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Corporate Presentation

August 16, 2021

Legal disclaimer

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Examples include statements that the Phase 1/2 dose confirmation trial for FLT180a is expected to be initiated by the end of 2021 and provide a data readout in 2022, that the Phase 3 pivotal trial is expected to be initiated by the middle of 2023, that a Biologics License Application (“BLA”) filing for FLT180a is expected to be made by the end of 2024, that the Company will be able to present durability data for up to four years from its Phase 1/2 B-AMAZE clinical trial in 2021, that the Company’s immune-management regimen will be successful in preserving Factor IX (“FIX”) activity levels in the normal range or eliminating the need for FIX supplementation, that the Company will be able to progress dose escalation of FLT190 in its current Phase 1/2 clinical trial and provide a data readout in 2021 or at all, that the Company will be able to initiate the Phase 1/2 dose-finding clinical trial for FLT201 in 2021, that FLT210 has the potential to deliver more stable Factor VIII activity or that such activity will be demonstrated in human clinical trials, that the Company will be able to complete IND/CTA-enabling studies for FLT210 in 2021, or that the Company will be able to further develop plans for a manufacturing facility in 2021, as well as any other discussion of the Company’s strategies, financing plans, business plans and prospects, capital allocation objectives and manufacturing, research, pipeline and clinical trial plans, including anticipated development milestones for the Company’s product candidates. In some cases, you can identify such forward-looking statements by terminology such as “anticipate,” “intend,” “believe,” “estimate,” “plan,” “seek,” “potential,” “project” or “expect,” “may,” “will,” “would,” “could” or “should,” the negative of these terms or similar expressions. Forward-looking statements are based on management’s current beliefs and assumptions and on information currently available to the Company, and you should not place undue reliance on such statements. Forward-looking statements are subject to many risks and uncertainties, including the Company’s recurring losses from operations; the uncertainties inherent in research and development of the Company’s product candidates, including statements regarding the timing of initiation, completion and the outcome of clinical studies or trials and related preparatory work and regulatory review, regulatory submission dates, regulatory approval dates and/or launch dates, as well as risks associated with preclinical and clinical data, including the possibility of unfavorable new preclinical, clinical or safety data and further analyses of existing preclinical, clinical or safety data; the Company’s ability to design and implement successful clinical trials for its product candidates; the recent departures of a number of executive officers of the Company, and the Company’s ability to fill open positions, implement an orderly transition process and retain key talent; whether the Company’s cash resources will be sufficient to fund the Company’s foreseeable and unforeseeable operating expenses and capital expenditure requirements for the Company’s expected timeline; the potential for a pandemic, epidemic or outbreak of infectious diseases in the United States, United Kingdom or European Union, including the COVID-19 pandemic, to disrupt and delay the Company’s clinical trial pipeline; the Company’s failure to demonstrate the safety and efficacy of its product candidates; the fact that results obtained in earlier stage clinical testing may not be indicative of results in future clinical trials; the Company’s ability to enroll patients in clinical trials for its product candidates; the possibility that one or more of the Company’s product candidates may cause serious adverse, undesirable or unacceptable side effects or have other properties that could delay or prevent their regulatory approval or limit their commercial potential; the Company’s ability to obtain and maintain regulatory approval of its product candidates; the Company’s limited manufacturing experience which could result in delays in the development, regulatory approval or commercialization of its product candidates; and the Company’s ability to identify or discover additional product candidates, or failure to capitalize on programs or product candidates. 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Clinical-stage biotechnology company developing transformative AAV-mediated gene therapies for patients suffering from inherited systemic debilitating diseases

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Proprietary capsid enables high protein expression at low doses in humans

Freeline positioned to target diseases perceived as beyond the reach of first-generation AAV gene therapy

FIX Lead product FLT180a for treatment of hemophilia B demonstrated Factor IX activity levels in normal range enabling potential for functional cure[1]

Fab FLT190 for treatment of Fabry disease completed lowest dose cohort; study positioned for dose escalation; plan to share data by year-end

GD FLT201 for treatment of Gaucher disease Type 1 shows promising pre-clinical data; on track to be in clinic by year-end

Proprietary protein engineering, analytics and CMC platform that deliver novel, high-quality gene therapy product candidates at commercial scale

1. Certain adult hemophilia B patients

In-house research and manufacturing platform enables the delivery of rationally designed novel AAV gene therapy programs

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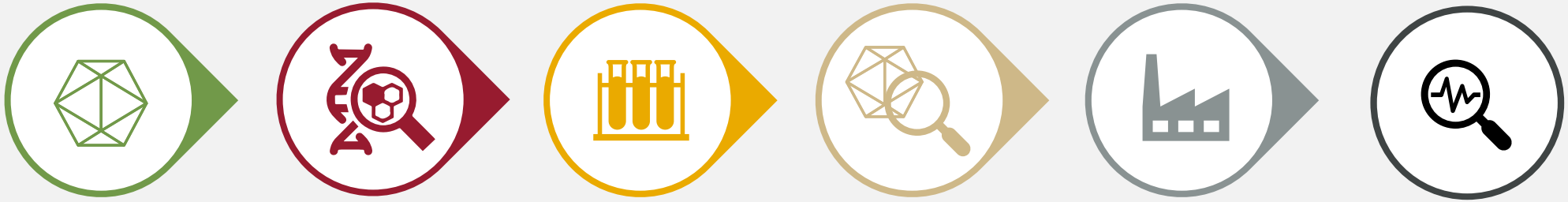

Vector design

Optimise vector design and thereby enhance candidate properties

Protein engineering

Design and develop novel protein molecules with favourable properties

Assay development

Develop assays to support candidate selection and for use in clinical trials

Rapid candidate screening

High-throughput screening to enable rapid identification of lead candidates

Manufacturing technology & Development

Create technology that enables high safety and potency and speed to GMP

Cutting edge analytics

Provides unique insight into AAV vectors and guides systematic platform development

- Identify and design novel targets/candidates with high potential to address unmet patient need
- Proprietary modular manufacturing technology enables rapid development of high quality products
- De-risked capsid with significant clinical data validating potency, tolerability and durability in humans

Hemophilia B data validates AAVS3 capsid and platform

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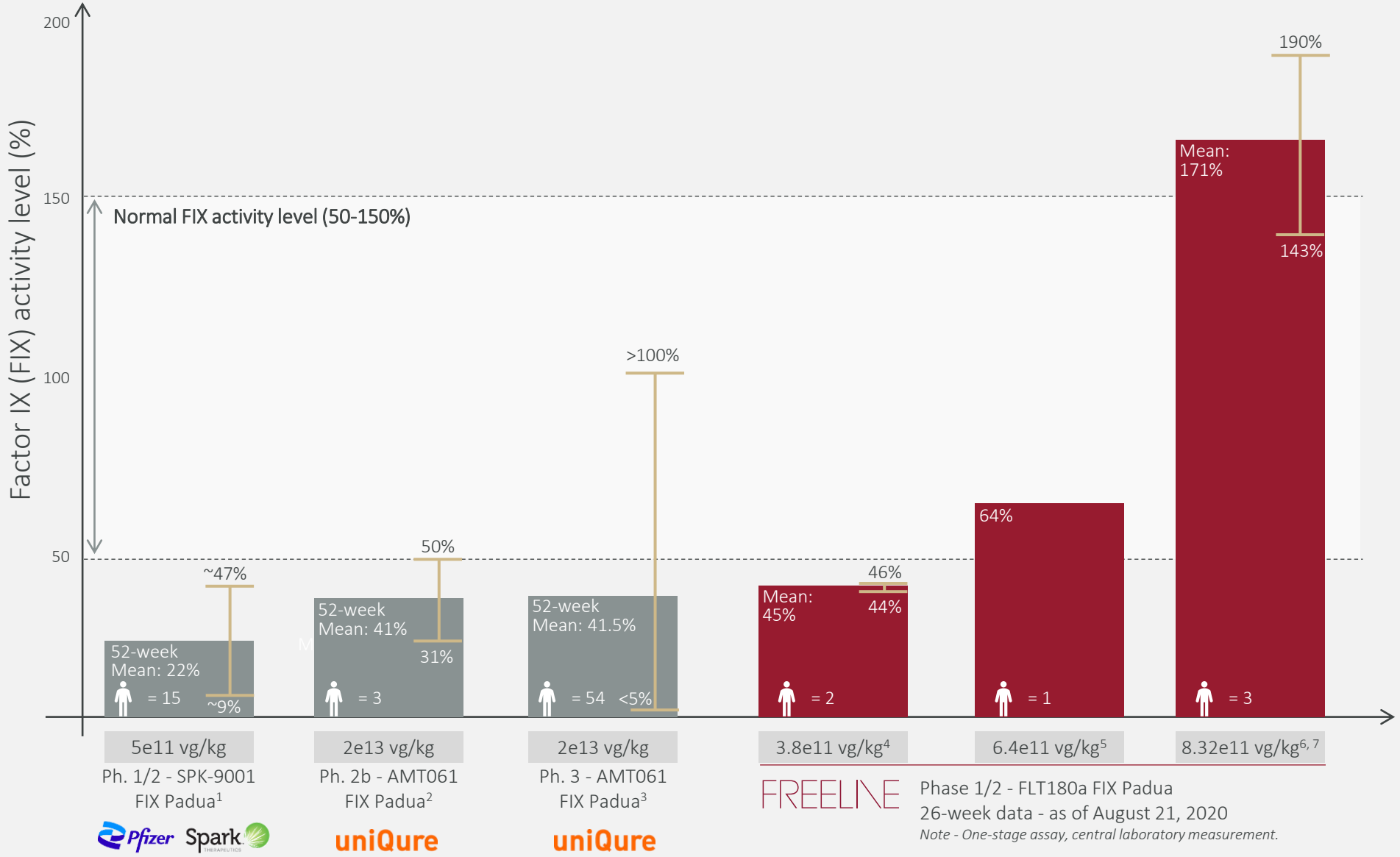
Our rationally designed AAVS3 capsid enables:

- Potent liver transduction
- High protein expression
- Lower dose levels & improved safety margin



FREELINE Phase 1/2 - FLT180a FIX Padua
26-week data - as of August 21, 2020
Note - One-stage assay, central laboratory measurement.

The FLT180a doses listed, 3.8e11, 6.4e11 and 8.32e11 vg/kg are equivalent to 4.5e11, 7.5e11 and 9.75e11 vg/kg respectively under the previous equivalent dosing nomenclature.

1. Pfizer R&D Day Sep 2020 – up to four-year follow-up data in 15 patients from Phase 1/2 trial.

2. Miesback et al; Blood 2018 131:1022-1031.

3. uniQure R&D day June 22, 2021 – 12-month follow-up data in 54 patients from the HOPE-B Phase 3 trial

4. 3.8e11 vg/kg dose: Two patients dosed at this level, with mean value calculated based on following Week 26 FIX activity levels: Patient 1, 44%, Patient 2, 46%.

5. 6.4e11 vg/kg dose: Two patients dosed at this level. Value of Patient 5, 64%. Patient 4 experienced loss of expression due to transaminitis and is not represented on this chart. At Week 26, Patient 4 FIX activity level was 7%, which would result in a mean FIX activity level of 36% for this dose cohort.

6. 8.32e11 vg/kg dose: Four patients dosed at this level, with mean value calculated for three of them based on following Week 26 FIX activity levels: Patient 8, 180%, Patient 9, 190%, Patient 10, 143%. Patient 7, not represented on chart, achieved FIX activity level of 53% at Week 26, which would result in a mean FIX activity level of 142% for this dose cohort. Patient 7 remains in normal range of FIX activity.

7. One patient in the 8.32e11 vg/kg dose cohort, Patient 8, received exogenous FIX for treatment of a traumatic bleed; at the time, this patient's FIX activity level was and remains in the low end of the normal range.

Robust pipeline in place: On track to have third program in the clinic by end of 2021

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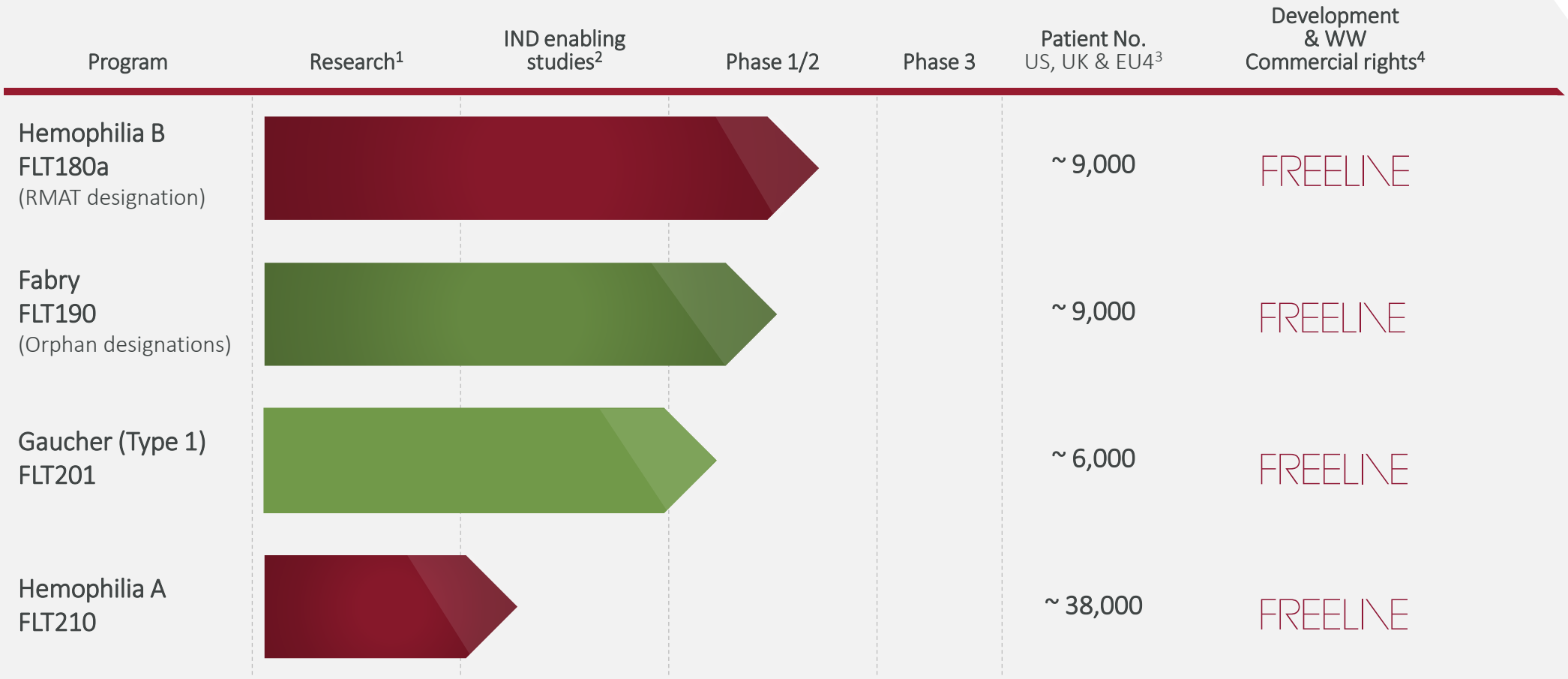

1. In the research stage, we conduct *in vitro* and *in vivo* preclinical studies to evaluate different product candidates to select those with the best tolerability and potency profiles.

2. In the IND enabling studies stage, we conduct preclinical *in vivo* studies in disease-specific mouse models and good laboratory practice, or GLP, toxicity studies in non-human primates and generate the CMC information and analytical data required for an investigational new drug, or IND, submission to the FDA for a clinical trial authorization, or CTA, submission to the EMA.

3 These figures represent the total approximate diagnosed population for each indication. The seroprevalence of antibodies against the AAV capsid renders approximately 30-50% of patients currently not eligible for gene therapy.

4. Owned and in-licensed intellectual property rights.

Hemophilia epidemiology: World Federation of Hemophilia 2018.

Fabry Disease epidemiology: Metchler et al 2012; Spada et al 2016; Fabry Register; Fabry Outcome Survey; Waldek et al 2009; Deegan et al 2006.

Gaucher Disease epidemiology: Nalysnyk et al 2016; Weinreb et al 2008 & 2013; Charrow et al 2000; National Gaucher Foundation; Orphanet; NIH Technology Assessment Panel on Gaucher; Poorthuis 1999; Stirnemann et al 2012; Puopetova 2010; Mehta et al 2006.

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To be life changers

Hemophilia B & A

Verbrinacogene setparvovec (FLT180a): Potential to provide a functional cure by normalizing FIX activity levels

Key learnings from the Phase 1/2 B-AMAZE dose-finding clinical trial

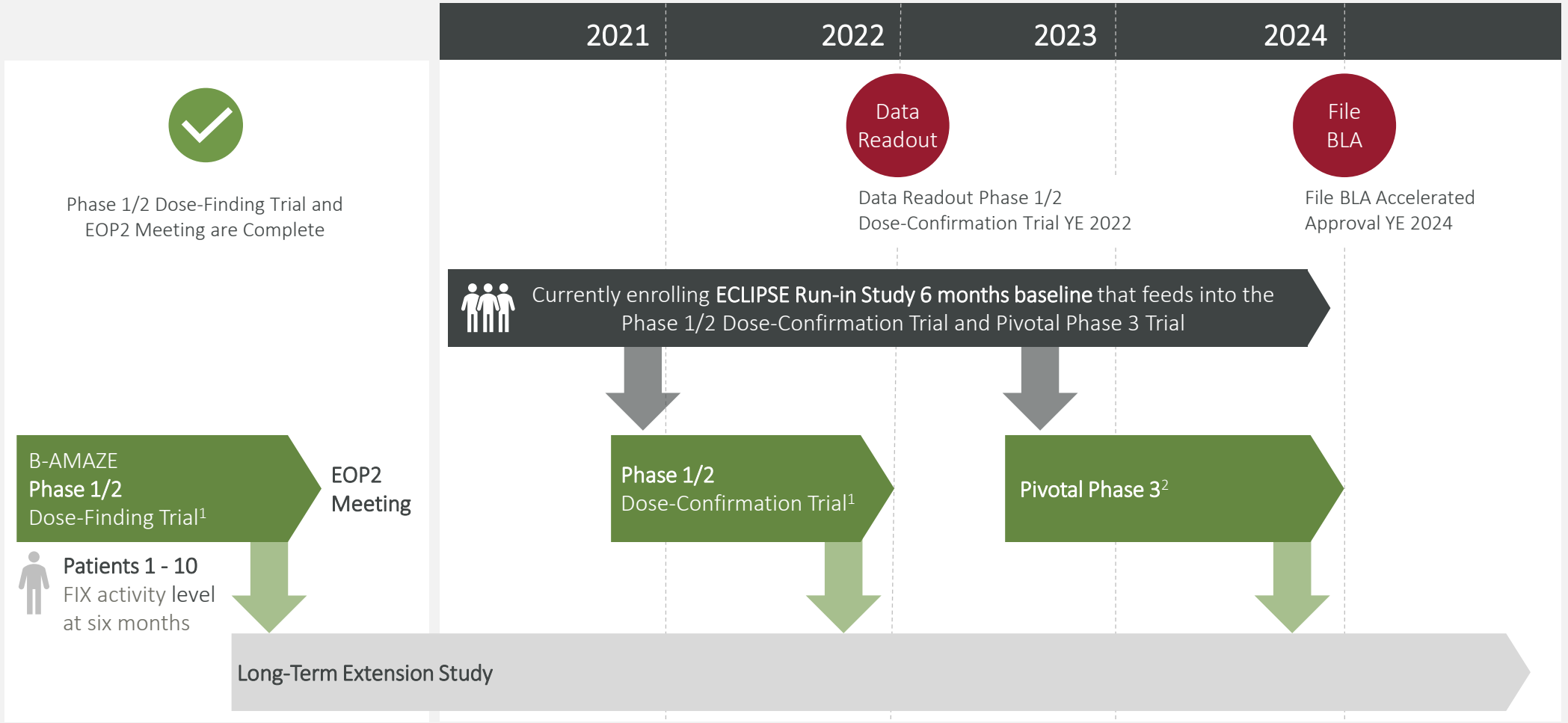
- Demonstrated dose response; dose with the potential to achieve FIX activity level in the normal range expected to be between 6.4e11 vg/kg and 8.32e11 vg/kg (7.5e11 vg/kg and 9.75e11 vg/kg, respectively, under the previous equivalent dosing nomenclature)[1]
- Stable and durable response up to 3 years post-treatment to date
- No spontaneous bleeds that required treatment with supplemental FIX[2]
- Favorable safety profile
- Short course of prophylactic tacrolimus combined with prophylactic prednisone and close monitoring expected to preserve FIX activity levels in the normal range and thereby eliminate the need for FIX supplementation

1. The Company's B-AMAZE trial dose escalated 10 patients across four dose levels. For future data updates, Freeline expects results will be reported using a new dose level nomenclature in the assay for the commercial-scale process in which the former doses of 4.5e11, 7.5e11, 9.75e11, and 1.5e12 vg/kg correspond to 3.8e11, 6.4e11, 8.32e11, and 1.28e12 vg/kg, respectively.

2. One patient in the 6.4e11 vg/kg dose cohort (7.5e11 vg/kg under the previous equivalent dosing nomenclature) lost expression due to transaminitis and resumed FIX prophylaxis.

FLT180a clinical development plan to accelerated approval

- Six-month Phase 1/2 trial to confirm the dose and immune management regimen for use in a pivotal Phase 3 study
- File accelerated approval using the surrogate endpoint of FIX activity levels combined with demonstration of a positive correlation between 26-week FIX activity levels and 52-week Annualized Bleeding Rate



1. To evaluate safety and durability.

2. To evaluate safety, durability and efficacy.

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Hemophilia A

FLT210 contains the only Factor VIII construct that fits within the carrying capacity of an AAV capsid

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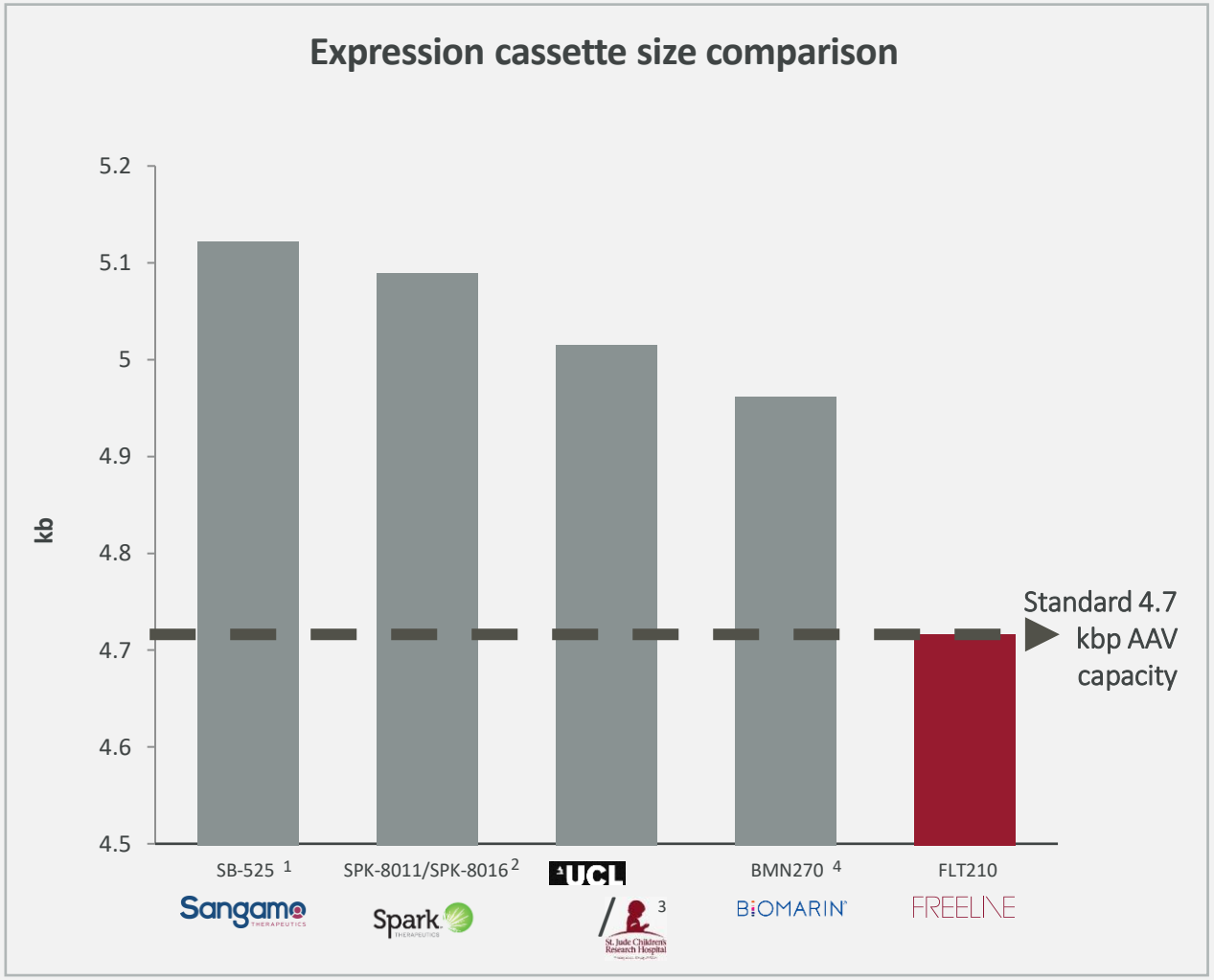

Key attributes of FLT210

- **Smallest disclosed** liver specific promoter in development
- **Shortened FVIII gene** to **reduce expression cassette size**
- **Allows expression cassette** to **fit within** the **natural capacity** of **AAV capsid**

Has the potential to deliver **more** stable FVIII activity*

*Can only be demonstrated in human trials, which have not yet been conducted.

Note: Hem A candidate nomination reached. Toxicology, CMC and disease animal model confirmation work ongoing.

Sources of construct sizes:

1. As presented at ASGCT (2016) and WFH (2020).

2. As documented in patent (international patent number: WO/2016/025764).

3. McIntosh J, Lenting PJ, Rosales C, et al. Therapeutic levels of FVIII following a single peripheral vein administration of rAAV vector encoding a novel human factor VIII variant. Blood. 2013;121(17):3335-3344.

4. Bunting S, Zhang L, Xie L, et al. Gene Therapy with BMN 270 Results in Therapeutic Levels of FVIII in Mice and Primates and Normalization of Bleeding in Hemophilic Mice. Mol Ther. 2018;26(2):496-509.

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Fabry & Gaucher disease

FLT190 demonstrates increased GLA expression and reduction in pathologic substrate in key tissues in Fabry mouse model

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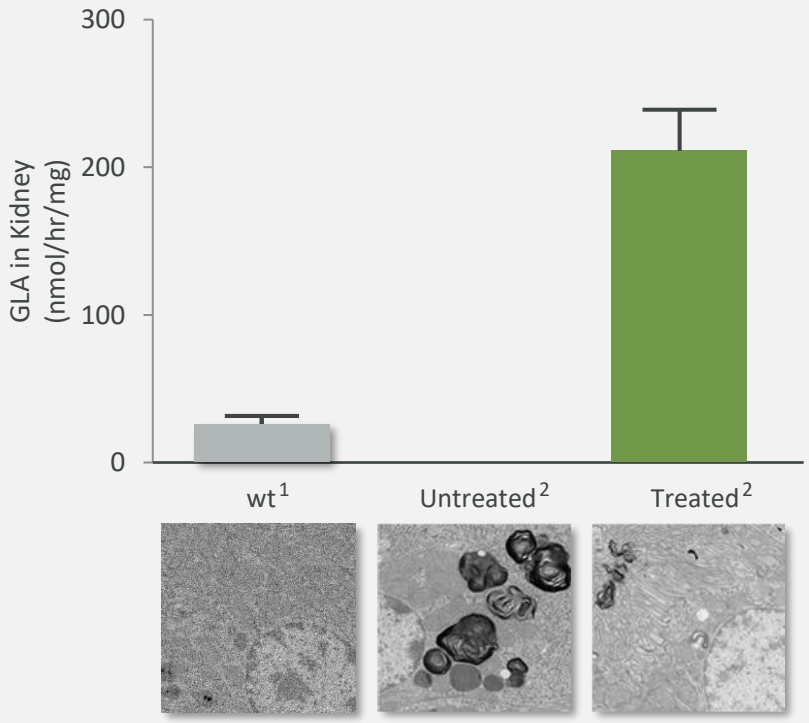
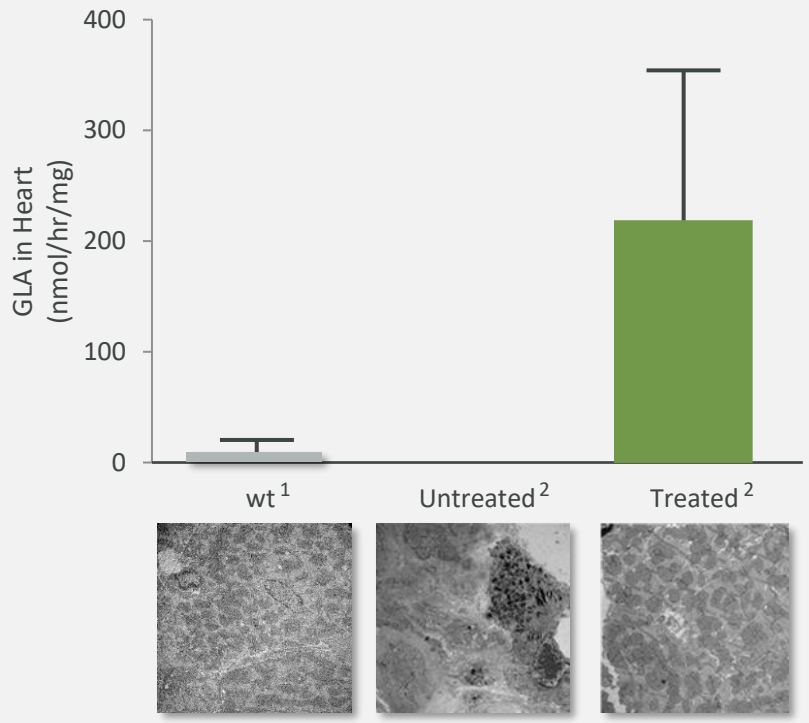
Kidney GLA activity levels



Heart GLA activity levels



WORLD symposia 2019: Jey Jeyakumar et al. Liver-directed gene therapy corrects Fabry disease in mice.

FLT190 vector genome pseudo-typed with AAV8 in GLA knockout ("GLA KO") mice; Dose: 2e12 vg/kg. Error bars: mean ± SD.

Time point: 16-week disease development prior to treatment; analysis 14 weeks post-treatment. Gb3/Lyso-Gb3 data (n=4, 2 males and 2 females).

1.Untreated wild-type (non-GLA KO) mice.

2. GLA KO mice.

Phase 1/2 dose-finding trial assessing the safety and efficacy of FLT190 in adult Fabry patients

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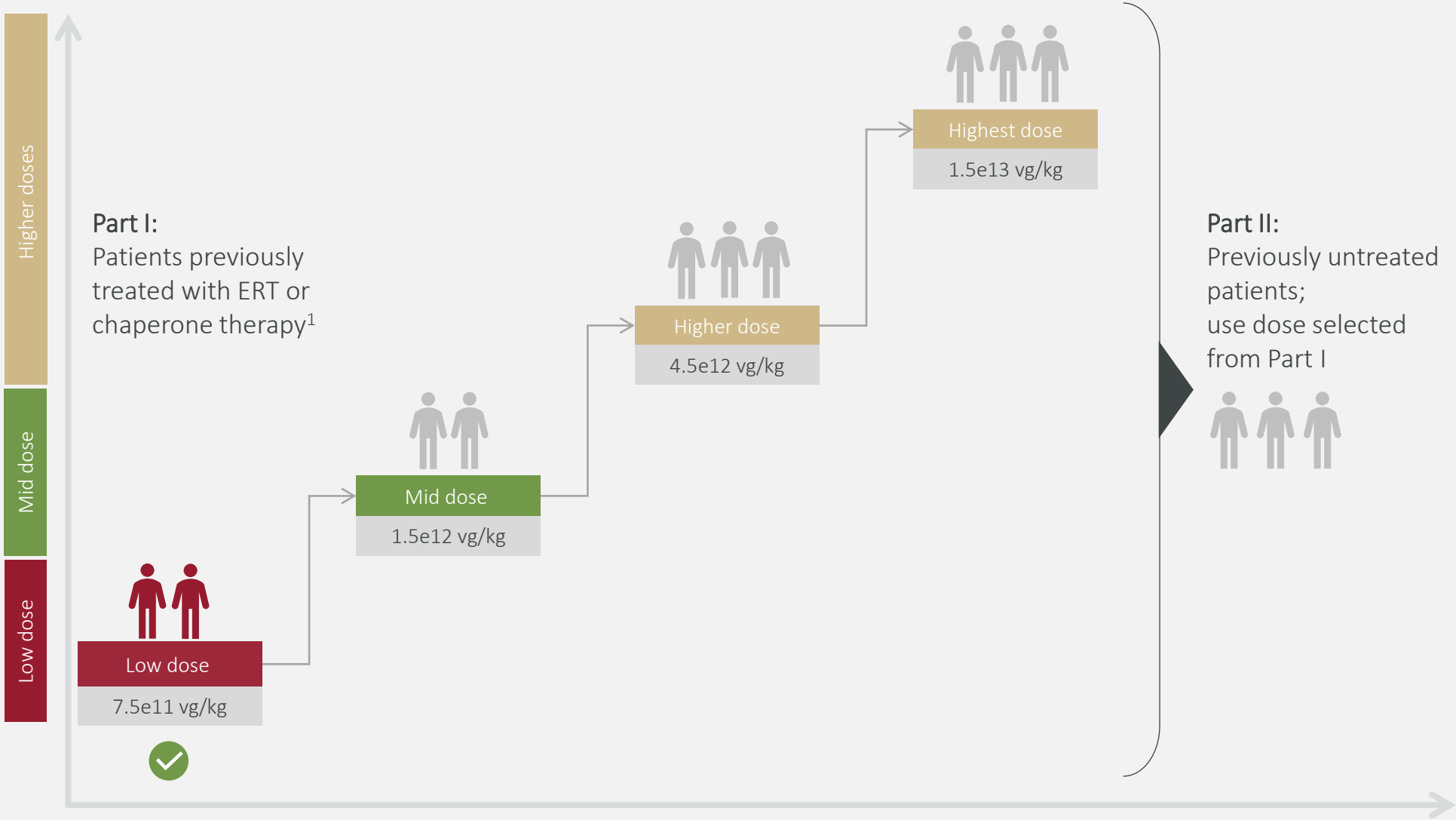
Adaptive study design



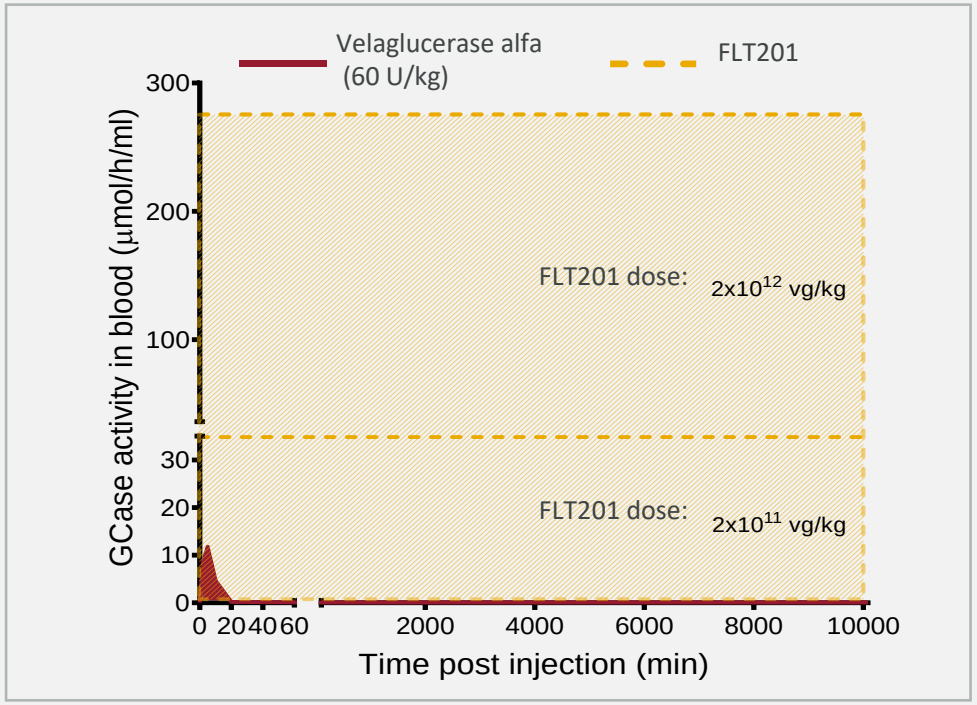
1. ERT= Enzyme Replacement Therapy

Marks cohort with patients dosed

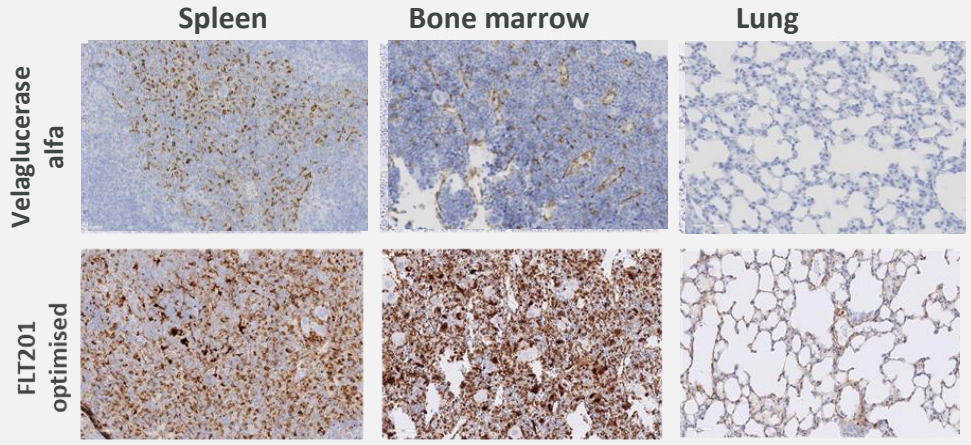
Low doses of FLT201 in Gaucher mice result in higher expression and increased uptake in tissues affected by Gaucher Type 1 disease

- Novel GCase variant produced by FLT201 is more stable in plasma than wild-type protein
- This leads to a greater than 20-fold increase in potency vs. wild-type protein and better substrate clearance in key tissues in Gaucher mice

Increased protein stability compared with velaglucerase alpha



Enhanced and sustained GCase uptake observed in key tissues as compared with velaglucerase alpha

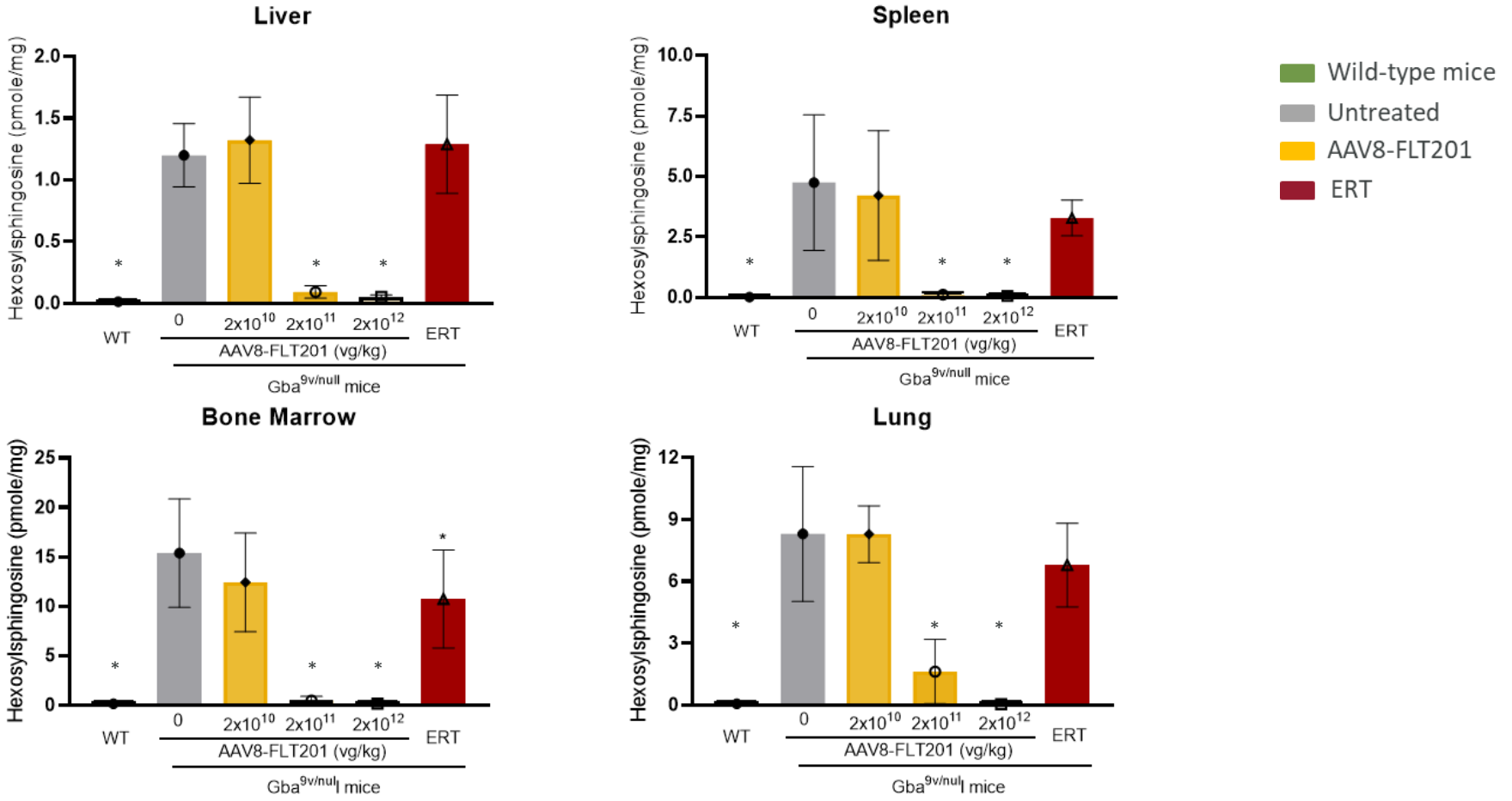


Anti-GCase – DAB, Haematoxylin counterstain, AAV8

Velaglucerase alfa is an Enzyme Replacement Therapy (ERT) for Gaucher disease.

Gba-deficient mice data demonstrates GCase tissue penetration by FLT201, enzymatic activity & substrate clearance

- Restoration of GCase activity after FLT201 injection was observed in Gba-deficient mice in difficult-to-reach tissues as shown by decreased levels of lyso-GB1 substrate[1]
- Dose-dependent reductions of lyso-GB1 were observed in all tissues analyzed including bone marrow and lung



Data from study conducted in collaboration with Professor Ying Sun (Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA) and presented at the 17th Annual WORLDSymposium.

Velaglucerase alpha - an ERT used for Gaucher disease.

AAV8-FLT201 = AAV8 pseudo-typed FLT201 genome.

ERT = Velaglucerase alfa 60 U/kg biweekly (equivalent of the standard of care in humans).

WT = wild-type mice.

Evaluated 12 weeks post-injection.

1. Lack of GCase enzyme in humans leads to the accumulation of lyso-GB1 and Gaucher disease.

*$p \leq 0.0001$.

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Milestones

Multiple potential near-term value-creating milestones targeted for 2021

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2021 Objectives

- Hemophilia B – Initiate clinical trial sites for the Phase 1/2 dose confirmation trial
- Hemophilia B – Present durability data up to 4 years from Phase 1/2 B-AMAZE dose-finding clinical trial
- Fabry – Progress dose escalation in Part I of Phase 1/2 dose-finding clinical trial and share data
- Gaucher – Initiate Phase 1/2 dose-finding clinical trial
- Hemophilia A – Complete IND/CTA-enabling studies
- Platform – Further develop plans for Freeline manufacturing facility


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Thank you