



The Leader in Redosable Gene Therapy for Rare Disease

January 2022



Forward looking statements

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Krystal overview

A fully integrated, clinical stage gene therapy company powered by proprietary redosable gene delivery platform

Differentiated viral vector platform enables *in vivo*, repeat dose gene therapies

- Proprietary, engineered *replication incompetent* HSV-1 based platform
- Clinical data shows maintenance of safety and transgene expression after repeat dosing
- Positive external clinical and regulatory precedent with *in vivo* HSV-1 based therapy

Initial focus on rare, dermatologic indications led to rapid clinical proof of concept and pipeline

- Lead program, VYJUVEK™ (beremagene geperpavec) went from IND to Phase 3 in less than 3 years; BLA filing anticipated in 1H22, MAA shortly after
- Two lead dermatologic pipeline programs, KB104 and KB105, leverage the same vector

Broadening focus to address larger indications and new tissue types

- Ongoing Phase 1 trial in aesthetic skin indications with KB301, under our wholly owned subsidiary Jeune Aesthetics, Inc.
- Positive pre-clinical data from KB407 for cystic fibrosis demonstrates potential to target lung tissue
- Continue to drive innovation by investing in next-gen platform capabilities

In-house GMP manufacturing to support clinical and commercial needs

- Stable producer cell line developed and leveraged across pipeline has cost, scale, and regulatory benefits
- Current GMP facility near company headquarters in Pittsburgh is producing pivotal material at commercial scale; BLA readiness is underway
- Investing in additional capacity via construction of an ~150,000 sqft facility which is expected to be operational in 2022

Upcoming Milestones

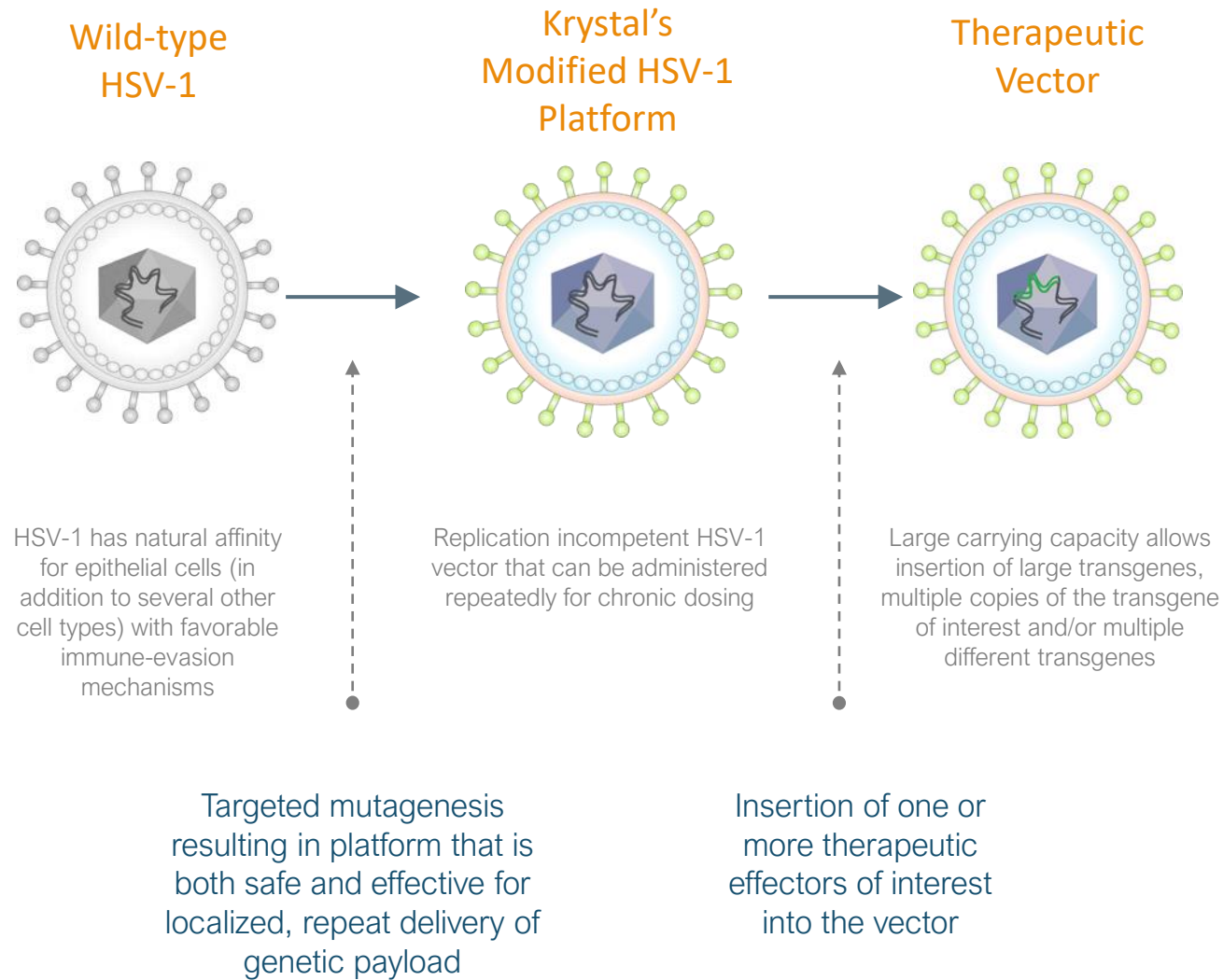
Timing	Program	Event
1Q22	KB301 for aesthetic indications	Initial POC efficacy data from Phase 1 study
1H22	VYJUVEK™ for Dystrophic EB	File BLA with US FDA
1H22	VYJUVEK™ for Dystrophic EB	Present more detailed GEM-3 results at medical congress
1H22	KB407 for cystic fibrosis	Initiate Phase 1 clinical trial in Australia
2H22	VYJUVEK™ for Dystrophic EB	Fila MAA with EMA
2H22	KB407 for cystic fibrosis	File IND / Initiate clinical trial in US
2022	KB105 for TGM1-ARCI	Initiate dosing in next Phase 1/2 cohort
2022	KB104 for Netherton	File IND and initiate clinical trial

All pipeline compounds are investigational, being evaluated in clinical or pre-clinical studies.

**Our technology platform enables
noninvasive, redosable gene therapy**



HSV-1 is positively differentiated vs. other gene therapy technologies



Vector Platform Comparison

	LV	AAV	HSV-1	LNP
<i>In vivo</i> dosing	No	Yes	Yes	Yes
Baseline antibody exclusion criteria	No (if <i>ex vivo</i>)	Yes	No	No
Repeat-dose capabilities	Yes (if <i>ex vivo</i>)	No	Yes	Yes
Carrying capacity	8 kb ¹	<4 kb ¹	>30 kb	~12 kb ²
Integrates payload into host cell DNA	Yes	No	No	No
Regulatory precedent	Yes	Yes	Yes	Yes

1. Lundstrom, K. Viral Vectors in Gene Therapy. *Diseases* 2018, 6, 42.

2. Generation Bio (GBIO) Prospectus. (2020, June 11). Retrieved September 4, 2020, <https://www.sec.gov/Archives/edgar/data/1733294/000119312520167812/d924849d424b4.htm>

LV = lentivirus

AAV = adeno-associated virus

HSV-1 = Herpes Simplex Virus type 1

LNP = lipid nanoparticle

Therapeutic pipeline

Dermatology

Respiratory

Product	Protein	Indication	Discovery	Preclinical	Phase 1/2	Phase 3	Key Upcoming Milestone	Ownership
VYJUVEK™ †•Δ‡§	Type VII collagen (COL7)	Dystrophic EB					File BLA in 1H22; MAA in 2H22	Wholly owned
KB105 †•‡	Transglutaminase 1 (TGM1)	TGM1-deficient ARCI					Initiate next Phase 2 cohort in 2022	Wholly owned
KB104 ‡	Serine Peptidase Inhibitor Kazal Type 5 (SPINK5)	Netherton Syndrome					File IND in 2022	Wholly owned
KB1XX	Undisclosed programs							Wholly owned
KB5XX	Vectorized antibodies	Chronic conditions						Wholly owned
KB407 †•‡	Cystic fibrosis transmembrane conductance regulator (CFTR)	Cystic fibrosis					Initiating Phase 1 study in 1H22	Wholly owned
KB408	Alpha-1 antitrypsin (AAT)	Alpha-1 antitrypsin deficiency						Wholly owned
KB4XX	Undisclosed programs							Wholly owned

All pipeline compounds are investigational, being evaluated in clinical or pre-clinical studies.

†: FDA Orphan Drug Designation;

Δ: FDA RMAT designation;

‡: FDA Rare Pediatric Disease Designation;

‡: EMA Orphan Drug Designation;

•: Fast-track Designation;

§: EMA PRIME Designation.



Program	Indication	Gene	Discovery	IND Enabling	Clinical Development	Next Milestone
KB301	Skin quality (face)	type III collagen (COL3)	→			Phase I efficacy data in 1Q22
KB302	TBA	type I collagen (COL1)	→			
KB303	TBA	elastin (ELN)	→			
KB304	TBA	COL3 + ELN	→			

All pipeline compounds are investigational, being evaluated in clinical or pre-clinical studies.

Platform supported by in-house manufacturing capacity and expertise

Established process conducted at Krystal's end-to-end GMP facility (Ancoris)

- Maintains control of IP/trade secrets relating to manufacturing process
- Adheres to internal process and production schedules, avoiding use of high demand gene therapy CMOs

Upstream process using stable producer cell lines has cost and regulatory benefits

- Stable complementary cell lines developed in-house are used in established methods for production of consistent batches
- Eliminates the need for multiple cGMP qualifications of plasmids and variability in transfection efficiency from batch to batch
- Scalable from clinical phase to commercial

We have successfully developed a robust and reproducible downstream process

- Work conducted in an aseptic closed system process
- The same process is leveraged across pipeline with minimal redevelopment effort between product candidates
- Compliant with global regulatory requirements



Initial focus on rare skin diseases led to rapid clinical POC and pipeline



Dystrophic epidermolysis bullosa (DEB)

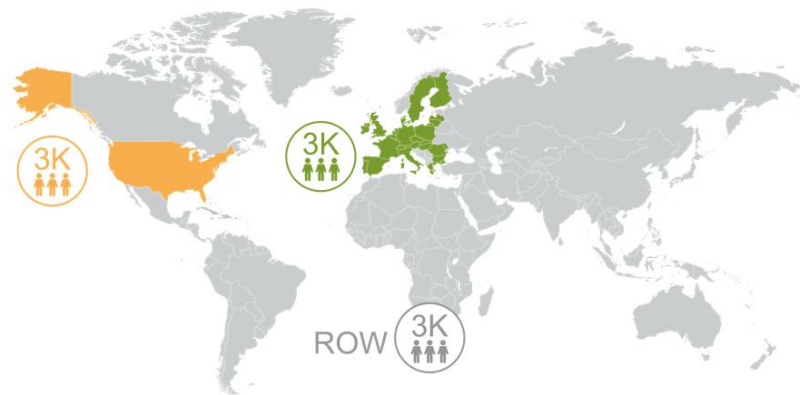
"Butterfly Children" is often used to describe young DEB patients because their skin is as fragile as a butterfly's wings

Dystrophic Epidermolysis Bullosa

- A rare, genetic skin disease that causes skin to tear or blister from minor contact
- Mutations in the *COL7A1* gene lead to absent or dysfunctional COL7 protein, without which the epidermis does not anchor to the dermis
- The recessive form (RDEB) is the classic, most severe form of the condition. Dominant DEB (DDEB) has a broader range in severity and is often characterized by blistering on the hands, feet, knees, and elbows



Epidemiology:



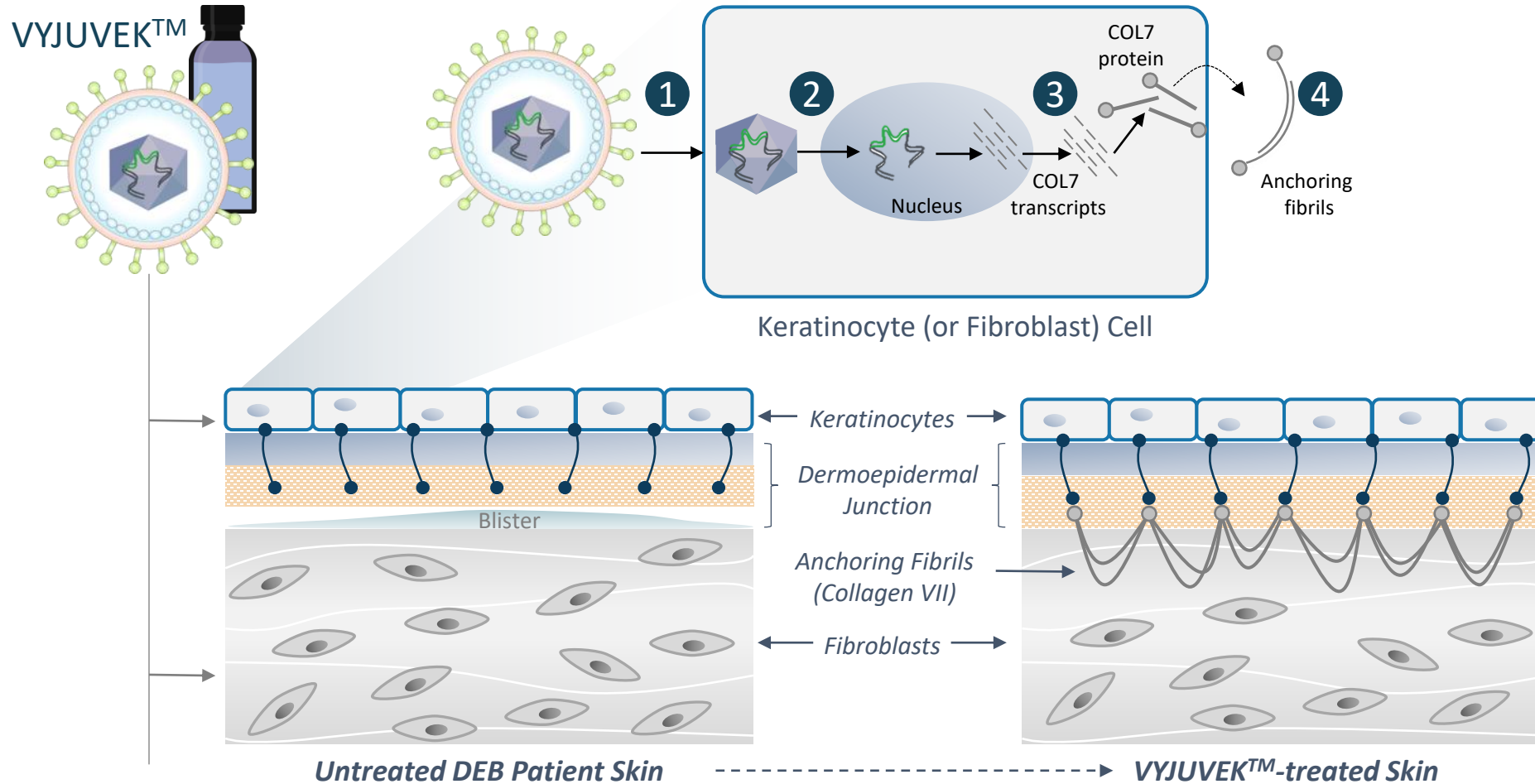
Current Standard of Care

- There are no approved treatments for DEB
- Existing therapies limited to expensive and time-consuming palliative treatments
- Palliative treatments cost \$200k – \$400k annually^{1,2}

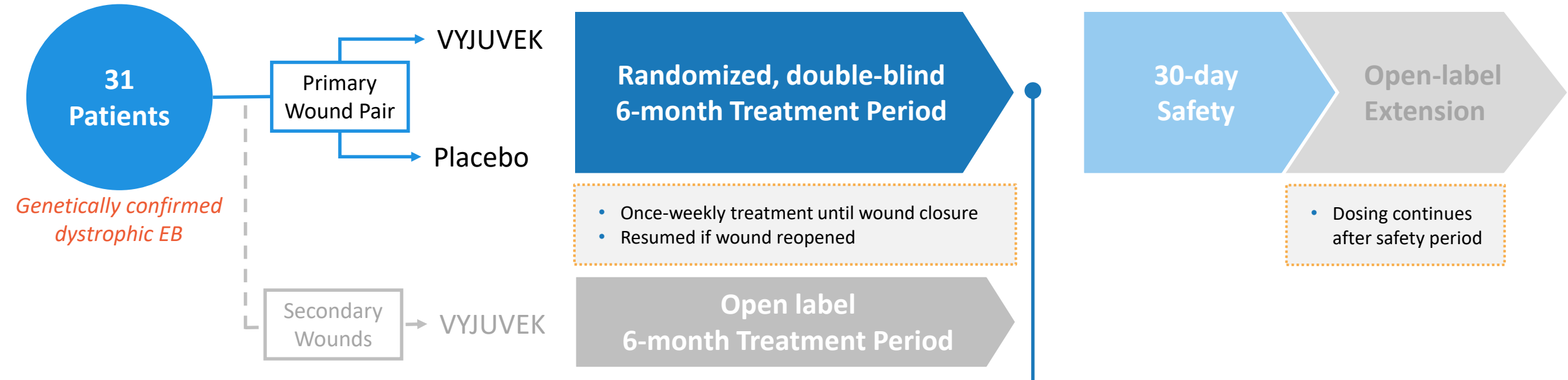
1. Rashidghamat E., Mellerio J.E., Management of chronic wounds in patients with dystrophic epidermolysis bullosa: challenges and solutions, Chronic Wound Care Management and Research Volume 2017:4, 45-54
2. GENEGRIFT Report Summary. (2015, February 16). Retrieved December 13, 2016, from http://cordis.europa.eu/result/rcn/156078_en.html

VYJUVEK™ (beremagene geperpavec) for DEB

Topically applied VYJUVEK gel is designed to induce local COL7 expression and molecular correction



GEM-3 evaluated weekly VYJUVEK™ or Placebo in dystrophic EB patients



Primary Efficacy Endpoints

- Complete wound healing at Week 22 and Week 24; or at Week 24 and Week 26 (six-month timepoints)

Secondary Efficacy Endpoints

- Complete wound healing at weeks 8 and 10, or 10 and 12 (three-month timepoints)
- Mean change in pain severity (VAS or FLACC-R Scale) associated with wound dressing changes

Demographics

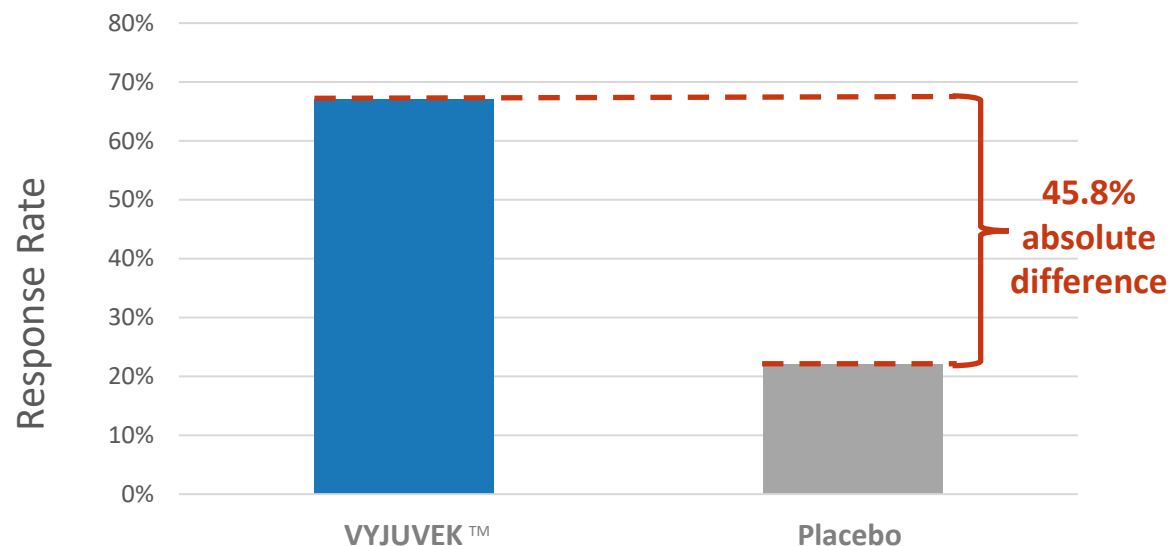
- 31 patients, each with one primary wound pair were enrolled and included in the intent-to-treat (ITT) analysis
- Enrolled patients ranged from 1 year old to 44 years old at baseline; 61% of the patients enrolled were pediatric (≤ 18 years old)
- Less than ten percent 10% of enrolled patients had the dominant form of dystrophic epidermolysis bullosa (DDEB)

Topline Ph3 safety data summary

- 1 **Topical VYJUVEK™ was well tolerated with a safety profile consistent with prior studies**
- 2 **No drug-related serious AEs or discontinuations due to treatment were reported**
 - One mild drug-related AE was reported during the trial
- 3 **Immunogenicity profile (as measured by anti-HSV-1 and anti-COL7 antibodies) was consistent with prior studies**

Topline Ph3 efficacy data summary

Met **primary endpoint** of complete wound healing at 6-month timepoints (ITT; N=31 primary wound pairs)

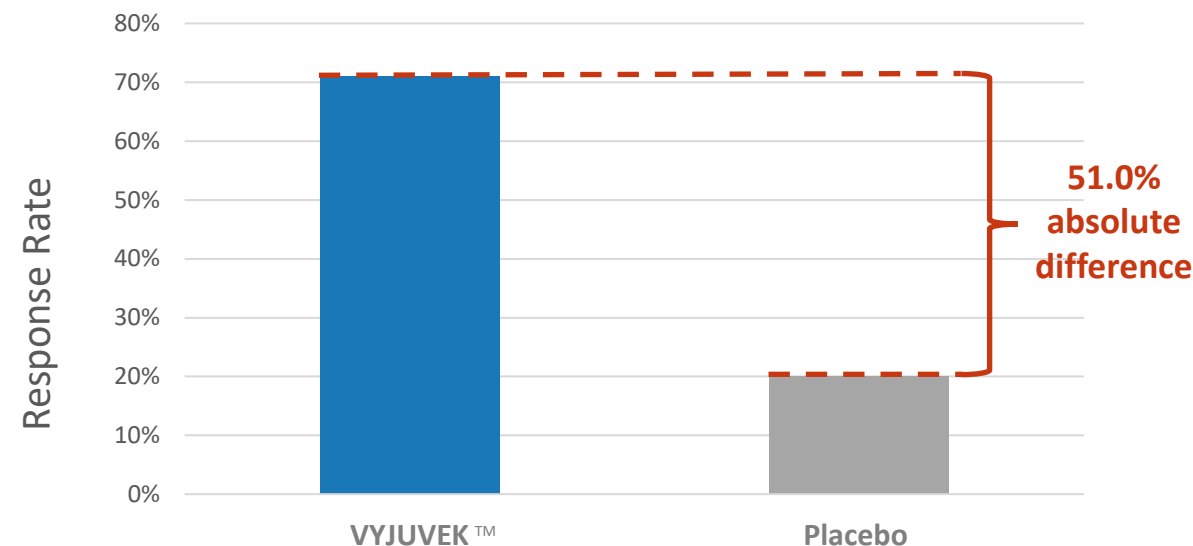


Response Rate*	67%	22%
Absolute Difference	45.8%	
95% Confidence Interval	23.6%-68.0%	
p-value**	<0.005	

*Response rate numbers rounded to whole values

**Based on McNemar test

Met **secondary endpoint** of complete wound healing at 3-month timepoints (ITT; N=31 primary wound pairs)



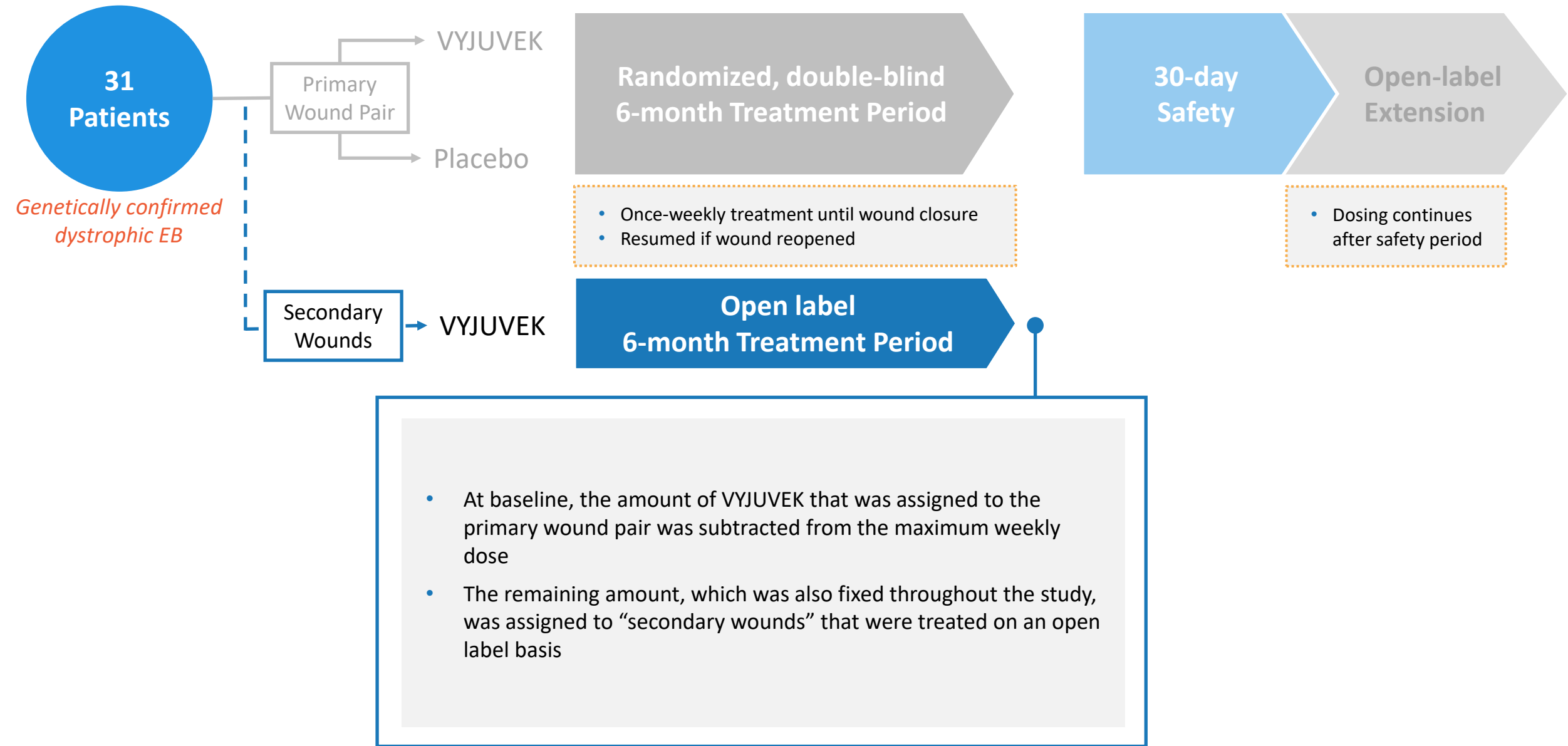
Response Rate*	71%	20%
Absolute Difference	51.0%	
95% Confidence Interval	29.3%-72.6%	
p-value**	<0.005	

*Response rate numbers rounded to whole values

**Based on McNemar test

- In an ad-hoc analysis, the trial also demonstrated a statistical difference between the active and placebo groups for wounds that demonstrated complete wound healing at both the three and six-month timepoints (p<0.005)

Secondary wounds received open-label VYJUVEK™ throughout the study



Secondary wound (Illustrative)

Large, chronic back wound in 21 year old RDEB patient



Baseline



End of Study

VYJUVEK is an investigational therapy being studied in clinical trials

Secondary wound (Illustrative)

Recurring foot wound in 34 year old RDEB patient



left foot



Right foot

Baseline



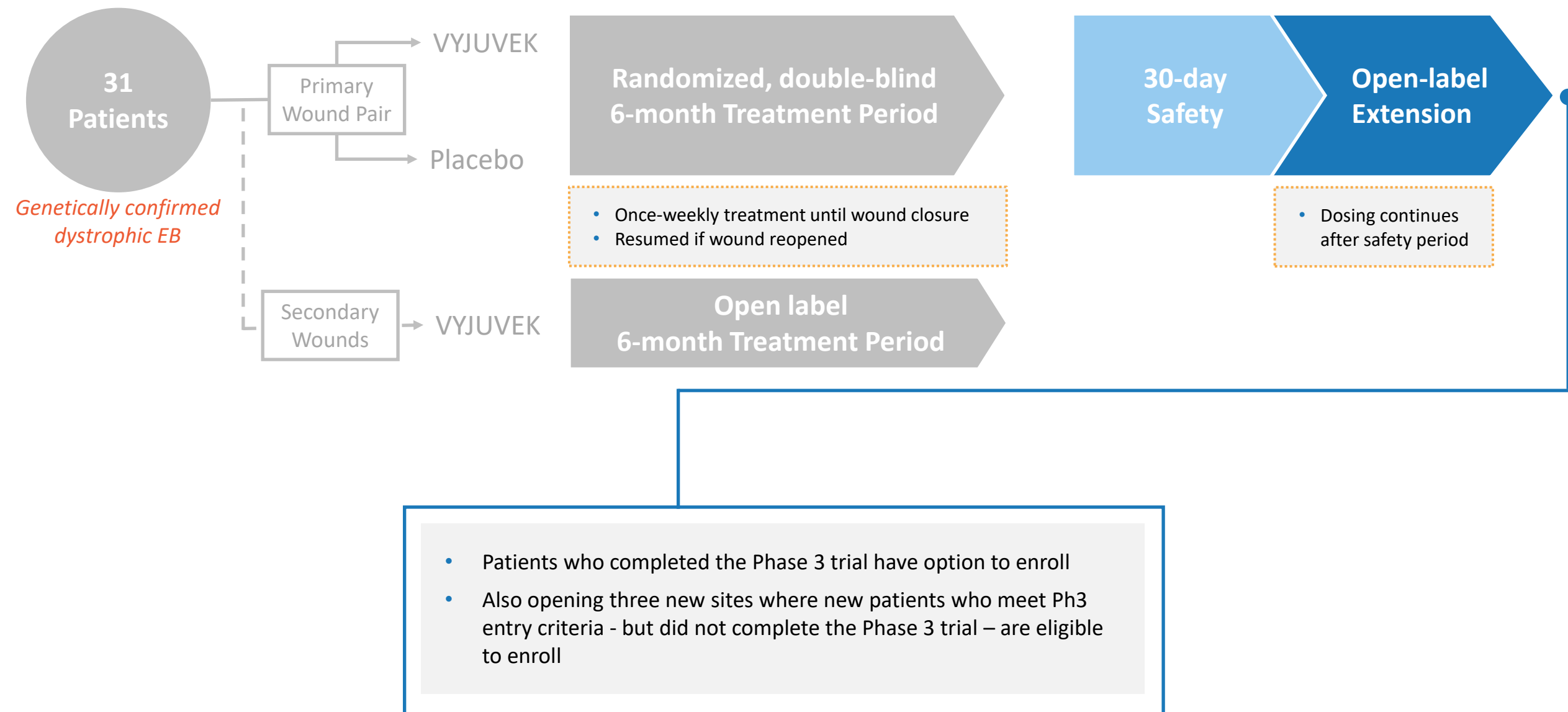
left foot



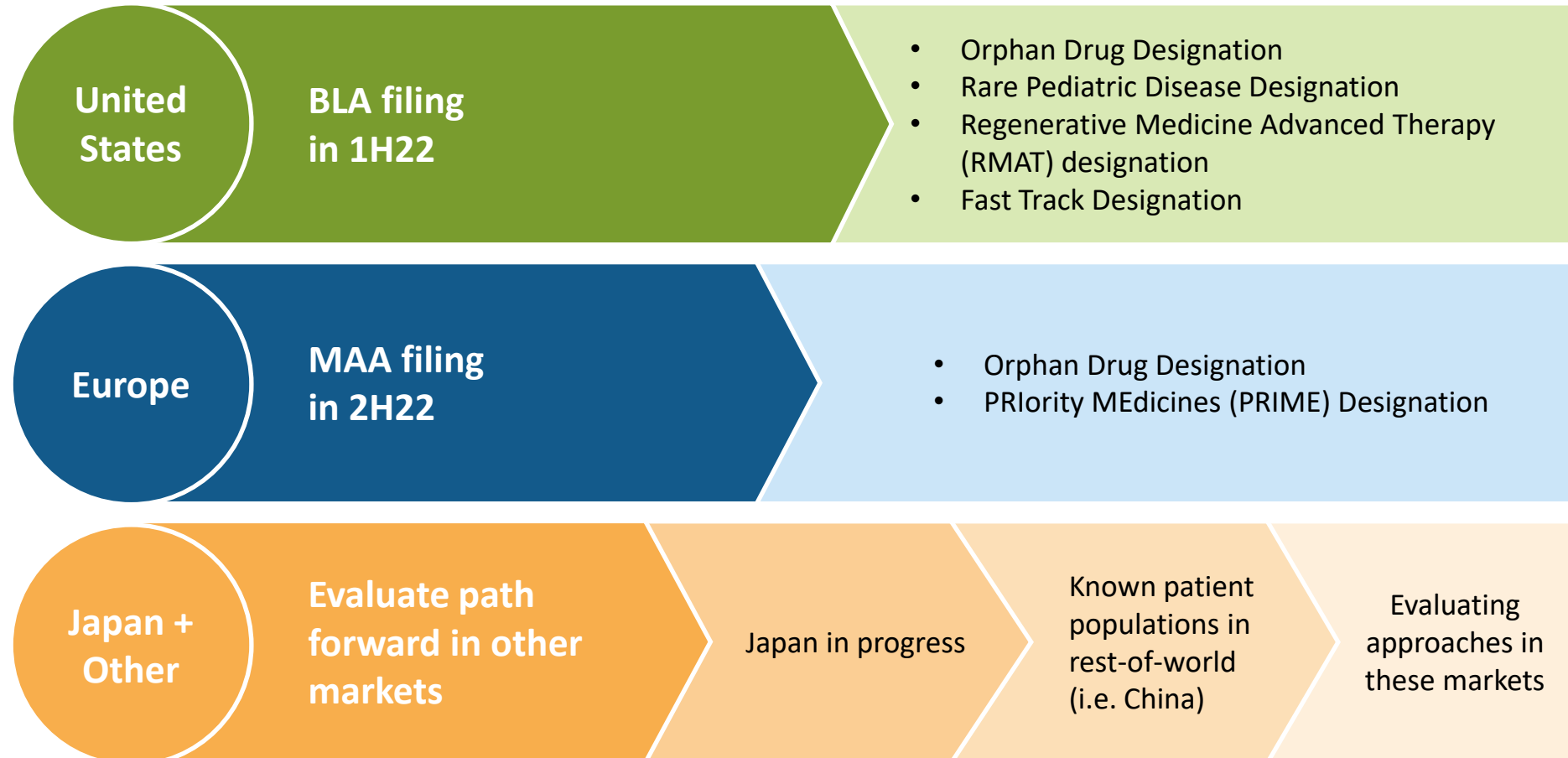
Right foot

End of Study

Open-label extension ongoing



VYJUVEK™ regulatory next steps



Autosomal Recessive Congenital Ichthyosis associated with TGM1 mutations

Transglutaminase-1 deficiency is associated with increased mortality in the neonatal period and has a dramatic impact on quality of life

Autosomal Recessive Congenital Ichthyosis (ARCI) Associated with TGM1

- The most common form of ARCI is caused by an inactivating mutation in the TGM1 gene encoding the enzyme transglutaminase-1, a protein that is essential for the proper formation of the skin barrier
- The condition is characterized by thick, dry, scaly skin, increased trans-epidermal water loss (TEWL), risk for dehydration, sepsis, skin malignancies, etc



Epidemiology¹⁻⁸

- **Prevalence:** There are approximately 20,000 people affected by TGM1 related ichthyosis worldwide (~1,800 US; 3,000 EU; 18,000 ROW)
- **Incidence:** It is estimated that around 350-400 babies are born with the condition each year, worldwide

Current Standard of Care

- There are no approved treatments for ARCI associated with TGM1
- Topical and systemic retinoids and time-consuming supportive treatments (up to 4 hours a day of skin care) are most often used

1. Rodriguez-Pazos et al. *Actas Dermosifiliogr*. 2013 May;104(4):270–284;

2. Dreyfus et al. *Orphanet J Rare Dis*. 2014 Jan 6;9:1;

3. Hernandez-Martin et al. *J Am Acad Dermatol*. 2012 Aug;67(2):240–244;

4. Pigg et al. *Eur J Hum Genet*. 1998 Nov-Dec;6(6):589–596.

5. Pigg et al. *Acta Derm Venereol*. 2016 Nov 2;96(7):932–937;

6. Orphanet;

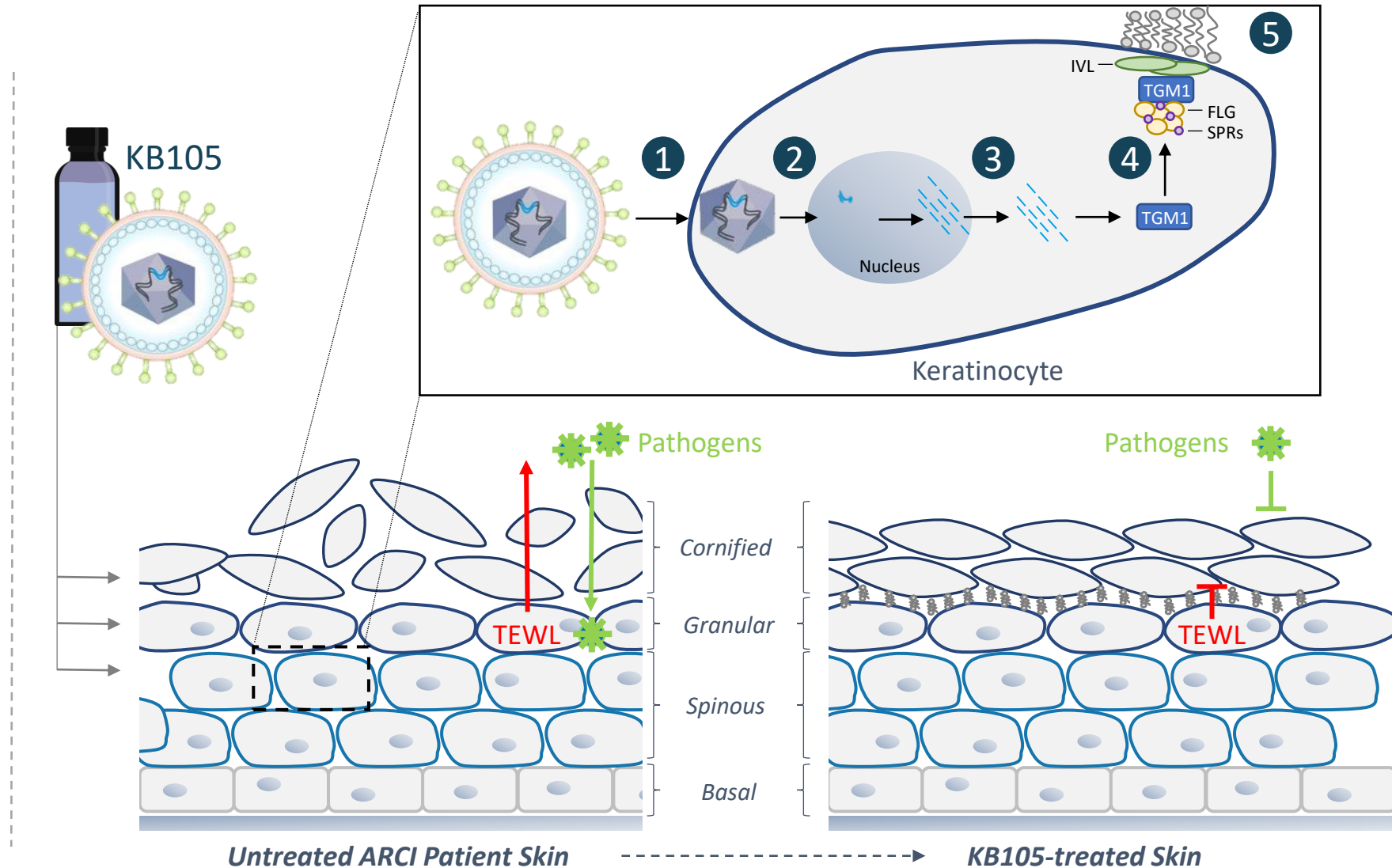
7. Foundation for Ichthyosis & Related Skin Types (FIRST);

8. National Organization for Rare Disorders (NORD).

KB105 for TGM1 associated ARCI

Topically applied KB105 delivers multiple copies of the human transglutaminase 1 ("TGM1") gene

- 1 KB105 enters permeabilized skin and transduces keratinocytes (native TGM1-producing cells)
- 2 KB105 is transported into the nucleus of transduced cells and the vector genome is deposited (episomally)
- 3 *TGM1* transcripts are generated, which allows the cell to produce functional TGM1 protein that localizes to the cell membrane
- 4 TGM1 crosslinks target proteins (e.g., filaggrin (FLG), involucrin (IVL), small proline-rich proteins (SPRs)) to aid in the formation of the cornified cell envelope
- 5 This layer, known as the stratum corneum, acts as a mechanical barrier to protect against transepidermal water loss (TEWL) and entry of infectious agents



KB105 is an investigational therapy being studied in clinical trials

KB105 is being evaluated in a Phase 1/2 study

Design

- The Ph1/2 trial (NCT04047732) is an open label, intra-patient comparison of KB105 and placebo
- Each patient on-study for four to six months
- *Study PI: Dr. Amy Paller (Northwestern University)*

Enrollment

- 4 TGM1-ARCI subjects were enrolled across 2 sites; three Ph1 patients were enrolled at Paddington Testing Company (Philadelphia); one Ph2 subject was enrolled at Northwestern (Chicago)

Dosing

- In the Ph1 portion (n=3) one or two ~20cm² target areas were administered placebo, and 3 target areas were administered 2x10⁹ PFU with varying frequency over ~60 days
- In Ph1, topical and microneedle administration was evaluated; in Ph2 topical administration will be utilized
- In the Phase 2 portion (n=1) four ~100cm² treatment areas were administered KB105, either 4x10⁹ PFU or 1x10¹⁰ at either a high or low dosing frequency

Key Endpoints

Safety measures

- AEs, including clinically significant changes in laboratory results, vitals, and physical exam findings
- Viral shedding analyzed through the collection of blood, urine, and skin swabs; antibodies to HSV and TGM1 analyzed through collection of serum

Efficacy measures

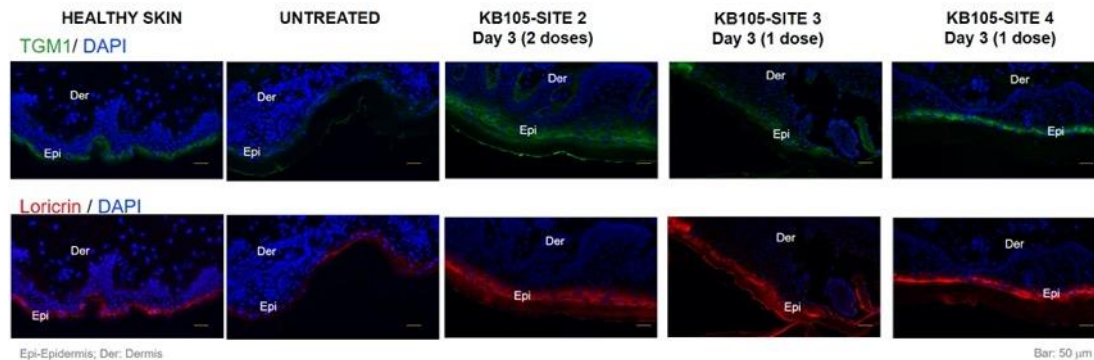
- Level of transglutaminase 1 in KB105-administered skin as measured by immunofluorescence microscopy (Ph1)
- Improvement of disease severity in the treatment area assessment through Investigator's Global Assessment (IGA)

Phase 1/2 data shows repeat dosing of KB105 to be well tolerated; molecular and phenotypic improvement evident

KB105 Was Well Tolerated and Generated Functional TGM1 protein

- Repeat dosing with KB105 was well tolerated with no drug related AEs and no immune response to HSV or TGM1
- No vector shedding detected in swabs, blood or urine in all three patients
- Biopsies assessed in the Phase 1 portion of the study show:
 - KB105 treatment restored functional TGM1 protein expression and activity in all treated sites
 - KB105-expressed TGM1 was correctly localized in the epidermis, colocalizing with Loricrin, and was functionally active
 - qPCR, IF, and in situ analyses demonstrated similar delivery efficacy of TGM1 DNA from single and repeat administration

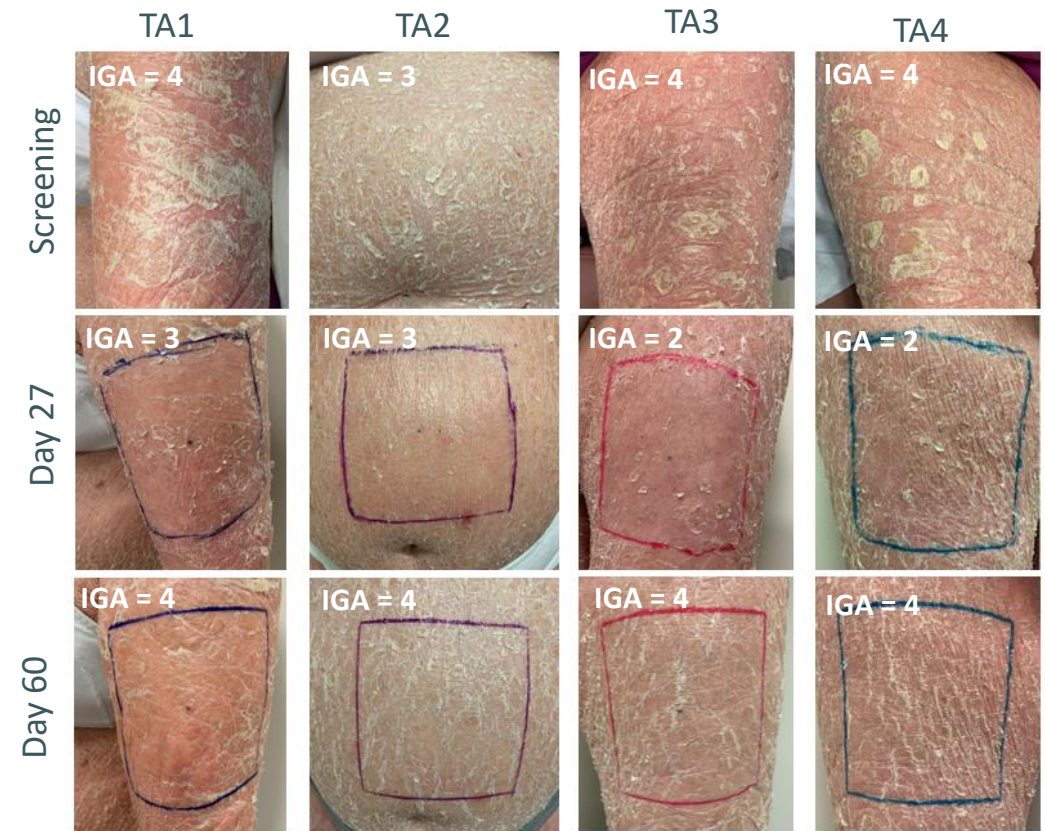
Subject 1: Treatment Restored TGM1 Expression to Normal Levels



- TGM-1 turnover was observed to be variable and rapid, and pharmacokinetic data suggested that the optimal dosing frequency may be more frequent

Maximum 2-point Improvement in IGA Scale as Compared to Screening Observed at Day 27 at High Dose

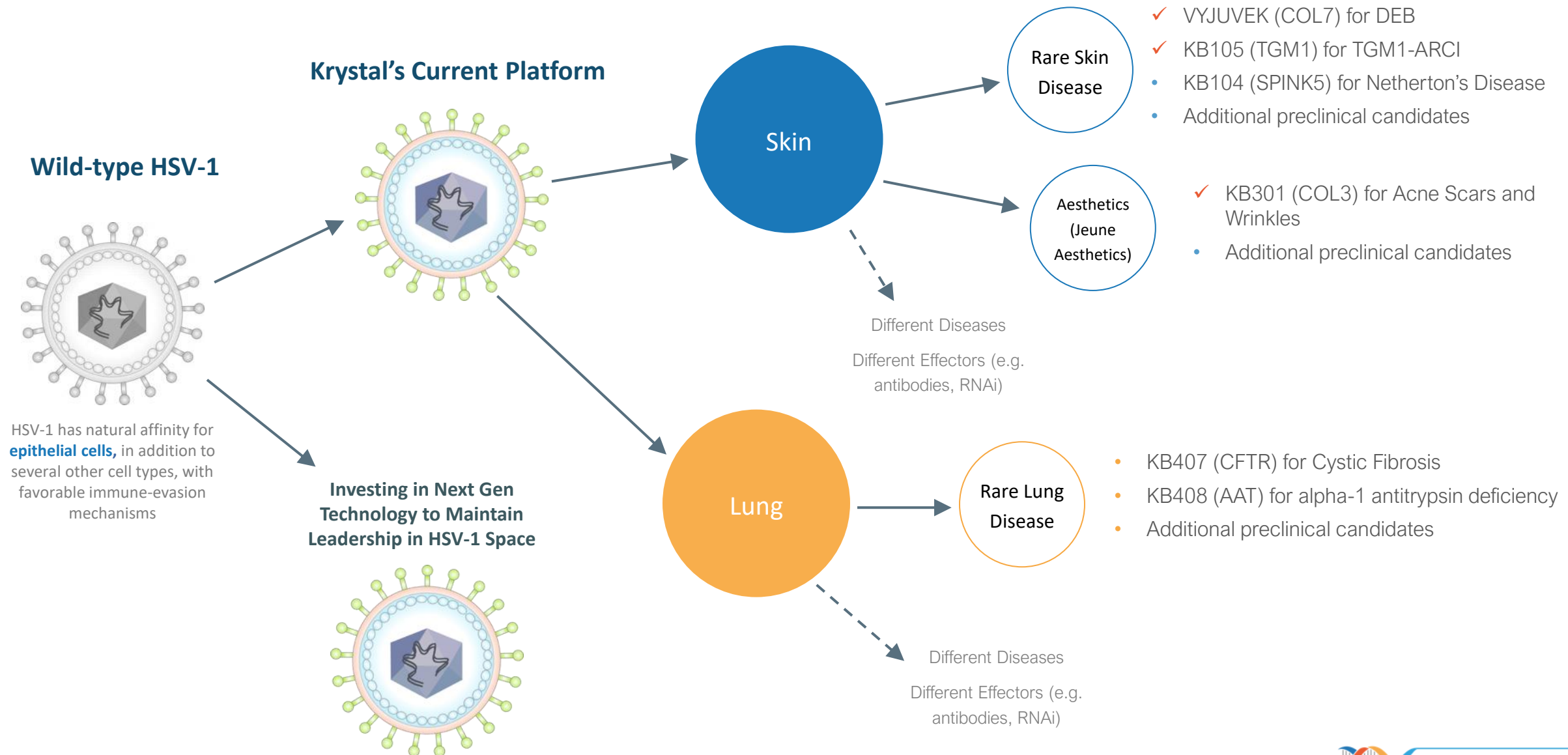
- In the Phase 2 portion (n=1) four ~100cm² treatment areas (TAs) were administered KB105, either 4x10⁹ PFU or 1x10¹⁰ at either a high or low dosing frequency





Leveraging platform to target new tissues and larger indications

HSV-1 has potential beyond rare skin diseases



KB407 for cystic fibrosis

Gene therapy approaches have been tried and failed in their attempts to replace CFTR protein

- Viral (adenovirus and AAV) and non-viral (DNA plasmids and stabilized mRNA) approaches have been tested in more than 25 clinical trials enrolling >470 patients
- Past approaches suffer from some combination of physical limitations for large cargo, low efficiency of gene transfer, toxicity, immune intolerance, product instability, and burdensome delivery

We are developing KB407 as an inhalable, repeat dose gene therapy that delivers the full human CFTR gene

- ✓ Replication incompetent HSV-1
- ✓ Delivers two copies of full length, human CFTR protein (mutation agnostic approach)
- ✓ Duration of nebulization expected to be under 30 minutes, using a commercially available nebulizer
- ✓ Episomal delivery of CFTR gene does not disrupt cell DNA
- ✓ Ability to re-dose and/or adjust dose over time as lung cells turnover

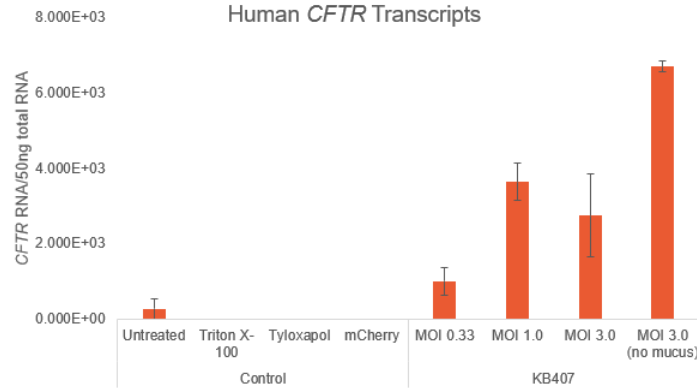
Our vector can be formulated and delivered via nebulizer with no significant change in activity

- In vitro data shows KB407 can be nebulized, successfully transduce target lung cells and induce expression of fully functional and properly localized CFTR

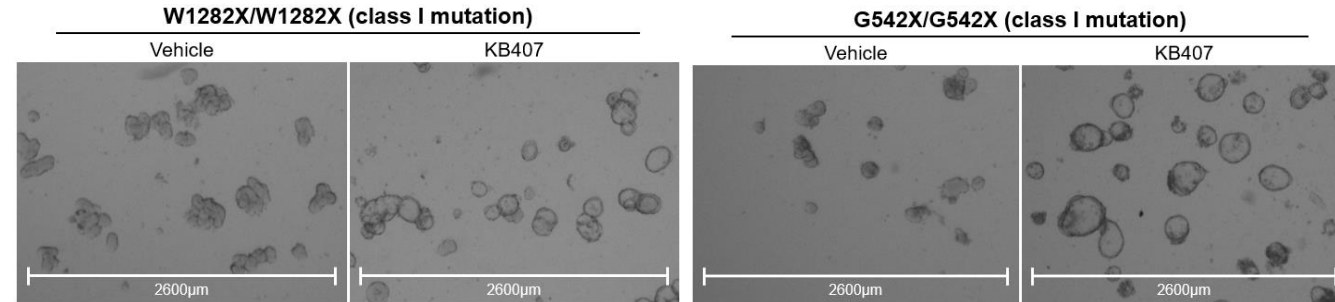


In vitro and in vivo data supportive of initial clinical testing

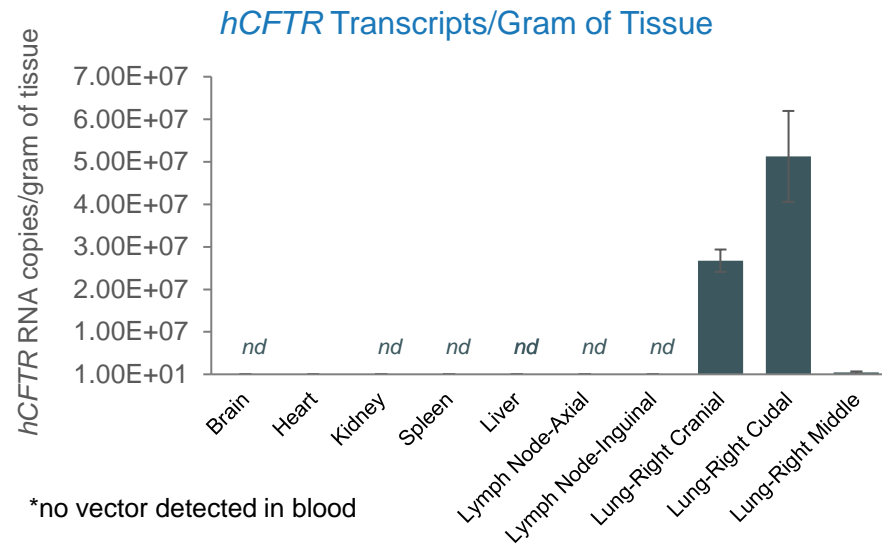
KB407 transduction and CFTR expression is similar with or without presence of mucus in ALI culture



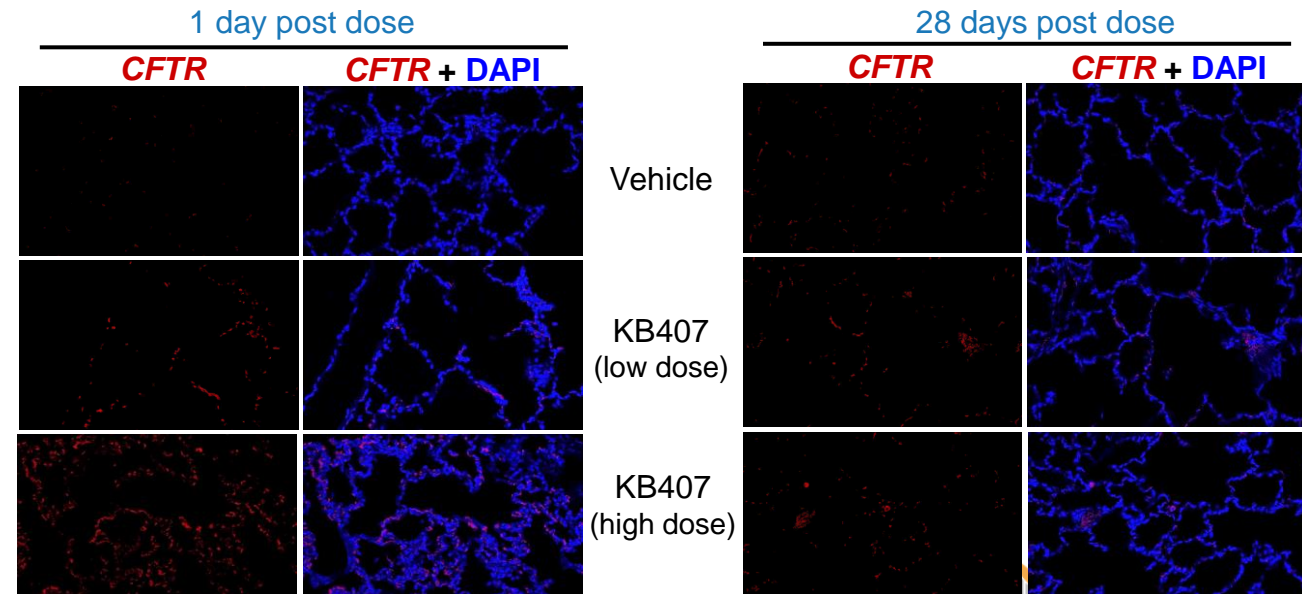
Treatment with KB407 rescued CF-patient derived organoids, restored to wild-type phenotype



Nebulized KB407 was distributed throughout the lung, with no evidence of systemic distribution



Dose dependent *CFTR* expression via FISH was observed and durable for at least 28 days



In Vitro
CF-patient
derived cell
culture)

In Vivo
nonhuman
primates

KB301 for aesthetic indications

KB301 and other discovery programs in Aesthetics, are housed in our wholly owned subsidiary, Jeune Aesthetics, Inc.



KB301 aims to increase neocollagenesis, thereby correcting the underlying molecular defect of the aged phenotype

- Dermal collagen, composed primarily of types 1 and 3 collagen fibrils, represents >90% (dry weight) of human skin
- Declining levels of collagen are caused by reduced collagen biosynthesis and increased collagen fibril fragmentation resulting from both intrinsic and extrinsic pressures
- KB301 is designed to deliver the gene for full-length type III collagen (COL3), to enable increased endogenous COL3 production

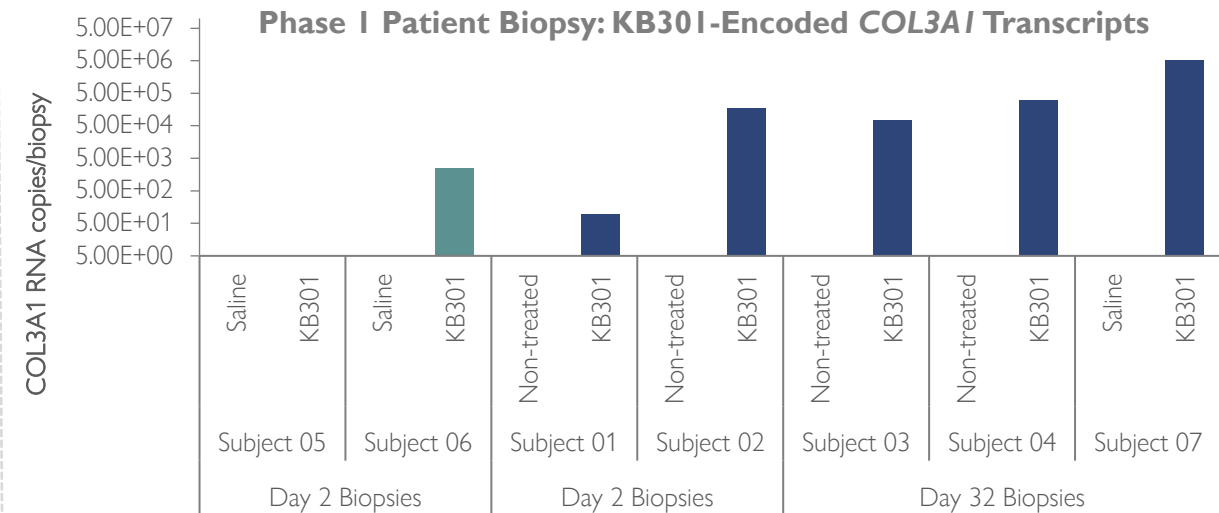
KB301 is currently being evaluated in a Phase 1 trial (NCT04540900)

- The open label, dose ranging study will evaluate repeat dosing of KB301 injections
- Safety data from Cohort 1 (repeat KB301 injections into the buttock region) was reported at SID 2021
- Cohort 2 is currently enrolling and will evaluate efficacy of repeat doses of KB301 on the face and knees
 - Change in skin quality from baseline will be assessed via the Skin Roughness Score (SRS)¹, Fine Lines Score (FLS)², and the Subject Satisfaction Score (SSS). Skin calipers will be used to measure the change in skin thickness over the knee

1. Donofrio L, Carruthers A, Hardas B, et al. Development and validation of a photonumeric scale for evaluation of facial skin texture. *Dermatol Surg.* 2016;42(suppl 1):S219–S226.
2. Carruthers J, Donofrio L, Hardas B et al. Development and validation of a photonumeric scale for evaluation of facial fine lines. *Dermatol Surg.* 2016;42:S227–S234. 101

Initial data from Cohort 1 of the Phase 1 study shows safety and tolerability of repeat KB301 injections

- Repeated intradermal injections of KB301 were well tolerated.
- Recorded adverse events were transient and limited to expected mild or moderate injection site or biopsy site reactions (e.g. erythema, site pain, purpura, ecchymosis)
- For all subjects who have completed follow up through day 90 (subjects 1-6; subject 7 follow up ongoing) no clinically significant changes in anti-drug antibodies were observed



- KB301-encoded COL3A1 expression measurable at the mid and high dose, with no detectable expression in control samples
- Expression was evident by day 2 following the first dose; expression levels were similar following the first and second dose

Financials and Milestones

Krystal summary

A fully integrated, clinical stage gene therapy company powered by proprietary HSV-1 vector technology

Current Status and Milestones

Rare Skin

- **VYJUVEK™**: BLA filing in US in 1H22, MAA filing in EU in 2H22
- **KB105**: Phase 2 study ongoing; Initiation of dosing in next Phase 2 cohort in 2022
- **KB104**: IND filing in 2022

Jeune Aesthetics, Inc

- **KB301**: Phase 1 trial in aesthetic skin indications ongoing; initial Phase 1 efficacy data anticipated in 1Q22

Rare Lung

- **KB407**: Phase 1 trial being initiated in Australia in 1H22; US IND filing anticipated in 2H22

Platform

- **Manufacturing**: Ancoris facility currently supplying all clinical material and will supply initial phase of VYJUVEK launch; Astra facility (150,000 sqft) construction underway, completion anticipated in 2022
- **Next Gen Tech**: Evaluation of novel effectors, routes of administration, and tissue tropism underway

September 30, 2021 cash balance of \$362.3M

- Completed secondary offering in December 2021 with proceeds net of underwriting fees of \$202M, which includes net proceeds from the underwriter's option to purchase additional shares of \$14M
- VYJUVEK, KB105, KB104 and KB407 are PRV eligible



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January 2022

