



Corporate Presentation

August 2019

Legal Warning

Cautionary note regarding forward-looking statements: This presentation contains forward-looking statements, including, but not limited to, statements regarding plans with respect to commercializing our product and product candidates, our translational research program, the expected timing of release of additional data for our product candidates, plans to initiate additional studies for product candidates and timing and design of these studies, plans regarding ongoing studies for existing programs, our liquidity position as of the most recent fiscal quarter end, expectations regarding the adequacy of clinical data to support marketing applications and approvals of product candidates, our intent to file, and potential timing and success of, marketing applications and other regulatory approvals, expectations regarding timing of receiving potential approval of product candidates, expectations regarding prevalence of patients, future regulatory interactions, and the value to be generated by our pipeline. Such forward-looking statements involve substantial risks and uncertainties that could cause our clinical development programs, future results, performance or achievements to differ significantly from those expressed or implied by the forward-looking statements. Such risks and uncertainties include, among others, the uncertainties inherent in the clinical drug development process, such as the regulatory approval process, the timing of our regulatory filings and other matters that could affect sufficiency of existing cash, cash equivalents and short-term investments to fund operations, the availability or commercial potential of our product and product candidates, and our ability to integrate acquired businesses, which are more fully described in our most recent Form 10-Q or Form 10-K under the caption “Risk Factors” and elsewhere in such reports. Any forward-looking statements made by us reflect our current views with respect to future events or to our future financial performance and involve known and unknown risks, uncertainties, and other factors that may cause our actual results, performance, or achievements to be materially different from any future results, performance, or achievements expressed or implied by these forward-looking statements. Accordingly, our actual results may materially differ from our current expectations, estimates, and projections. Given these uncertainties, you should not place undue reliance on these forward-looking statements.

Any forward-looking statements made by us in this presentation speak only as of the date of this presentation and represent our estimates and assumptions only as of the date of this presentation. Except as required by law, we assume no obligation, and we disclaim any intent, to update these statements to reflect actual results.

This presentation concerns commercial products as well as discussion of investigational drugs that are under preclinical and/or clinical investigation and which have not yet been approved for marketing by the U.S. Food and Drug Administration (FDA). They are currently limited by Federal law to investigational use, and no representations are made as to their safety or effectiveness for the purposes for which they are being investigated.

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Ultragenyx: Rare by Design, 9 Years from Founding

Exceptional Rare Disease Company

- Forging new approaches
- 14+ indications
- Multiple modalities

Gene Therapy Platform

- 6+ programs
- Clinical POC in 2
- Strong manufacturing

Global Commercial

- 2 approved therapies
- 1 to be filed in 2019
- N. America, S. America, Europe and Turkey

The RARE Formula for Effective Pipeline Development

Science We Choose



The Need We Solve

Serious Unmet
Medical Need:
Often First Drug Ever

Disease-Modifying
Therapeutic

The Development We Plan

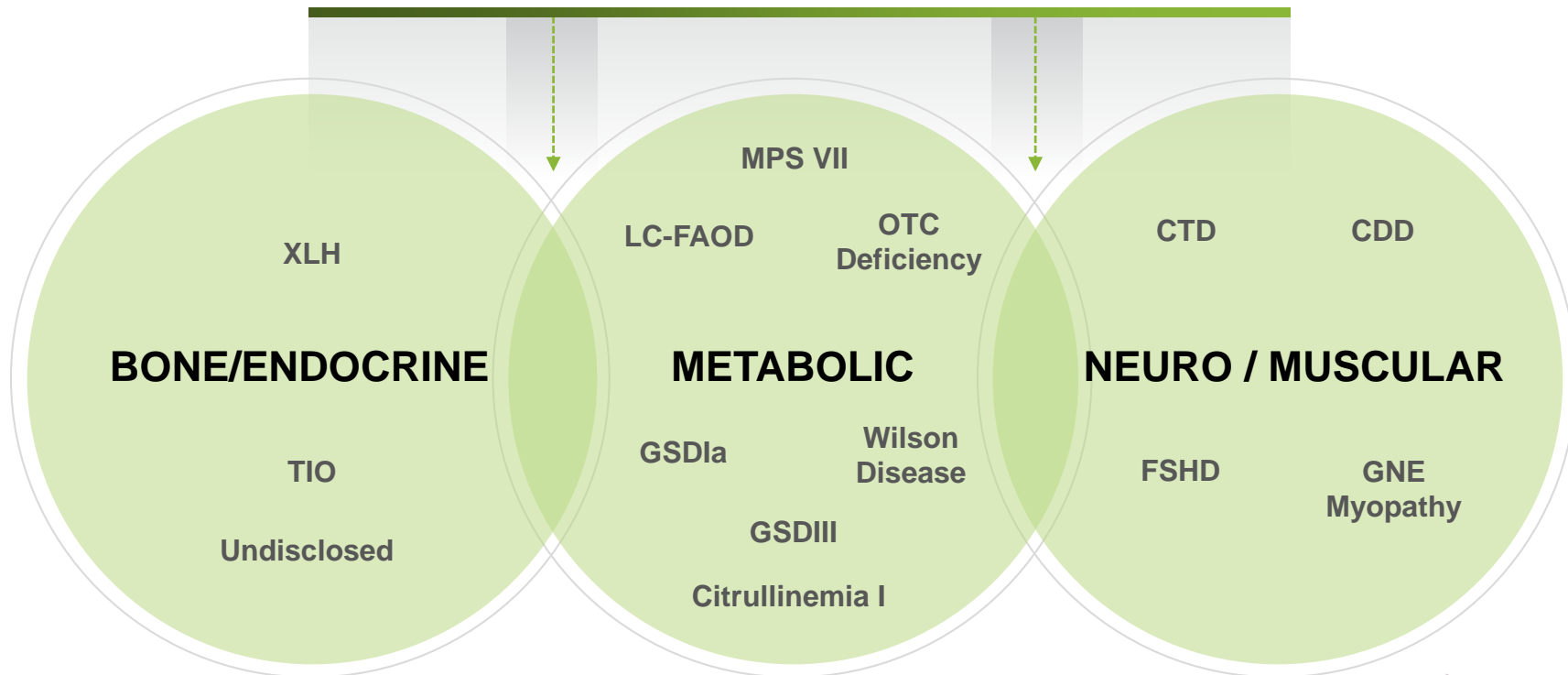
Fast to Clinic and Speed:
Dynamic Development Model

Creative, Adaptive Clinical and
Regulatory Strategy

Rapid Global Submissions
Long-Term Follow-up in DMP




Current Focus on Therapeutic Areas with Rare Genetic Disease

Clinical and Commercial Synergies






Pipeline Driving Next Opportunities Across 4 Modes

Picking the best mode for each indication

	TRADITIONAL BIOLOGICS	SMALL MOLECULE	AAV GENE THERAPY	mRNA
Commercial	 	LC-FAOD UX007		
Clinical	TIO Crysvita		OTC DTX301 GSDIa DTX401 Hem A DTX201 	
Research	Undisclosed UX064 Undisclosed UX032 Undisclosed UX008	Creatine Transporter Deficiency UX068 FSHD UX018 GNE Myopathy UX001P	Wilson UX701 CDD UX055 3 Additional Targets	GSDIII UX053 Up to 11 Additional Targets

Diverse Clinical Pipeline Across Metabolic Indications

Candidate	Description	Pre-Clinical	IND	Phase 1	Phase 2	Phase 3	Approved*	Est'd Patients in Dev. World
 CRYSVITA[®] <small>bucosumab</small> KYOWA KIRIN	Anti-FGF23 monoclonal antibody	XLH						~48,000
		TIO						~2,000 - 4,000
 Mepsevii[™] <small>(vestronidase alfa-vjok) injection</small>	Enzyme replacement	MPS 7						~200
UX007	Substrate replacement	LC-FAOD						~8,000-14,000
DTX301	AAV8-OTC Gene Transfer	OTC						~10,000
DTX401	AAV8-G6Pase Gene Transfer	GSDIa						~6,000
 DTX201	AAV-FVIII Gene Transfer	Hemophilia A						~144,000

Protein Biologic

Gene Therapy

Small Molecule

14+ Translational Research Programs | Advancing One into the Clinic Every 1-2 Years

Near-term Commercial and Clinical Catalysts

Candidate	Disease	1H19	Mid-19	2020
Mepsevii <i>Enzyme Replacement</i>	MPS7	Commercial Updates		
Crysvita <i>Anti-FGF23 monoclonal antibody</i>	XLH	Commercial Updates		
	TIO	✓ 64-week pediatric data	□ Finalize registrational plan	
UX007 <i>Substrate Replacement</i>	LC-FAOD	✓ Long-term extension data	✓ NDA submission	
DTX301 <i>AAV8 gene therapy</i>	OTC Deficiency		□ Phase 1/2 Cohort 3 data	□ Potential Ph3 Initiation
DTX401 <i>AAV8 gene therapy</i>	GSDIa	✓ Phase 1/2 Cohort 1 data	□ Phase 1/2 Cohort 2 data	□ Potential Ph3 Initiation
UX701 <i>Gene Therapy</i>	Wilson			
UX053 <i>mRNA</i>	GSDIII	IND Enabling Nonclinical Studies, CMC Process Optimization, and Clinical Protocol Development		
UX068 <i>Small Molecule</i>	CTD			



Commercial Update



Mepsevii
(vestronidase alfa-vjbk)
injection

Presence in Three Major Rare Disease Markets

Less than 18 Months Post-Launch



Mepsevii
(vestronidase alfa-vjbk)
injection

North America

APPROVED



APPROVED



PLANNED



Europe

APPROVED



NAMED PATIENT /
PENDING DECISIONS



APPROVED



PLANNED



Latin America

APPROVED



NAMED PATIENT /
PENDING DECISIONS



APPROVED



NAMED PATIENT /
PENDING DECISIONS



U.S. Patient Access Model

Unique model to support and accelerate growth



Patient Diagnosis Liaisons (~30)



Find new doctors with XLH patients

Hand off leads

UltraCare Liaisons (~30)



Assist identified XLH doctors in placing patients on therapy

Start forms sent

UltraCare Guides (~15) Patient Access Liaisons (5)



Support treatment or reimbursement needs

Market Access Support

Medical Science Liaisons

Educate HCPs and payers throughout the process

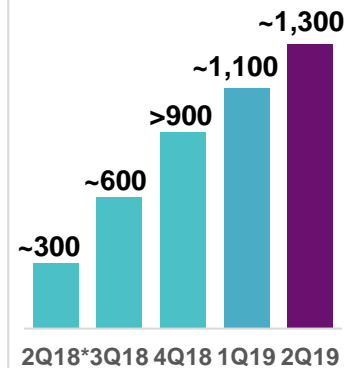
Strong Crysvita U.S. Launch

Key U.S. Commercial Launch Metrics

As of June 30, 2019

- ~ 1,300 completed start forms
- ~ 530 unique prescribers
- ~ 960 patients on reimbursed, commercial therapy
- In 2Q19, policies (60% private / 40% gov't) , nearly full coverage of lives in the U.S.

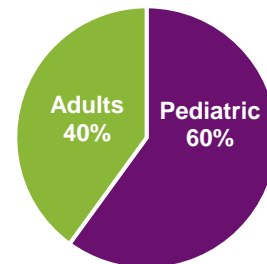
Completed Start Forms



2Q18*3Q18 4Q18 1Q19 2Q19

* Launched on April 27, 2018

Patient Mix



Crysvita Clinical Data Supports Launch

Pediatric

Crysvita Superiority Over Conventional Therapy

Substantial Rickets Healing after 64 Weeks on Treatment

- 86.2% on Crysvita
- 18.8% on oral phosphate, vitamin D regimen

Adult

Significant Clinical Improvement with Crysvita Treatment

Substantial Fracture Healing

- Serum phosphorus normal
- Improvements in stiffness, pain, physical functioning

Untreated Adult XLH





UX007 for Long-Chain Fatty Acid Oxidation Disorders (LC-FAOD)

Phase 2 substrate replacement therapy
(oral liquid)

UX007 for LC-FAOD

NDA submitted July 2019

- **LC-FAOD:** Inability to convert fat into energy
 - **Key symptoms/prognosis:**
 - Hypoglycemia, muscle rupture, heart failure
 - Mortality ~50%¹; a cause of SIDS (newborn screened in U.S.)
 - **Standard of care:** Diet and MCT² oil
 - **UX007 Phase 2 data:**
 - Clinically meaningful reduction in frequency and duration of major medical events
 - **U.S. prevalence:** ~2,000 – 3,500
- **Status:**
 - ✓ Submitted NDA to FDA



UX007 Granted Fast Track and Rare Pediatric Disease Designations



Ultragenyx Announces UX007 Granted Fast Track Designation and Rare Pediatric Disease Designation by U.S. FDA for Treatment of Long-Chain Fatty Acid Oxidation Disorders

Company on Track to Submit NDA to FDA by Mid-2019

Novato, Calif. — April 16, 2019 — Ultragenyx Pharmaceutical Inc. (NASDAQ: RARE), a biopharmaceutical company focused on the development of novel products for serious rare and ultra-rare genetic diseases, today announced that the U.S. Food and Drug Administration (FDA) has granted Fast Track designation and Rare Pediatric Disease designation to UX007 for the treatment of long-chain fatty acid oxidation disorders (LC-FAOD), a group of genetic disorders in which the body is unable to convert long-chain fatty acids into energy.

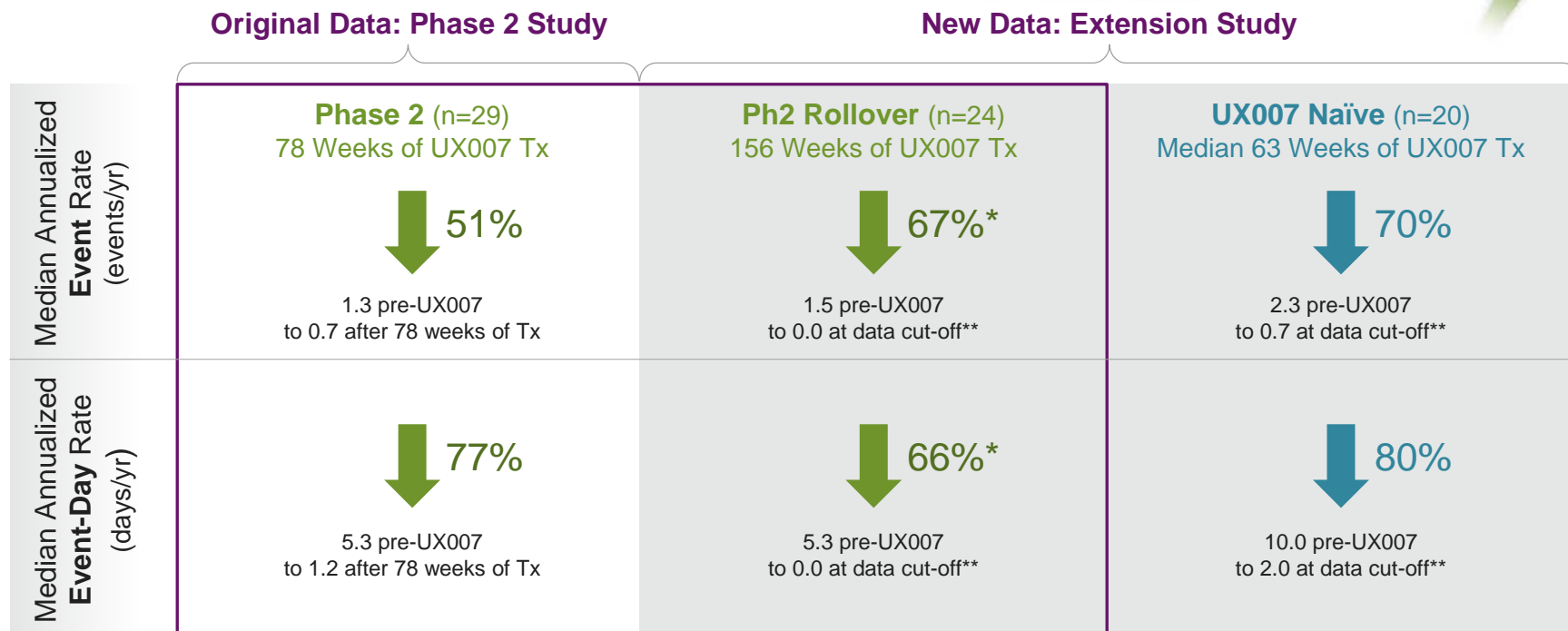
“These designations for UX007 underscore FDA’s belief that new treatments are needed for patients with LC-FAOD, a severe and potentially life-threatening disease. In addition,

NDA submission includes:

- Company-sponsored Phase 2 (n=29)
- Long-term extension study (n=75)
- Retrospective medical review (n=20)
- Expanded access (n=70)
- Investigator-sponsored study (n=32)

NDA submitted July 2019

Extension Study Supports Sustained Clinically Meaningful Impact of UX007



* Percent reductions based on total UX007 treatment period (Phase 2 + Ext periods)

** 156 weeks on Tx for Ph2 rollover patients and median of 63 weeks for naïve patients

Safety profile in the long-term extension study (n=75) consistent with what has been previously observed with UX007




AAV Gene Therapy Platform

Gene Therapy Platform Supported by People, Pipeline, and Manufacturing

People	Deep and Focused Pipeline	Scalable Mammalian Manufacturing
<ul style="list-style-type: none">■ Dimension Therapeutics provided technology base■ Ultragenyx Gene Therapy has built in-house process discovery, definition, and development■ Internal knowledge de-risks scale up and tech transfer	<ul style="list-style-type: none">■ 2 clinical-stage programs<ul style="list-style-type: none">— OTC, GSDIa■ 1 partnered clinical program<ul style="list-style-type: none">— Hem A■ 1 late-stage research<ul style="list-style-type: none">— Wilson■ 4 early-stage research<ul style="list-style-type: none">— CDD, PKU, Citrullinemia type I, Undisclosed	<ul style="list-style-type: none">■ HEK293■ HeLa producer cell line■ Internally controlled process development■ Scalable up to 2,000L

Gene Therapy Pipeline: Deep and Focused

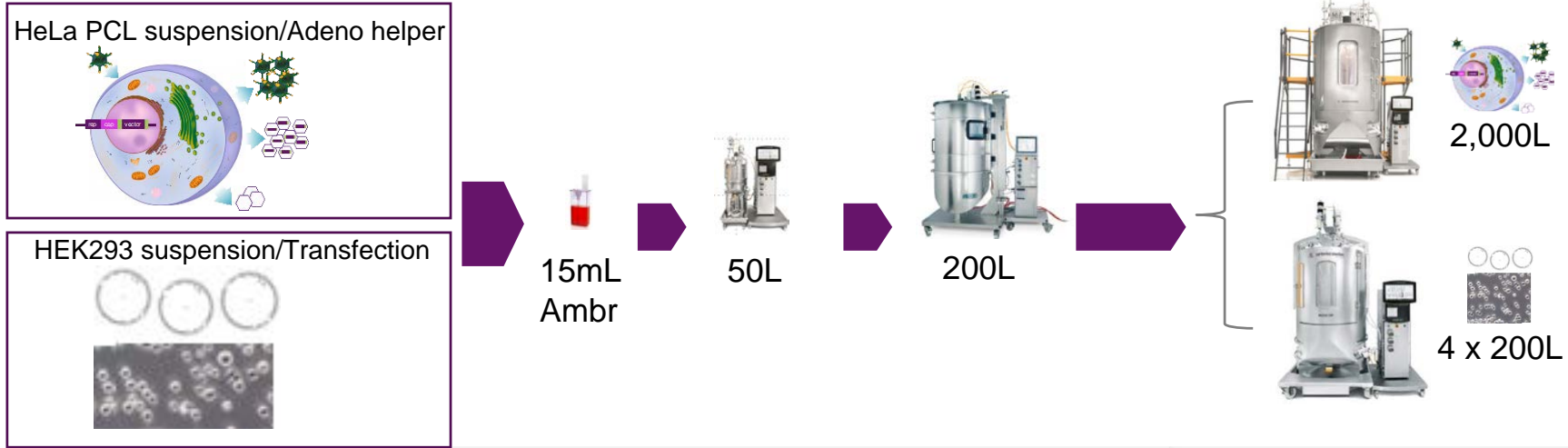
Candidate	Description	Pre-Clinical	IND	Phase 1	Phase 2	Phase 3	Est'd Patients in Dev. World
DTX301	AAV8-OTC Gene Transfer	Ornithine Transcarbamylase Deficiency					~10,000
DTX401	AAV8-G6Pase Gene Transfer	Glycogen Storage Disease Type Ia					~6,000
 DTX201	AAV-FVIII Gene Transfer	Hemophilia A					~144,000
UX701	AAV-ATP7B Gene Transfer	Wilson Disease					>50,000
UX055	AAV9-CDKL5 Gene Transfer	CDKL5 Deficiency Disorder					~30,000
UX501	AAV8-PAH Gene Transfer	PKU					~50,000
UX601	AAV8-ASS1 Gene Transfer	Citrullinemia type I					~2,000
UX067 (Partnered)	Undisclosed						>10,000

Combination Liver Metabolic Diseases (OTC, GSDIa, PAH, ASS1 +1, Wilson) and Neurology (CDKL5)

Ultragenyx Gene Therapy AAV Vector Production

Vector Discovery to GMP Manufacturing

PD & manufacturing across 15 ml to 2,000L continuum – scaling factor > 130,000



- Cell line cloning
- Early development

- Bioprocess development
- Preclinical & tech transfer Center of Excellence
- Large scale reference tox vector manufacturing

Clinical & commercial manufacturing at partner CMOs

Product yield consistency maintained across scale



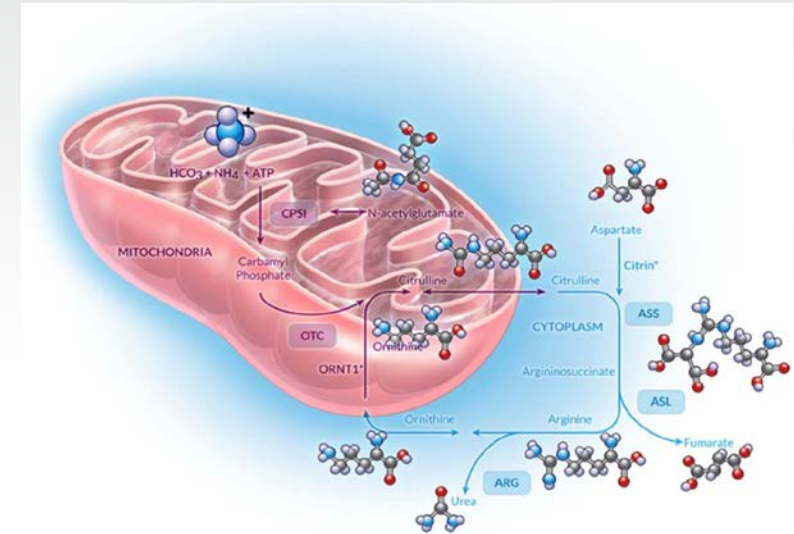
DTX301 Program for Ornithine Transcarbamylase (OTC) Deficiency

Phase 1/2 study of adeno-associated virus
serotype AAV8 vector encoding human OTC

DTX301 AAV8 for OTC Deficiency

AAV8 gene therapy for stable expression of OTC

- **OTC Deficiency:** X-linked urea cycle disorder, genetic defect in ammonia detoxification
- **Key symptoms/prognosis:** Acute hyperammonemic episodes that can lead to hospitalization, adverse cognitive & neurological effects, death
- **Treatment limited; only curative approach is liver transplantation**
- **WW prevalence:** ~10,000, 80% late-onset



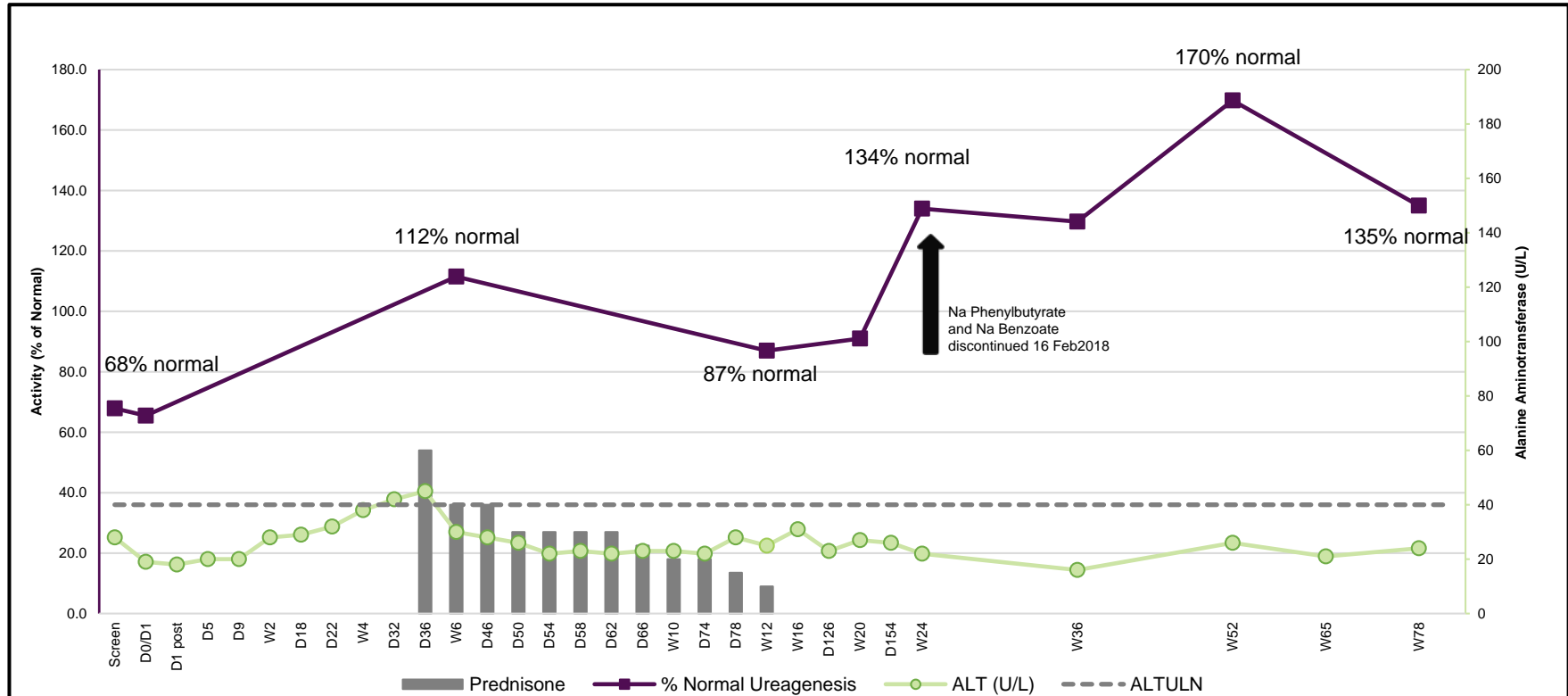
DTX301: Two Patients Continue to Demonstrate Long-term Normalization of Ureagenesis

- Sustained normalization of ureagenesis at 52-78 weeks
- Clinically and metabolically stable, while discontinuing all alternate pathway medications
- Liberalized protein-restrictive diet without hyperammonemia concerns
- One patient had proven Influenza illness without hyperammonemia episode

Cohort 3 (1e13 GC/kg dose) update Q3 2019

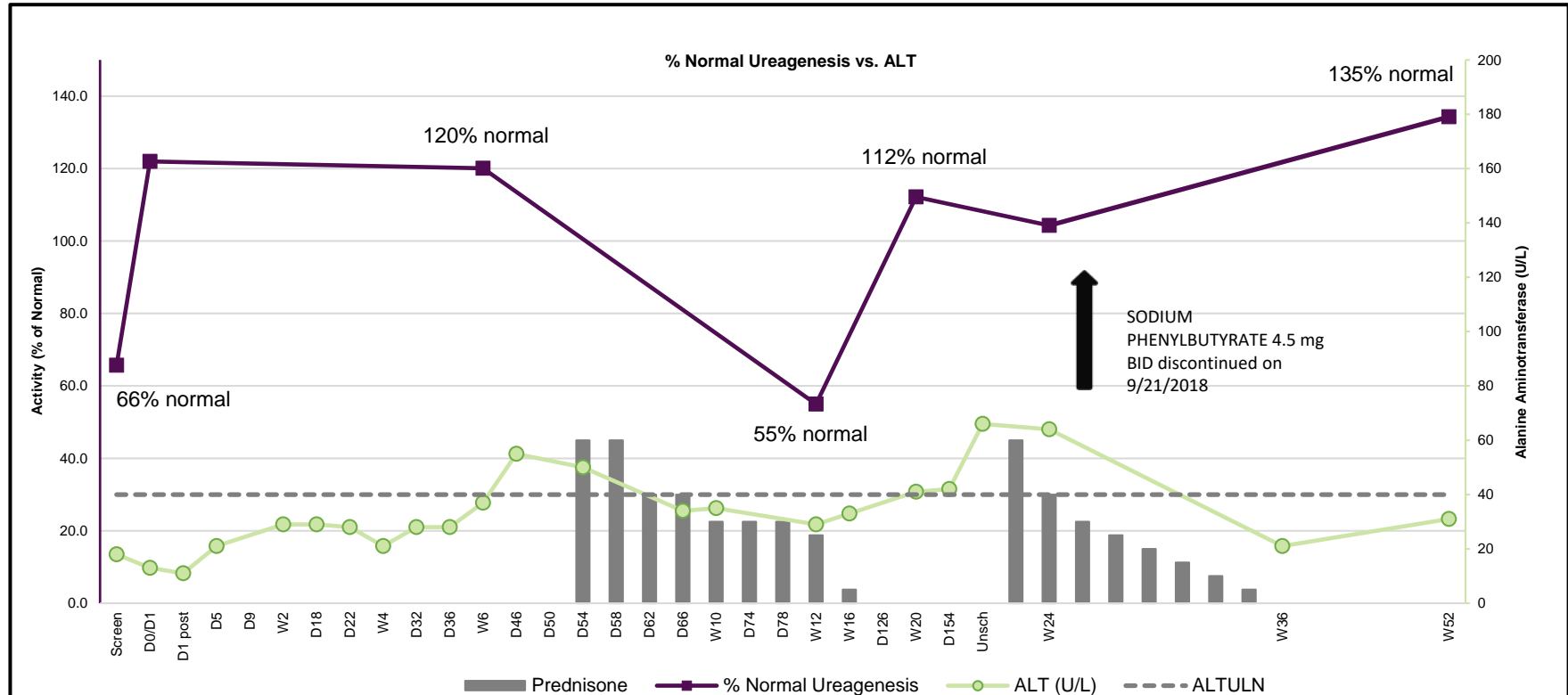
Cohort 1, Patient 1 – Durable Normalization of Ureagenesis

Liberalized diet and clinical stability off medications since ~Week 24



Cohort 2, Patient 4 – Durable Normalization of Ureagenesis

Liberalized diet and clinical stability off medications since ~Week 24





DTX401 Program for Glycogen Storage Disease Type Ia (GSDIa)

Phase 1/2 study of adeno-associated virus
serotype AAV8-G6Pase Gene Transfer

DTX401 AAV8 for GSDIa

- **GSDIa:** Autosomal recessive, inborn error of glucose metabolism; deficient glucose-6-phosphatase (G6Pase)
- **Key symptoms/prognosis**
 - Hypoglycemia leading to significant morbidity and mortality
 - Long-term liver and renal disease
 - Impaired growth and delayed puberty
 - Severe long-term complications (70-80% patients)
- **Treatment limited; only curative approach is liver transplantation**
- **WW prevalence:** 6,000



Clinical Response from All Patients in Cohort 1 at Week 24

- Time to hypoglycemia maintained or further increased
- Normal glucose levels maintained after continued reductions in use of cornstarch
- Patients continue to do well with reduced cornstarch requirements
- No treatment-related serious adverse events (SAEs)

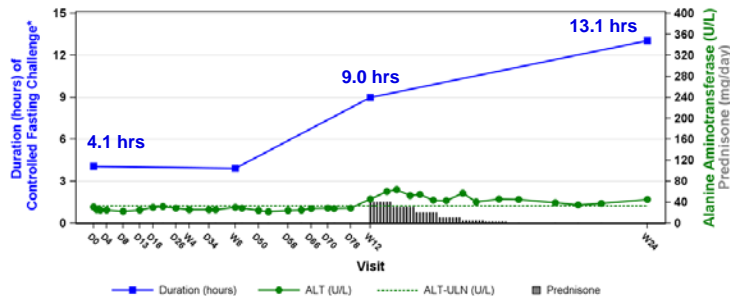
Cohort 2 (6e12 GC/kg dose) update Q3 2019

DTX401 Response in Time to Hypoglycemia Maintained or Increased While Reducing Daily Cornstarch at Week 24



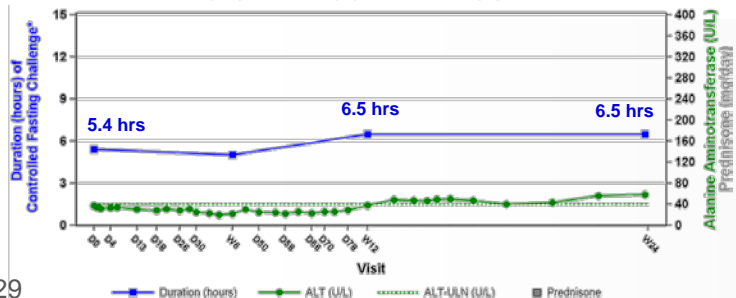
Cohort 1, Patient 1

- 79% improvement in time to hypoglycemia
- 77% reduction in daily cornstarch



Cohort 1, Patient 2

- 220% improvement in time to hypoglycemia
- 44% reduction in daily cornstarch
- 36% reduction in overnight glucose infusion rate



Cohort 1, Patient 3

- 20% improvement in time to hypoglycemia
- 73% reduction in daily cornstarch

DTX401

No Safety Issues Observed in Cohort 1

- Mild asymptomatic elevation in ALT levels due to a response to the vector administration in 2 patients
 - Successfully treated with a tapering course of steroids
- No infusion-related adverse events
- All AE severity graded as 1 or 2
- No treatment related SAEs



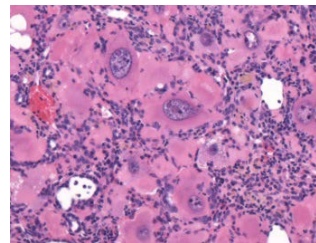
DTX701 Program for Wilson Disease

AAV-ATP7B Gene Transfer

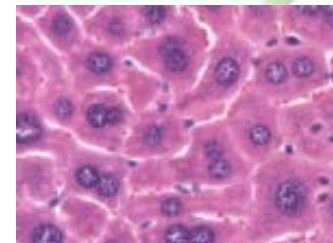
UX701 for Wilson Disease

Next Gene Therapy program, entering the clinic in 2020

- **Wilson Disease:** Causes copper to accumulate in liver, brain and other vital organs
- **Key symptoms/prognosis:** Liver failure, neurological deterioration, death
- **Standard of Care:** Chelation therapy and dietary restriction
 - Many patients still experience liver/neurological deterioration
- **WW prevalence:** >50,000
- **Initial preclinical studies completed**
 - Novel version of ATP7B developed
 - Capsids from REGENXBIO
 - IND filing expected 2020

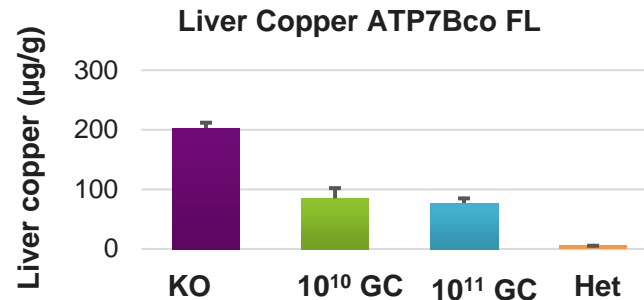


Untreated KO Mice



1×10^{11} GC Treated Mice

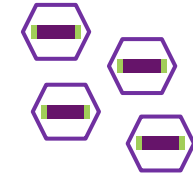
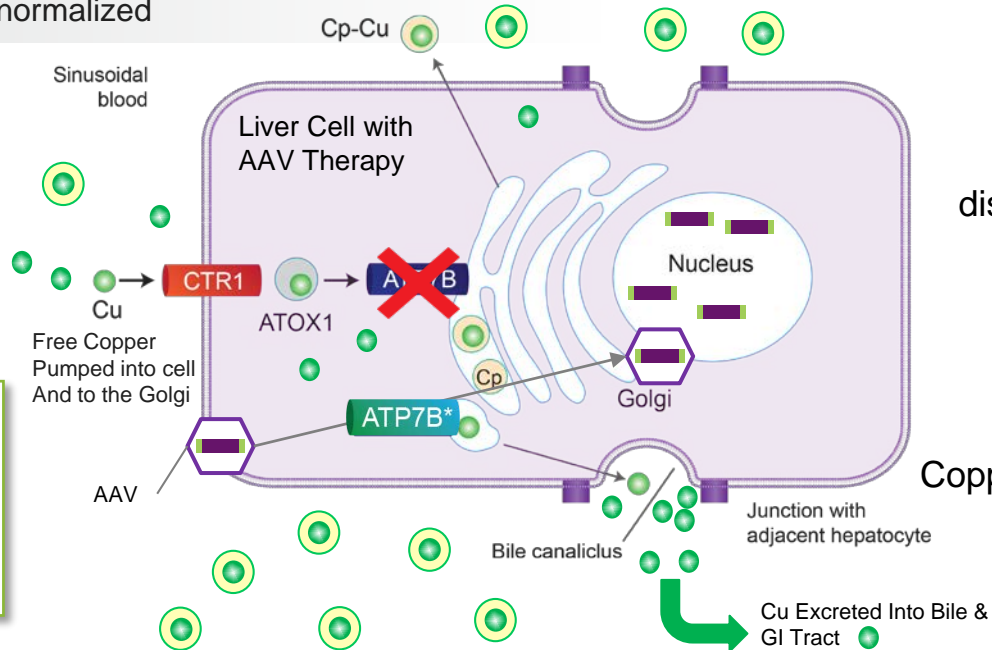
Reduced liver copper accumulation leading to improved liver pathology in preclinical models



AAV Therapy Pumps Copper from the Liver into Blood and Bile

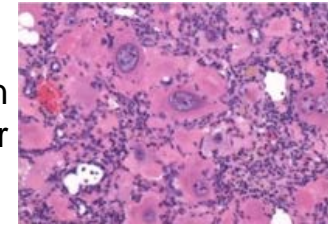
With AAV Therapy

- ATP7B* is formed and pumps copper from cytoplasm into the Golgi
- Loads copper onto ceruloplasmin to secrete into the serum
- Excretes excess copper into the bile to exit the body
- Functionality normalized

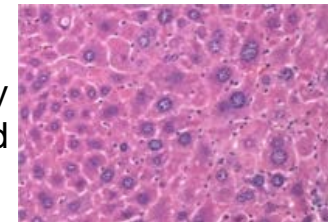


AAV ATP7B*

Wilson disease liver



Copper toxicity treated

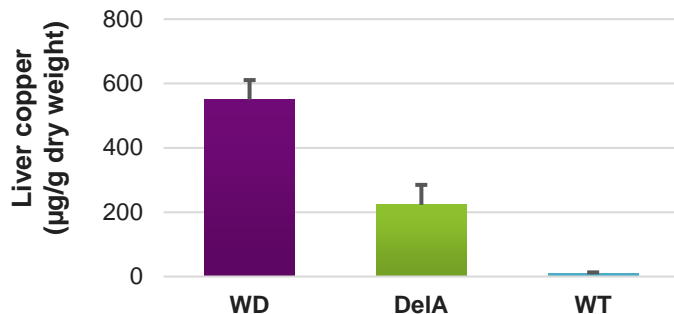


After AAV GT with ATP7B*

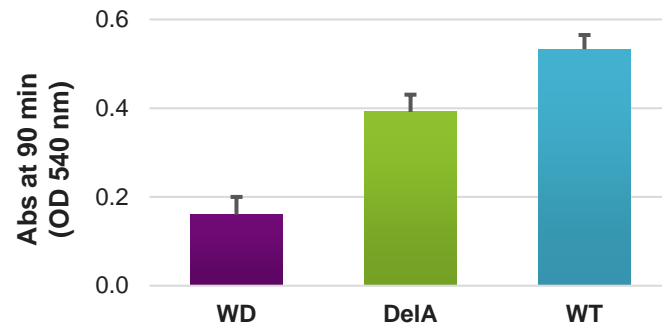
ATP7B Deletion A – Key Therapeutic Properties

Rapid reduction in free liver copper, increased copper ceruloplasmin and reduced liver pathology

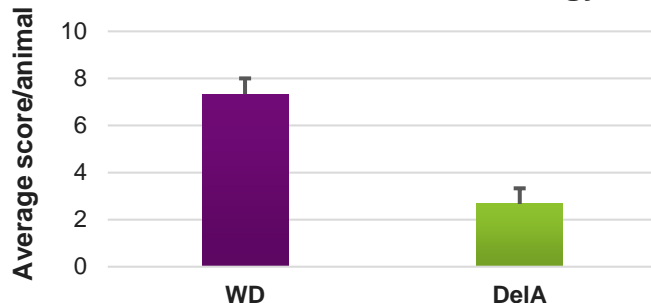
Reduction in Liver Cu Levels



Increase in Ceruloplasmin



Reduction in Liver Pathology



Study Design

- Vector: DelA
- At T_0 mice = 6 - 8 weeks old
- Duration of study: 4 weeks



UX053 Program for Glycogen Storage Disease III

UX053 for Glycogen Storage Disease III

Lead mRNA preclinical program, entering the clinic in 2020

Genetics

Autosomal recessive mutation in the AGL gene leading to glycogen accumulation in the liver and muscle

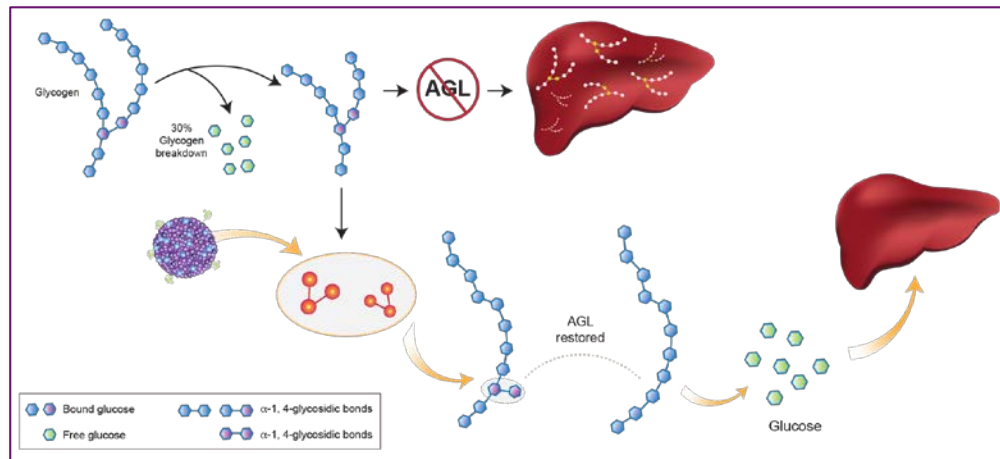
Clinical Presentation (based on literature)

- Beginning in infancy:
 - Hypoglycemia, hyperlipidemia, increased LFTs, hepatomegaly
- Later in Life
 - Fibrosis and cirrhosis
 - Cardiomyopathy, hypotonia, myopathy

Current Management

- High protein, cornstarch, fructose / galactose
- Hypoglycemia prevention
- Liver transplant

WW prevalence: ~10,000

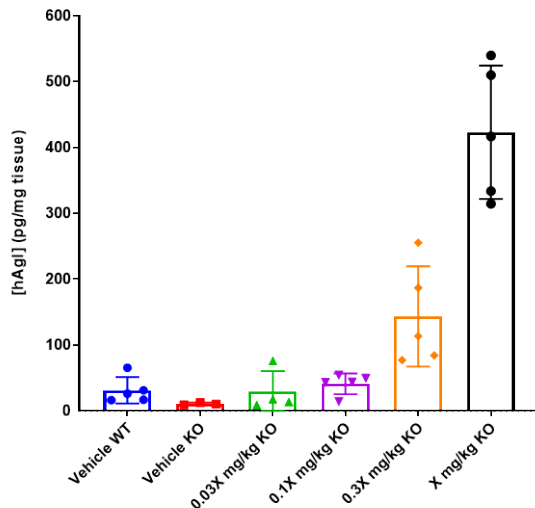


IND-Enabling Studies Underway
IND Filing Expected 2020

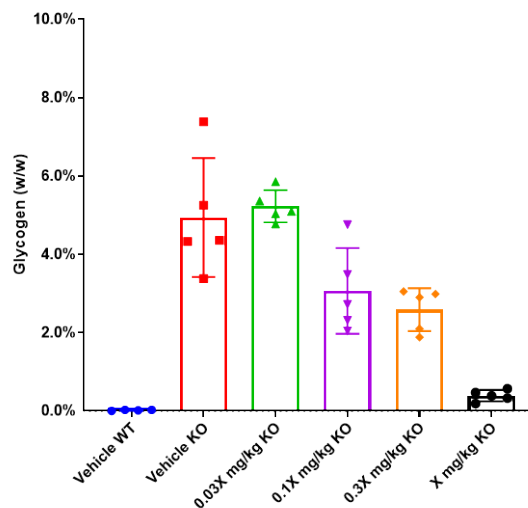
Dose-Response for AGL mRNA-LNP in GSDIII Mouse Model

Reduction in liver glycogen, and an increase in blood glucose

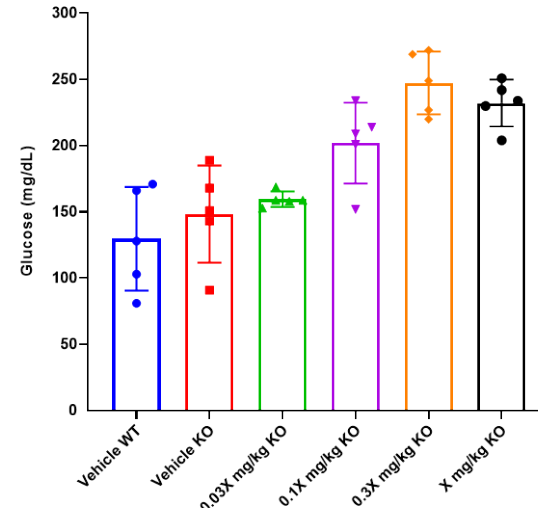
**Liver human AGL Protein (hGDE)
24 hours Post-Dose**



**Liver Glycogen Content
24 hours Post-Dose**



**Serum Glucose
24 hours Post-Dose**



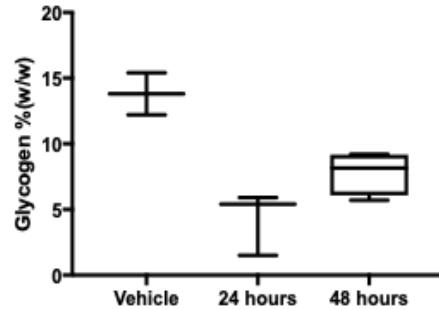
X= dose undisclosed

Dose-response after a single dose of AGL-mRNA to reduce liver glycogen and stimulate increase in serum glucose (24 hours post-dose shown)

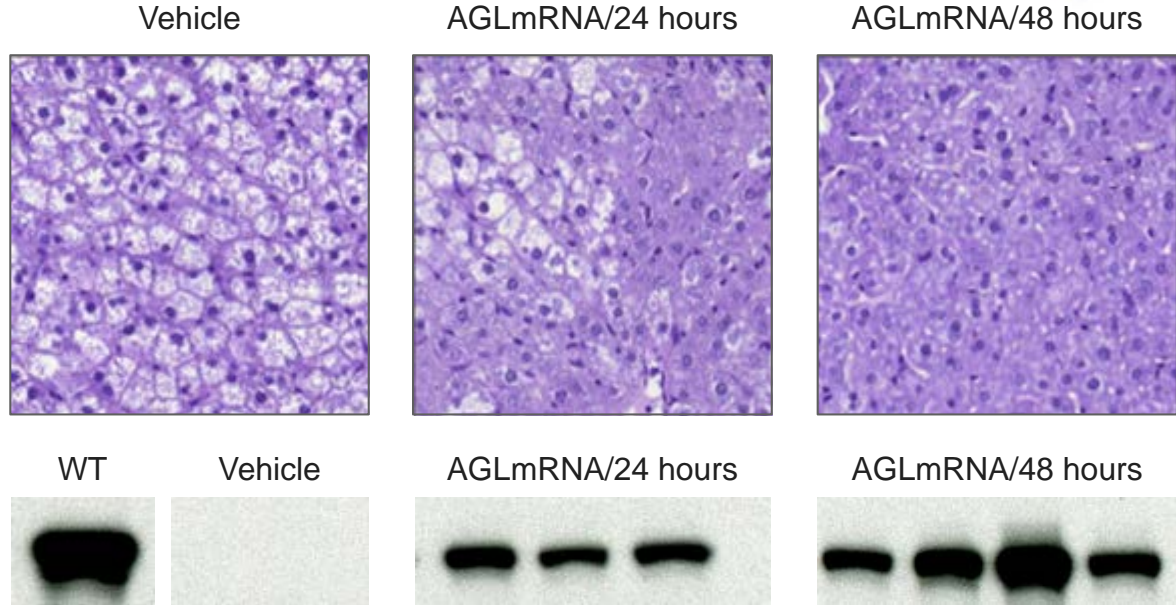
AGL mRNA-LNP Reduces Liver Glycogen in Single Dose

Levels approach normal and are maintained for 48 hours in mouse model

Liver Glycogen GSDIII Fasted Mice



Protein levels:



Glycogen levels are reduced and hepatocyte hypertrophy is completely resolved after a single dose, and maintained for 48 hours. PD Response correlates with liver delivered protein levels.



UX068

Double-Trigger Prodrug for
Creatine Transporter Deficiency

UX068 for Creatine Transporter Deficiency

Lead small molecule preclinical program, entering the clinic in 2020

Genetics: X-linked recessive disorder due to mutations in SLC6A8

- Leading cause of X-linked intellectual disability in males
- Females can have mild to severe phenotype

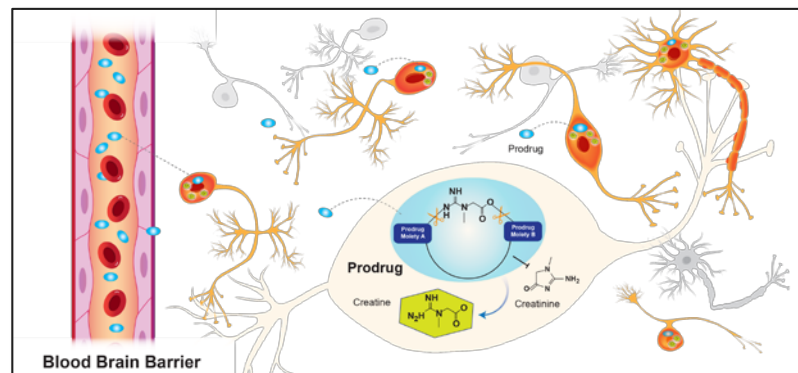
Clinical Presentation (based on literature)

- Neurological deficits
 - Autism, speech/language developmental delays
 - Cognitive / developmental impairment
 - Motor skill delays, extrapyramidal symptoms
 - Seizures
 - Brain Cr levels range from undetectable to ~20 % of normal
- Non-CNS deficits
 - Muscle hypotonia and hypotrophy

Current Management: No SOC, only supportive care, AEDs effective for seizures

WW prevalence: >50,000

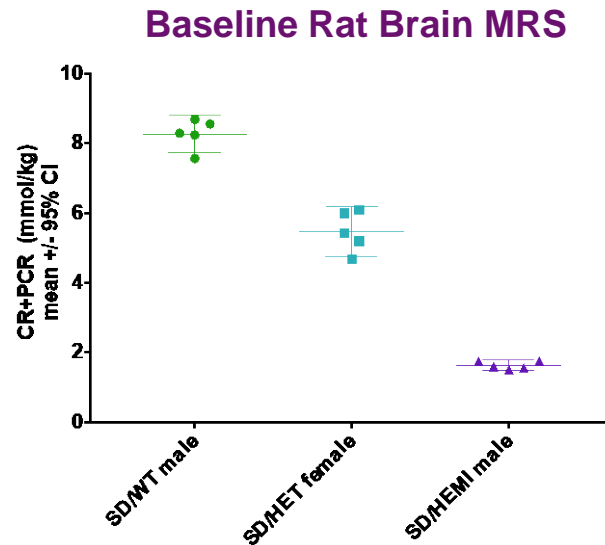
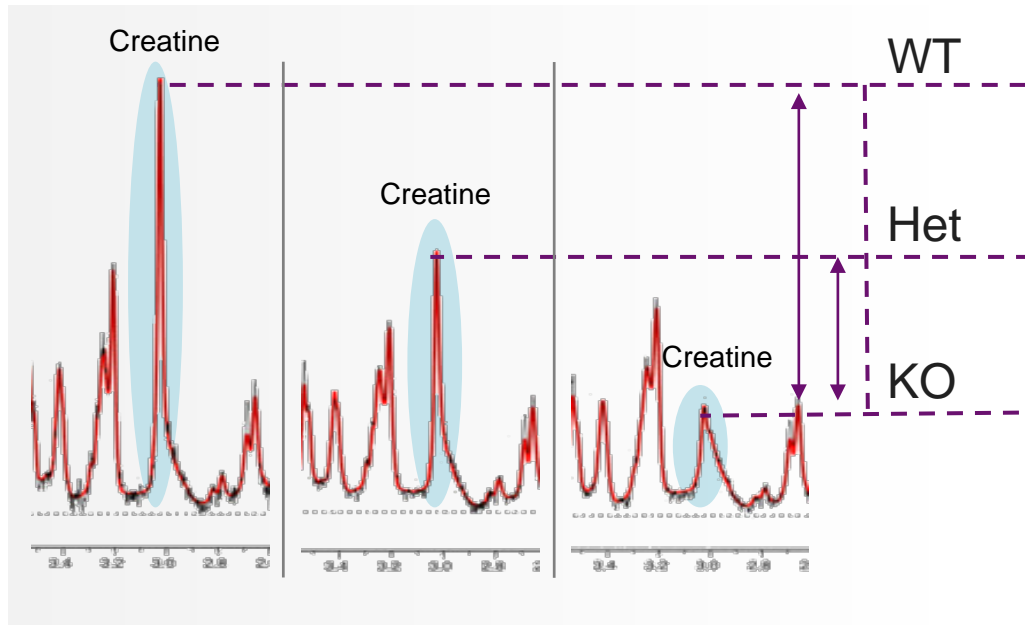
Mechanism of Action: Prodrug traverses the BBB and cell membrane and releases creatine to neurons



IND-Enabling Studies Underway
IND Filing Expected 2020

UGX-developed Rat KO Model using CRISPR-technology

MR Spectroscopy, a clinically relevant biomarker, is used to characterize creatine in this animal model



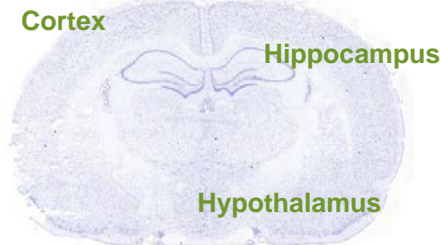
MR Spectroscopy discriminates total brain creatine by genetic phenotype

Widespread Prodrug-derived Brain Creatine Distribution

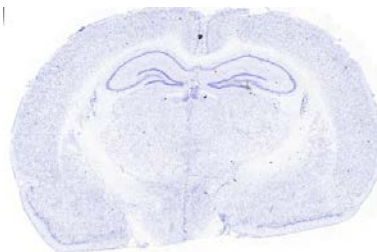
Creatine is delivered throughout the brain, including cortex and hippocampus

Imaging Mass-Spec for d3-Creatine (prodrug derived)

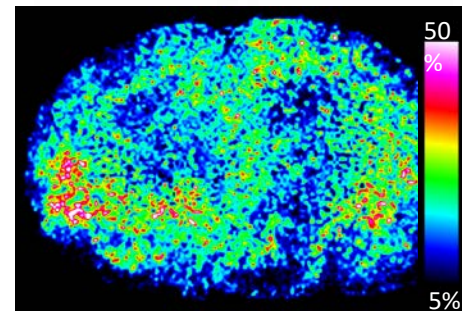
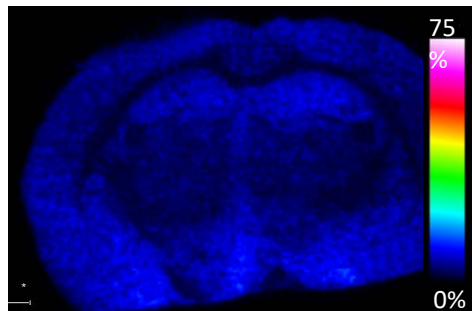
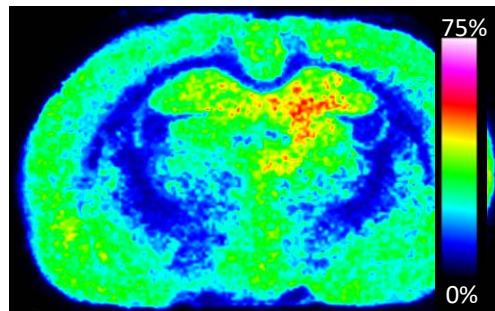
Wild Type Rat
Endogenous creatine



CrT KO rat
Endogenous creatine



CrT KO rat
Prodrug derived d3-Creatine



40 mg/kg dosed over 8 hours to SLC6A8 KO-rat, brains harvested after 24 hours



Finance and Business Summary

Financial Overview

as of June 30, 2019



- **Total Revenue (2Q19):**
\$24.1 million
- **Total RARE Crysvita Revenue (2Q19):**
\$20.2 million
- **Cash¹: \$618.3 million**
- **Cash Used in Operations (1H19):**
\$184.8 million
- **No Debt**

¹Cash, cash equivalents, and available-for-sale investments as of June 30, 2019

2019 Will Fuel Continued Value Expansion



2010 – 2018

- 2 Commercially approved products in 3 major geographic regions
- 34 active or completed clinical studies
- 14+ programs in the development pipeline



2019

- Continue successful global launches of Crysvita and Mepsevii
- Submit UX007 NDA
- DTX301 and DTX401 data readouts
- Begin building our AAV GMP manufacturing facility
- Prepare for up to 3 INDs to be filed in 2020
- Active on BD front



2020+

- Ph 3 gene therapy studies
- Launch UX007 for LC-FAOD if approved
- Initiate clinical trials for Wilson, GSDIII, and CTD programs
- Incorporate other BD deals into the pipeline

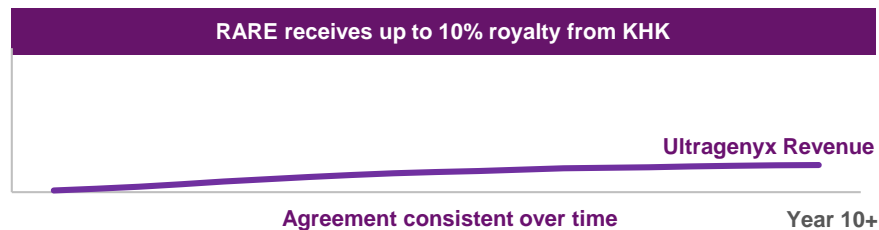
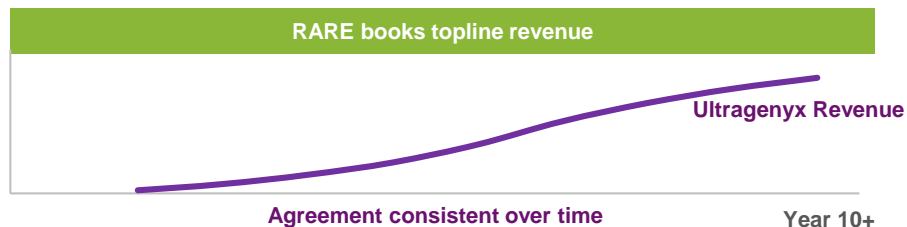
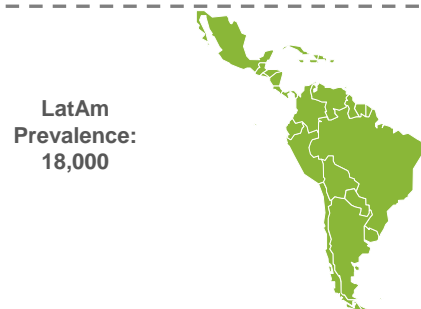
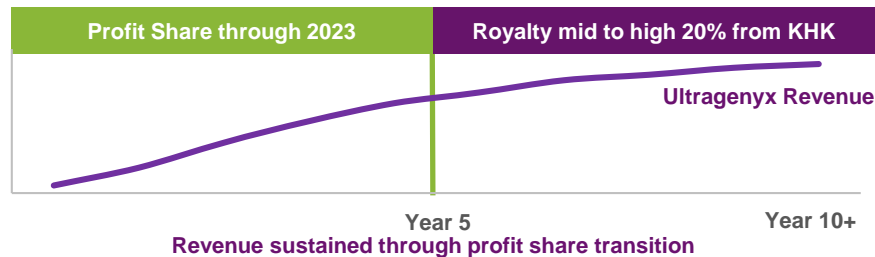


Appendix

Review of KHK Co-Promotion and Profit Share

	U.S. AND CANADA	EUROPE	LATIN AMERICA
Commercialization	<ul style="list-style-type: none"> ■ Ultragenyx launches ■ KHK books sales ■ 50/50 profit share for 5 years then tiered revenue share ■ Shared commercial activities over time 	KHK commercializes and books sales	Ultragenyx commercializes and books sales
Royalties	After 5 years, tiered revenue share in mid to high 20% range to Ultragenyx after profit share period	Up to 10% royalty to Ultragenyx	Low single-digit royalty to KHK
Commercial supply	KHK supplies; price is double-digit percentage of net sales	NA	KHK supplies; price is double-digit percentage of net sales

Revenue to Ultragenyx Maintained After Transition from Profit Share to Royalty in U.S.

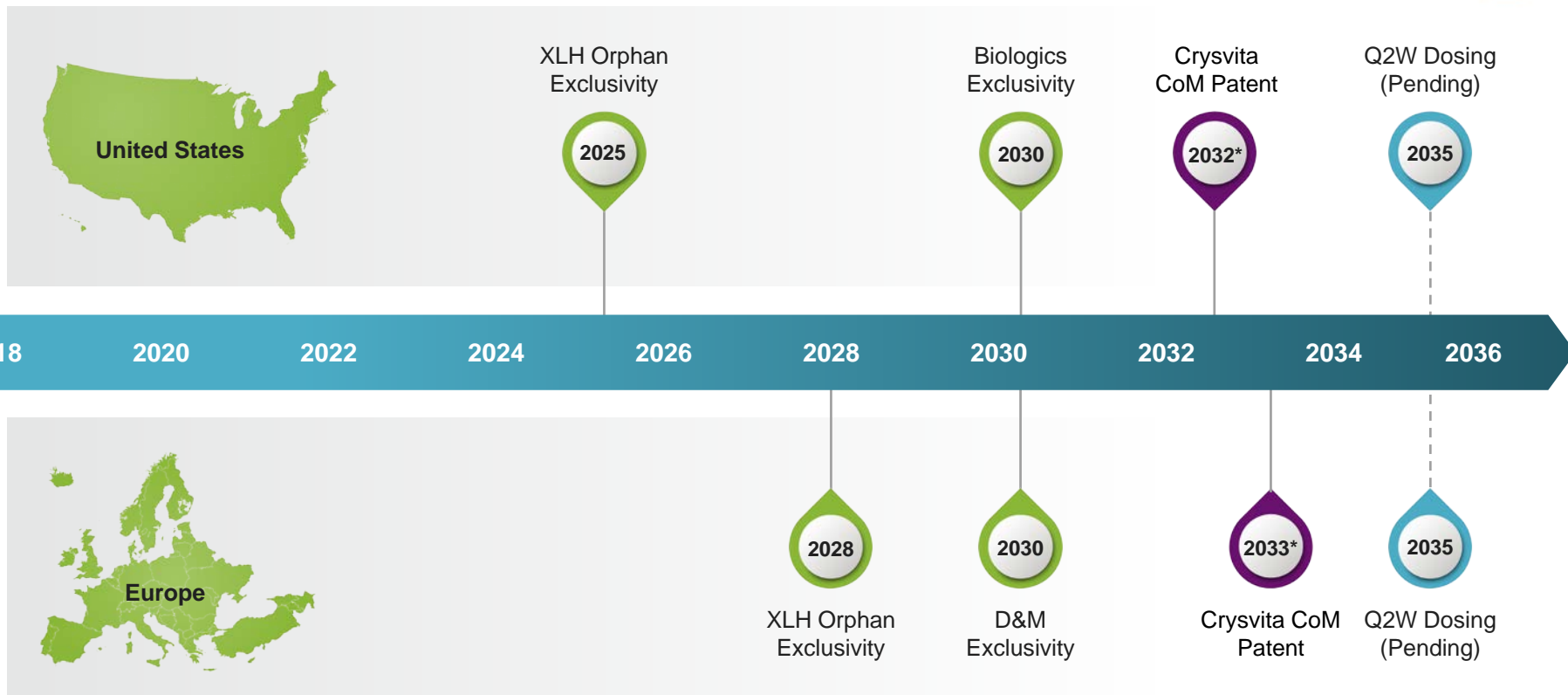


Key Licenses & Intellectual Property

Product	License	Intellectual Property/Royalties
Burosumab (XLH, TIO)	KHK	<ul style="list-style-type: none"> Shared rights to U.S. patents to generic and specific antibodies and use for treatment of XLH (2022-2032)¹ See summary of collaboration
Vestronidase Alfa (MPS 7)	St. Louis University	<ul style="list-style-type: none"> Composition and use for treatment of MPS 7 (2035) Low single-digit royalty
UX007 (LC-FAOD)	Baylor Research Institute (BRI)	<ul style="list-style-type: none"> Composition (2020-2029/30)¹ Use for treatment of LC-FAOD (2020) Mid single-digit royalty
DTX301 (OTC Deficiency)	Sub-License from REGENXBIO of UPENN IP	<ul style="list-style-type: none"> Composition and use for treatment of OTC Deficiency (2022-2035) Low to mid single-digit royalty
DTX401 (GSDIa)	Sub-License from REGENXBIO of UPENN IP	<ul style="list-style-type: none"> Composition for treatment of GSDIa (2022-2024) Low to mid single-digit royalty
	NIH (Non-Exclusive)	<ul style="list-style-type: none"> Composition for treatment of GSDIa (2034) Low single-digit royalty

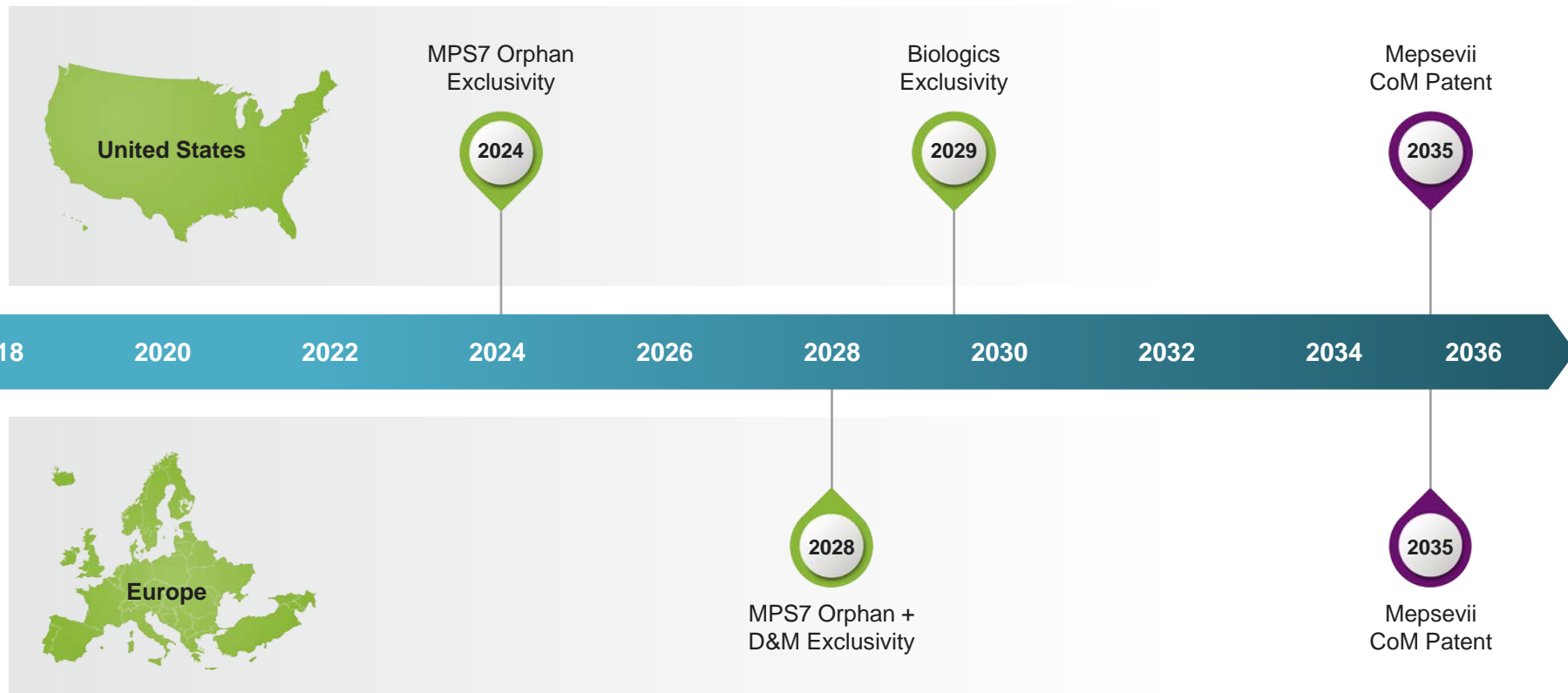
¹Includes projected U.S. patent term extension

Crysvita® Exclusivity Summary



Mepsevii™ Exclusivity Summary

Mepsevii™
(vestronidase alfa-vjbk)
injection, for intravenous use



UX007 Exclusivity Summary

