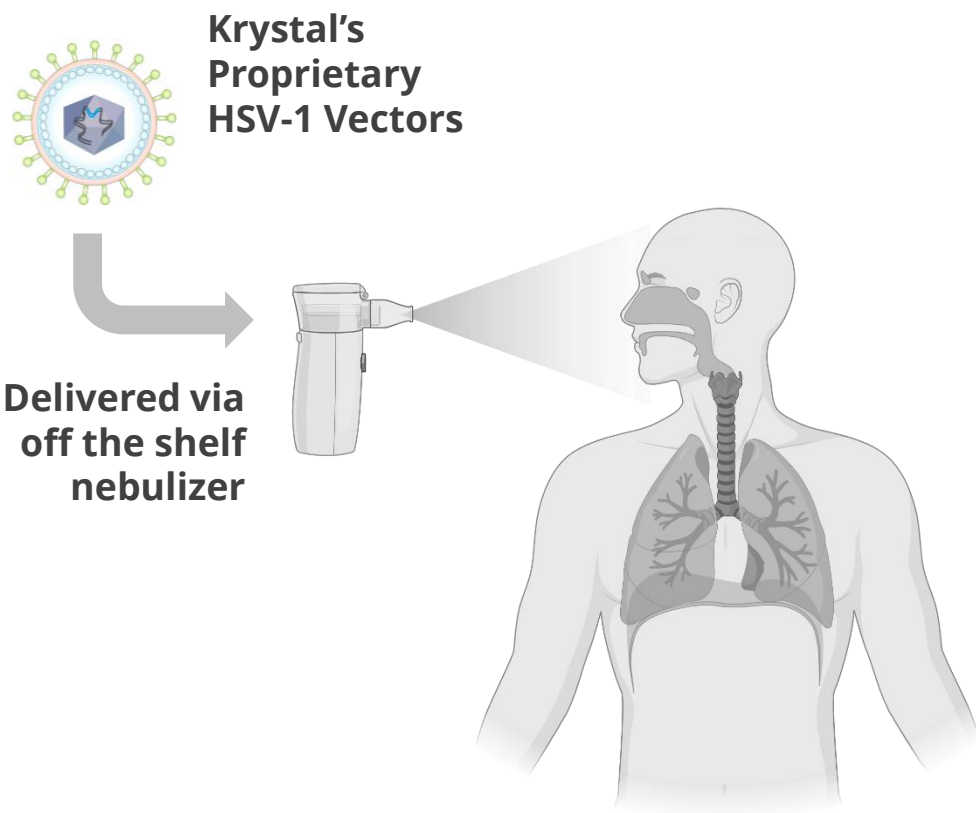
Disclosures

Other than VYJUVEK®, all products described in this presentation are investigational therapies.

The Company is using the Aerogen Solo® Nebulizer System and Aerogen® Ultra in its clinical trials evaluating KB407, KB408, and inhaled KB707.

Krystal's HSV-1 Based Approach for Lung Gene Delivery

Developing redosable, non-invasive, inhaled gene therapies to address monogenic disorders of the lung



Historical Challenges with Inhaled Gene Therapy¹

- Inhaled gene therapy has been explored for decades, with little success
- Focus to date has been on adenovirus, AAV, and non-viral approaches
- Multiple challenges including cargo limitations, low efficiency of gene transfer, toxicity, product instability, and burdensome delivery

HSV-1 Platform Has Potential to Overcome Historical Challenges

- Clinically validated vector; tolerated and redosable in Phase 3 for DEB
- Large cargo capacity to load in full genes, including *CFTR* for cystic fibrosis
- Ability to redose and/or adjust dose over time as lung cells turnover
- Broad cellular tropism and efficient transduction of airway epithelium
- Expected nebulization time is under 30-minutes using off-the-shelf nebulizer

Growing clinical dataset demonstrating that Krystal's inhaled candidates are well-tolerated and distribute broadly in the lung

1. Vu A, et al. *Human Gene Therapy* 2020;31(17-18):921-939

Alpha-1 Antitrypsin Deficiency (AATD)

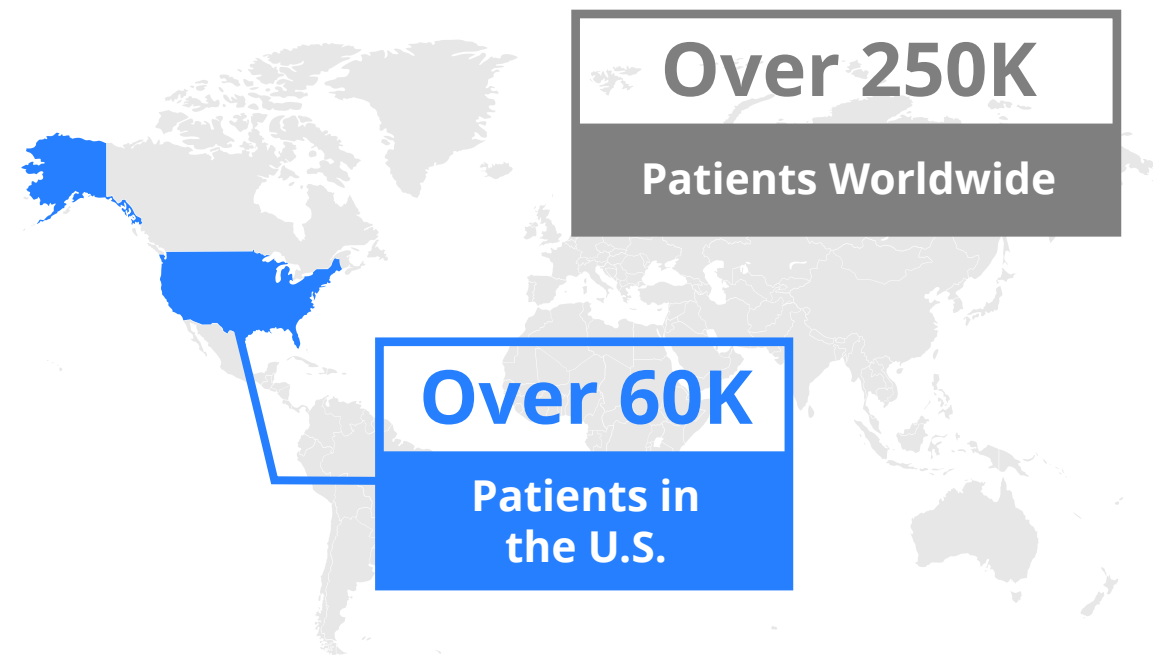
Monogenic disorder that leads to progressive lung disease

- Alpha-1 antitrypsin (AAT) is a key regulator of protease activity, in particular neutrophil elastase in lungs³
- AATD is an autosomal co-dominant inherited genetic disorder resulting from mutations in *SERPINA1* gene encoding AAT, misfolding mutations Pi*ZZ and Pi*SZ are the most common
- Genetic deficiency of AAT can result in unopposed neutrophil elastase activity and progressive pulmonary impairment

Unproven and Limited Treatment Options^{1,2}

- There is no cure available for patients with AATD
- Standard of care is weekly IV infusions of AAT but treatment is burdensome on patients and clinical benefit not well defined

Severe AATD Prevalence^{3-5*}



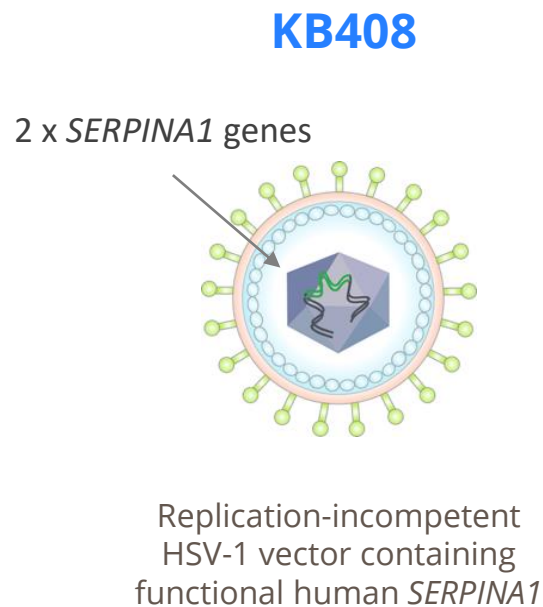
1. Greene CM, et al. *Nat Rev Dis Primers* 2016;2:16051; 2. Brantly ML, et al. *Int J Chron Obstruct Pulmon Dis.* 2019;6:100-114; 3. Aboussouan LS, et al. *Respir Med.* 2009;103:335-341; 4. Stoller JK, et al. *Int J Chron Obstruct Pulmon Dis.* 2013;10:26-24; 5. Blanco I, et al. *Int J Chron Obstruct Pulmon Dis.* 2017;12:561-569;

*Severe AATD defined as patients with Pi*ZZ genotype

Inhaled Candidate KB408 for AATD Lung Disease

Genetic medicine designed to achieve sustained, local AAT expression is supported by robust preclinical data package

Preclinical Summary



- ✓ Transduces human airway cells *in vitro* leading to dose-dependent expression and secretion of functional AAT
- ✓ AAT secreted from KB408 transduced cells is functional as demonstrated by binding to target neutrophil elastase
- ✓ Airway administration to wild-type or *SERPINA1* deficient mice yielded robust AAT expression detected by multiple independent assessments
- ✓ Vector platform shown to be amenable to nebulization with broad airway transduction and tolerability in non-human primates – *KB407 data*
- ✓ Repeat KB408 dosing well-tolerated in murine GLP IND-enabling toxicology study with only mild findings and NOAEL of top dose

Data package strongly supportive of KB408 progression to the clinic

KB408 Phase 1 Study SERPENTINE-1

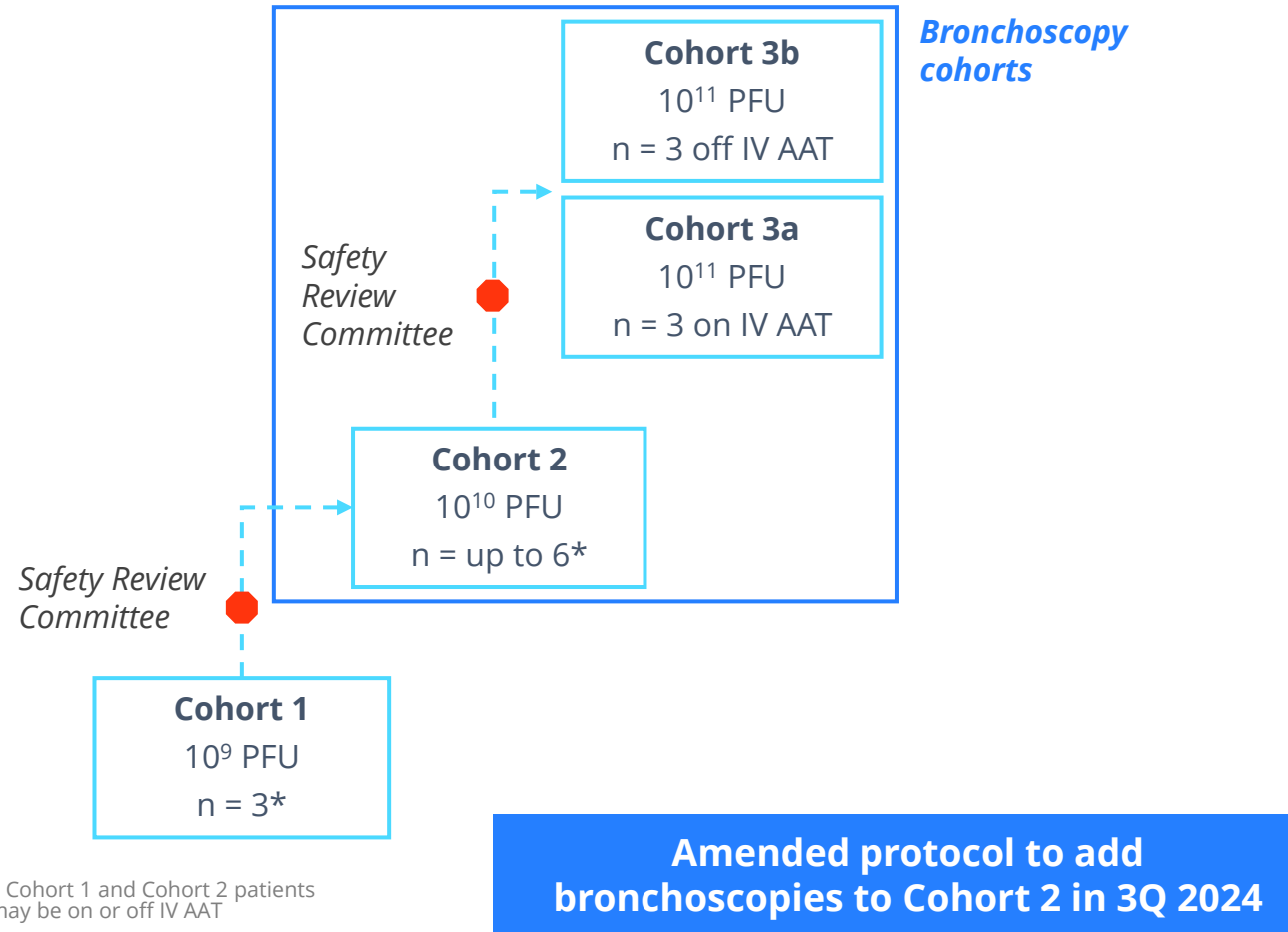
Open-label, single dose escalation study in adult patients with AATD with a PI*ZZ genotype

Study Objectives

- Evaluate safety and tolerability, including
 - Frequency and severity of adverse events
 - Changes in vital signs, spirometry, ECGs, and clinical labs
- Measure AAT and neutrophil elastase concentration in serum, sputum, and bronchoalveolar lavage fluid
- Evaluate transgene expression in lung tissue
- Exploratory evaluation of impact on inflammatory biomarkers, quality of life measures, and pharmacodynamic markers

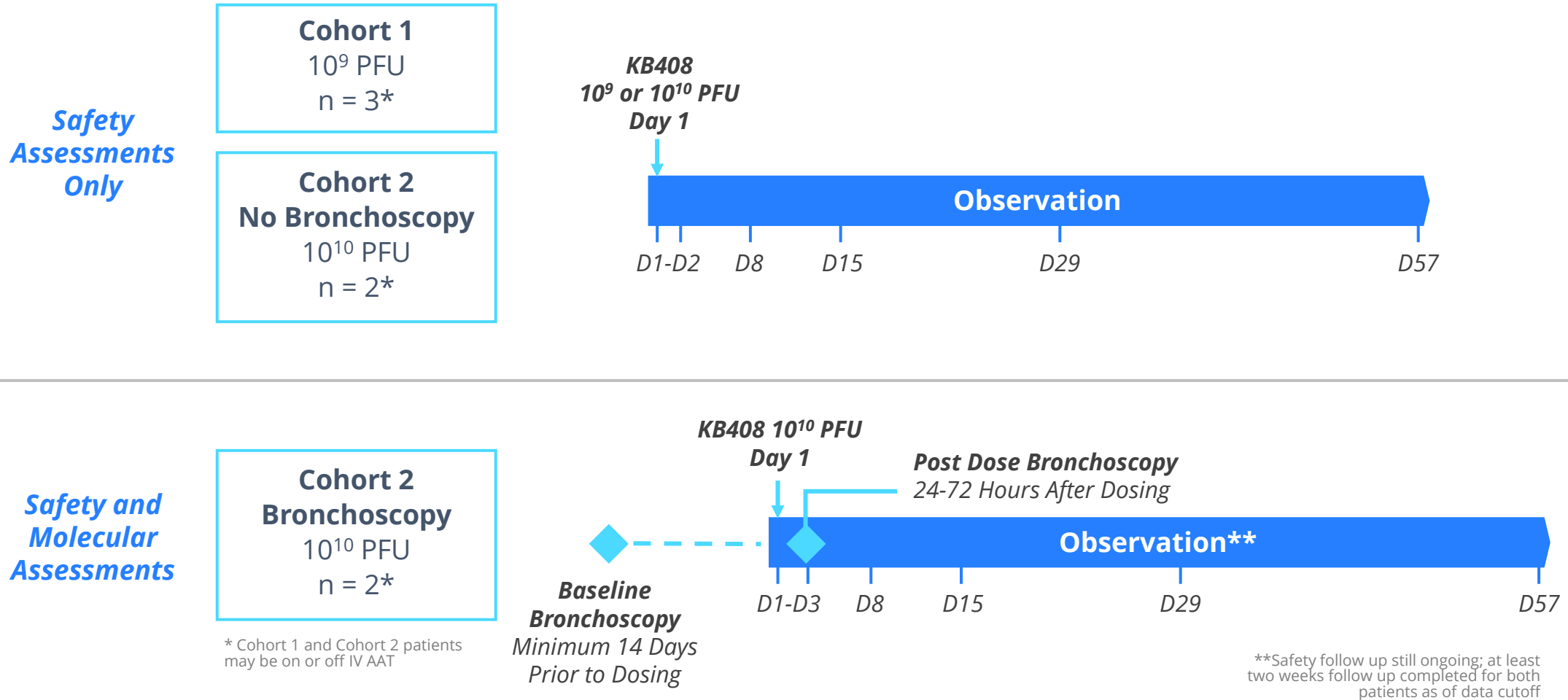
Key Enrollment Criteria

- Key Inclusion Criteria
 - Age ≥ 18 to ≤ 70
 - PI*ZZ or Pi*ZNull genotype
 - Serum AAT $< 11\mu\text{M}$ - **Cohort 3b only**
- Key Exclusion Criteria
 - ppFEV₁ $< 50\%$
 - IV AAT within 6 weeks - **Cohort 3b only**



Scope of First SERPENTINE-1 Interim Readout

Safety data from seven patients across two dose levels, and initial molecular data from two Cohort 2 patients



Patient Demographics and Augmentation Therapy Status

Study population predominantly elderly with variable augmentation therapy use, all Pi*ZZ genotype

Safety Assessments Only

Cohort 1
10⁹ PFU
n = 3*

**Cohort 2
No Bronchoscopy**
10¹⁰ PFU
n = 2*

Cohort	Patient ID	<i>SERPINA1</i> Genotype	Age	Sex	Background Augmentation
1	01	Pi*ZZ	60	Female	No
	02	Pi*ZZ	66	Female	Yes
	03	Pi*ZZ	67	Female	No
2	04	Pi*ZZ	31	Male	No
	05	Pi*ZZ	56	Female	No

Safety and Molecular Assessments

**Cohort 2
Bronchoscopy**
10¹⁰ PFU
n = 2*

Cohort	Patient ID	<i>SERPINA1</i> Genotype	Age	Sex	Background Augmentation
2	06	Pi*ZZ	60	Male	Yes
	07	Pi*ZZ	58	Male	No

* Cohort 1 and Cohort 2 patients may be on or off IV AAT

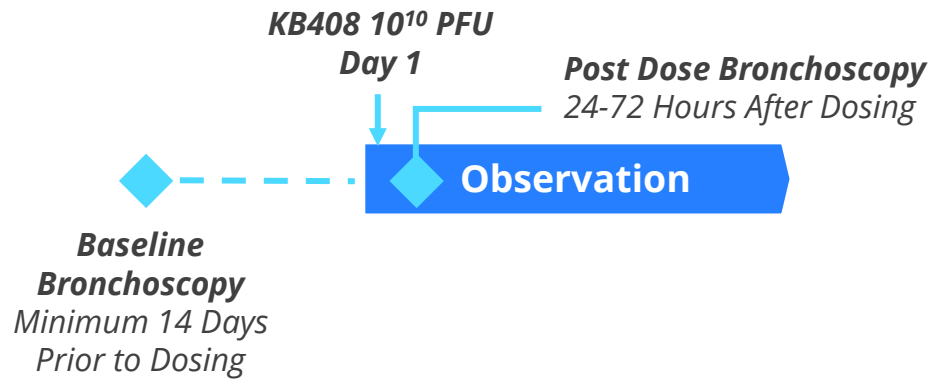
KB408 Well Tolerated in All Patients Dosed To Date

- ✓ **No serious adverse events or dose-limiting toxicities observed**
- ✓ **All KB408-related adverse events reported have been mild-to-moderate and transient**
- ✓ **No evidence of significant neutralizing antibody response following KB408 administration**
- ✓ **No systemic vector distribution after inhalation, based on blood and urine analysis**

Bronchoscopy Sampling Plan and Molecular Data in Interim Readout

Multiple assessments conducted to mitigate inherent variability in sample collection across patients

Cohort 2 Bronchoscopy Timing



Sample Collection at Each Timepoint

- Tissue Biopsies
- Bronchial Brushings
- Bronchoalveolar Lavage

Assessments Included in Interim Readout

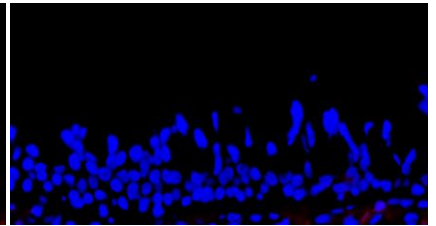
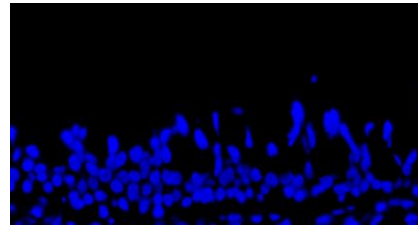
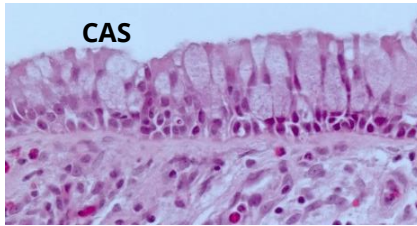
1. **Rate of KB408 transduction and AAT expression in cells of the conducting airways:** Assessed by immunofluorescent staining for AAT positive cells in tissue biopsy samples
2. **Secreted free AAT levels and residual active neutrophil elastase in lung ELF:** Free AAT and % unbound neutrophil elastase assessed by ELISA in lung lavage samples, adjusted for lavage dilution factor
3. **Change in *SERPINA1* Expression Levels in Lung Airway Cells:** Assessed by quantification of codon-optimized *SERPINA1* genome copies and transcript levels by qPCR and qRT-PCR in brushings

Clear Evidence of Transduction and AAT Expression in KB408 Treated Lungs

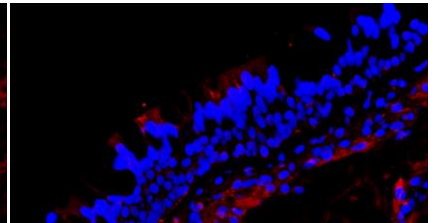
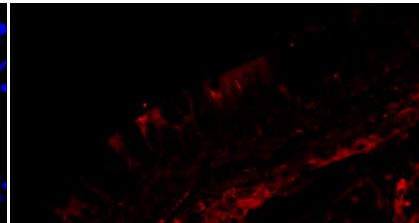
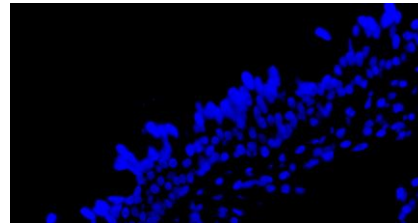
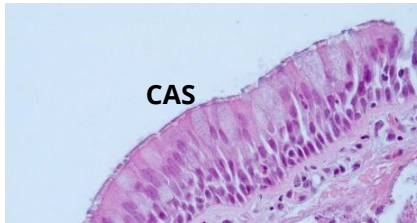
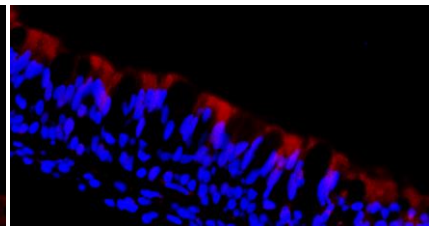
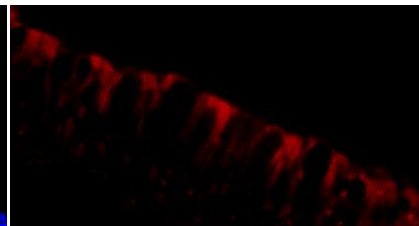
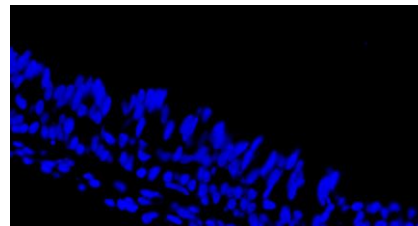
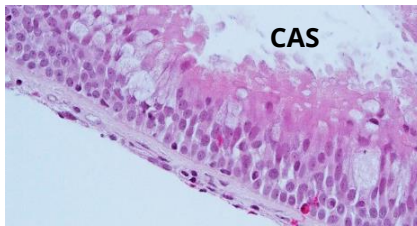
Patient 07, **no** background augmentation; clinically meaningful proportion of airway cells positive for AAT after single dose

Patient 07 Images

Baseline



After KB408



H&E

DAPI

AAT

Merge

39%

AAT Positive Cells
After Single
KB408 Dose*

0%

AAT Positive Cells
at Baseline

Patient 07

All imaging conducted at 40x magnification

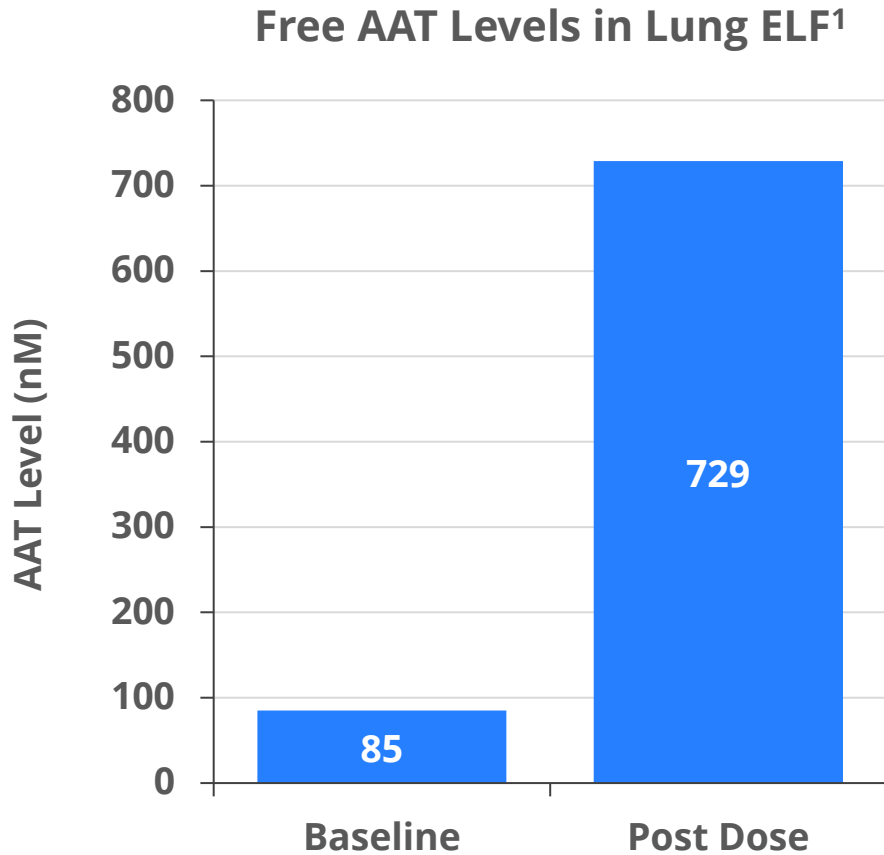
Post-dose biopsies harvested 48 hours after nebulization

Biopsy locations: Baseline biopsy #1, top: lower lobe, right lung; post-dose biopsy #3, middle: lower lobe, left lung; post-dose biopsy #4, bottom: lower lobe, left lung

* Based on quantification of DAPI positive and DAPI + AAT co-positive cells lining the conducting airways of the lung by immunofluorescence; three biopsies assessed for post-dose DAPI + AAT co-positive cell quantification, total cell counts > 300

Secreted AAT Reached Clinically Meaningful Levels after Single KB408 Dose

Patient 07, **no** background augmentation; increase in AAT to high nanomolar range supports further exploration of mid dose



Over 8-fold increase in ELF AAT with one dose
Achieved target range of 5-10% of systemic levels

% Free Neutrophil Elastase in ELF

97.2%

At Baseline



Over 50% reduction in % unbound NE within 48 hours of first dose

40.2%

After Single KB408 Dose

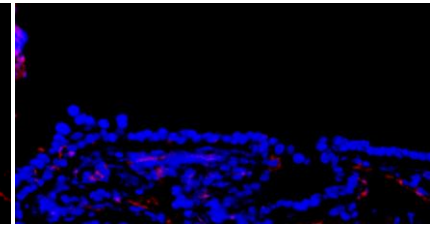
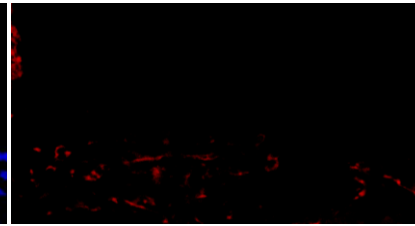
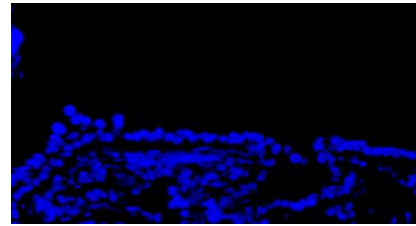
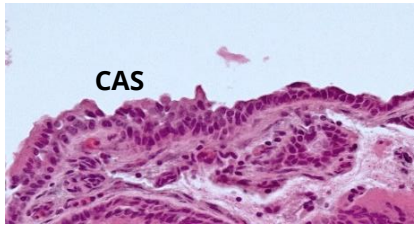
1. Average values from 2 lobes (pre-dose samples). Only 1 post-dose sample was evaluable due to low return from second lobe (<10%)

Clear Evidence of Transduction and AAT Expression in KB408 Treated Lungs

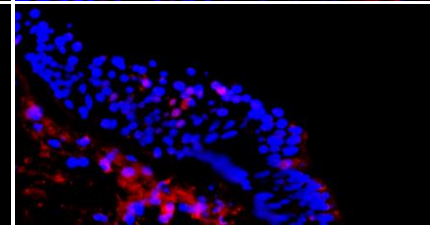
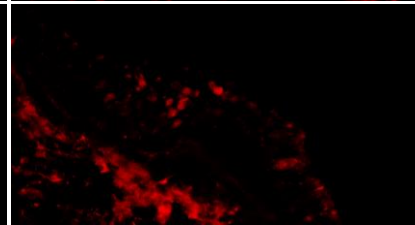
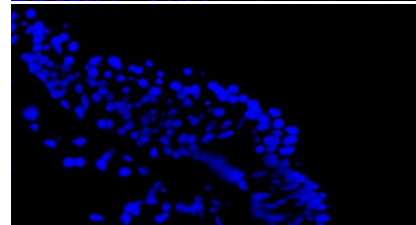
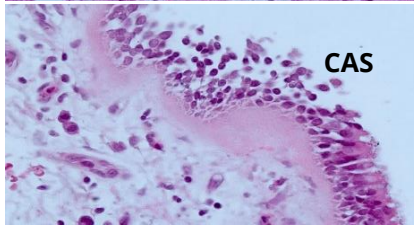
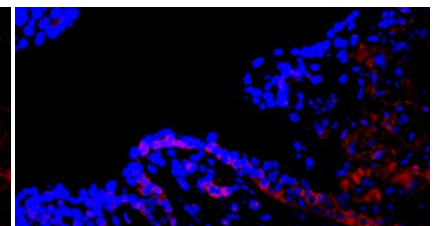
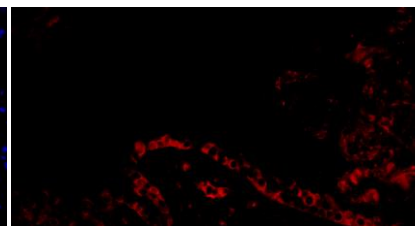
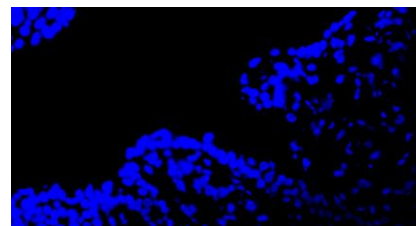
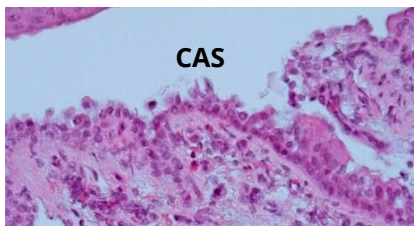
Patient 06, on background augmentation; also detected meaningful proportion of airway cells positive for AAT after single dose

Patient 06 Images

Baseline



After KB408



H&E

DAPI

AAT

Merge

35%

AAT Positive Cells
After Single
KB408 Dose*

3%

AAT Positive Cells
at Baseline
Patient 06

* Based on quantification of DAPI positive and DAPI + AAT co-positive cells lining the conducting airways of the lung by immunofluorescence; four biopsies assessed for post-dose DAPI + AAT co-positive cell quantification, total cell counts > 600

AAT, alpha-1 antitrypsin; CAS, conducting airway surface; DAPI, 4',6-diamidino-2-phenylindole; H&E, hematoxylin and eosin

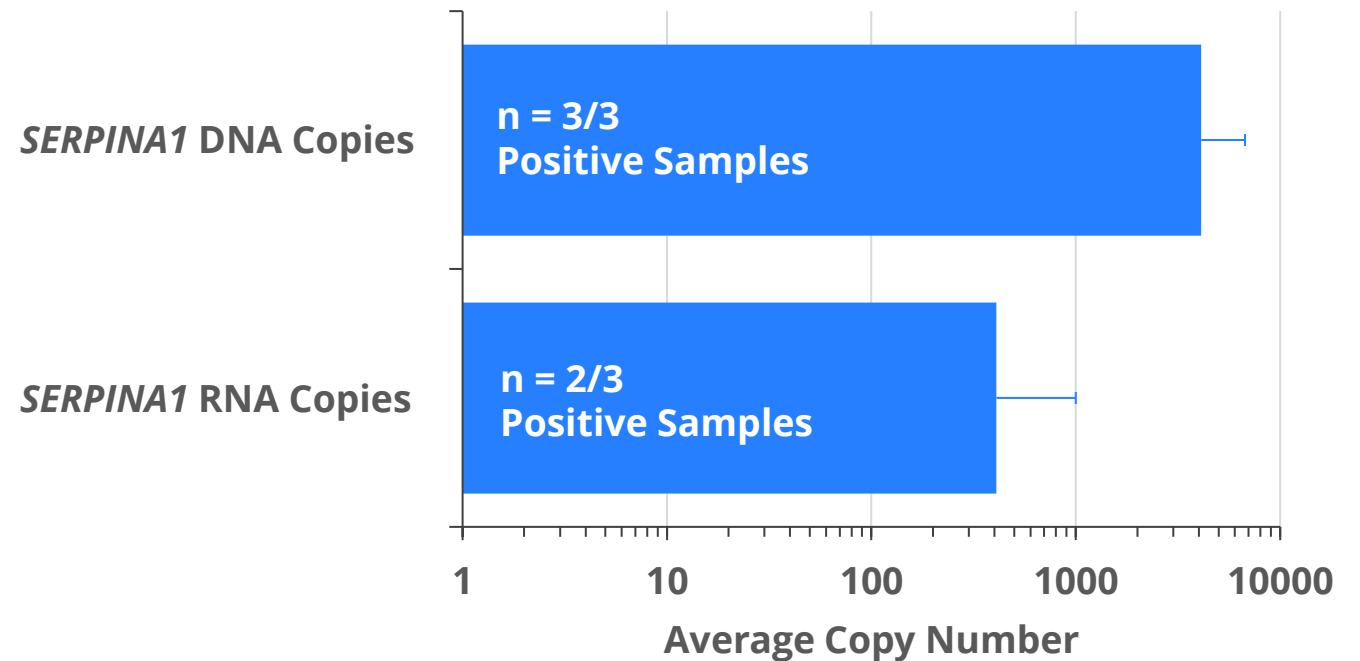
All imaging conducted at 40x magnification
Post-dose biopsies harvested 24 hours after nebulization
Biopsy locations: Baseline biopsy #2, top: lingula (left lung); Post-dose biopsy #2, middle: lower lobe, right lung; Post-dose biopsy #3, bottom: lower lobe, right lung.

Increased *SERPINA1* in Brushings Consistent with KB408 Mechanism

Lavages not successfully collected in Patient 06 but increased *SERPINA1* levels provide further evidence of successful delivery

- Challenges with lavage sample collection prevented evaluation of AAT levels in Patient 06 epithelial lining fluid
- However, KB408 transduction and *SERPINA1* expression was independently confirmed by qPCR and qRT-PCR analysis
- Assays are specific for KB408-encoded, codon-optimized *SERPINA1*
- No signal was detected from baseline samples (n = 3)

SERPINA1 DNA and RNA Levels After KB408 Dosing



Clear Evidence of Successful and Safe Gene Delivery with KB408

Positive initial data supports acceleration of KB408 and has positive read-through implications for pipeline

- ✓ **KB408 delivery via inhalation well tolerated at both dose levels tested to date**
- ✓ **Over a third of airway cells positive for AAT in both patients after single 10^{10} PFU KB408 dose**
- ✓ **Free AAT levels in ELF of over 700 nM from first patient are already in clinically relevant range**
- ✓ **Encoded AAT is functional and binds neutrophil elastase; over 50% reduction from single dose**
- ✓ **Increases in *SERPINA1* transcript levels consistent with KB408 mechanism and AAT data**

Based on positive data will simultaneously continue enrollment in Cohort 2 and open Cohort 3 to explore higher end of dose range

Cystic Fibrosis Disease Overview

A life-span shortening progressive disease of the lung

CF Prevalence & Incidence^{1,2}



105,000

CF Patients in
94 Countries



32,000+

CF Patients in
U.S. Registry

+1,000

New Cases
Annually in
U.S.

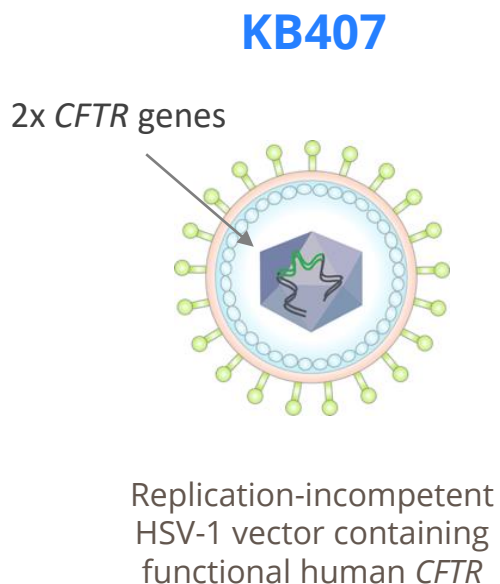
- Cystic fibrosis (CF) is a life-threatening inherited disease caused by mutations in the cystic fibrosis transmembrane conductance regulator (CFTR), leading to reduced and/or loss of CFTR function^{3,4,5}
- Progressive lung disease is the primary cause of morbidity and mortality with loss of CFTR-mediated ion transport leading to⁶
 - Airway mucus obstruction
 - Recurrent bacterial infection
 - Inflammation
- According to the U.S. Cystic Fibrosis Foundation, the median age at death for patients with CF in the United States was 36.6 years in 2022⁷
- CFTR modulators, first approved in 2012 and now used in combination, are emerging as standard of care for eligible patients⁸
- **Limitations of CFTR Modulators:** Not effective for all CFTR mutation types, heterogeneous patient response, GI / liver tolerability, frequent dosing⁸

1. U.S. Cystic Fibrosis Foundation – About Cystic Fibrosis, accessible at: [About Cystic Fibrosis | Cystic Fibrosis Foundation](#) (cff.org); 2. U.S. Cystic Fibrosis Foundation – 2022 CFF Patient Registry Highlights; 3. O’Sullivan BP, et al. *Lancet* 2009;373:1891-904; 4. Elborn JS, et al. *Lancet* 2016; 388:2519-31; 5. Sanders DB, et al. *Pediatr Clin North Am.* 2016;63:567-84; 6. Stoltz DA, et al. *N Engl J Med.* 2015, 372 (4): 351-362; 7. Cystic Fibrosis Foundation (2022) Patient Registry Annual Data Report; 8. Hapnadak SG, et al. *J Cyst Fibros.* 2020;19(3):344-354

CF, cystic fibrosis; CFTR / *CFTR*, cystic fibrosis transmembrane conductance regulator; GI, gastrointestinal; U.S., United States

KB407 Designed To Address Major Unmet Needs in CF

Multiple opportunities for KB407 to improve CF patient outcomes as mutation agnostic, redosable gene therapy



Target Segments for KB407		Estimated Patients
1	Patients ineligible for CFTR modulator therapy including CFTR null patients 10%+ of all CF patients ¹	10K
2	Patients either weakly or non-responsive to TRIKAFTA®, ppFEV₁ increase < 5% 15-25% of patients otherwise eligible for TRIKAFTA ²	19K
3	Alternate regimen for patients that poorly tolerate TRIKAFTA 5% of patients otherwise eligible for TRIKAFTA ²	5K
+	Upside: Combination therapy or direct competition with TRIKAFTA if demonstrating superior dosing, efficacy, and/or safety	All 105K

1. Krystal estimates based on CFF Patient Registry 2019, ECFS Patient Registry 2018; 2. Krystal estimates based on Middleton PG, et al. *N Engl J Med.* 2009;381:1809-1819; Heijerman HG, et al. *Lancet* 2019;394:1940-1948; Trikafta® FDA Label, Revised 10/2021

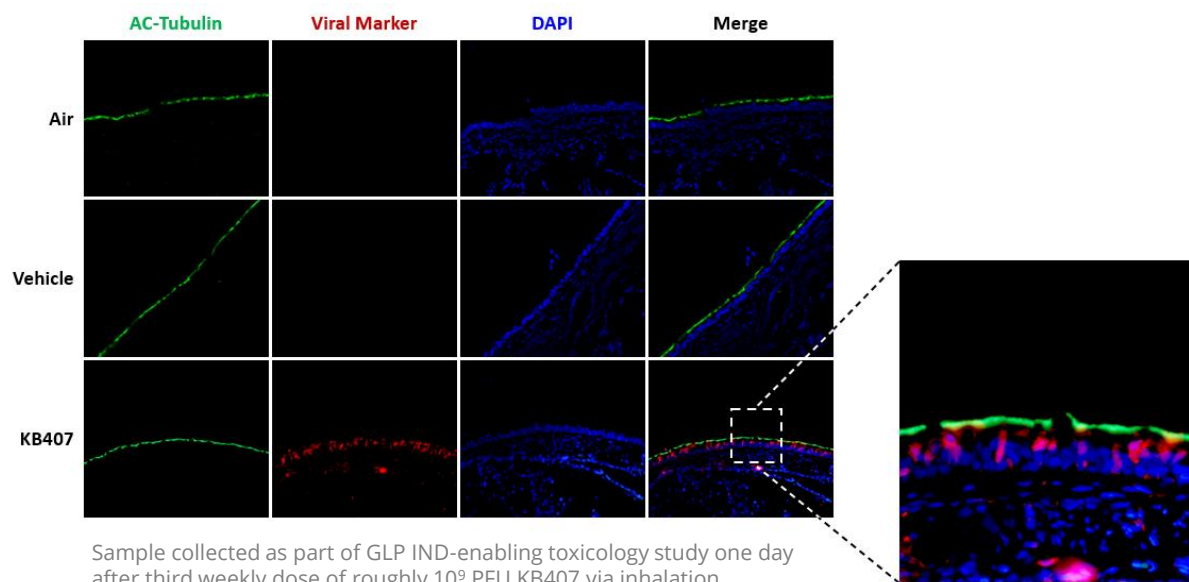
Robust Preclinical Data Package Supports Clinical Evaluation of KB407

Studies across multiple models have shown KB407 is amenable to lung delivery, well tolerated, and encodes functional CFTR

All Key Preclinical Criteria for KB407 Have Been Met

1. **Cellular Tropism:** KB407 efficiently transduces human primary airway epithelial cells leading to dose dependent *CFTR* expression
2. **Full-Length Payload:** *CFTR* protein expressed in KB407 transduced cells is full-length, properly localized, and glycosylated
3. **Functionality:** Encoded *CFTR* has shown functionality in both *in vitro* CF patient model and *in vivo* rodent model
4. **Tolerability:** KB407 well tolerated in multiple preclinical studies including in GLP IND-enabling toxicology study with repeat delivery to the lung via inhalation – **adverse level was not reached and NOAEL was top dose**
5. **Broad and Sustained *In Vivo* Expression:** KB407 was broadly disseminated in NHP lungs after delivery via inhalation and *CFTR* detected out to at least 28 days after last dose

Representative Image from NHP Lung



Sample collected as part of GLP IND-enabling toxicology study one day after third weekly dose of roughly 10^9 PFU KB407 via inhalation

KB407 recently received conditional sanctioning from CFF TDN subject to data monitoring committee charter review – no additional preclinical data requested

KB407 Phase 1 Study CORAL-1

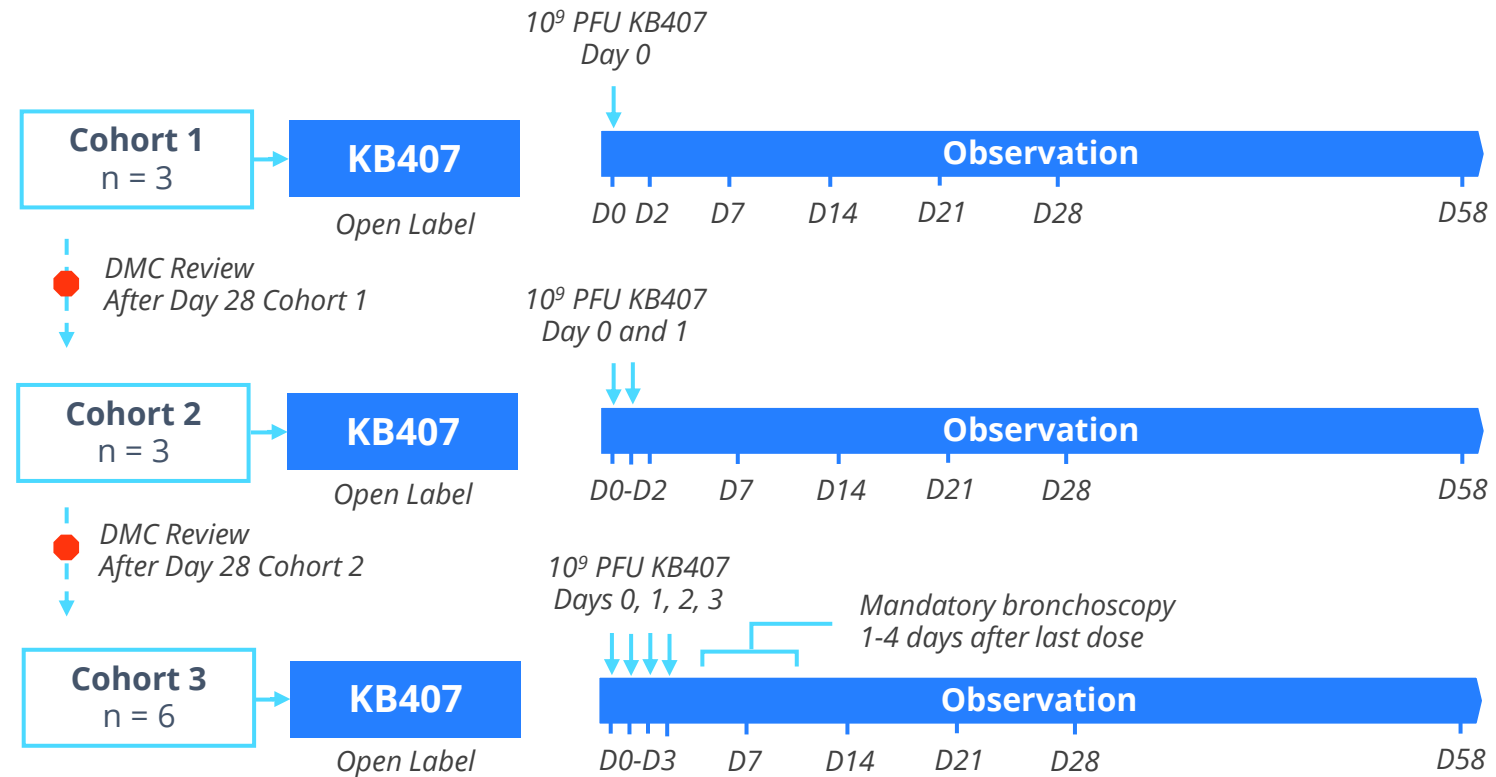
Ongoing study to assess safety and transduction efficiency of ascending doses of KB407 in adults with CF

Study Objectives

- Evaluate safety and tolerability of **ascending doses** of nebulized KB407, as well as preliminary efficacy evaluation
- KB407 transduction and *CFTR* transgene expression in lung (bronchoscopy sub-study only)
- Effects of KB407 on pulmonary function (ppFEV₁)
- Effects of KB407 on lung-specific quality of life (CFQ-R respiratory domain)
- Vector shedding and biodistribution will also be assessed in blood, urine, buccal, and sputum samples

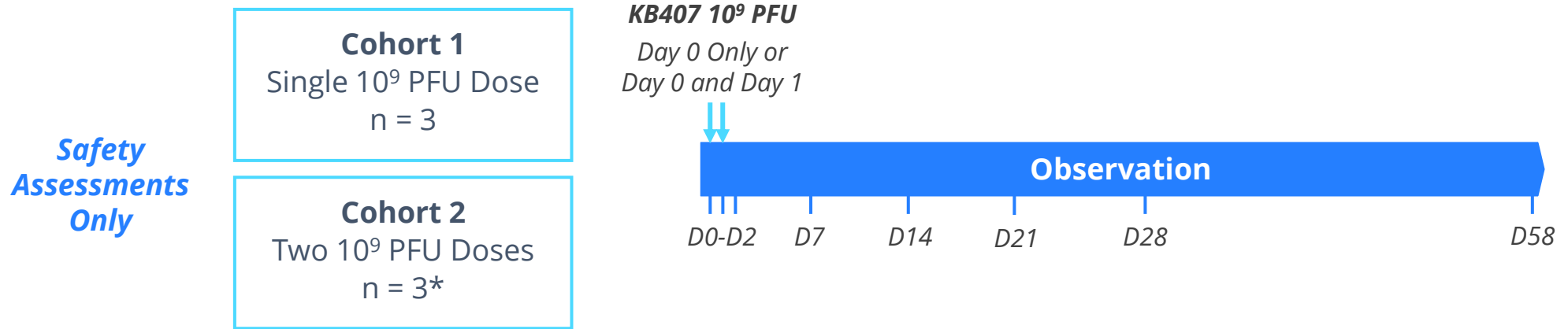
Key Enrollment Criteria

- Age ≥ 18 years with confirmed diagnosis of CF
- ppFEV₁ ≥50% and ≤100%
- Resting O₂ saturation ≥92% on room air
- **Cohort 1 and 2:** Participants may receive concurrent modulator therapy, bronchoscopy optional
- **Cohort 3:** No more than 3 out of 6 participants may be on concurrent modulator therapy, bronchoscopy mandatory



Scope of CORAL-1 Interim Safety Data Update and Patient Demographics

Safety data available from five patients dosed once or twice with KB407*



Cohort	Patient ID	CFTR Genotype	Age	Sex	Modulator Therapy
1	01-01	F508del/F508del	35	Male	Yes
	01-02	F508del/F508del	28	Female	Yes
	01-03	G551D/E60X	34	Female	Yes
2	02-01*	F508del/F508del	36	Male	Yes
	02-02	F508del/F508del	27	Male	Yes
	02-03	F508del/F508del	29	Male	No

*One patient rolled over from Cohort 1 to Cohort 2

Data cutoff date of December 6, 2024

CFTR / *CFTR*, cystic fibrosis transmembrane conductance regulator; PFU, plaque forming unit; ppFEV₁, percent predicted forced expiratory volume in 1 second

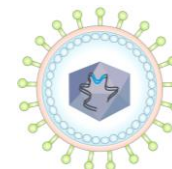
KB407 Well Tolerated in All Patients Dosed To Date

- ✓ **No serious adverse events or dose-limiting toxicities observed**
- ✓ **All KB407-related adverse events reported have been mild-to-moderate and transient**
- ✓ **No evidence of significant neutralizing antibody response following KB407 administration**
- ✓ **No systemic vector distribution after inhalation, based on blood and urine analysis**

Working Towards a Highly Differentiated Respiratory Franchise

Safe delivery of genetic cargo in Phase 1 is a key derisking event for the platform with read-through to broader pipeline

- First direct clinical evidence of safe gene delivery using HSV-1
- Well-tolerated by patient population with underlying lung disease
- Delivering full-length genes and demonstrated functionality of KB408-encoded AAT in patients with AATD
- Successfully delivered to the lung using commercially available nebulization technology - *off the shelf, non-invasive therapy*
- Redosability provides opportunity to build on efficacy over time
- KB407 sanctioning by CFF TDN will accelerate enrollment and shorten time to bronchoscopies and KB407 molecular data



Positive read though implications for all of Krystal's inhaled genetic medicines portfolio

KB408

For AATD Lung Disease

KB407

For Cystic Fibrosis

Inhaled KB707

For Solid Tumors of the Lung

+ *future pipeline opportunities*



Developing Genetic Medicines to Treat Diseases with High Unmet Medical Needs