



# Corporate & Clinical Overview

June 28, 2023



# Forward Looking Statements

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This presentation contains forward-looking statements of Lumos that involve substantial risks and uncertainties. All such statements contained in this presentation are forward-looking statements within the meaning of The Private Securities Litigation Reform Act of 1995.

We are passionate about our business, including LUM-201 and the potential it may have to help patients in the clinic. This passion feeds our optimism that our efforts will be successful and bring about therapeutics that are safe, efficacious, and offer a meaningful change for patients. Please keep in mind that actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements that we make.

We have attempted to identify forward-looking statements by using words such as “projected,” “upcoming,” “will,” “would,” “plan,” “intend,” “anticipate,” “approximate,” “expect,” “potential,” “imminent,” and similar references to future periods or the negative of these terms. Not all forward-looking statements contain these identifying words. Examples of forward-looking statements include, among others, statements we make regarding progress in our clinical efforts including comments concerning screening and enrollment for our trials, momentum building in our LUM-201 program for PGHD, anticipated timing of interim analyses of trials, LUM-201’s therapeutic potential when administered to pediatric subjects with idiopathic or moderate growth hormone deficiency, that the interim sample size should be adequate to provide an initial indication of LUM 201’s impact, expecting the primary outcome data readout for our trials, market size potential for LUM-201, predictions regarding LUM-201, goals with respect to LUM-201, the potential to expand our LUM-201 platform into other indications, future financial performance, results of operations, cash position, cash use rate and sufficiency of our cash resources to fund our operating requirements through the primary outcome data readout from the OraGrowthH210 and OraGrowthH212 Trials, and any other statements other than statements of historical fact.

We wish we were able to predict the future with 100% accuracy, but that just is not possible. Our forward-looking statements are neither historical facts nor assurances of future performance. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements that we make due to a number of important factors, including potential material differences between the interim results of our LUM-201 trials and the final results of the trials which are not known at this time, the effects of pandemics (including COVID-19), other widespread health problems, the Ukraine-Russia conflict, the outcome of our future interactions with regulatory authorities, our ability to project future cash utilization and reserves needed for contingent future liabilities and business operations, the ability to obtain the necessary patient enrollment for our product candidate in a timely manner, the ability to successfully develop our product candidate, the timing and ability of Lumos to raise additional equity capital as needed and other risks that could cause actual results to differ materially from those matters expressed in or implied by such forward-looking statements. You should not rely on any of these forward-looking statements and, to help you make your own risk determinations, we have provided an extensive discussion of risks that could cause actual results to differ materially from our forward-looking statements in the “Risk Factors” section and elsewhere in our Annual Report on Form 10-K for the year ended December 31, 2022, as well as other reports filed with the SEC including our Quarterly Reports on Form 10-Q filed after such Annual Report. All of these documents are available on our website. Before making any decisions concerning our stock, you should read and understand those documents.

We anticipate that subsequent events and developments will cause our views to change. We may choose to update these forward-looking statements at some point in the future; however, we disclaim any obligation to do so. As a result, you should not rely on these forward-looking statements as representing our views as of any date subsequent to the date of this presentation.

The data contained herein is derived from various internal and external sources. All of the market data in the presentation involves a number of assumptions and limitations, and there can be no guarantee as to the accuracy or reliability of such assumptions. Further, no representation is made as to the reasonableness of the assumptions made within or the accuracy or completeness of any projections or modeling or any other information contained herein. Any data on past performance or modeling contained herein is not an indication as to future performance. [5.3.2023](#)

# Investment Highlights

## Lead asset targeting children with growth disorders

### Novel Oral Rare Disease Asset

- Novel **oral** therapeutic asset, **LUM-201**, for growth hormone deficiency (GHD) disorders
- LUM-201 **acts within natural endocrine pathway**, differentiated from injectable therapies
- **Potential to disrupt** significant subset of sizable **injectable market** for GHD



### Pipeline in a Product

- Worldwide injectable market for GHD disorders is **\$3.4 billion\***
- Market for initial oral LUM-201 indication, Pediatric GHD (PGHD), is **\$1.2 billion\***
- Prior data support potential efficacy of LUM-201 in multiple GHD disorders



### Late-stage Trials in PGHD

- **Enrollment completed** for Phase 2 OraGrowthH210 and PK/PD OraGrowthH212 Trials
- **Primary outcome data** expected **4Q 2023**
- Interim data showed LUM-201 met growth expectations
- Enriched patient population **de-risks** clinical program as all subjects randomized demonstrate a response to LUM-201 in stimulation test



### Solid Financial Position

- Cash balance of **\$58.0 million** as of close of **1Q 2023**
- Cash runway **into 3Q 2024**, beyond OraGrowthH210 & OraGrowthH212 primary outcome data



PGHD = Pediatric Growth Hormone Deficiency

\* USA, Germany, France, Italy, Spain, UK, Japan (Grandview Research, Growth Hormone Market Forecast, 2019)

# Management and Advisors – Significant Clinical Development and Commercial Experience



**Richard Hawkins**  
Chairman & CEO

Developed Growth Hormone (GH) Receptor Antagonist for Acromegaly at Sensus (sold to Pfizer). Built one of the first contract recombinant protein manufacturing facilities (Covance Biotechnology). Founder of Pharmaco, a pioneer in the contract research organization sector (merged with PPD).

**John McKew, PhD**  
President & Chief Scientific Officer

Prior VP of Research at aTyr Pharma – led team advancing protein-based therapeutics for rare diseases. Former Scientific Director, NIH - National Center for Advancing Translational Science (NCATS) and Therapeutics for Rare and Neglected Diseases (TRND).

**Lori Lawley, CPA**  
Chief Financial Officer

Former SVP, Finance and Controller at Lumos Pharma. Previously, SVP, Finance and Member of the Office of the CEO of NewLink Genetics. Prior to that, Senior Manager in Assurance Services at Ernst and Young.

**Aaron Schuchart, MBA**  
Chief Business Officer

Former Chief Business Officer of Aeglea BioTherapeutics. Former leadership roles in Business Development, Strategy, and Finance at Coherus Biosciences, Novartis Diagnostics/Grifols, and Amgen.

**Pisit “Duke” Pitukcheewanont, MD**  
SVP Global Clinical Development and Medical Affairs

Pediatric endocrinologist and Professor, Clinical Pediatrics, Keck School of Medicine, USC. President, Human Growth Foundation. Former VP Medical Affairs and VP Global Medical Ambassador & Medical Education at Ascendis Pharma; project: long-acting TransCon GH. Former Advisory Board member at Pfizer, Ipsen, Alexion, Ultragenyx, Pharmacia, Serono, others.



**Peter Clayton, MD, PhD**  
Senior Medical Advisor and CSAB Member

Professor of Child Health and Paediatric Endocrinology, University of Manchester. Prior member of Councils of GH Research Society, Society for Endocrinology UK, and European Society of Paediatric Endocrinology. Served as Chair of ESPE Corporate Liaison Board. Authored over 300 publications on clinical and scientific aspects of paediatric endocrinology.



**Michael Thorner, MB, BS, DSC**  
VP Endocrine Sciences

Endocrinologist. Former Chairman of Dept of Medicine, Chief of Division of Endocrinology & Metabolism, Director Clinical Research Center at University of Virginia. Led research group investigating GH secretion regulation. Discovered GH releasing hormone. Instrumental in early studies of LUM-201 (MK-0677). Pioneered use of dopamine agonist drugs for prolactin secreting pituitary tumors.

# LUM-201 Program Pipeline

	Study	Pre-Clinical	Phase 1	Phase 2	Phase 3	Status
LUM-201 (Ibutamoren) in Idiopathic PGHD	Dose-finding trial					Dose-finding trial: Enrollment completed Primary outcome data expected 4Q 2023
	Long-term extension					Long-term extension study for OraGrowthH Trials
	PK/PD trial					Mechanistic PK/PD trial: Enrollment completed Primary outcome data expected 4Q 2023
	Switch trial					Switch trial evaluating LUM-201 in subjects from rhGH arm of OraGrowthH210 Trial: Ongoing
LUM-201 in NAFLD	Phase 2 pilot trial					Pilot trial initiated by Mass Gen Hospital (MGH) evaluating LUM-201 in NAFLD: Enrolling

**Lumos Pharma is evaluating additional indications for LUM-201 for Phase 2 studies**

\*Trial supported by prior data evaluating rhGH in NAFLD: (ENDO 2022) JES, Volume 6, Issue Supplement\_1, November-December 2022, Page A525  
 PGHD Pediatric Growth Hormone Deficiency    NAFLD Non-Alcoholic Fatty Liver Disease    MGH Massachusetts General Hospital

# Pediatric Growth Hormone Deficiency (PGHD) – Conversion from Injection to Oral

## PGHD

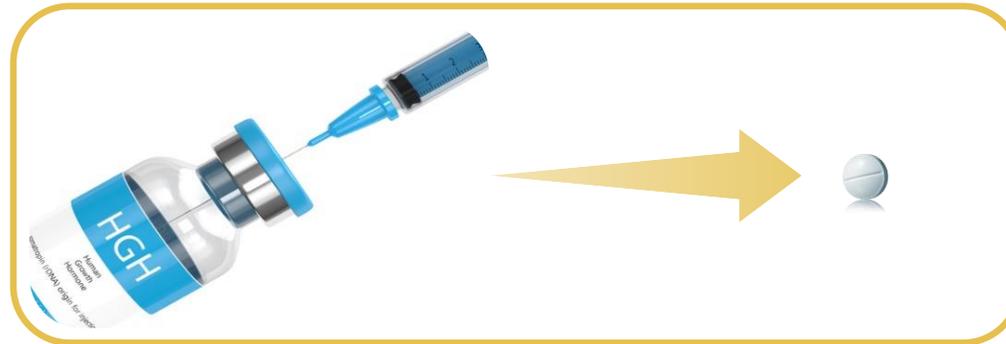
- **Inadequate secretion of growth hormone during childhood**
- Majority of cases are idiopathic
- Slower physical growth
- Negative effect on metabolic processes
- Incidence  $\approx$  1:3500<sup>1</sup>

## Current Treatment

- **Injectable therapies are only options**
- Daily, subcutaneous injections of recombinant human growth hormone (rhGH) represent standard of care
- Weekly rhGH injections are entering the market

## Unmet Need

- **Standard treatment is ~2,500 daily injections over multi-year period**
- Injections can be painful and burdensome
- Missed doses lead to suboptimal growth<sup>2,3</sup>
- **Initial market research supports oral therapy vs weekly injections**



**An established market is now primed for the first oral alternative**

<sup>1</sup> GlobalData EpiCast Report for Growth Hormone Deficiency Epidemiology forecast to 2026

<sup>2</sup> Rosenfeld 2008 Endocrine Practice

<sup>3</sup> Cutfield 2011 PLOS ONE

# Market Research: Daily Oral Therapeutic Preferred Over Weekly Injectable

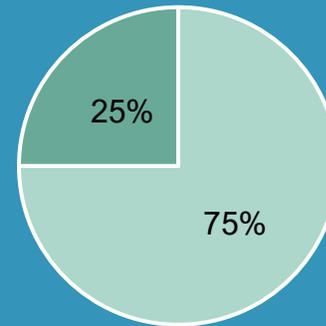
Consideration	Market Research Findings <sup>1</sup>
Unmet Need	Non-injectable (oral) therapy; Less frequent administration of injectable therapy
Preference	Vast majority of physicians & caregivers surveyed prefer daily oral tablet over weekly injectable
MOA	Favorable impression regarding LUM-201 affecting natural physiology vs bolus rhGH treatment
Treatment Decisions	Collaborative between physicians and caregivers
Payer Decisions	Price policies in place for category – small molecule COGS should provide attractive margins



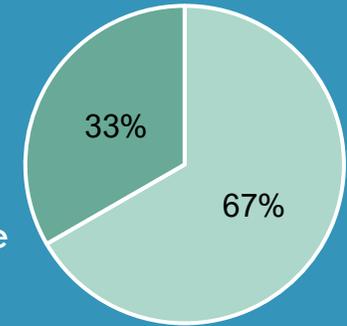
### Interview Question:

If a daily oral secretagogue and a weekly rhGH injectable product were both FDA-approved and available for use, which product would you prefer?

### Physicians

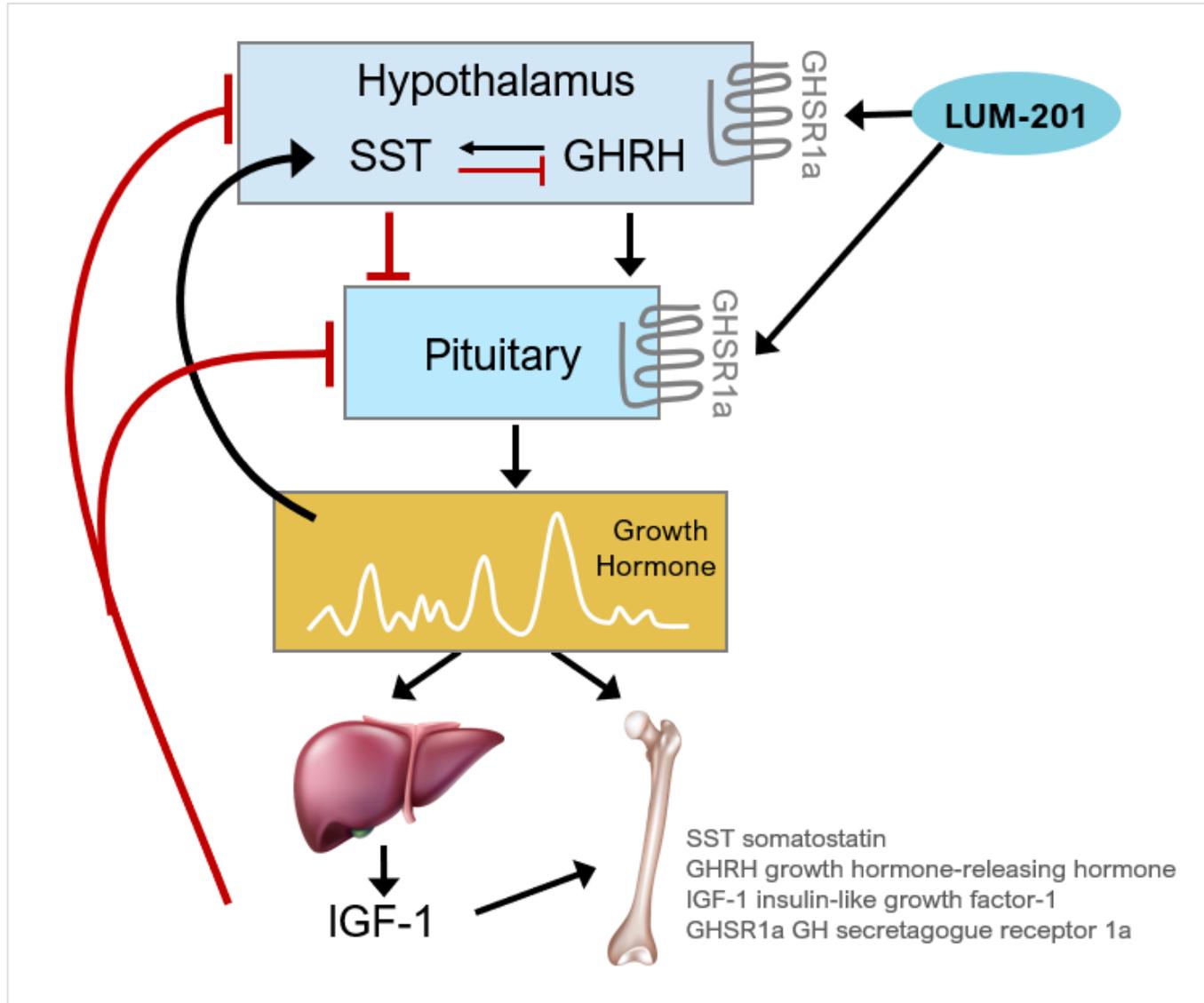


### Caregivers



■ Daily Oral  
■ Weekly Injectable

# LUM-201 Stimulates Natural Growth Hormone Secretion

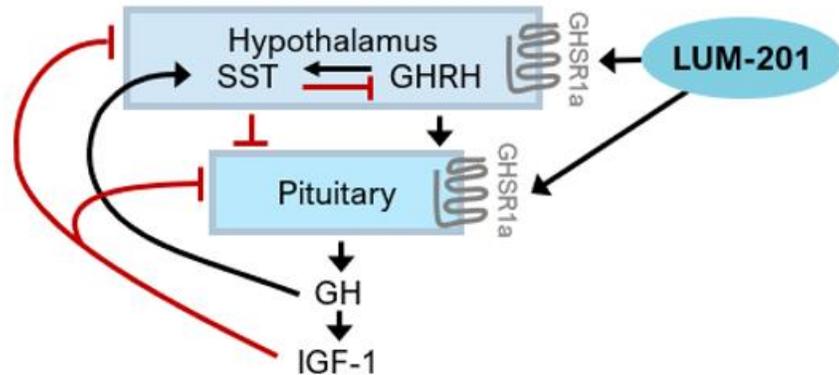


**LUM-201 mimics natural release of growth hormone (GH)  
Different from injections of synthetic GH**

- LUM-201 is an oral GH secretagogue\*
- Acts on specific receptors in hypothalamus and pituitary to stimulate release of GH<sup>1</sup>
- Increases the amplitude of natural pulsatile GH secretion<sup>2,3</sup>
- LUM-201 stimulated GH release regulated by natural GH/IGF-1 feedback mechanisms
- Differentiated mechanism versus exogenous injection of recombinant human growth hormone (rhGH) products

## Moderate / Idiopathic PGHD PEM-Positive

~60% of total PGHD population<sup>1</sup>



**Responders to LUM-201<sup>2</sup>**

### Predictive Enrichment Marker Positive (PEM+)

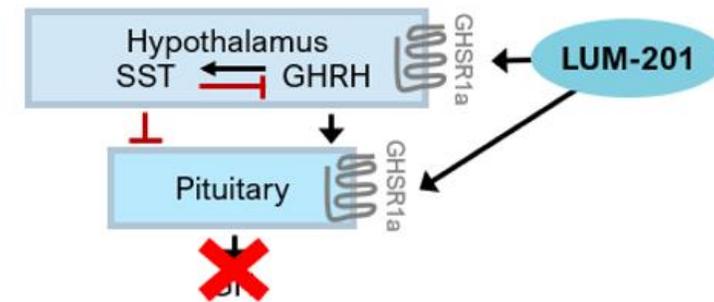
- Baseline IGF-1 > 30 ng/ml
- Stimulation LUM-201 peak GH ≥ 5 ng/ml
- Functional but reduced HP-GH axis

LUM-201

Single  
Stimulation  
Dose

## Severe / Organic PGHD PEM-Negative

~40% of total PGHD population



**Non-Responders to LUM-201**

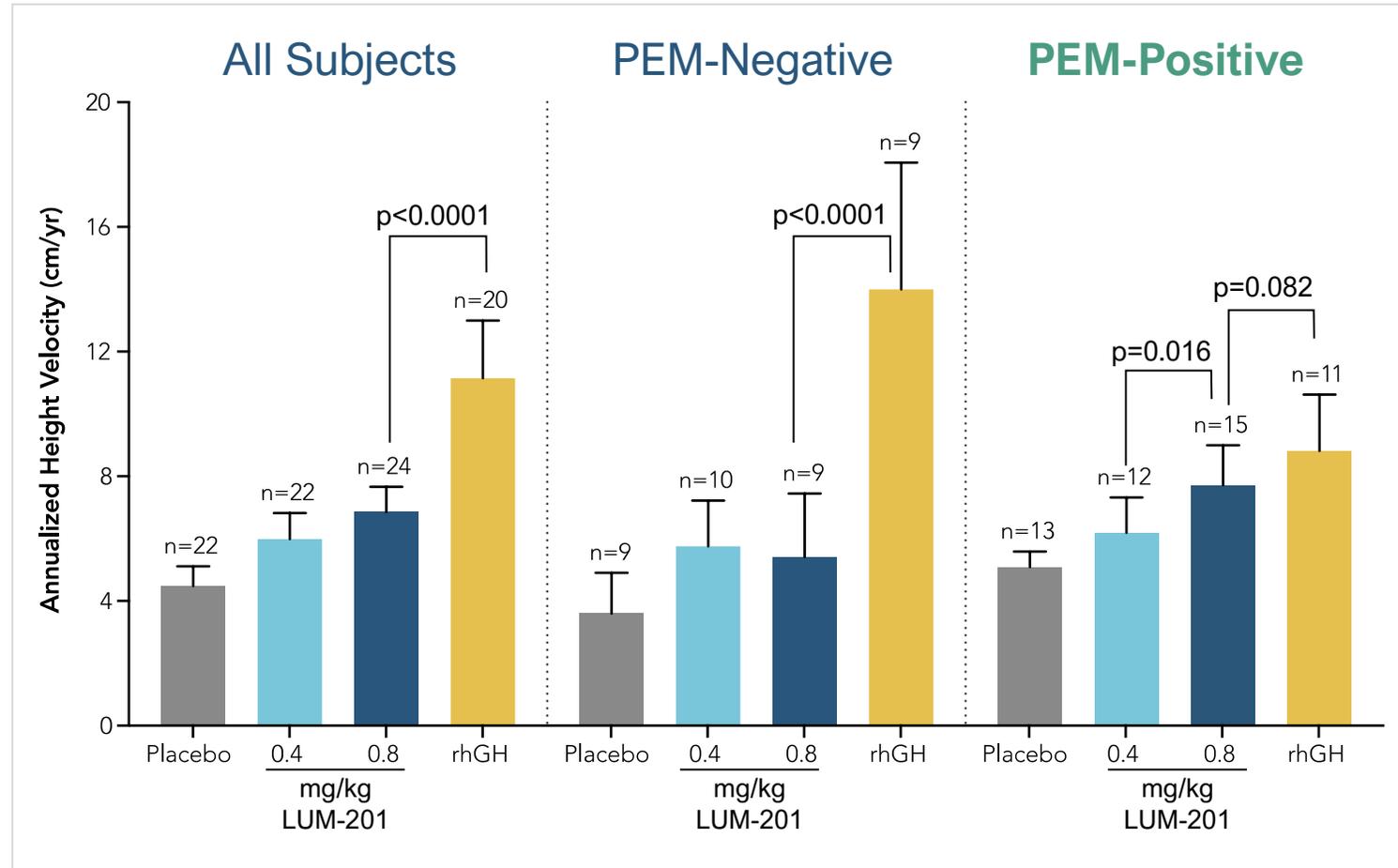
### Predictive Enrichment Marker Negative (PEM-)

- Baseline IGF-1 < 30 ng/ml
- Stimulation LUM-201 peak GH < 5 ng/ml
- Non-functional HP-GH axis

# Study 020 Post-Hoc Analysis: PEM-Positive Patients Responsive to LUM-201

## PEM = Predictive Enrichment Marker

- Multiple LUM-201 trials conducted by Merck
  - In ~1000 adults – for sarcopenia, other
    - GH/IGF-1 raised from baseline by LUM-201
  - In ~200 children – for PGHD
- Naïve PGHD, Study 020<sup>1</sup>
  - N=68; three arms
  - Placebo patients switched to rhGH at 6 mos.
  - Annualized growth shown for each arm
- PEM-positive subset\*:
  - LUM-201 0.8 mg/kg not statistically different from rhGH
  - Dose response: 0.8 mg/kg statistically superior to 0.4 mg/kg

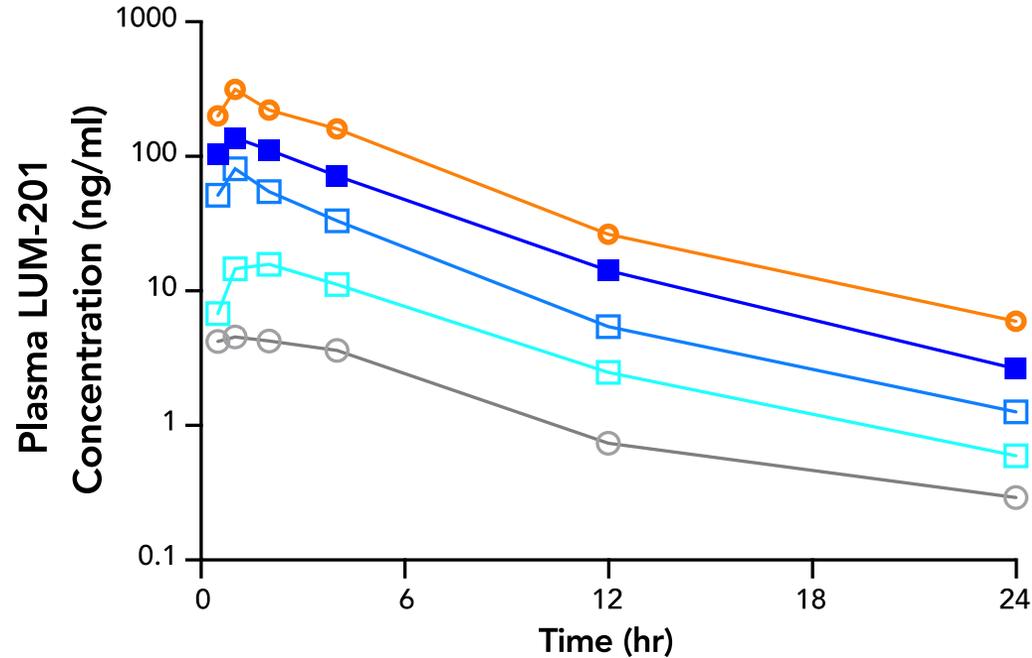


**Expect prospective inclusion of only PEM(+) patients and higher doses to improve response to LUM-201**

# PK/PD: Evidence of a PK and PD Dose Response in Healthy Volunteers

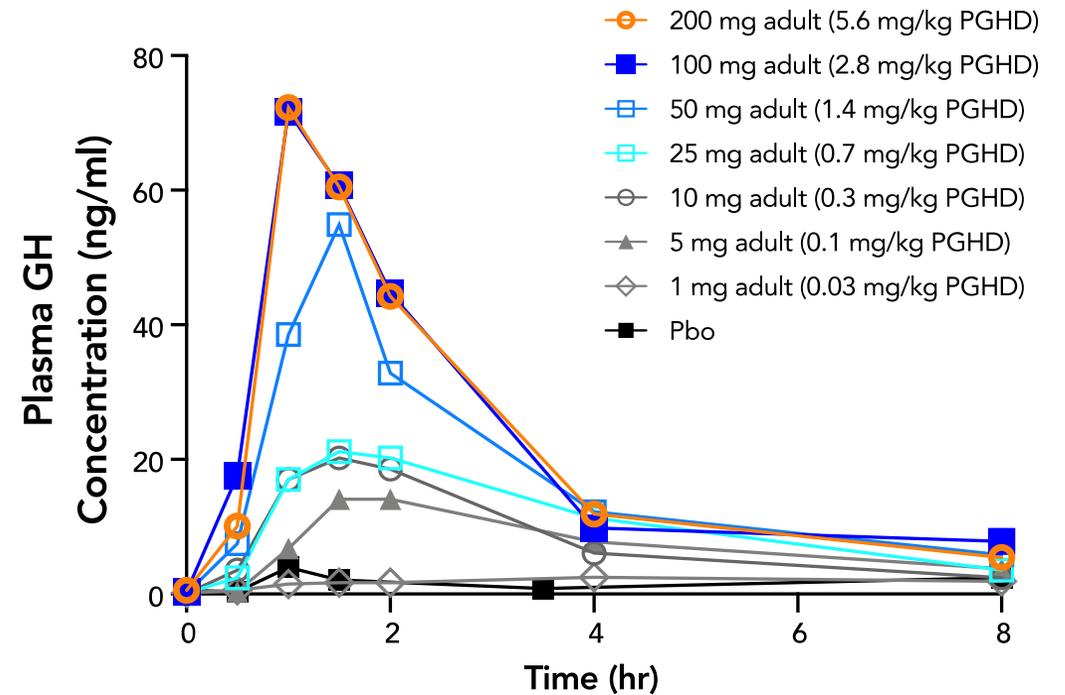
## Pharmacokinetics

Dose response to 5.6 mg/kg PGHD dose equivalent\*



## Pharmacodynamics

PD plateau possible  $\geq$  2.8 mg/kg PGHD dose equivalent\*



Higher LUM-201 doses produce higher plasma concentrations of LUM-201 & GH up to PD plateau  
 PD curve shows potential for LUM-201 doses in OraGrowth210 Trial to produce greater GH response

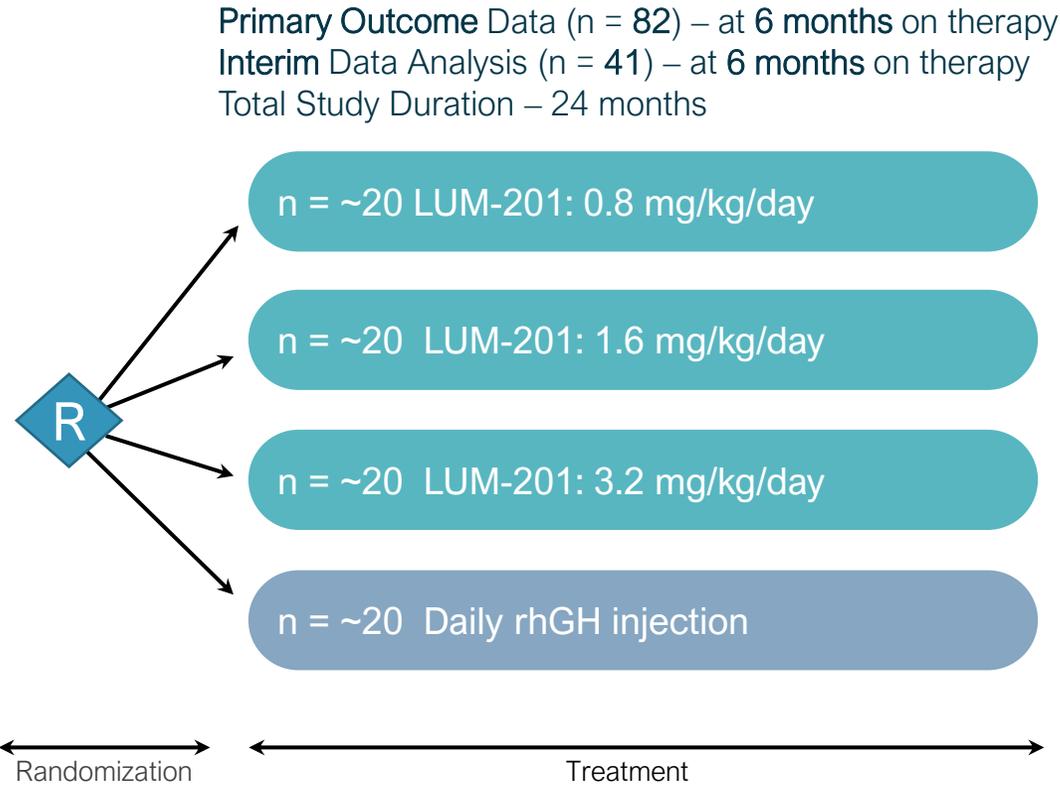
# OraGrowthH210 Trial

Phase 2 Trial Evaluating Oral LUM-201 in Moderate Idiopathic PGHD

# OraGrowthH210 Trial: Phase 2 Trial in Idiopathic PGHD – Enrollment Completed

## OraGrowthH210 TRIAL

- n = 82
- PEM(+) PGHD subjects
- Inclusion: stim GH  $\geq$  5 ng/ml and baseline IGF-1  $>$ 30 ng/ml
- rhGH treatment naïve
- ~45 trial sites US & International



### Objectives

#### Primary Endpoint:

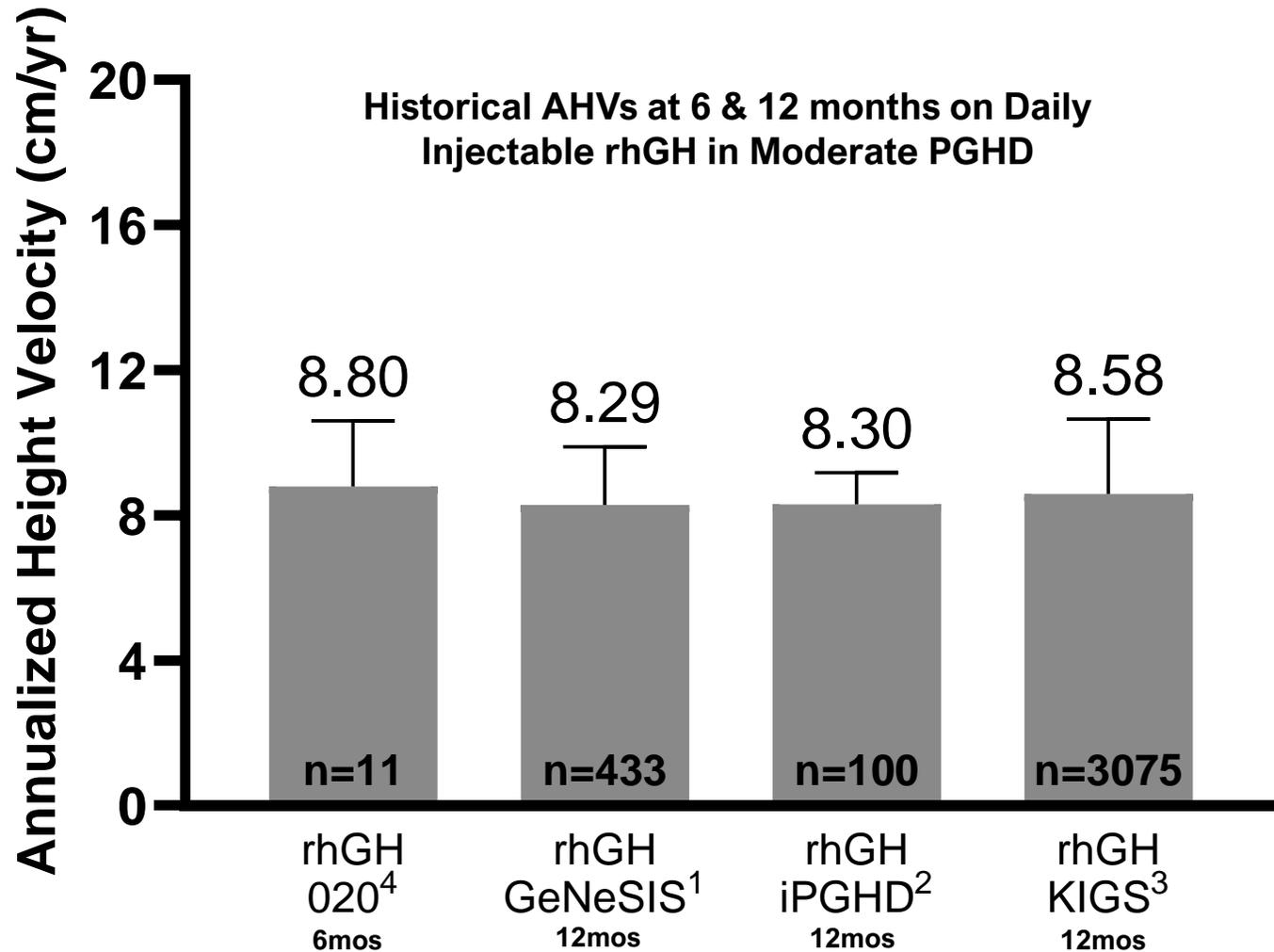
- Annualized Height Velocity (AHV)

#### Goals:

- Prospectively confirm utility of PEM strategy
- Determine optimal dose for Phase 3

**Primary outcome data for OraGrowthH210 Trial on 82 subjects anticipated 4Q 2023**  
**Interim AHV and safety data on 41 subjects at 6 months on therapy announced November 2022**

# Historical rhGH Data Set Expectations for Growth on Therapy in Moderate PGHD



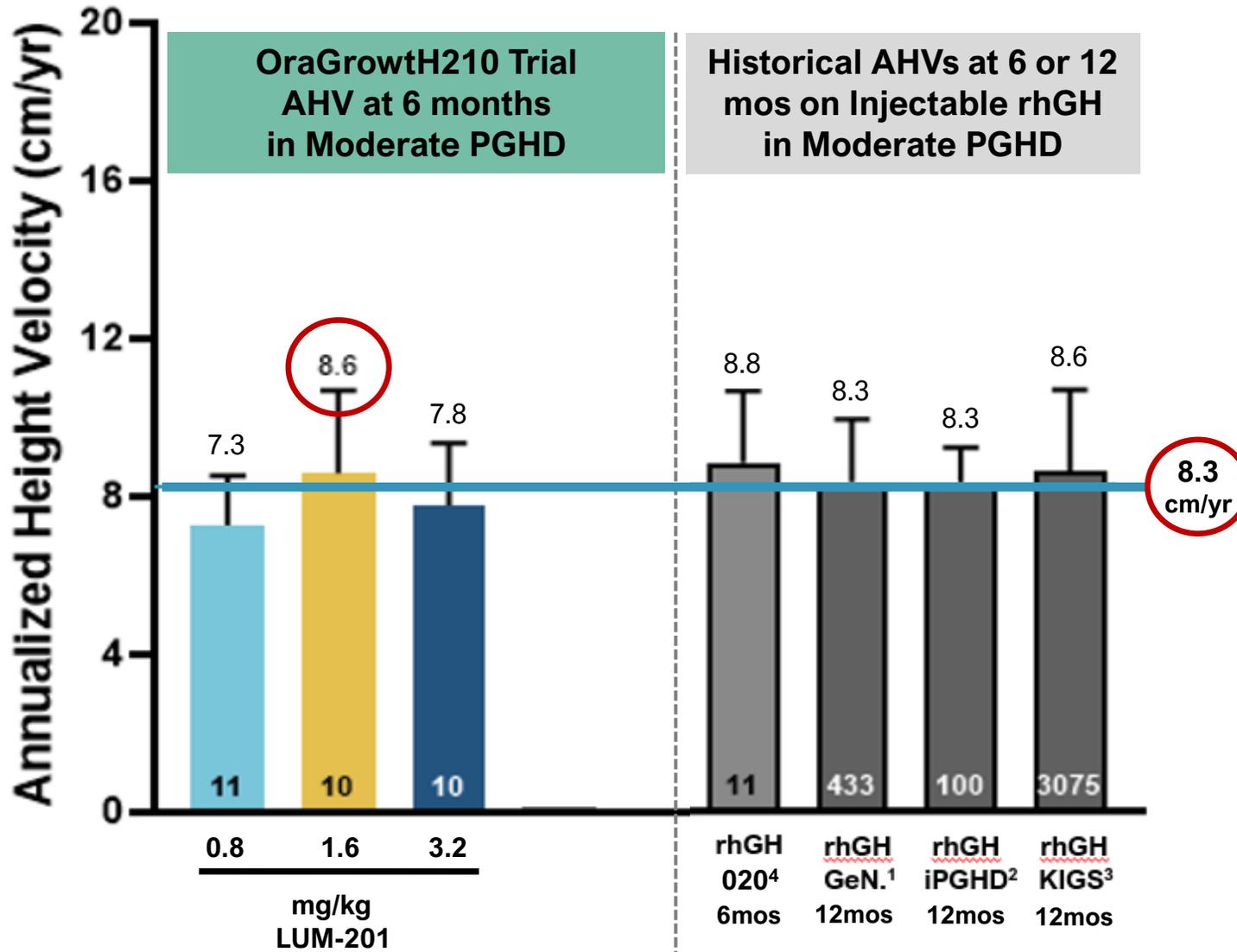
## Historical Datasets for Moderate PGHD

- GeNeSIS<sup>1</sup>, iPGHD<sup>2</sup>, and KIGS<sup>3</sup> datasets demonstrating AHV at 12 months on rhGH
- Merck 020<sup>4</sup> AHV from 6 months of rhGH
- These trials set precedent for expected growth on rhGH in moderate idiopathic PGHD

## Expected Growth in OraGrowthH210 Trial

- Prediction for growth in OraGrowthH210 is AHV of ~8.3-8.6 cm/yr on both LUM-201 and rhGH based on historical data

# LUM-201 Growth in OraGrowthH210 Trial is Consistent with Historical Precedent

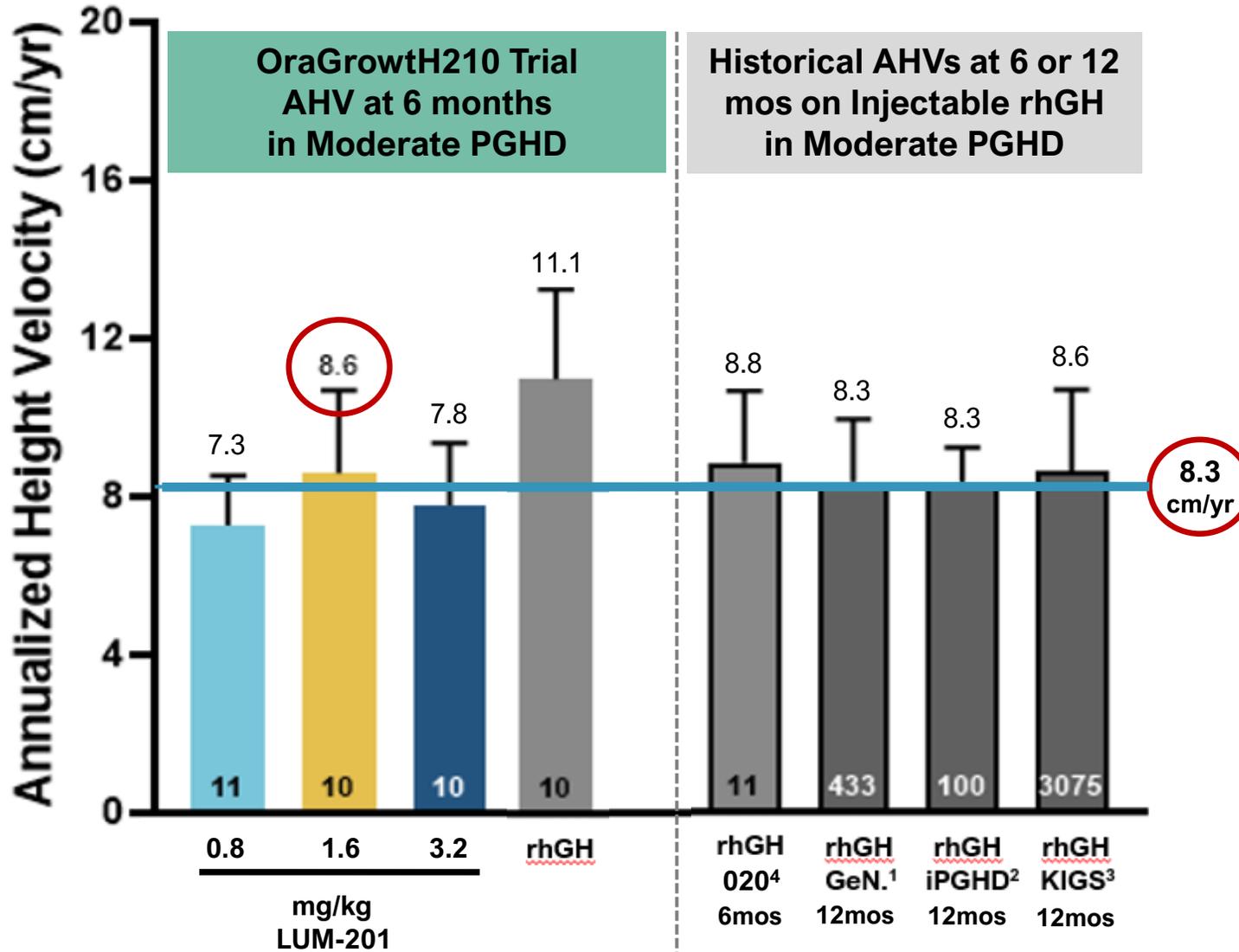


## OraGrowthH210 Trial Interim Results

- LUM-201 1.6 mg/kg/day cohort grew **8.6** cm/year, in line with the expected rate of ~ **8.3-8.5** cm/year from prior data
- Expected growth rate was based on historical AHV values from multiple datasets of moderate idiopathic PGHD patients treated with rhGH

## LUM-201 Growth Met Expectations

# rhGH Growth in OraGrowthH210 Trial Inconsistent with Historical Norms



### OraGrowthH210 Trial Interim Results

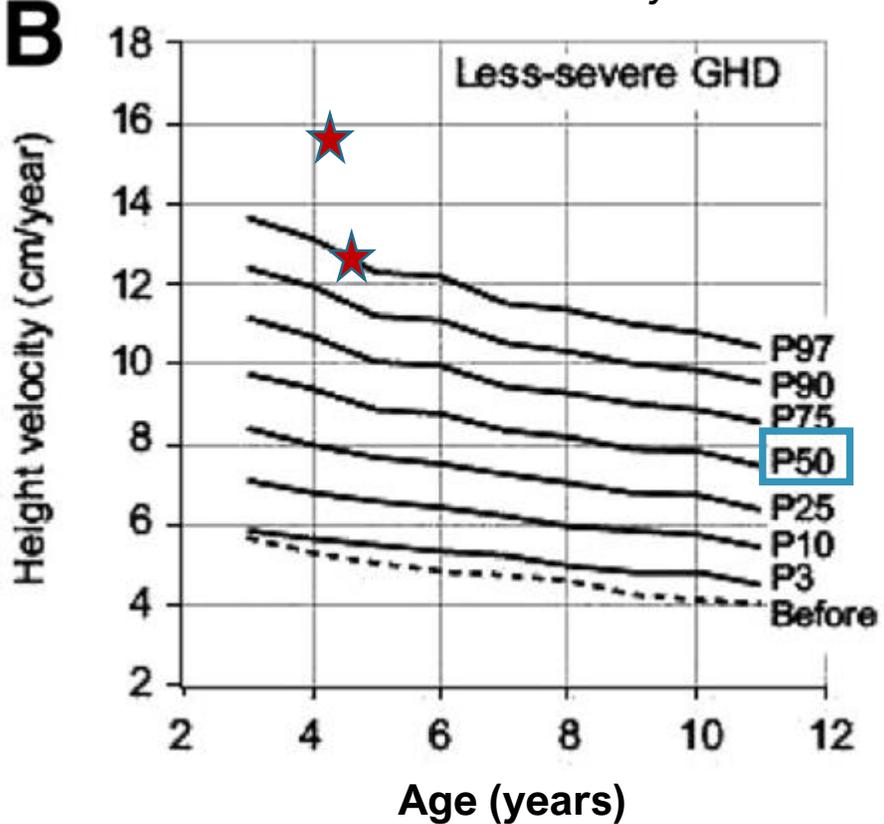
- rhGH cohort grew at a much faster rate than expected or previously reported in moderate PGHD population
- Cohort baseline differences predict faster first-year growth in the rhGH arm<sup>1,3</sup>
- The balance between cohorts should improve with full enrollment of trial

**AHV disparities should narrow as baseline imbalances improve**

Sources: 1 Blum et al JES 2021, 2 Lechuga-Sancho et al JPEM 2009, 3 Ranke et al JCEM 2010, 4 Bright et al JES 2021.

# Growth Outliers in the rhGH Cohort: 2 of 3 Subjects under Age 5 Randomized to rhGH

First-year Growth on rhGH for Moderate PGHD  
KIGS Database Analysis<sup>1</sup>

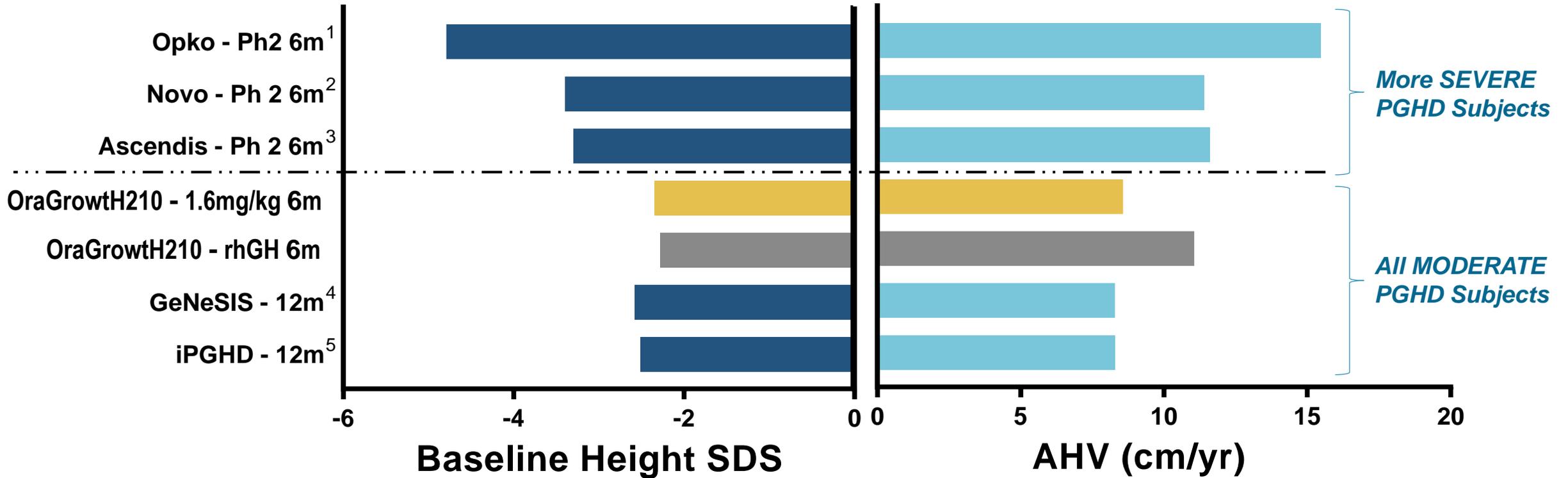


★ OraGrowth210 youngest subjects in rhGH cohort at 6-months AHV

P lines = Percentiles  
“Before” line marks height velocity before GH therapy

<sup>1</sup> Ranke, et al 2010 JCEM

# Interim OraGrowthH210 Data: rhGH Cohort Grew More than Historical Norms in Moderate PGHD Patient Population



Unprecedented rhGH growth response in OraGrowthH 210 in moderate PGHD at ~50% enrollment likely due to outlier & small sample size

Expect larger N from fully enrolled OraGrowthH210 Trial to reduce impact of growth outliers

SDS = Standard Deviation Score

1) Rosenfeld, ENDO 2014 presentation interim analysis, full analysis Zelinska et al JCEM 2017 2) Sävendahl et al JCEM, 2020 3) Chatelain et al JCEM, 2017

4) Blum et al JES 2021 5) Lechuga-Sancho et al JPEM 2009

# Key Baseline Characteristics that Predict Better AHV With rhGH Treatment of PGHD Patients

Historical data from multiple peer-reviewed scientific publications demonstrate the following metrics as key predictors of first-year growth

- Baseline Age
  - Age is the top predictor of growth on treatment
  - **Younger PGHD subjects grow faster<sup>1</sup>**
- Baseline Height
  - **Shorter stature at baseline predicts greater 1<sup>st</sup> year growth<sup>2</sup>**
- Baseline IGF-1 SDS
  - **Lower baseline IGF-1 SDS predicts faster growth<sup>3</sup>**
- Baseline Mid-parental height & Delta MPH SDS
  - **Greater mid-parental height and subject Height SDS farther below MPH SDS predicts greater 1<sup>st</sup> year growth<sup>4</sup>**
- Baseline weight (BMI)
  - **Greater baseline weight (higher BMI) predicts faster growth<sup>5</sup>**

<sup>1</sup> Ranke, et al. Growth Horm & IGF Res (2009) 19:1–11; Lee, et al. Internat J Pediat Endocrin (2011):6; Yang, et al. Nature Sci Rep (2019) 9(1):16181; Blum et al JES (2021); Ranke et al JCEM (2010); Blethen, et al. JCEM (1993 Mar);76(3):574-9; Cho, et al. J Korean Med Sci. (2020 May) 35(19):e151

<sup>2</sup> Ranke, et al. Growth Horm & IGF Res (2009) 19:1–11; Lee, et al. Intern J Pediat Endocrin (2011):6; Cho, et al. J Korean Med Sci. (2020 May) 35(19):e151; Ranke et al. JCEM (2005) 90(4);1966-1971

<sup>3</sup> Ranke, et al. Growth Horm & IGF Res (2009) 19:1–11; Lee, et al. Internat J Pediat Endocrin (2011):6

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<sup>5</sup> Ranke, et al. Growth Horm & IGF Res (2009) 19:1–11; Lee, et al. Intern J Pediat Endocrin 2011:6; Cho, et al. J Korean Med Sci. 2020 May 18;35(19):e151; Blethen, et al. JCEM (1993 Mar);76(3):574-9; Ranke, et al. JCEM (2005) 90(4);1966-1971; Yang, et al. Nature Sci Rep 2019, 9(1); 16181

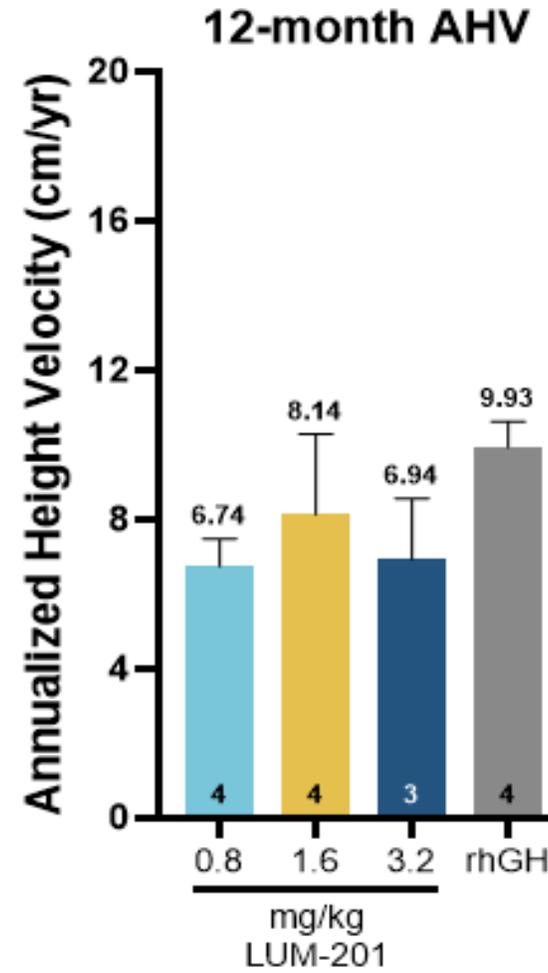
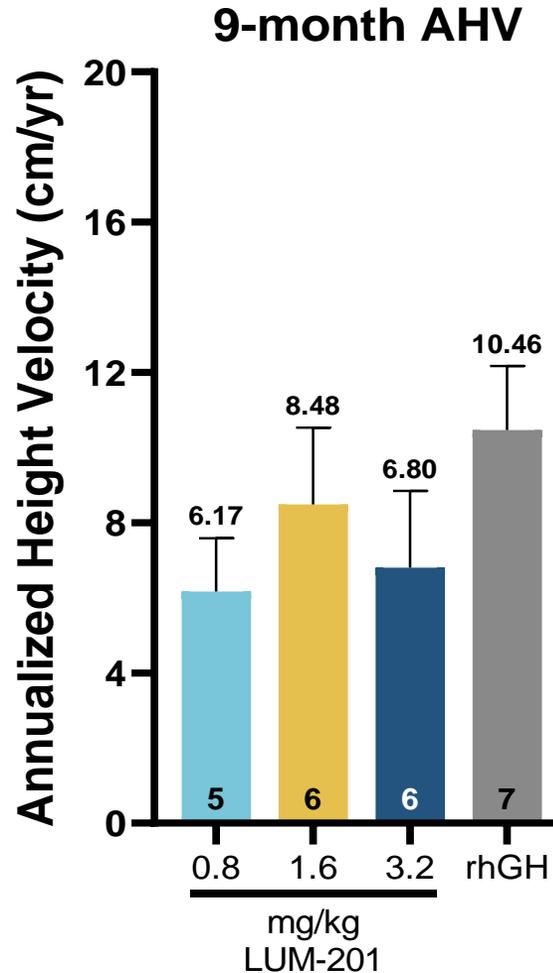
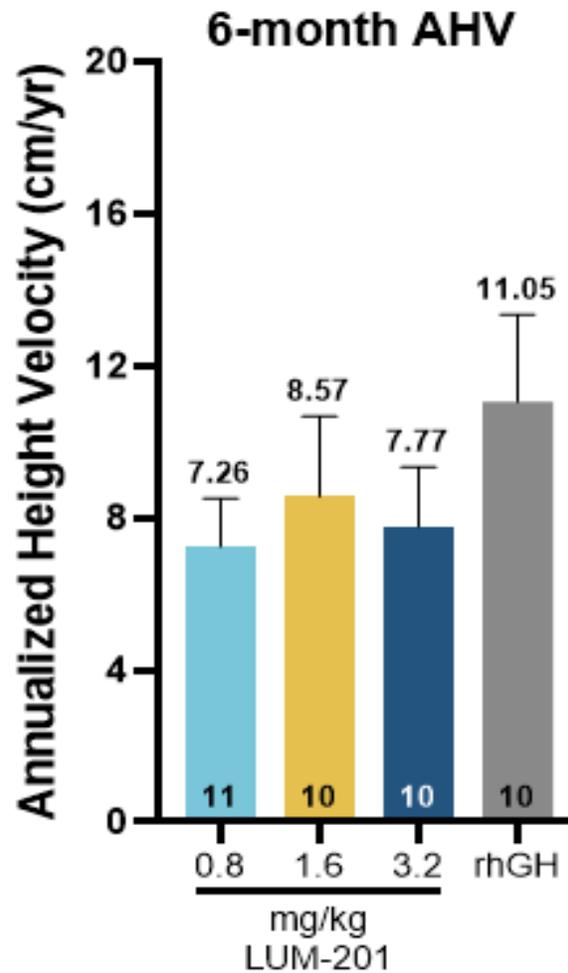
# OraGrowthH210 Trial Baseline Characteristics at 50% & 100% Enrollment

	At 50% enrollment			At 100% enrollment*	
	LUM-201 1.6 mg Mean (SD) N=10	rhGH Mean (SD) N=10		LUM-201 1.6 mg Mean (SD) N=22	rhGH Mean (SD) N=20
Age (months)	99.3 (28.3)	90.3 (26.7)	← Imbalance between LUM-201 & rhGH arms narrows at full enrollment, which we expect will diminish the rhGH outlier impact → ←	95.2 (27.3)	91.4 (23.3)
Height (cm)	114.6 (9.6)	111.6 (11.9)		113.0 (11.0)	112.3 (10.5)
Height SDS	-2.35 (0.62)	-2.29 (0.43)		-2.42 (0.68)	-2.23 (0.41)
IGF-1 SDS	-1.17 (0.72)	-1.37 (0.48)		-1.40 (0.57)	-1.39 (0.47)
MPH (cm)	166.98 (7.15)	168.78 (8.85)		165.4 (7.4)	169.1 (8.26)
MPH SDS $\Delta$	1.76 (0.60)	1.76 (0.73)		1.69 (0.81)	1.91 (0.65)
BA Delay (yrs)	1.9 (0.5)	1.8 (1.0)		1.8 (0.9)	1.9 (0.9)
BMI SDS <sup>1</sup>	-0.35 (0.79)	+0.31 (1.05)		-0.27 (0.90)	+0.01 (0.95)

\* Preliminary assessment

<sup>1</sup> Yang, et al. Nature Sci Rep 2019, 9(1); 16181

# OraGrowtH210 Interim Data: LUM-201 Demonstrates Durable Response to 12 Months



## Conclusions

- LUM-201 growth rates consistent from 6 to 12 months
- rhGH growth rates decline more from 6 to 12 months, narrowing the AHV  $\Delta$  between the arms at 12 months
- A Phase 3 non-inferiority trial is expected to be a 12-month study in a much larger population
- Historically, non-inferiority margin for AHV's in Phase 3 trials was ~2 cm at 12 months

# OraGrowthH212 Trial

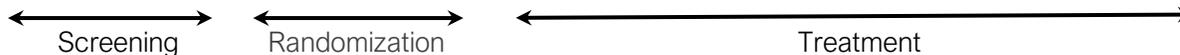
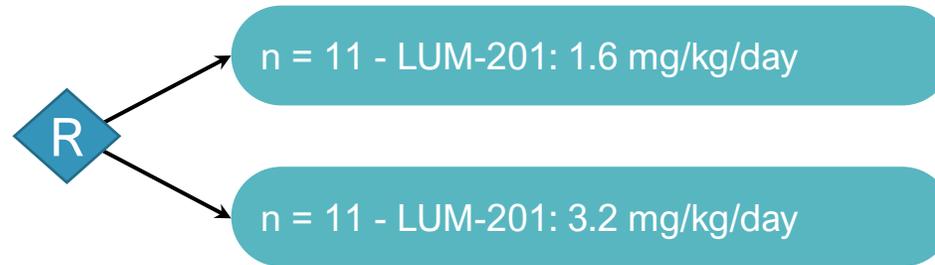
PK/PD Trial Evaluating Oral LUM-201 in Idiopathic PGHD

# OraGrowthH212 Trial: PK/PD Trial in Idiopathic PGHD: Enrollment Completed

## OraGrowthH212 TRIAL

- n = 22
- Open-label study
- Idiopathic PGHD patients
- rhGH-treatment naïve
- Dosing to near-adult height
- Single, specialized clinical site
- Q10 minute GH sampling for 12 hours

Primary Outcome Data (n = 22) – at 6 months on therapy  
 Interim Data Analysis (n = 10) – at 6 months on therapy  
 Total Study Duration – subjects on therapy to near adult height



### Objectives

#### Primary Endpoints:

- Assess LUM-201 effect on endogenous GH pulsatility and Annualized Height Velocity (AHV)
- Evaluate PK/PD in children

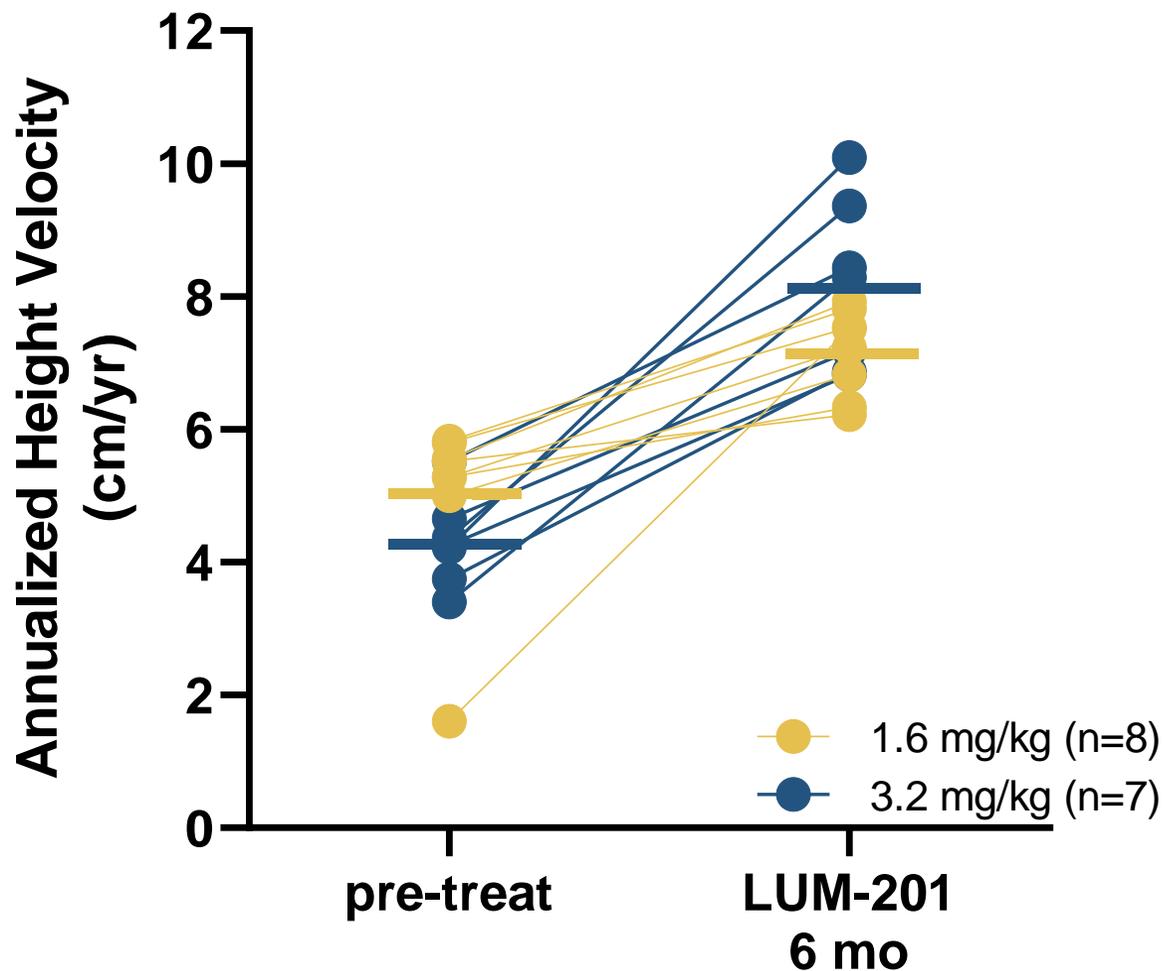
#### Goals:

- Confirm prior PK/PD data in adults & subset of Merck 020 trial
- Support future regulatory filings & commercialization

**Primary outcome data on 22 subjects anticipated 4Q 2023**  
**Interim AHV and safety data on 10 subjects announced November 2022**

# OraGrowthH212 Trial: AHV Before and After 6 Months of LUM-201 Treatment

At ~70% enrollment (N=15)

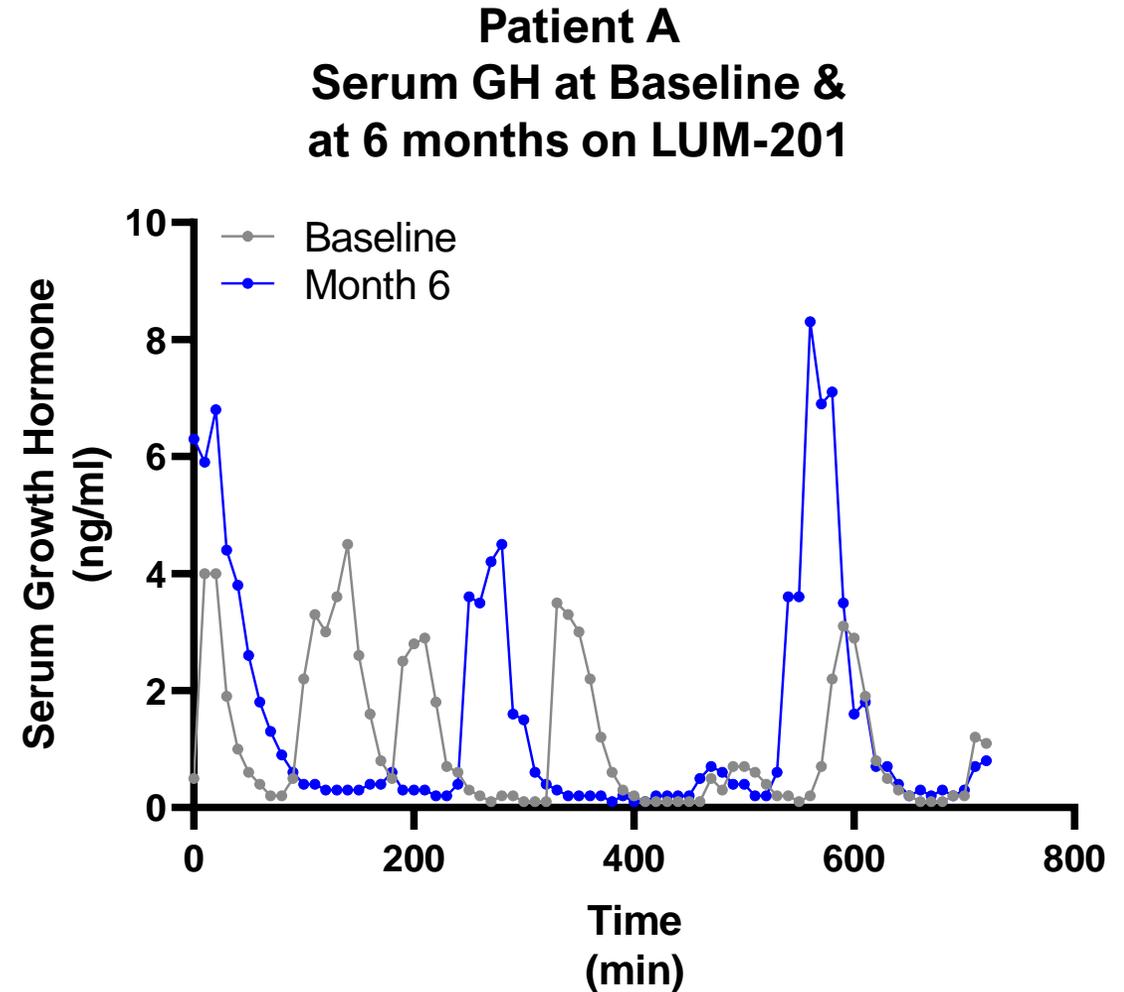


## 6-month Observations

- **LUM-201 raised the AHV (growth rate) from baseline after 6 months on therapy for both the 1.6 mg/kg cohort ( $p = 0.0006$ ) and the 3.2 mg/kg cohort ( $p < 0.0001$ )**
- No statistical difference exists between the two cohorts at each timepoint
- As expected, greater growth response was observed in patients with lower baseline height velocity

# OraGrowthH212 Trial: Pulsatility and AHV data: **Month 6** for Patient A (1.6 mg/kg/day)

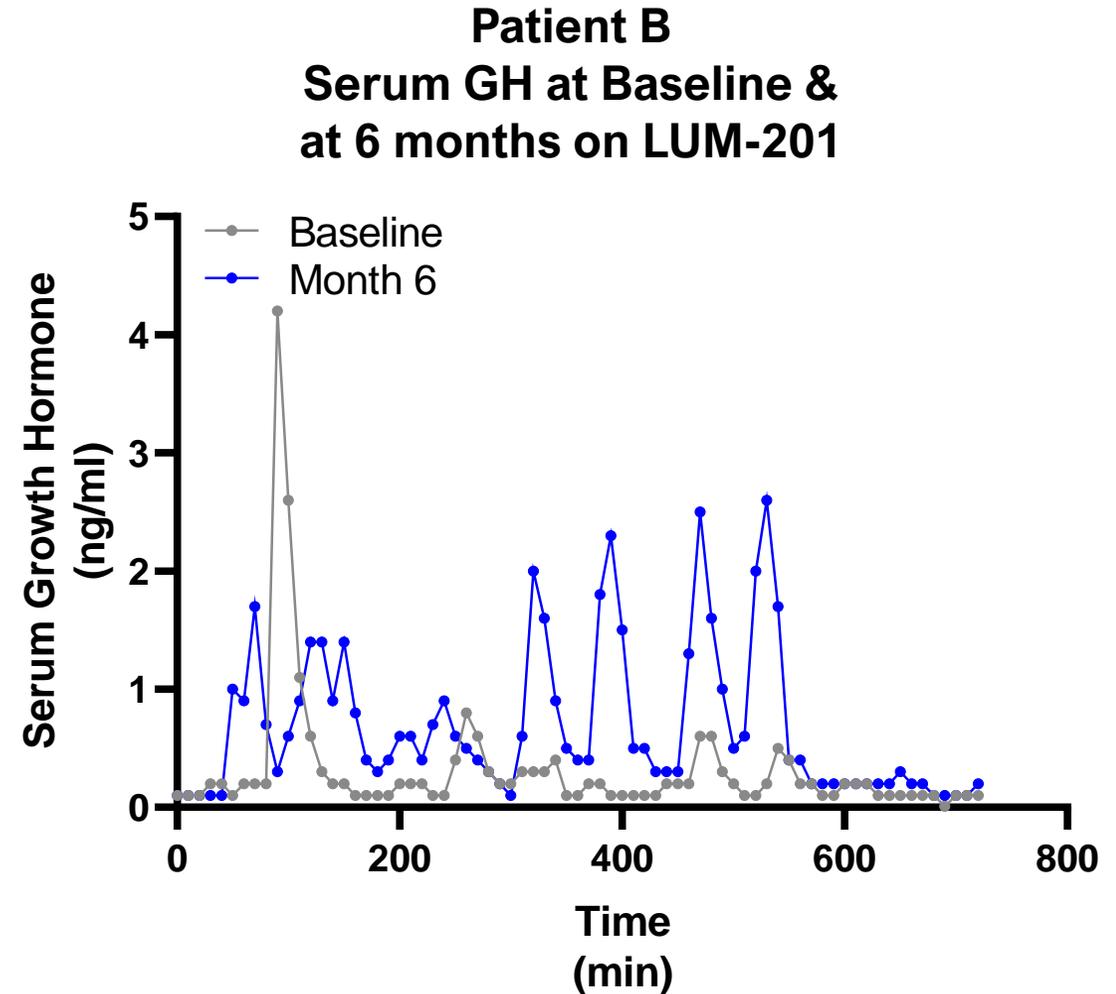
	Baseline	6 months LUM-201 3.2 mg/kg/d
IGF-1 (ng/ml)	179	289
	% change from baseline**	61%
<b>Q10m 12h GH</b>	$AUC_{0-12}$ (ng*hr/ml)	798.8
	% change from baseline**	33%
Height velocity (cm/yr)	5.6	7.9



\*\*Percent change from baseline calculated as:  $(6\text{mo value} - \text{baseline value}) / (\text{baseline value})$

# OraGrowthH212 Trial: Pulsatility and AHV data: **Month 6** for Patient B (3.2 mg/kg/day)

	Baseline	6 months LUM-201 3.2 mg/kg/d
IGF-1 (ng/ml)	48	111
	% change from baseline**	131%
<b>Q10m 12h GH</b>	AUC <sub>0-12</sub> (ng*hr/ml)	481.8
	% change from baseline**	91%
Height velocity (cm/yr)	4.4	9.4



\*\*Percent change from baseline calculated as: (6mo value – baseline value) / (baseline value)

# OraGrowthH212 Trial: Change from Baseline in Mean GH Concentration and GH AUC<sub>0-12h</sub> after 6-months LUM-201 Daily Dosing at ~70% Enrollment (N=15)

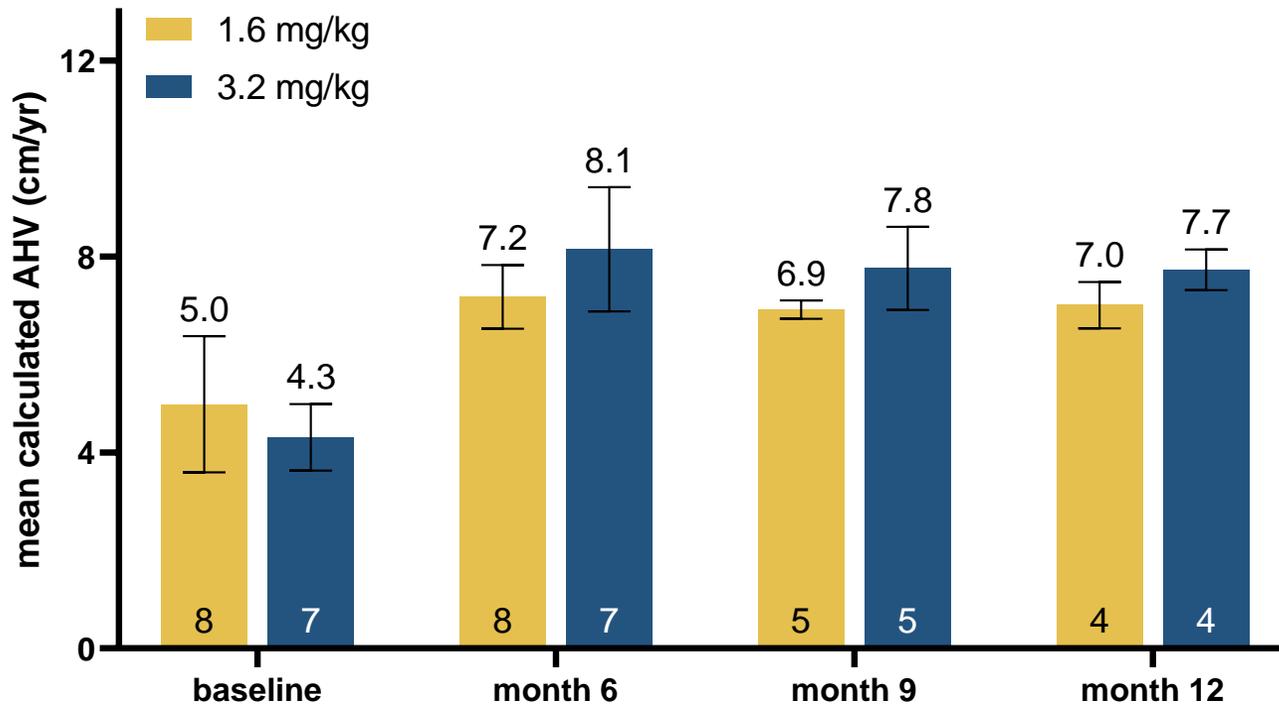
Dose of LUM-201		1.6 mg/kg (n = 8)		3.2 mg/kg (n=7)	
		baseline	6 mo	baseline	6 mo
mean GH conc (ng/ml)	Median	<b>1.04</b>	1.22	<b>0.47</b>	1.36
	95% CI	0.51-1.59	0.81-1.93	0.25-1.17	0.49-3.02
GH AUC <sub>0-12h</sub>	Median	<b>758.6</b>	894.0	<b>343.8</b>	992.3
	95% CI	376.4-1161	587.1-1411	182.0-854.9	357.3-2207

## Conclusions

- Increases in GH AUC<sub>0-12</sub> are driven primarily by increased amplitude of GH pulses to generate increases in height velocity
- Number of GH pulses is unchanged from baseline to 6 months of treatment
- The 3.2 mg/kg cohort started with lower GH secretion at baseline than the 1.6 mg/kg cohort

# OraGrowthH212 Interim Data at ~70% Enrollment Demonstrate Durable Response

Mean AHV's from OraGrowthH212 Trial

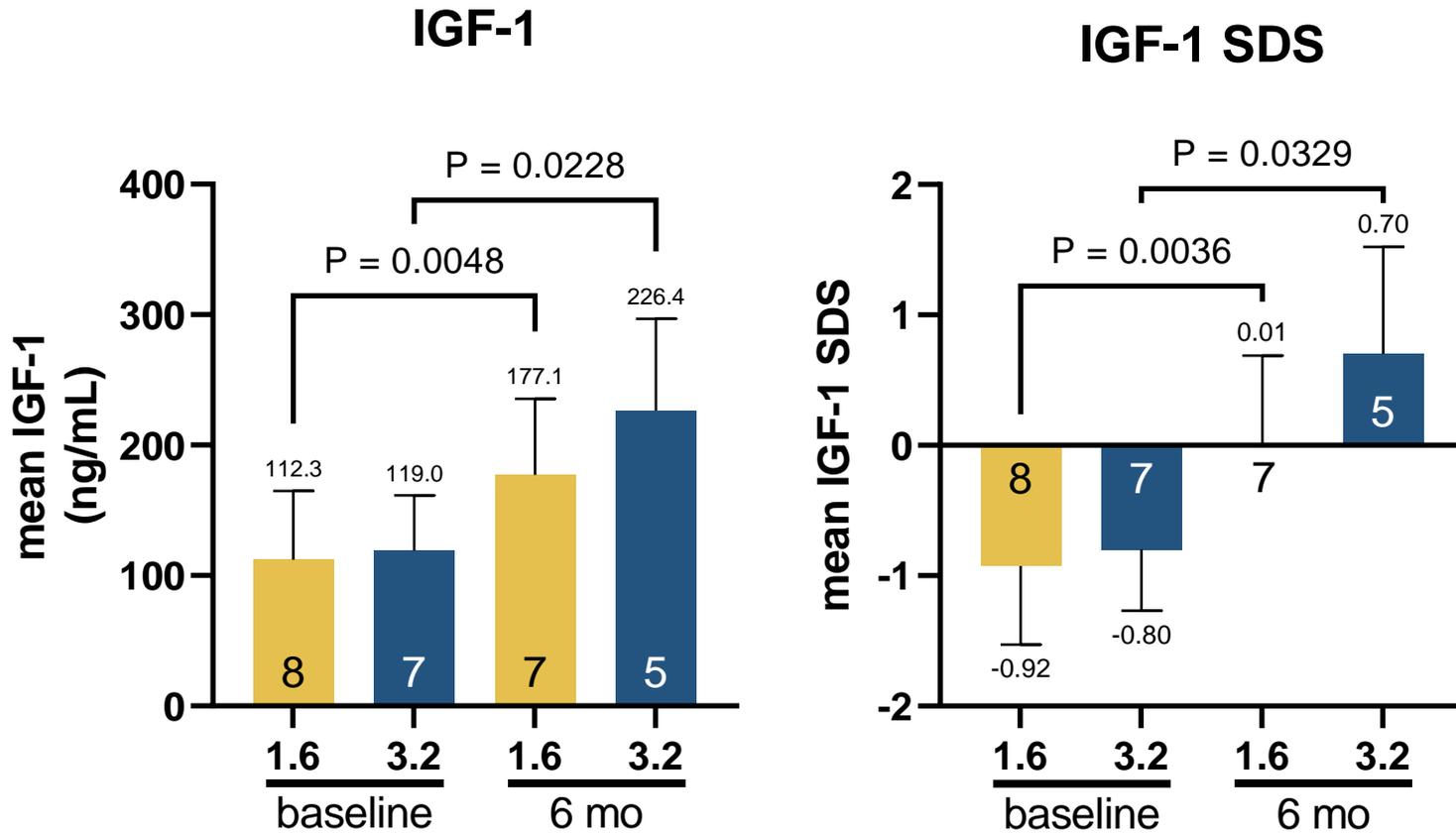


## Conclusions

- Based on Interim data, OraGrowthH212 data demonstrate meaningful increase in AHV on LUM-201 vs baseline
- Data show growth acceleration is durable through 12 months
- No statistical difference exists between the cohorts at any time point
- We plan to continue the OraGrowthH212 Trial until near adult height
- The observed growth is in line with rhGH historical growth (KIGS, GeNeSiS)<sup>1</sup>, in this moderate iPGHD population

# Treatment with LUM-201 Increased Serum IGF-1 Concentration & IGF-1 SDS Values

IGF-1 & IGF-1 SDS Values from OraGrowthH212 Trial

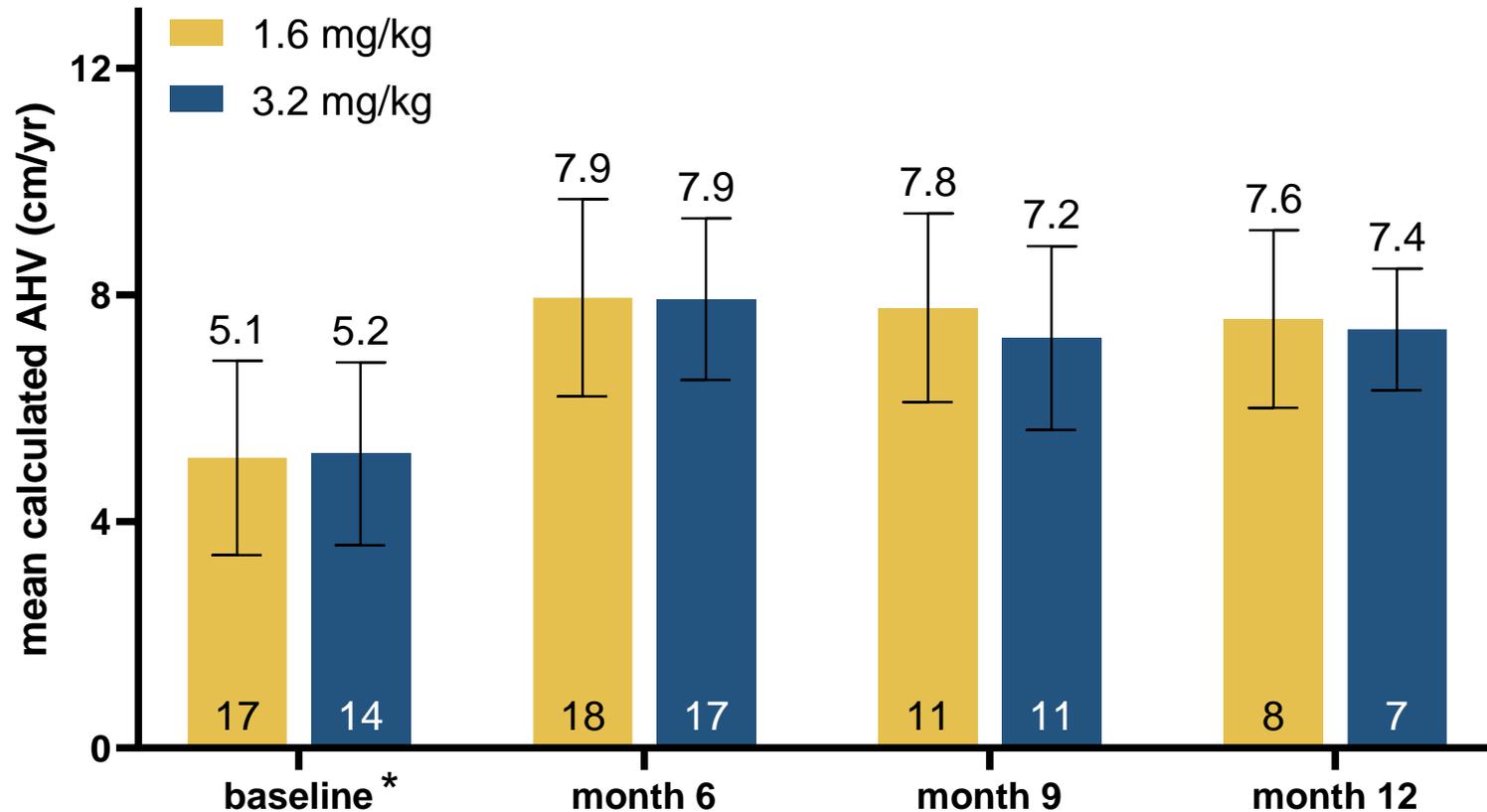


## Conclusions

- Interim data show LUM-201 produces a significant increase in IGF-1 levels vs baseline that remains within the normal range
- Based on the MOA of LUM-201, these data support the physiological IGF-1 feedback

# OraGrowthH210 & OraGrowthH212 Interim Data Combined Show Durable Response

Interim Combined AHV Data from  
OraGrowthH210 & OraGrowthH212 Trials\*\*



## Conclusions

- Post-hoc analysis of combined interim data conducted to determine optimal dose for Phase 3
- Comparable mean AHVs for top 2 LUM-201 doses seen at 6, 9, and 12 months
- Combined interim data support selection of 1.6 mg/kg/day dose for pivotal Phase 3 trial

\*Pre-treatment baseline AHV was not required for this study, but available data shown

# Safety and Tolerability

# Interim Safety and Tolerability Profile from Combined Trials

## OraGrowtH210 & OraGrowtH212 Combined

	1.6 mg/kg	3.2 mg/kg
	N =33	N=33
Number of AEs	105	110
Subjects with AE (%)	29 (87.9%)	30 (90.9%)
Treatment Related AEs*	17	19
Subjects with Treatment Related AEs (%)	12 (36.4%)	13 (39.4%)
Subjects with SAEs (%)	0 (0%)	0 (0%)

### Conclusions

- No treatment-related Serious Adverse Events (SAEs)
- No drop-outs due to SAEs or AEs
- No meaningful safety signals observed in laboratory values, adverse events data, or in EKG values

# Interim OraGrowth Trials Analysis: LUM-201 Met Expectations in Idiopathic PGHD

## Expected annualized height velocity (AHV) was met

- AHV of 8.6 cm at 6-months on 1.6 mg/kg/day LUM-201, in line with 8.3 cm expected in PEM+ PGHD

## Durability of growth response was observed at 9 and 12 months

- LUM-201 AHVs are sustained & converge with rhGH AHVs at 12-month treatment interval

## Interim safety and tolerability profile

- No treatment related SAEs, no trial dropouts due to AEs, and no meaningful safety signal

## Evidence of a dose response & Phase 3 dose identified

- Interim safety and efficacy data support selection of 1.6 mg/kg/day for Phase 3

## Data support potential for oral LUM-201 to disrupt injectable PGHD market

- ~\$3.4 billion worldwide GHD market treated by injectable rhGH primed for conversion to oral therapy

# LUM-201: Exclusivity and Barriers with Orphan Designation and IP

## Orphan Drug Designation

- **Orphan Drug Designation (ODD)** granted in US & EU for GHD in 2017
- LUM-201 eligible for 12 years of exclusivity in EU and 7.5 years of exclusivity in US\*
- Plan to seek Orphan Drug Designation in Japan

## Intellectual Property

- **Patent granted for “Detecting & Treating GHD”**
- Use of LUM-201 in PGHD and other GHD indications based on PEM strategy
- Patents for LUM-201 in GHD with **protection through 2036**
- Patents granted in US, Australia, EU, Israel, Japan, S. Korea, Hong Kong and Ukraine
- Additional applications pending in multiple jurisdictions
- Applications for LUM-201 in NAFLD being prosecuted in multiple jurisdictions

## New Patent Filing

- Patent filed November 2022 for novel LUM-201 formulation
- If granted, **Composition of Matter IP protection would be provided through 2042**

# Financials

# Lumos Pharma Financial Information as of March 31, 2023

Values in USD

Cash, equivalents & short-term securities	\$58.0M
Debt	\$0
Shares Outstanding	8.2M
Cash Use per Quarter in 2023	\$9.5-\$10.5M
Fiscal Year End	March 31



**Cash and equivalents balance to support current operations into 3Q 2024,  
Beyond primary outcome data readouts for OraGrowthH210 and OraGrowthH212 Trials 4Q 2023**

# Conclusions

# Investment Highlights

## Lead asset targeting children with growth disorders

### Novel Oral Rare Disease Asset

- Novel **oral** therapeutic asset, **LUM-201**, for growth hormone deficiency (GHD) disorders
- LUM-201 **acts within natural endocrine pathway**, differentiated from injectable therapies
- **Potential to disrupt** significant subset of sizable **injectable market** for GHD



### Pipeline in a Product

- Worldwide injectable market for GHD disorders is **\$3.4 billion\***
- Market for initial oral LUM-201 indication, Pediatric GHD (PGHD), is **\$1.2 billion\***
- Prior data support potential efficacy of LUM-201 in multiple GHD disorders



### Late-stage Trials in PGHD

- **Enrollment completed** for Phase 2 OraGrowthH210 and PK/PD OraGrowthH212 Trials
- **Primary outcome data** expected **4Q 2023**
- Interim data showed LUM-201 met growth expectations
- Enriched patient population **de-risks** clinical program as all subjects randomized demonstrate a response to LUM-201 in stimulation test



### Solid Financial Position

- Cash balance of **\$58.0 million** as of close of **1Q 2023**
- Cash runway **into 3Q 2024**, beyond OraGrowthH210 & OraGrowthH212 primary outcome data



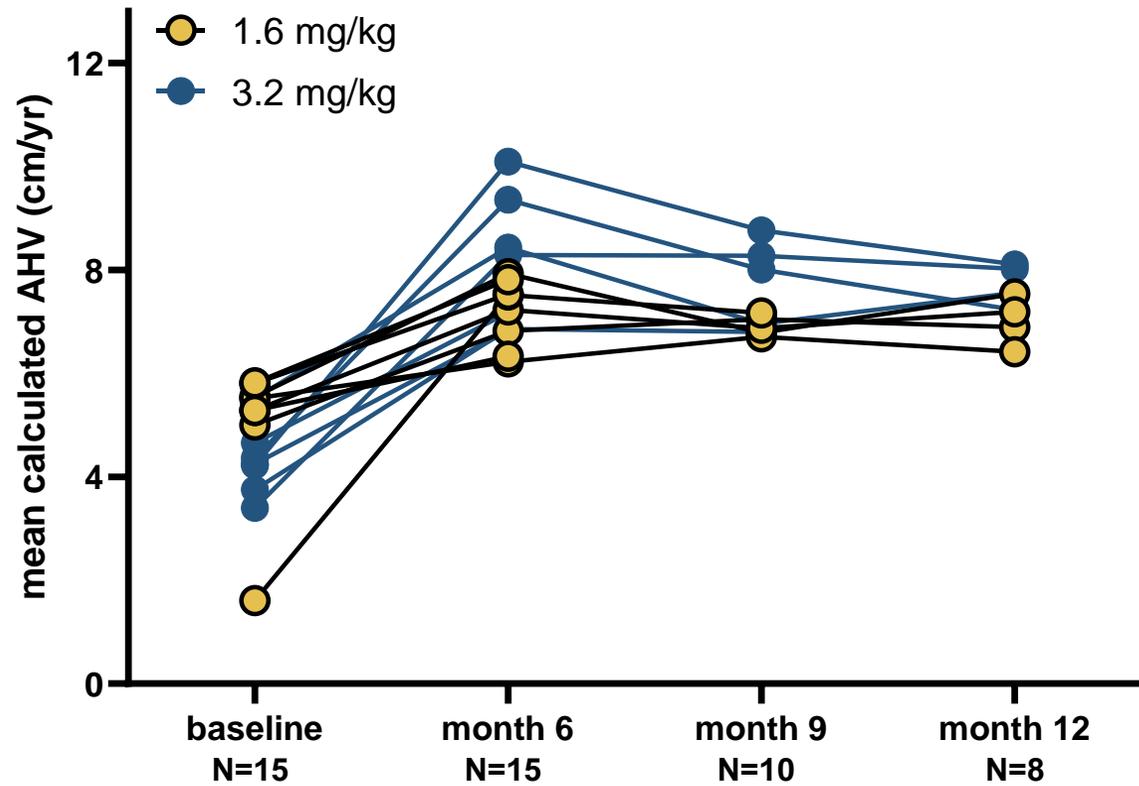
PGHD = Pediatric Growth Hormone Deficiency

\* USA, Germany, France, Italy, Spain, UK, Japan (Grandview Research, Growth Hormone Market Forecast, 2019)

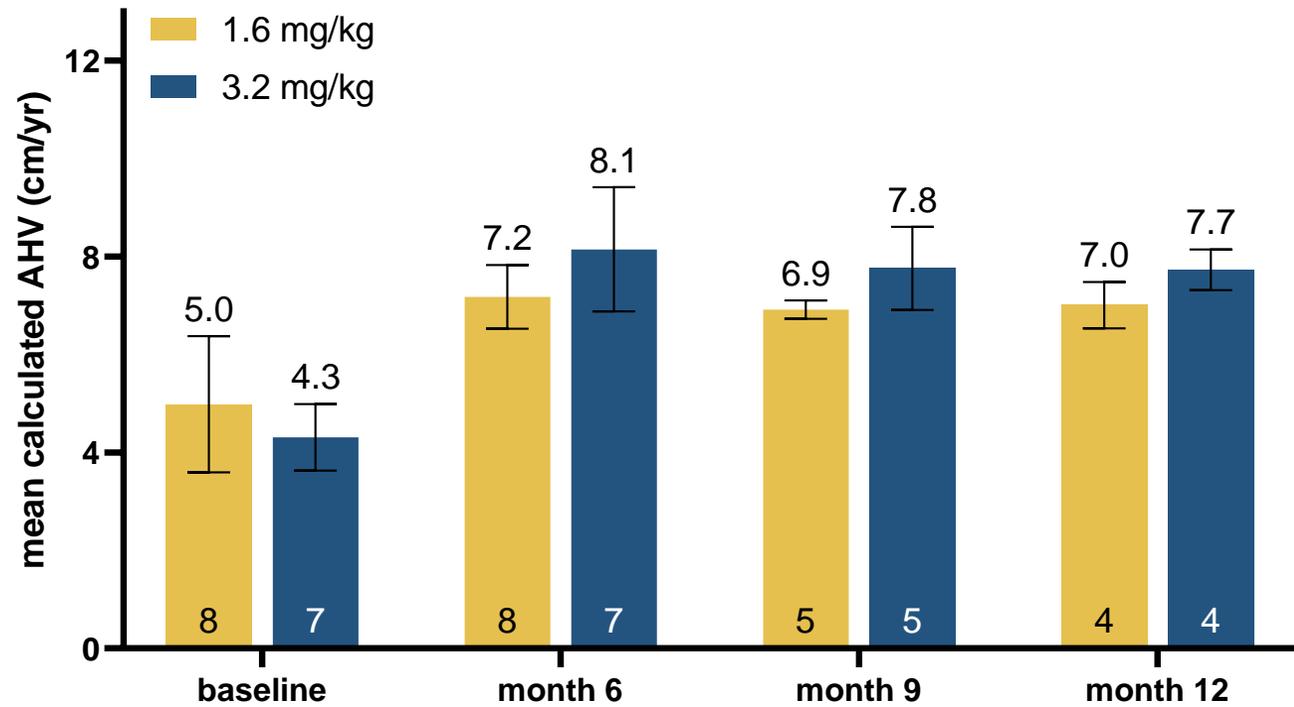
# Interim and Subsequent Analyses Supplementary Materials

# OraGrowtH212 Data: Durable LUM-201 Response at 12 Months

## AHV's by Subject in OraGrowtH212



## Mean AHV's in OraGrowtH212 Trial



# Ranke Model is the Gold Standard in Growth Prediction for GHD

$$\text{PHV} = 14.55 + [-1.37 \times (\ln \text{ max GH stim})] + (-0.32 \times \text{Age}) + (0.32 \times \text{BWt SDS}) + (-0.5457) + (-0.4 \times \text{HtSDS-MPH SDS}) + (0.29 \times \text{Wt SDS})$$

- Parameter Rank 1<sup>st</sup>      [-1.37 X (ln max GH stim)]      A measure of how GHD subject is by stim test value
- Parameter Rank 2<sup>nd</sup>      (-0.32 X Age)      Age at treatment start is a very important predictor
- Parameter Rank 6<sup>th</sup>      (0.32 X BWt SDS)      Birth weight SDS
- Parameter Rank 5<sup>th</sup>      (-0.5457)      Dose of rhGH (constant for this trial)
- Parameter Rank 3<sup>rd</sup>      (-0.4 X HtSDS-MPH SDS)      Measure of how far away from their target height
- Parameter Rank 4<sup>th</sup>      (0.29 X Wt SDS)      Body weight at start of treatment
  
- The model was developed based on mining the KIGS data set of rhGH PGHD treatment data
  - Phase 4 database for Genotropin N= 593 when model developed
  - Developed models to predict 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> year growth

Growth for both rhGH and LUM-201 1.6 mg/kg cohorts was predicted using Ranke models

# Safety Profile at Interim Analysis for OraGrowthH210 Trial

66 subjects randomized to date with safety data available for 58 subjects at interim analysis

	0.8 mg/kg	1.6 mg/kg	3.2 mg/kg	ALL LUM-201	rhGH 34 mcg/kg
<b>N =</b>	<b>14</b>	<b>15</b>	<b>14</b>	<b><u>43</u></b>	<b>15</b>
<b>Number of AEs</b>	31	45	38	114	21
<b>Subjects with AE (%)</b>	8 (57.1%)	13 (86.7%)	9 (64.3%)	30 (69.8%)	9 (60.0%)
<b>Treatment Related AEs (N)</b>	2	1	3	6	3
<b>Subjects with Treatment Related AEs (%)</b>	1 (7.1%)	1 (6.7%)	2 (14.3%)	4 (9.3%)	2 (13.3%)
<b>Subjects with SAEs (%)</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

# Specific AEs – No meaningful signal

66 subjects randomized to date with safety data available for 58 subjects at interim analysis

	<b>0.8 N=14</b>	<b>1.6 N=15</b>	<b>3.2 N=14</b>	<b>ALL N=43</b>	<b>rhGH N=15</b>
<b>Arthralgia</b>	1 (7.1%)	2 (13.3%)	2 (14.3%)	5 (11.6%)	1 (6.7%)
<b>Myalgia</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (20.0%)
<b>Headache</b>	2 (14.3%)	3 (20.0%)	2 (14.3%)	7 (16.3%)	2 (13.3%)
<b>Lethargy</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
<b>Abd. pain</b>	0 (0.0%)	0 (0.0%)	2 (14.3%)	2 (4.7%)	0 (0.0%)
<b>Emesis</b>	1 (7.1%)	1 (6.7%)	1 (7.1%)	3 (7.0%)	1 (6.7%)
<b>Inc. appetite</b>	1 (7.1%)	1 (6.7%)	0 (0.0%)	2 (4.7%)	2 (13.3%)
<b>Hypoglycemia</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
<b>Orophary. pain</b>	1 (7.1%)	1 (6.7%)	0 (0.0%)	2 (4.7%)	1 (6.7%)

# Laboratory Shifts: No meaningful signal

66 subjects randomized to date with safety data available for 58 subjects at interim analysis\*

	0.8 mg/kg N=14	1.6 mg/kg N=15	3.2 mg/kg N=14	ALL N=43	rhGH N=15
<b>ALT NI to high</b>	2/12 (16.7%)	1/15 (6.7%)	2/12 (16.7%)	5/39 (12.8%)	5/12 (41.7%)
<b>TAP NI to high</b>	1/12 (8.3%)	0/15 (0.0%)	1/12 (8.3%)	2/39 (5.1%)	5/12 (41.7%)
<b>Bili NI to high</b>	0/13 (0.0%)	0/15 (0.0%)	0/13 (0.0%)	0/41 (0.0%)	0/15 (0%)
<b>Creat. NI to high</b>	0/13 (0.0%)	0/15 (0.0%)	0/13 (0.0%)	0/43 (0.0%)	0/12 (0%)
<b>Gluc NI to high</b>	0/13 (0.0%)	3/15 (20.0%)	1/13 (7.7%)	4/41 (9.8%)	1/12 (8.3%)
<b>Phos. NI to high</b>	3/13 (23.1%)	2/15 (13.3%)	3/13 (23.1%)	8/41 (19.5%)	5/12 (41.7%)
<b>Eos NI to high</b>	2/11 (18.2%)	3/15 (20.0%)	2/13 (15.4%)	7/39 (17.9%)	3/12 (25.0%)
<b>Gran. NI to low</b>	1/11 (9.1%)	3/15 (20.0%)	4/13 (30.8%)**	8/39 (20.5%)	1/12 (8.3%)
<b>Gran. NI to high</b>	0/11 (0.0%)	1/15 (6.7%)	2/13 (15.4%)**	3/39 (7.7%)	0/12 (0%)

\* Percentages calculated based on subjects with both baseline and post-baseline assay data

\*\* Bidirectional shifts diminish any concern

# OraGrowthH210 Trial: Baseline Characteristics at Interim Data (N=41)

*Imbalance in baseline characteristics between rhGH and LUM-201 arms*

	LUM-201 0.8 mg Mean (SD) N=11	LUM-201 1.6 mg Mean (SD) N=10	LUM-201 3.2 mg Mean (SD) N=10	rhGH Mean (SD) N=10
<b>Age (months)</b>	95.5 (28.2)	99.3 (28.3)	96.1 (21.7)	90.3 (26.7)
<b>Height (cm)</b>	113.8 (12.6)	114.6 (9.6)	113.8 (8.8)	111.6 (11.9)
<b>Height SDS</b>	-2.31 (0.32)	-2.35 (0.62)	-2.30 (0.48)	-2.29 (0.43)
<b>Max Height SDS</b>	-1.76	-1.66	-1.57	-1.73
<b>IGF-1 SDS</b>	-1.24 (0.573)	-1.17 (0.72)	-1.39 (0.61)	-1.37 (0.48)
<b>Max IGF-1 SDS</b>	-0.3	-0.3	-0.6	-0.7
<b>MPH (cm)</b>	164.47 (6.44)	166.98 (7.15)	166.20 (8.06)	168.78 (8.85)
<b>MPH SDS <math>\Delta</math></b>	1.29 (0.62)	1.76 (0.60)	1.96 (0.83)	1.76 (0.73)
<b>BA Delay (yrs)</b>	1.89 (1.02)	1.91 (0.53)	2.19 (0.86)	1.78 (0.96)
<b>BMI SDS<sup>1</sup></b>	-0.29 (1.04)	-0.35 (0.79)	-0.70 (0.48)	+0.31 (1.05)

Baseline characteristics for the rhGH arm predict this cohort will show a faster first-year growth rate on treatment than the LUM-201 cohorts <sup>2,3</sup>

<sup>1</sup> Yang, et al. Nature Sci Rep 2019, 9(1); 16181 <sup>2</sup> Blum et al JES 2021, <sup>3</sup> Ranke et al JCEM 2010

KEY: SDS = Standard deviation score MPH = Mid-parental height (Child's target height) MPH SDS delta = SD's from target height BA = Bone age BMI = Body mass index

# OraGrowthH212 Trial: Baseline Demographics at ~70% Enrollment (N=15)

Subjects N=15	1.6 mg N=8	3.2 mg N=7
Mean (SD)		
Age (mos)	<b>96.9</b> (11.9)	<b>95.0</b> (22.7)
Height (cm)	115.2 (4.57)	113.1(9.97)
Height SDS	-2.12 (0.29)	-2.34 (0.45)
IGF-1 SDS	-1.1 (0.535)	-0.8 (0.377)
MPH (cm)	161.8 (6.98)	160.82 (5.73)
MPH SDS Δ	<b>0.73</b> (0.47)	<b>0.81</b> (0.43)
BA Delay (yrs)	<b>1.50</b> (0.26)	<b>1.83</b> (0.88)
BMI (SDS)	<b>-0.18</b> (0.96)	<b>+0.48</b> (1.02)
Male/Female %	<b>63/37</b>	<b>71/29</b>

## Differences between the Two Cohorts

- Slight imbalance in age and gender
- Slight imbalance in delta below MPH, BMI, and bone age delay

# OraGrowthH210 & OraGrowthH212: Baseline Characteristics for Top Dose Cohorts

## OraGrowthH210 TRIAL

Subjects N=20	1.6 mg N=10	3.2 mg N=10
	Mean (SD)	
Age (mos)	99.3 (28.3)	<b>96.1</b> (21.7)
Height (cm)	114.6 (9.6)	113.8 (8.8)
Height SDS	-2.35 (0.62)	-2.30 (0.48)
IGF-1 SDS	-1.17 (0.72)	-1.39 (0.61)
MPH (cm)	166.98 (7.15)	166.20 (8.06)
MPH SDS Δ	1.76 (0.60)	<b>1.96 (0.83)</b>
BA Delay (yrs)	1.91 (0.53)	<b>2.19 (0.86)</b>
BMI (SDS)	-0.35 (0.79)	<b>-0.70 (0.48)</b>
Male/Female%	60/40	40/60

## OraGrowthH212 TRIAL

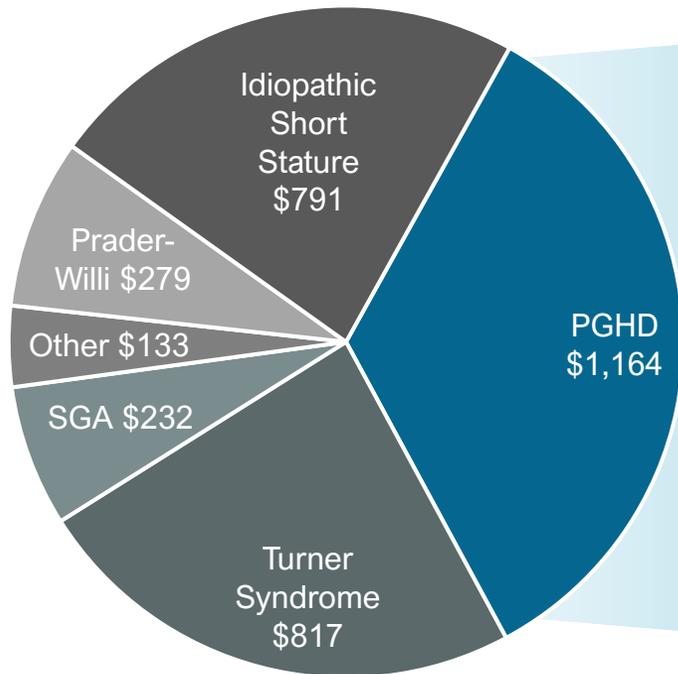
Subjects N=15	1.6 mg N=8	3.2 mg N=7
	Mean (SD)	
Age (mos)	96.9 (11.9)	<b>95.0</b> (22.7)
Height (cm)	115.2 (4.57)	113.1(9.97)
Height SDS	-2.12 (0.29)	-2.34 (0.45)
IGF-1 SDS	-1.1 (0.535)	-0.8 (0.377)
MPH (cm)	161.8 (6.98)	160.82 (5.73)
MPH SDS Δ	0.73 (0.47)	<b>0.81 (0.43)</b>
BA Delay (yrs)	1.50 (0.26)	<b>1.83 (0.88)</b>
BMI (SDS)	-0.18 (0.96)	<b>+0.48 (1.02)</b>
Male/Female%	63/37	<b>71/29</b>

These data represent the patient data that had been collected at time of Interim Analysis calculation.  
No statistically significant differences between cohorts in each trial (unpaired t-test comparing baseline mean/SD)

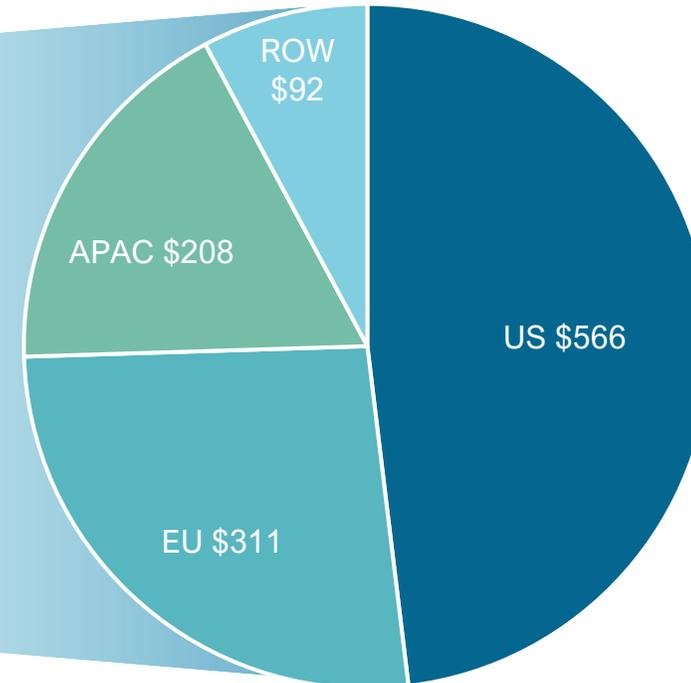
# Additional Supplementary Materials

# PGHD is ~35% of the \$3.4B Pediatric Recombinant Growth Hormone Market

2018 Global rhGH Sales \$3.4B\*  
(Values below in \$millions)



2018 Sales of rhGH for PGHD \$1.2B\*  
(Values below in \$millions)

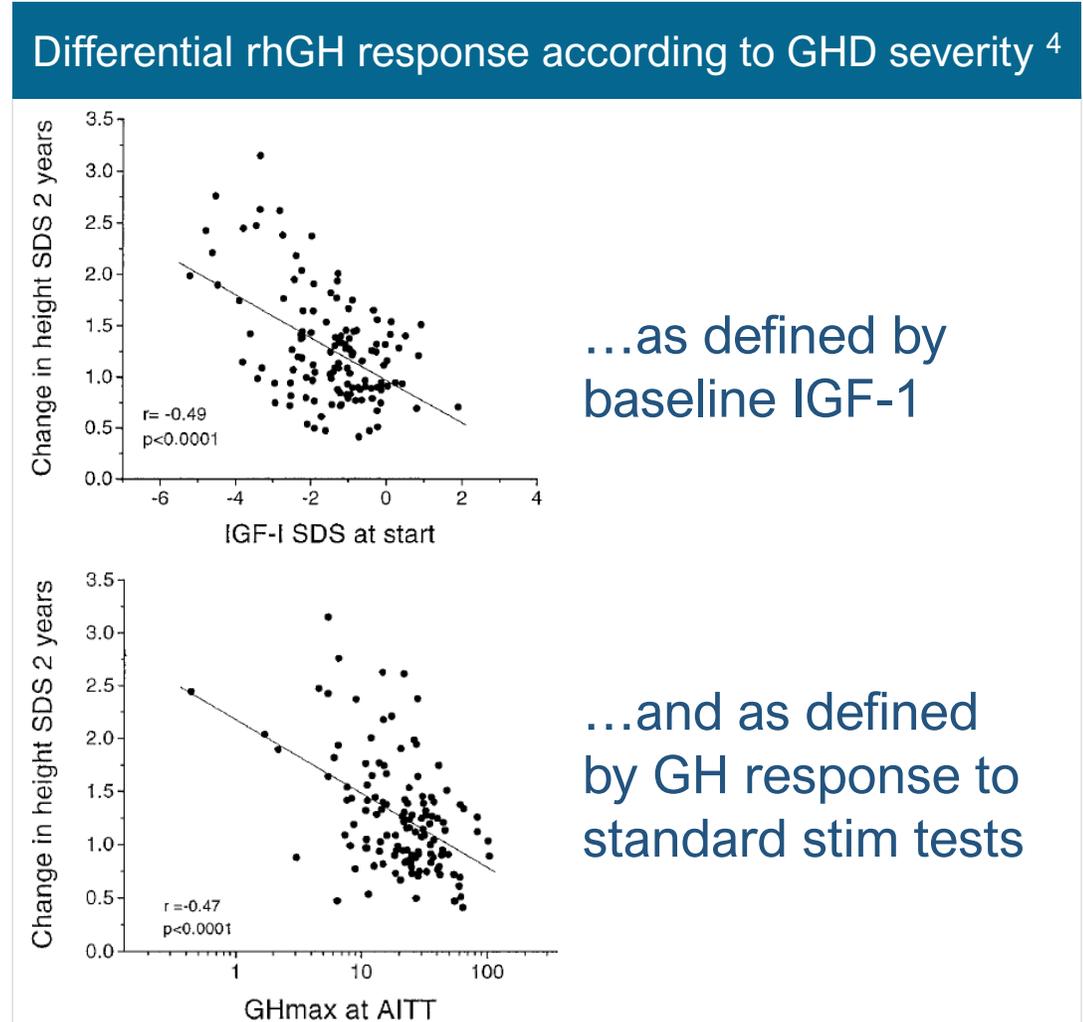


- Pediatric rhGH market projected to grow ~8% per year\*
- Well characterized market with established reimbursement mechanisms
- Current SOC consists of daily injectables; expected to convert to weekly injectables
- **Pediatric rhGH market appears primed for conversion to oral therapy**

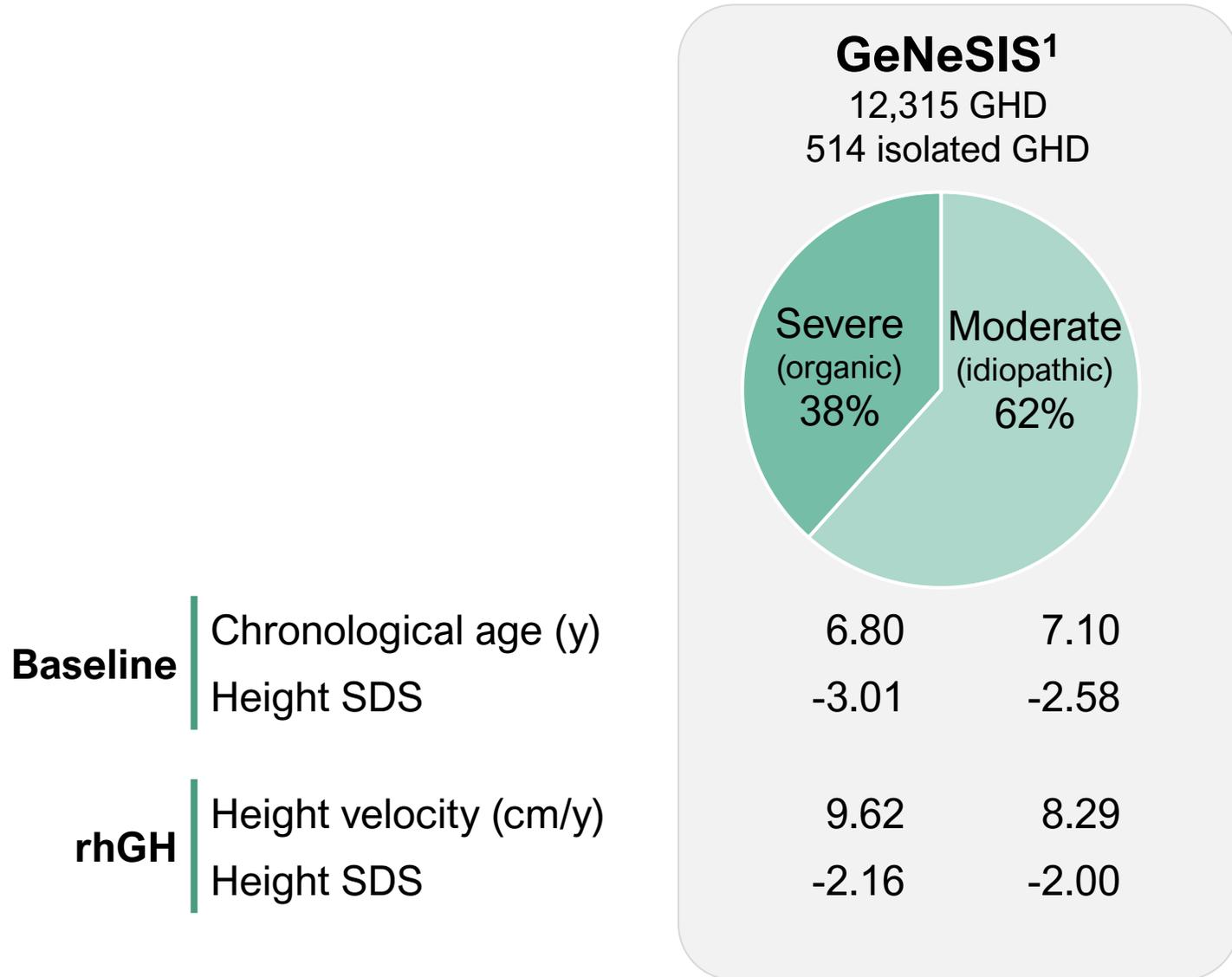
\*Grandview Research, hGH Market, 2018, excludes Adult Growth Hormone Deficiency

# Growth Hormone Deficiency Patients Have a Range of Secretion Insufficiency

- Well established in the literature:
  - A wide range of severity in GHD<sup>1</sup>
  - Variability in responses to GH therapy
  - Severely GH deficient patients exhibit greater growth response to rhGH compared to moderately deficient patients<sup>1</sup>
- Several prediction models attempt to explain variability and optimize GH treatment<sup>2</sup>
  - Multiple factors may contribute
  - GH response to standard stimulation tests is most important predictor of first year growth response to rhGH in PGHD in one analysis<sup>3</sup>
  - Inclusion of baseline IGF-1 strengthened model<sup>4</sup>
- Recent publications
  - Baseline IGF-1 and GH response to standard stimulations tests are independent predictors of growth when patients are treated with rhGH<sup>5</sup>
  - Moderate GHD represents ~60% of total PGHD population<sup>5</sup>



# PEM Segmentation Aligns With Patients' Differentiated Baseline Characteristics



## Conclusions

Analysis of 20-yr multinational database for Eli Lilly's rhGH:

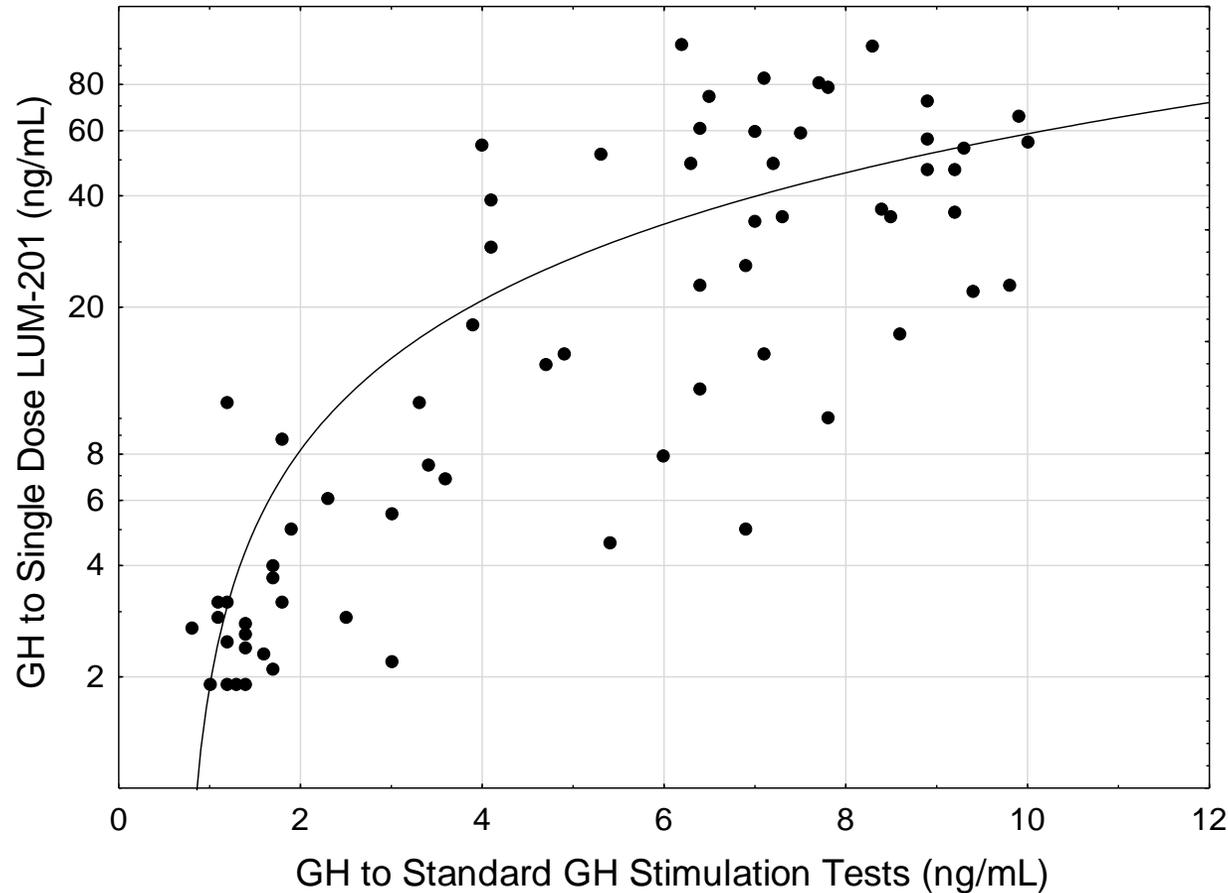
Illustrates PGHD population can be segmented by severity

- Segmentation achieved using PEMs (markers) IGF-1 and peak GH to stimulation tests
- Moderate (idiopathic) and Severe (organic) PGHD have distinct characteristics

Lumos PEMs applied to GeNeSIS show Moderates ~60% of PGHD

- Likely LUM-201 responders
- Moderate<sup>2</sup>: LUM-201 PEMs baseline IGF > 30 ng/ml and stim GH ≥ 5 ng/ml

# More GH Released from LUM-201 Stim than from Standard Stim Test Agents



68 children with growth hormone deficiency

All had 2 standard GH stimulation tests

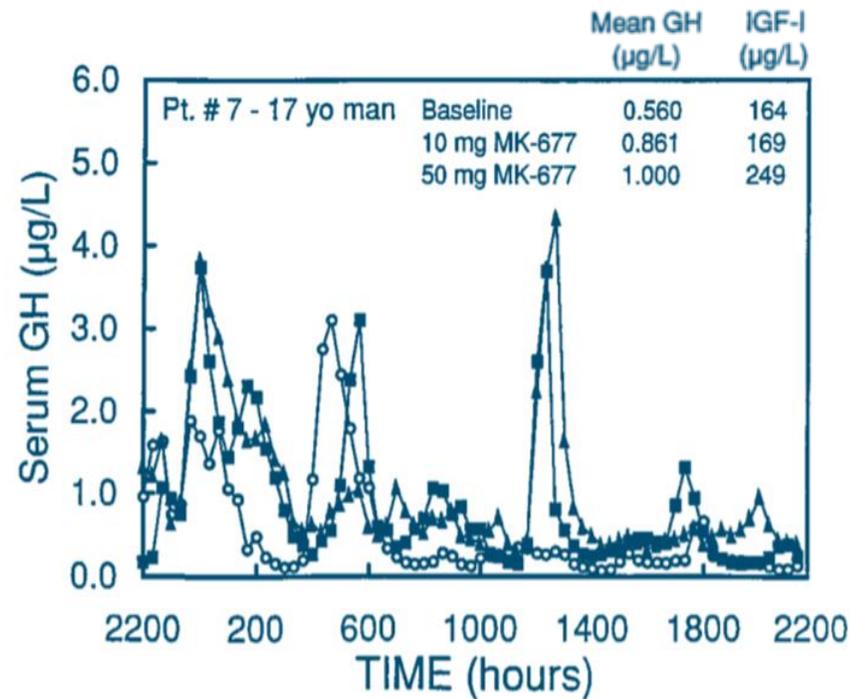
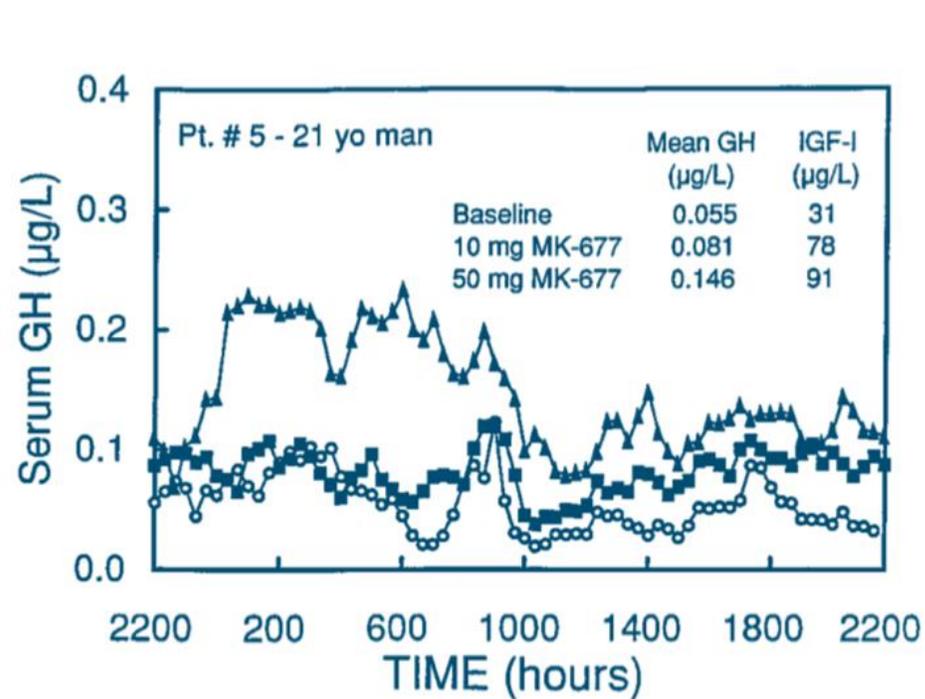
- Standard test agents: arginine, clonidine, l-dopa, glucagon, insulin

All had a single dose of LUM-201 stim test

*Data presented at the 2021 Annual Meeting of The Endocrine Society and published online in the journal, Hormone Research in Paediatrics, March 2022*

# LUM-201 Augments Pulsatility

- Adults with GH deficiency
- Individual subjects
- Representative 24-hour GH profiles on Day 4 of treatment

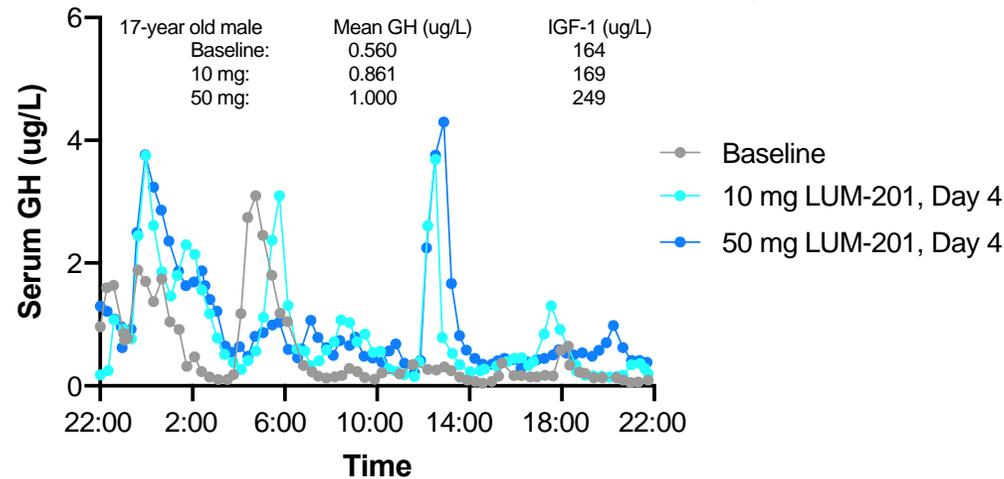


● Baseline  
■ 10 mg, Day 4  
▲ 50 mg, Day 4

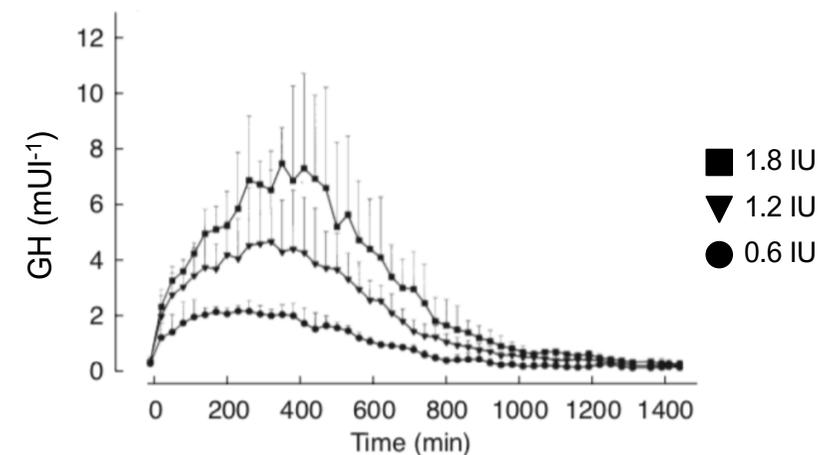
# LUM-201 Augments Pulsatility in GHD Adults

- LUM-201 augments endogenous GH pulses
- rhGH is administered as single, daily bolus doses

24h GH profile following oral LUM-201 administration in an adult with GH deficiency<sup>1</sup>



24h PK profile following subcutaneous rhGH injection in adults with GH deficiency<sup>2</sup>



**Potential to achieve non-inferior growth from smaller GH AUC via LUM-201 pulsatile delivery vs rhGH bolus administration**

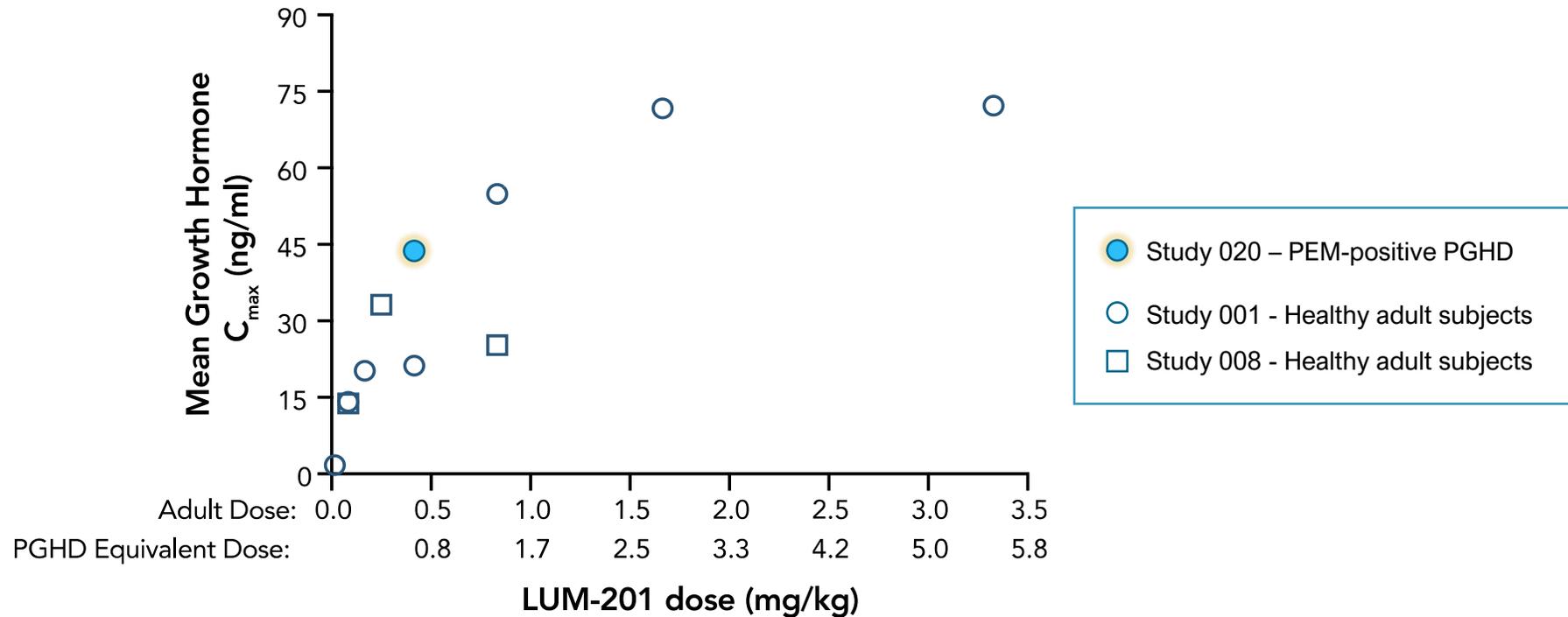
<sup>1</sup> Adapted, Chapman 1997 J Clin Endocrinol

<sup>2</sup> Janssen 1999 Br J Clin Pharmacol (Genotropin)

# GH Response to LUM-201 in Healthy Volunteers and PGHD Patients

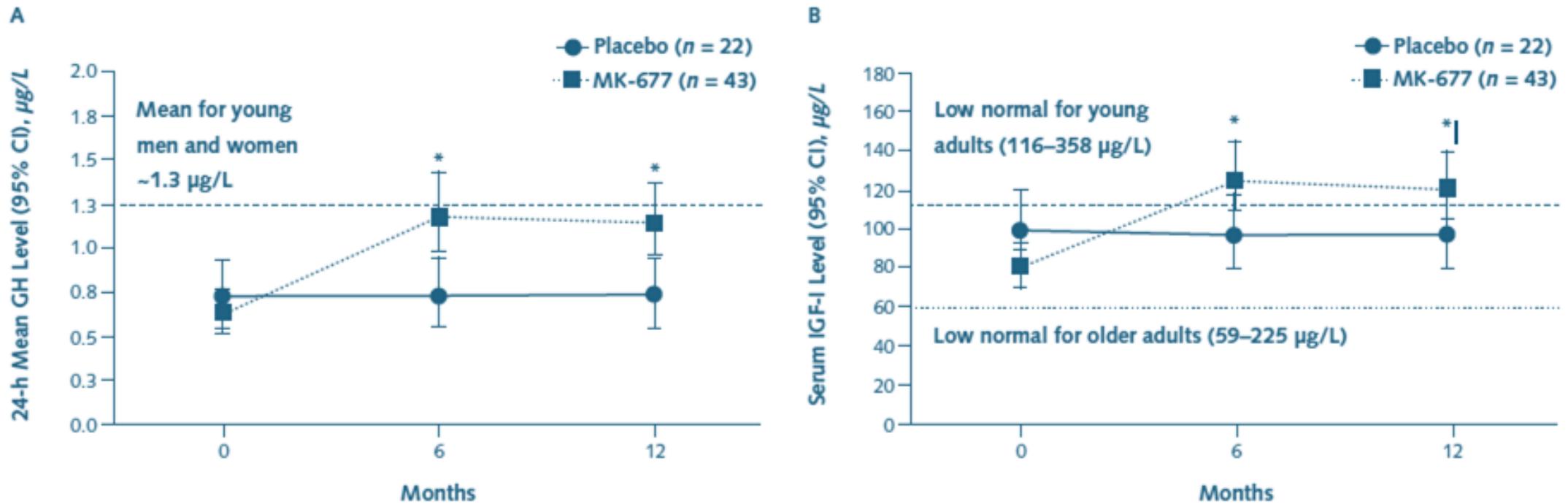
Growth hormone  $C_{max}$  in response to single doses of LUM-201 in healthy adults can serve as a benchmark

PEM+ PGHD  $C_{max}$  values lie on the curve



**GH  $C_{max}$  for LUM-201 for PEM+ PGHD subjects aligns with data for LUM-201 in adults**

# LUM-201 Effects Are Durable In Healthy Elderly



LUM-201 mediated increases in serum GH and IGF-1 are sustained over 1 year of treatment

# Study of Oral LUM-201 in Non-Alcoholic Fatty Liver Disease (NAFLD) Mass General Investigator-Initiated Phase 2 Pilot Trial

## MGH Initiated Phase 2 Pilot Trial<sup>#</sup>

- n = 10
- Adult NAFLD subjects with relative GH/IGF-1 deficiency
- Open-label
- Single-site pilot study
- 6-month dosing

Currently enrolling subjects

Study Duration – 6 months

n = 10 – LUM-201 at dose level of 25 mg/day

## Objectives

### Primary Objective:

- Determine changes in intra-hepatic lipid content, inflammation, and potentially fibrosis resulting from LUM-201 induced GH augmentation compared to historical placebo-treated controls

**Massachusetts General Hospital (MGH) initiated pilot study of oral LUM-201 in NAFLD: Enrollment ongoing**

<sup>#</sup> Principal Investigator: Laura Dichtel, MD, Assistant Professor, Massachusetts General Hospital

Trial supported by prior data evaluating rhGH in NAFLD: (ENDO 2022) JES, Volume 6, Issue Supplement\_1, November-December 2022, Page A525