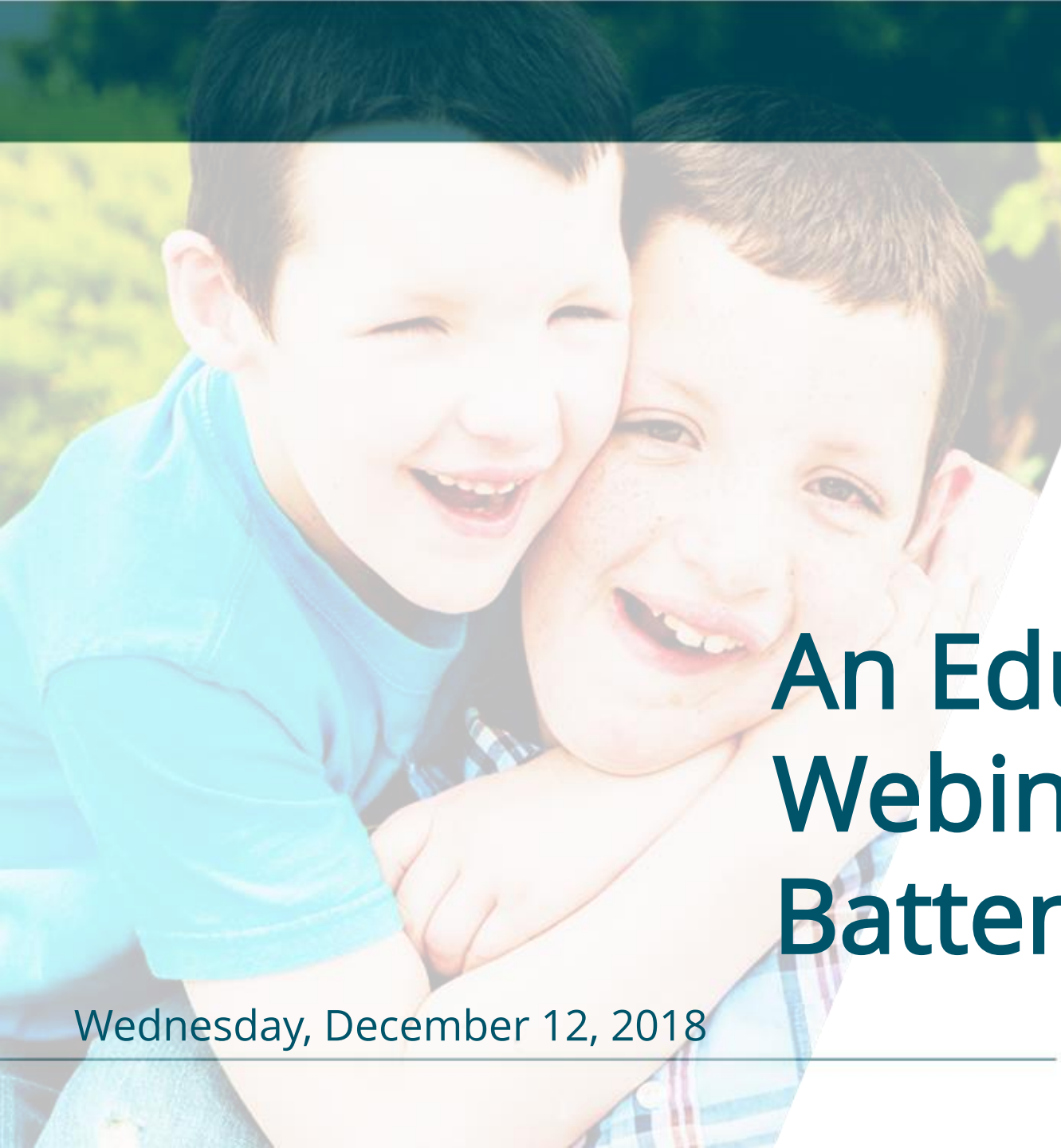


Global Genes®
Allies in Rare Disease

An Educational Webinar on Batten Disease

Wednesday, December 12, 2018

Global Genes®

Global Genes: Who We Are

Our Purpose, Our Mission:

The purpose of Global Genes is to *Connect, Empower and Inspire* the rare disease community.

Global Genes®

Agenda

TOPIC	SPEAKER
Welcome	Meredith Cagle, Global Genes
Clinical Overview of Batten Disease	Emily de los Reyes, MD, Nationwide Children's Hospital
Current Efforts in Batten Disease Research	Craig Benson and Mary Beth Kiser, Beyond Batten Disease Foundation Noreen Murphy, Batten Disease Support and Research Association
Efforts in Gene Therapy	Kathrin Meyer, PhD, Nationwide Children's Hospital
Parent Perspective on Clinical Trial Participation	Maria Graham
Amicus Therapeutics Overview and Advocacy Program	Jayne Gershkowitz, Amicus Therapeutics
Q & A	All
Additional Resources	Meredith Cagle

Global Genes®

Clinical Overview of Batten disease

Presented by: Emily de los Reyes, MD

Nationwide Children's
When your child needs a hospital, everything matters.℠

The Ohio State University
College of Medicine

Batten's disease

Objectives

- To discuss diagnosis and current classification
- To review current treatment and future modes of therapy for Batten's disease

Batten's disease

Grants and Consultancy

- Biomarin
- Charlotte and Gwenyth Gray foundation
- Amicus

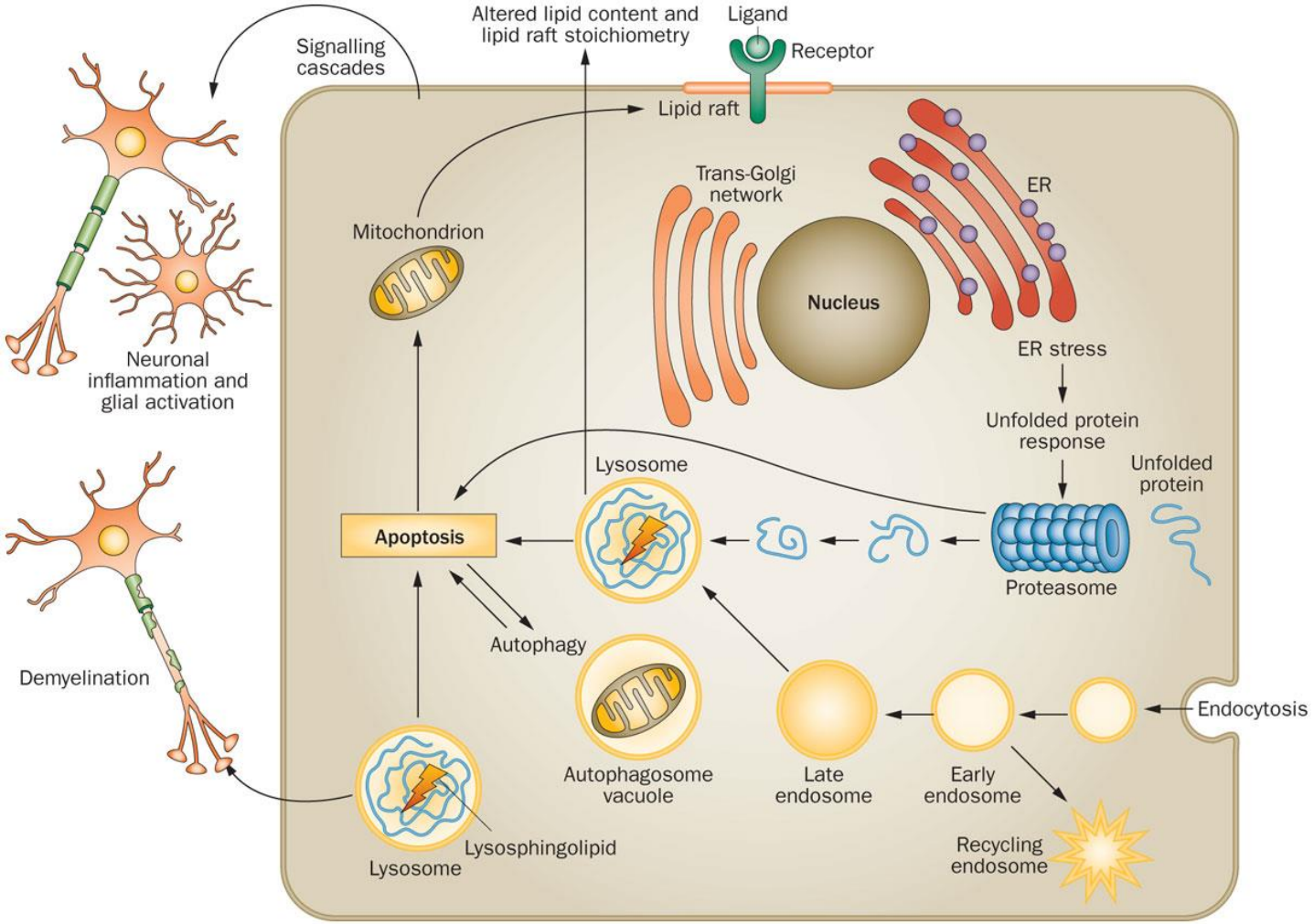
Batten's disease

- Most common clinical cause of dementia in children
  - Previously normal children may lose their ability to talk or walk, cognitive or learning disability
- Lysosomal disease
- Autosomal recessive (two family members have the genetic abnormality)
- 100 molecular mutations with 14 presumed genes
- Accumulation of lipopigments called lipofuscin

Batten's disease

- Language delay or language regression
- Blindness, typically the presenting symptom in CLN3
- Epilepsy
- Motor regression, balance issues
- Cognitive decline
- Sleep disorders

Lysosome



Boustany R-M. N. *Nat. Rev. Neurol.* 2013 doi:10.1038/nrneurol.2013.163.

If the mitochondria is the powerhouse

Lysosome

- Degrades and takes up protein
- Roles in macroautophagy and microautophagy
- Lysosome associated membrane proteins
  - Proteins facilitate the uptake and digestion.

Lysosomal disease

- Loss of normal function of specific lysosomal acid hydrolases, which act to degrade large complex substrates that have been targeted for degradation after endocytosis or autophagy.
- Accumulation of partially degraded substrate affects the architecture and function of cells, tissues, and organs. In some cases the accumulate substrate may be cytotoxic

There Are 14 Types Of NCL And 13 Known Genes-classification And Characteristics Of NCLs

Disease	Onset & clinical phenotype	Gene	Protein
CLN1	Infantile classic, late-infantile, juvenile, adult	*CLN1 (PPT1)*	Palmitoyl protein thioesterase 1
CLN2	Classic late-infantile phenotype; atypical phenotypes: infantile, juvenile, protracted; SCAR7	*CLN2 (TPP1)*	Tripeptidyl peptidase 1
CLN3	Juvenile classic	*CLN3*	Transmembrane protein
CLN4	Adult (autosomal dominant)	*CLN4 (DNAJC5)*	Soluble cysteine string protein
CLN5	Late-infantile variant, juvenile, adult	*CLN5*	Soluble lysosomal protein
CLN6	Late-infantile variant, adult (Kufs type A)	*CLN6*	Transmembrane protein
CLN7	Late-infantile variant	*CLN7*	Transmembrane protein
CLN8	Late-infantile variant	*CLN8*	Transmembrane protein
CLN9	Juvenile variant	-	-
CLN10	Congenital class, late-infantile, juvenile, adult	*CLN10 (CTSD)*	Cathepsin D
CLN11	Adult	*CLN11 (GRN)*	Progranulin
CLN12	Juvenile	*CLN12 (ATP13A2)*	ATPase
CLN13	Adult (Kufs type B)	*CLN13 (CTSF)*	Cathepsin F
CLN14	Infantile	*CLN14 (KCTD7)*	Potassium channel protein

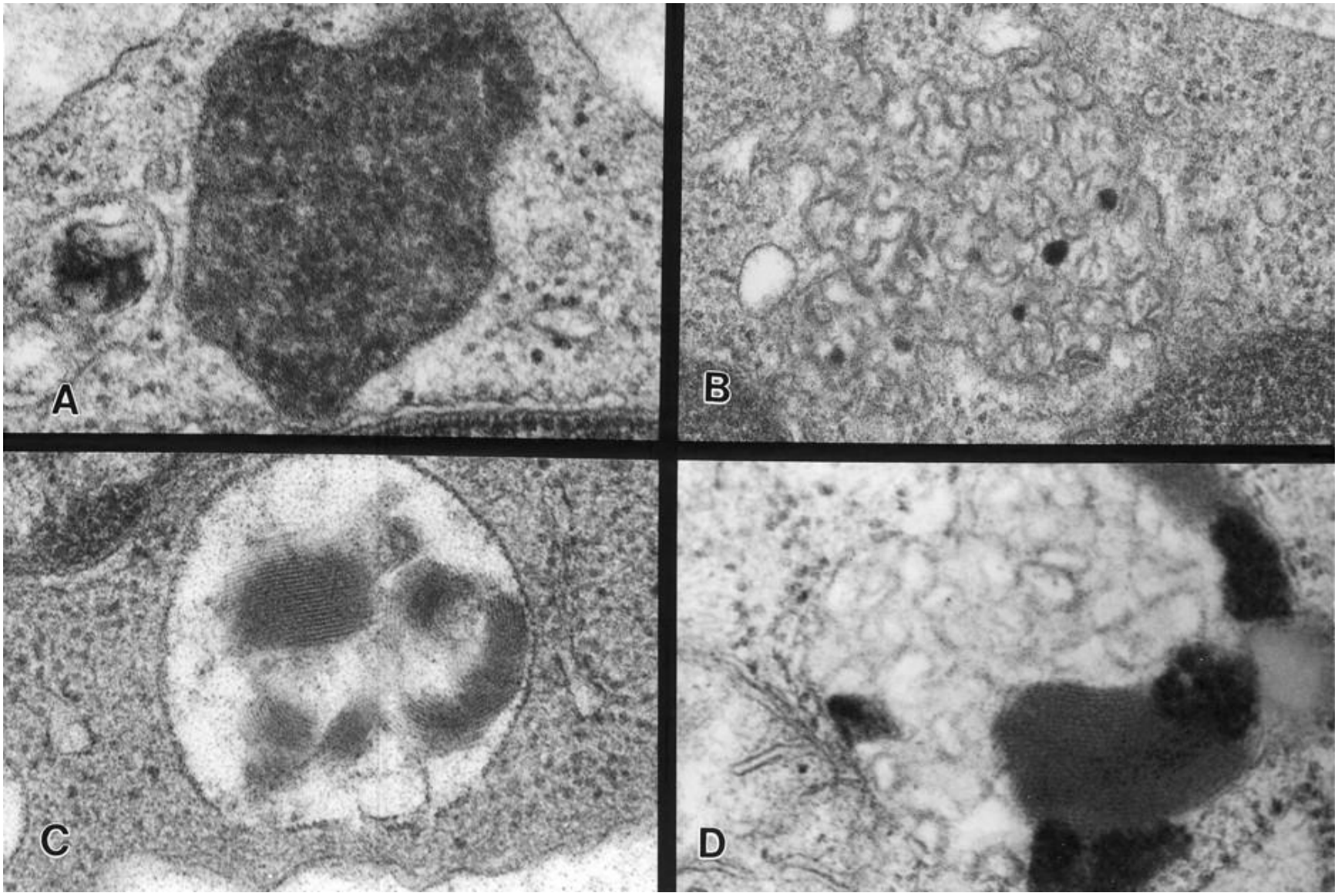
Adapted from: Schulz A, et al. *Biochim Biophys Acta*. 2013;1832(11):1801-1806.

Neuronal Ceroid Lipofuscinosis

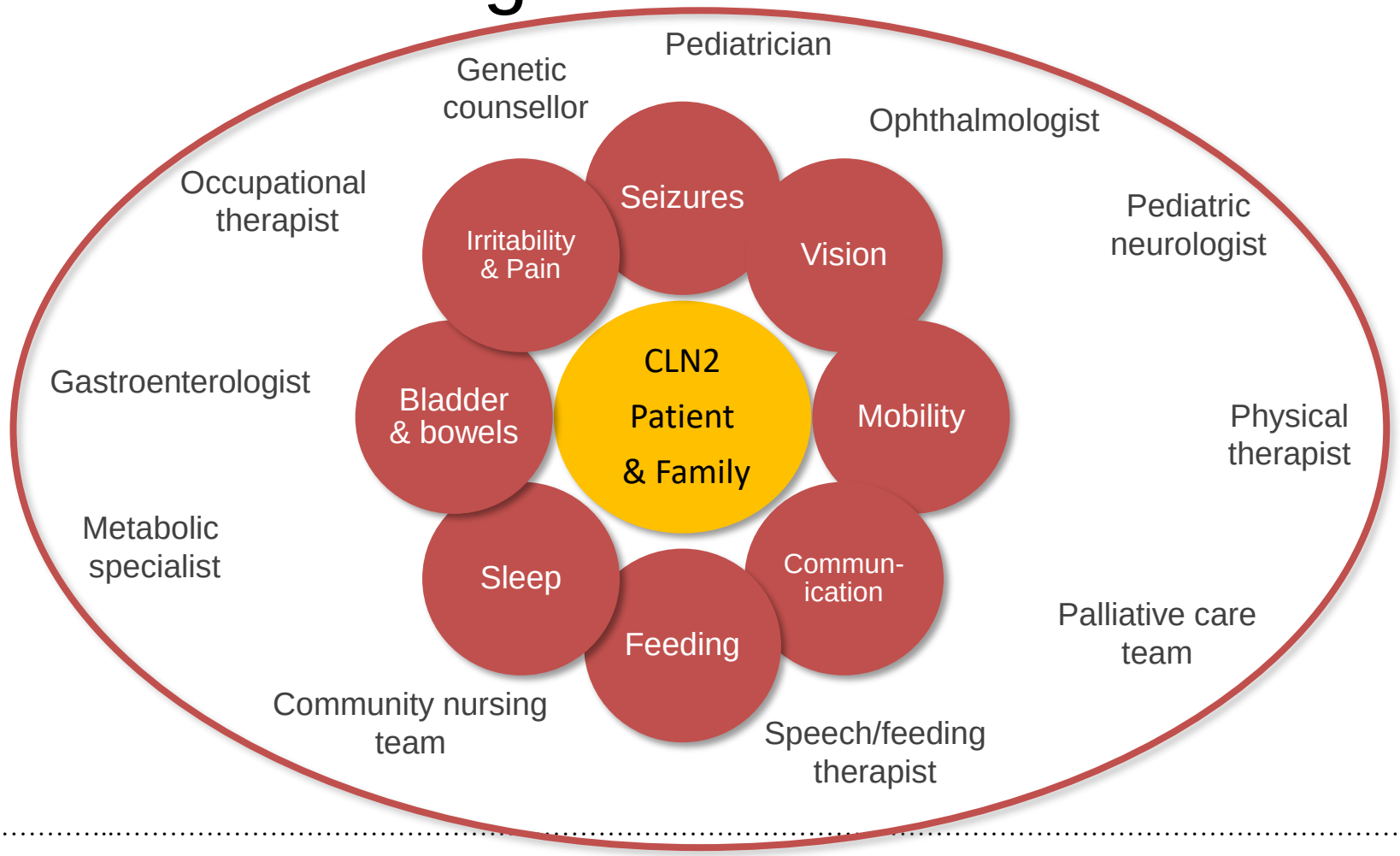
- **Most common types**
  - CLN1 (Infantile NCL),Soluble enzyme,
    - PPT, palmitoyl protein thioesterase
  - CLN2 (Late Infantile NCL),Soluble enzyme,
    - TPP, tripeptidyl peptidase
  - CLN3 (Juvenile NCL)
    - Transmembrane protein

In The Old Days……..

- Age of Onset
- Clinical Phenotype
- Ultrastructural Characteristics
  - Granular Osmiophilic Deposits(GROD)
  - Curvilinear bodies
  - Fingerprint bodies


A
B
C
D

The Multidisciplinary Team Is Essential For The Management .



Treatment

Symptomatic treatment

- Seizures
  - Myoclonus, Partial seizures, Generalized tonic clonic
  - Zonisamide, Valproic acid , Clobazam
- Spasticity
- Therapies: Physical, Occupational and Speech

Medical issues

- Swallowing problems
  - Speech/Swallow therapies
  - Thickening feeds
  - G tube, dependent of families.
- Respiratory
  - Potentially treatable, Flu
  - Tendency to worsen disease

Symptomatic treatment

Immunizations

No reason to hold immunizations, if families wish, we can space it out

Nutrition

Weight gain, good nutrition very important

Adequate hydration

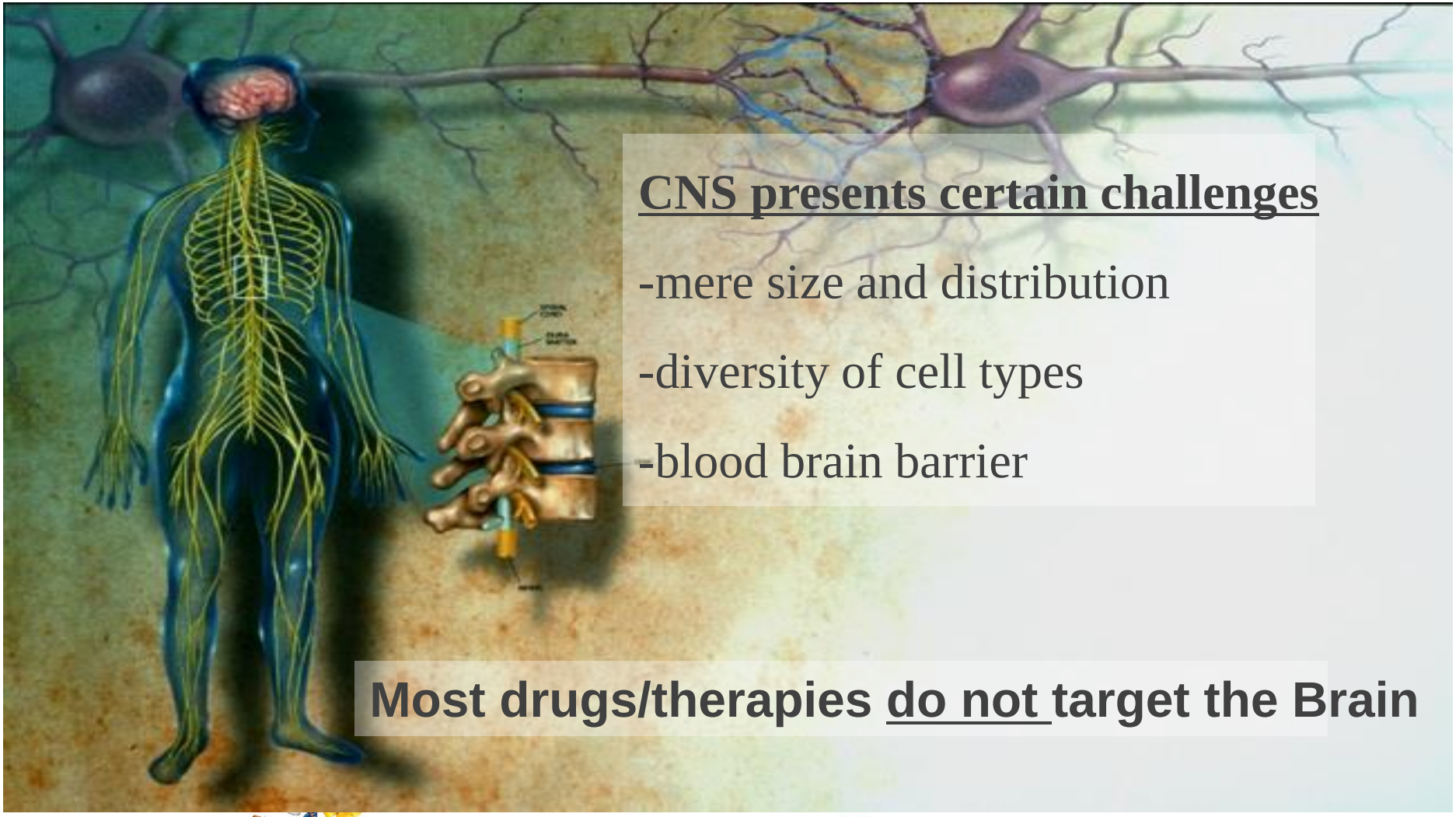
Nutritional reserves

Goals Of Care Evolve As The Disease Progresses

Quality of Life	Maintenance of function to support QoL as disease progresses	Maintenance of QoL as disease progresses
Medical management	Symptom management	Ongoing symptom management Prevention and management of complications (e.g., respiratory, immobility)
Family support	Psychosocial support Transition support	These activities become more important
End-of-life care	Early discussions of what the future looks like	Implement palliative care concept with multidisciplinary support for the patient, the parents and the family

Williams RE, et al. Presented at the 12th Annual WORLD Symposium. 29 February-4 March 2016, San Diego, Ca. Poster #274.

Challenges of Delivering Therapies to the brain and spinal cord



Batten's treatment

Enzyme replacement therapy, approved in 2017 for the treatment of CLN2

Intracerebral gene therapy for CLN2

Clinical trials for CLN3 and CLN6 disease

BMT

Stem cell

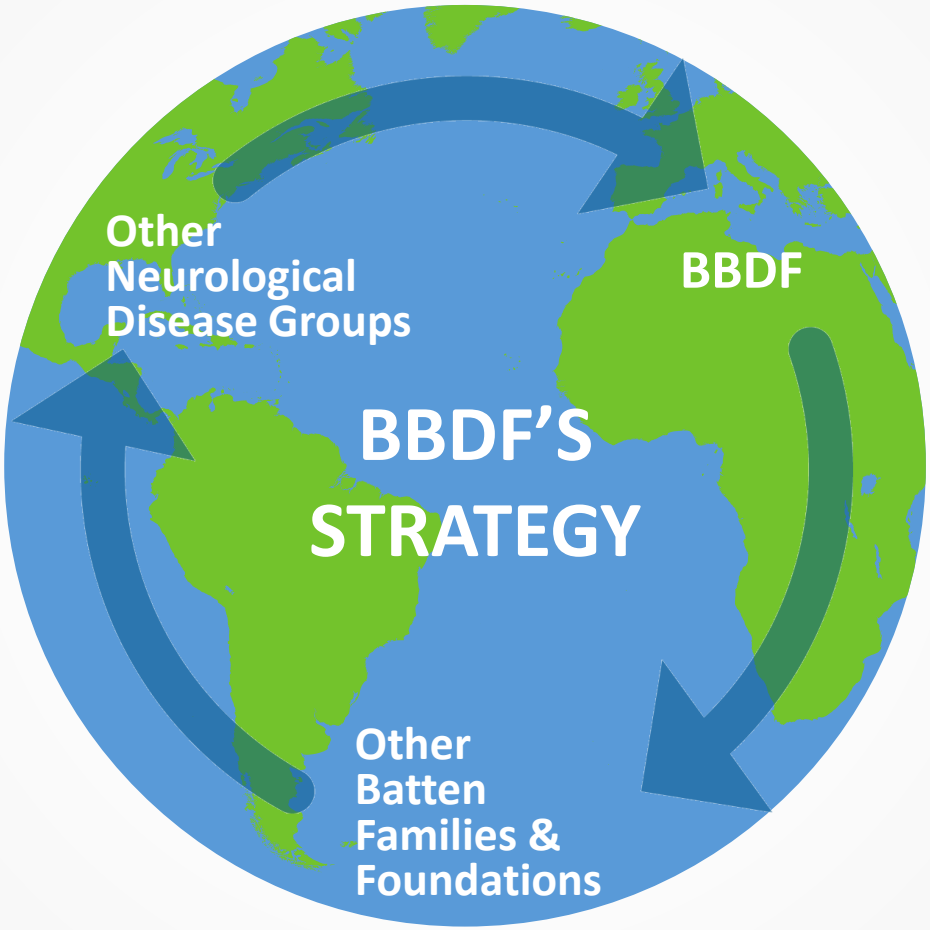
Neuroprotective agents, Seizure control

Craig Benson
Father of Christiane
Founder and Board Chair

Mary Beth Kiser
President and CEO

Beyond Batten Disease Foundation

BEYOND BATTEN DISEASE
FOUNDATION


Other
Neurological
Disease Groups
BBDF
BBDF'S
STRATEGY
Other
Batten
Families &
Foundations

Directed Funds

HOPE

www.willherndon.org

BIND BATTEN

Hugs for Hudson

AT BEYOND BATTEN DISEASE FOUNDATION

CHASE the CURE

CHASE "JASPER" PETERSON FUND AT BEYOND BATTEN DISEASE FOUNDATION

Tyler's Mission

Go Tyler! Beat Batten!

RARE Sisters

Bonding through Batten

Partner and Leverage

BBDF has matched every donation

by leveraging partnerships and co-funding resulting in
$26 million in research over the last 10 years

Funded Research

2008 - 2016

$20 Million

40 RESEARCH PROJECTS

2016

DRUG DISCOVERY

2017 - 2018

$6 MILLION

FUND the treatment
PREPARE for clinical trial success
SUPPORT research for a cure

Research Program Highlights

- Built a rare disease genetic test
- Funded research initiatives for:
  - Discovery of drug targets and medicines
  - Screened thousands of drugs for potential to treat juvenile Batten disease
  - Created Batten specific tools: biomarkers, animal models, antibodies
  - Developed and commercialized Batten iPS stem cell line
  - Advancing multiple approaches to treating CLN3 – exon skipping, gene therapy
- Support for international patient registries and natural history studies
- Funding initiative for biomarkers and clinical endpoints

Medical Breakthrough:

Treatment now in sight!

- These efforts have resulted in a treatment which slows the progression in Batten disease models.
- This treatment has undergone an expensive validation and development process to prepare for a clinical trial.
- Successful FDA PreIND meeting in May 2018. Clinical trial in 2019.

BEYOND BATTEN DISEASE
FOUNDATION

THE FDA Approval Process

PRECLINICAL

Lab Studies

Pre IND

PHASE I

- Is it safe?
- Is it toxic?

PHASE II

- Is it safe?
- What are the side effects?
- Dosing
- Early signs that it is working

PHASE III

- What are the side effects in the larger population?
- Efficacy
- Optimal dosing

FDA NEW DRUG APPROVAL

- Application submitted
- Application reviewed
- Application approved
- Available to the public

FDA Pathway for BBDF 101

192 Studies Pre IND

J

Juvenile Toxicity

PHASE III Children under 18

Safety Study in healthy adults

FDA Approval

ODD and RDPRV

EXPANDED USE FOR ADULTS (18 AND OVER)

2019

CLINICAL TRIAL

TODAY: Get a treatment to the kids who need it most to slow disease progression

TOMORROW: Buy time while we continue to support research for a cure

FOREVER: Leave a legacy that lives on for kids and families affected by Batten and many other diseases

BATTEN DISEASE SM
Support and Research Association

Noreen Murphy
Patient and Family Education Coordinator

Our long-term vision is a world without Batten disease. Our mission is to support Batten families, fund and facilitate research for treatments and cures, and advocate for action.

How BDSRA Supports Families

Yearly 3-day family conference (~480 attendees)

Private Facebook group for parents and caregivers (~1,000 people)

Monthly Newsletter

Expert Facebook chats

Staff available for calls and connect families with experts in any topic

Connect families for 1 on 1 communication

Represent the patient voice to industry

Emerging Research in Batten Disease

Type of Batten				
CLN1	Abeona Therapeutics, Inc.	Circumvent Pharmaceuticals	Polaryx Therapeutics, Inc.	
CLN2	BioMarin	Polaryx Therapeutics, Inc.	REGENXBIO	Spark Therapeutics
CLN3	Abeona Therapeutics, Inc.	Amicus Therapeutics	Beyond Batten Disease Foundation	Circumvent Pharmaceuticals
CLN5	UT Southwestern			
CLN6	Amicus Therapeutics			
CLN7	Foundation for Batten Hope			
CLN8	Amicus Therapeutics			
CLN10	Circumvent Pharmaceuticals			
ANCL	Circumvent Pharmaceuticals			

Company Name: **Abeona Therapeutics, Inc.**
Type of Batten: **CLN1 disease and CLN3 disease**
Type of program: Gene Therapy
Program Information:
ABO-202(scAAV-CLN1) for CLN1 disease
One-time administration of the correct version of the CLN1 gene using Adeno-associated virus (AAV9)
Targeting initiation of a Phase 1/2 clinical trial (primary objective of evaluating safety) in 2019
Orphan Drug Designation (FDA)
Orphan Drug Designation (EMA)
Rare Pediatric Disease Designation (FDA)
AB0-201 (scAAV-CLN3) for CLN3 disease
One-time administration of the correct version of the CLN3 gene using Adeno-associated virus (AAV9)
Targeting initiation of a Phase 1/2 clinical trial (primary objective of evaluating safety) in 2019
Orphan Drug Designation (FDA)
Orphan Drug Designation (EMA)

Contact:
Judy Doyle, Patient Engagement Specialist
jdoyle@abeonatherapeutics.com
Michelle Berg, VP Patient Affairs and Community Engagement
mberg@abeonatherapeutics.com

Abeona THERAPEUTICS
Working together to find a cure.

Company Name: **Amicus Therapeutics**

Type of Batten: **CLN3, CLN6 and CLN8**

Type of program: Gene Therapy

Website: https://www.amicusrx.com/programs-pipeline/

Contact: patientadvocacy@amicusrx.com

Company Name: **Foundation for Batten Hope**
Type of Batten: **CLN7**
Type of program: Gene Therapy
Recruiting for Natural History Study:

- Clinical Research Program Manager:
  Sam Hughes, (Samuel.Hughes@utsouthwestern.edu)
- Clinical Trial Research Medical Director:
  Dr. Saima Kayani, USTW (Saima.Kayani@utsouthwestern.edu)

Current Status: Toxicology study, viral vector development and initial animal study in process.

Next Milestone: Recruiting for natural history study for CLN7 and CLN5 beginning in 2019. Please contact Dr. Kayani if interested.

For patient advocacy questions, please contact Gina Hann (ginahann@gmail.com)

https://battenhope.org/batten-hope-video/

Circumvent Pharmaceuticals Overview

- Company name: Circumvent Pharmaceuticals
- We are working in: CLN1, CLN3, CLN10, ANCL
- We are developing: Small molecule thioesterase mimetics
- www.circumventpharmaceuticals.com
- Update: We completed key non-GLP pharmacokinetic and toxicology preclinical studies validating our Development Candidate (compound for advancing towards clinical development) and are developing a clinical formulation for IND-enabling studies
- Contact info: misty@circumventpharmaceuticals.com

Polaryx Therapeutics, Inc.

Indications: CLN2 and CLN3

Type of therapy: Small molecule molecule therapy which is safe, oral, and easily portable

Characteristics of lead compound (PLX-200)

- Gemfibrozil, an FDA-approved lipid lowering agent
- Increases lysosome biogenesis, anti-inflammatory mediators, remyelination, and neurotrophins
- Reduces inflammation, glial activation, lipofuscin in the brain, and apoptosis
- Increases survival in CLN2/Cln3 murine disease models

IND filing: Expected in 2Q 2019

Clinical trials: Expected in 3Q 2019 in the US

Key progress:

- Completed rat juvenile toxicity study and formulation development,
- Orphan drug designation for all subtypes of neuronal ceroid lipofucinosis granted by FDA and EMA

Contact: Hahn-Jun Lee, M.Sc., Ph.D., President/CEO, Polaryx Therapeutics, Inc
140 E. Ridgewood Avenue , Suite# 415, South Tower, Paramus, NJ 07652 US
O: +1-201-940-7236, F: +1-201-940-7218, hahnjun7@polaryx.com

REGENXBIO is a leading clinical-stage biotechnology company seeking to improve lives through the curative potential of gene therapy based on its proprietary NAV® Technology Platform, which consists of exclusive rights to AAV7, AAV8, AAV9, AAVrh10 and over 100 other novel AAV vectors.

REGENXBIO is developing a gene therapy, **RGX-181**, for the treatment of CLN2 disease, a form of Batten disease.

- **RGX-181** is designed to use **REGENXBIO**'s AAV9 vector to deliver the TPP1 gene directly to the central nervous system (CNS) to induce sustained levels of TPP1, the enzyme deficient in children with CLN2 disease.
- The program is in the preclinical stage of development and the company continues to make progress to submit an Investigational New Drug Application (IND) to the US Food and Drug Administration (FDA) in 2019 to enable initiation of a global clinical trial for CLN2.
- RGX-181 was granted Orphan Drug Designation by the FDA.

For more information on **REGENXBIO** and the CLN2 program, visit www.regenxbio.com, or contact patientadvocacy@regenxbio.com.

The Leader in AAV Gene Therapy

3Dec2018

REGENXBIO®

Company Name: **Spark Therapeutics**

Type of Batten: **CLN2**

Type of program: Gene Therapy

Program Information:

Spark Therapeutics is developing *SPK-TPP1*, an investigational gene therapy that has demonstrated compelling preclinical proof-of-concept in one naturally occurring preclinical model of *TPP1* deficiency, a form of Batten disease. Batten disease is a fatal neurological disorder involving mutations of the *TPP1*gene that begins in early childhood. We have received orphan product designation from the U.S. FDA for *SPK-TPP1* for the treatment of CLN2 disease (neuronal ceroid lipofuscinosis [NCL]) caused by TPP1 deficiency.

Contact: patients@sparktx.com

SANFORD RESEARCH

NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.℠

Update on AAV9 gene therapy programs for Batten Disease

Kathrin Meyer
Principal Investigator at the Center for Gene Therapy
Assistant Professor at The Ohio State University
Nationwide Children's Hospital, Columbus Ohio

Disclosure Information

I have the following financial relationships to disclose:

- Consultant for Amicus Therapeutics, Inc.

I will discuss the following off-label use and/or investigational use in my presentation:

- Preclinical, proof of concept data from studies for the treatment of patients with Batten disease

Validated Gene Therapy Platform

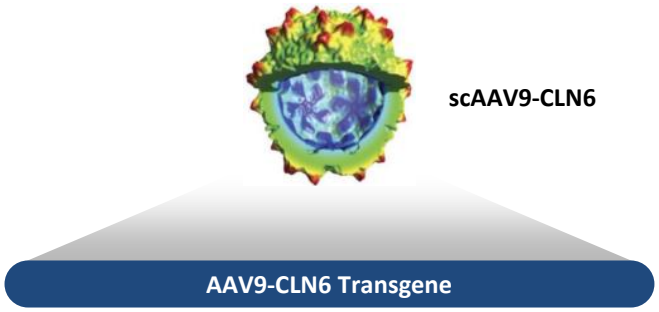
Portfolio is Based on a Validated Gene Therapy Approach Across Multiple CNS Diseases

Clinically validated AAV gene therapy approach

- Nationwide Children's Hospital Center for Gene Therapy (NCH)
- Intrathecal delivery with robust expression throughout CNS

Preclinical safety and efficacy studies replicated across multiple diseases at NCH

- SMA
- Rett Syndrome
- ALS
- CLN6
- CLN3



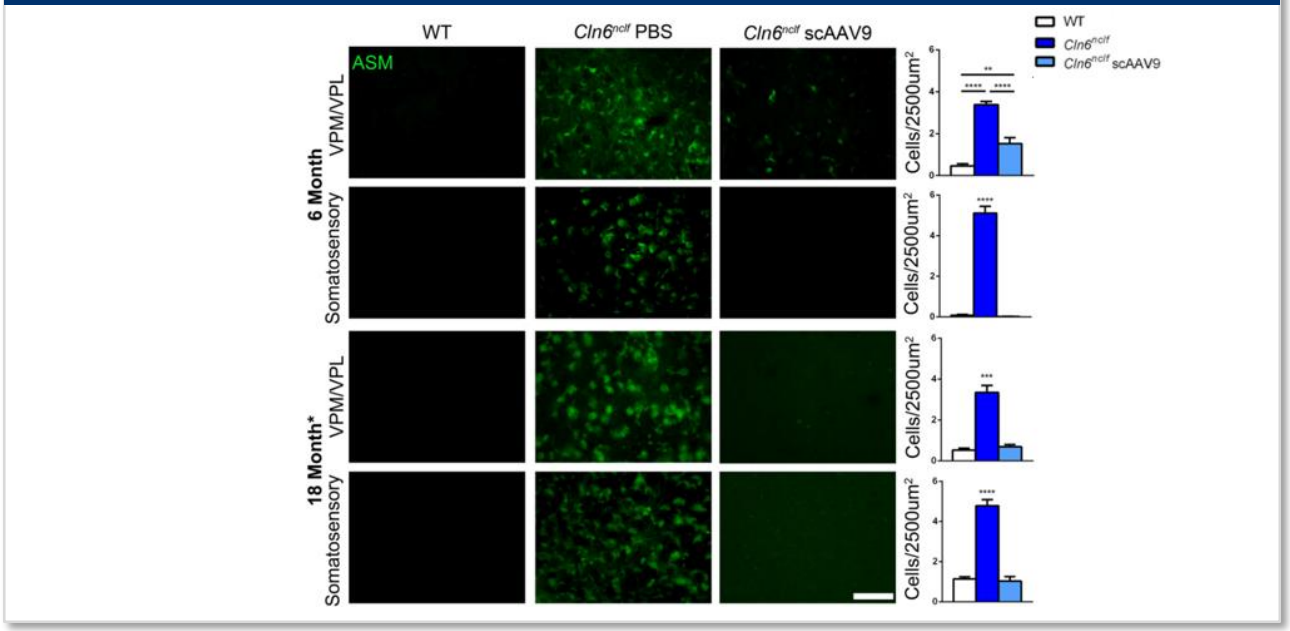
Foust, Kaspar et al, 2009

Source: Likhite 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, IND-enabling Preclinical Studies for Batten Disease Gene Therapy

CLN6: Preclinical Mouse Data – Autofluorescent Storage Material

Single AAV9-CLN6 Administration Results in Reduction of Autofluorescent Substrate Material Throughout the Brain

Autofluorescent Storage Material Accumulation

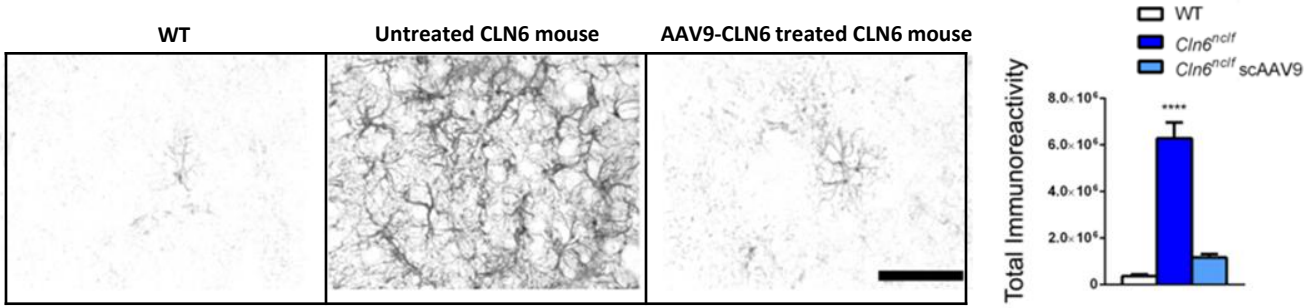


Source: Likhite 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, IND-enabling Preclinical Studies for Batten Disease Gene Therapy

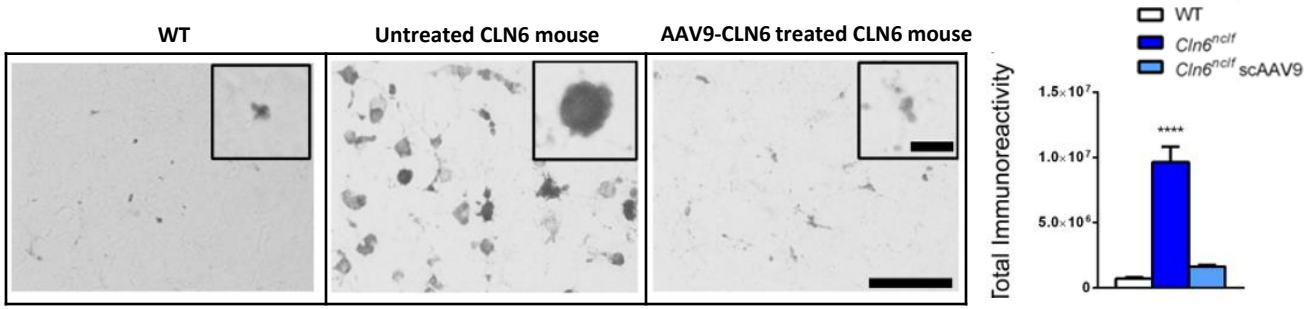
CLN6: Preclinical Mouse Data – Somatosensory Glial Activation

Single AAV9-CLN6 Administration Results in Reduction of Glial Activation

Astrocyte Activation: Month 18



Microglial Activation: Month 18

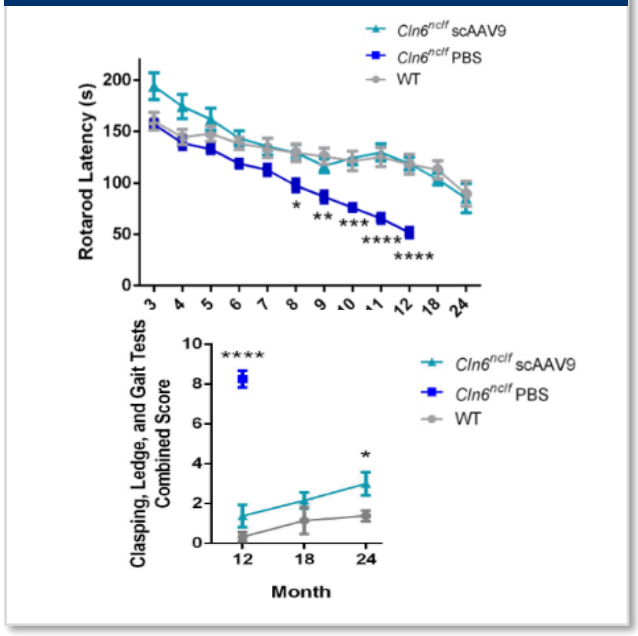


CLN6: Preclinical Mouse Data

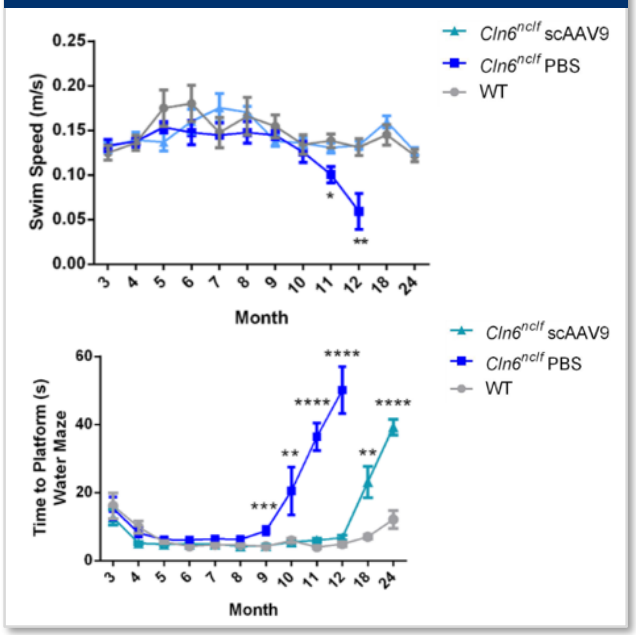
Motor Performance and Cognitive Behavior

Single AAV9-CLN6 Administration Improves Motor Performance & Cognitive Behavior Out to Month 24

Motor Performance



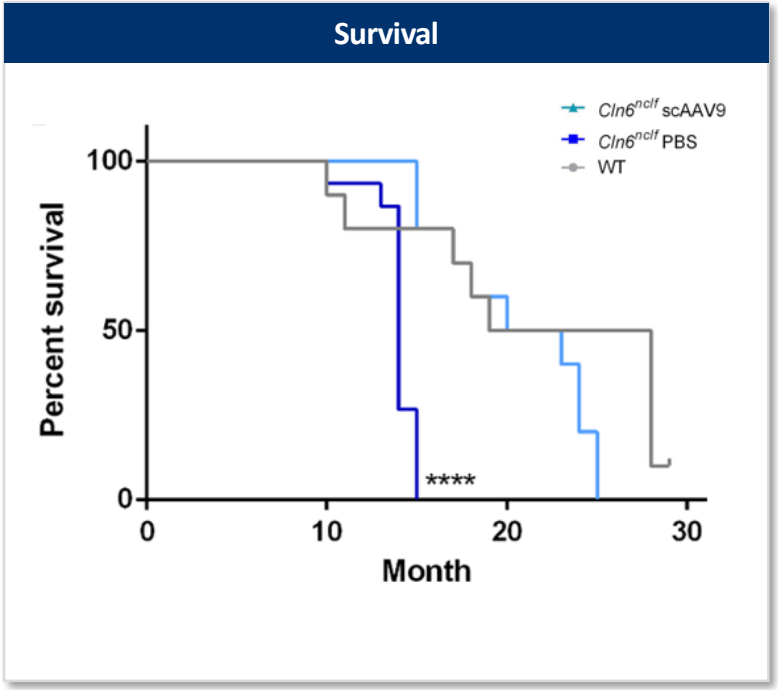
Water Maze Analysis



Source: Likhite 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, IND-enabling Preclinical Studies for Batten Disease Gene Therapy; Data on file

CLN6: Preclinical Mouse Data - Survival

Single AAV9-CLN6 Administration Significantly Extends Median Survival

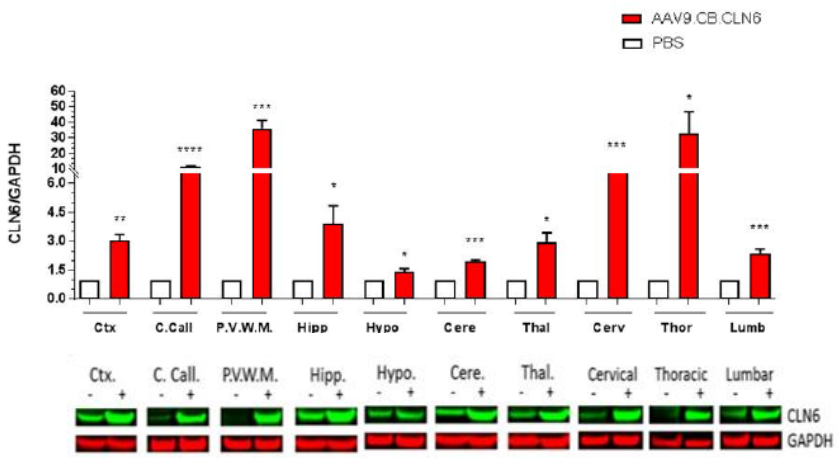


Source: Likhite 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, IND-enabling Preclinical Studies for Batten Disease Gene Therapy

CLN6 Expression in NHP Safety Study

Demonstrated Safety and Meaningful Transduction and CLN6 Expression Throughout the Brain in NHPs

Western Blot on various brain regions of AAV9-CLN6 injected juvenile NHPs



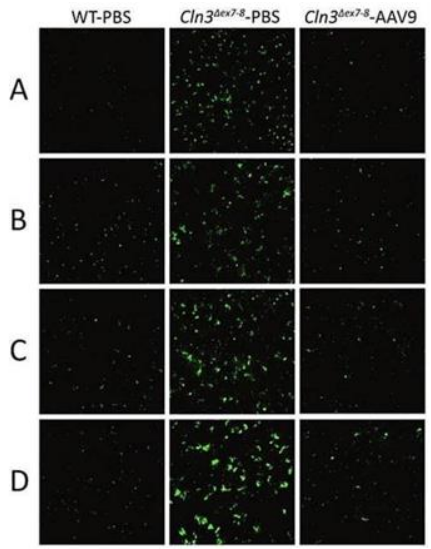
Source: Meyer 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, From mouse to human –Translating intrathecal gene therapy for NCLs; Data on file

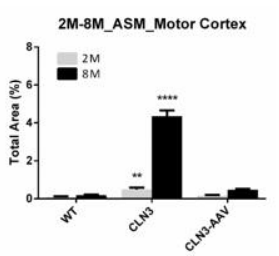
Preclinical Proof of Concept Data in CLN3 Batten Disease

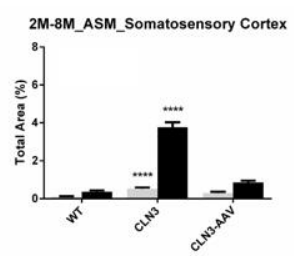
CLN3: Preclinical Mouse Data – Autofluorescent Substrate Material

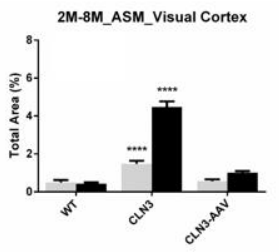
Single AAV9-CLN3 Administration Results in Reduction of Autofluorescent Substrate Material Throughout the Brain

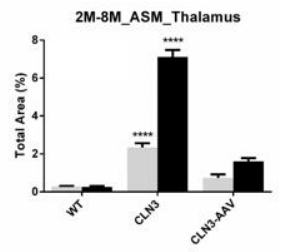
Autofluorescent Storage Material Accumulation









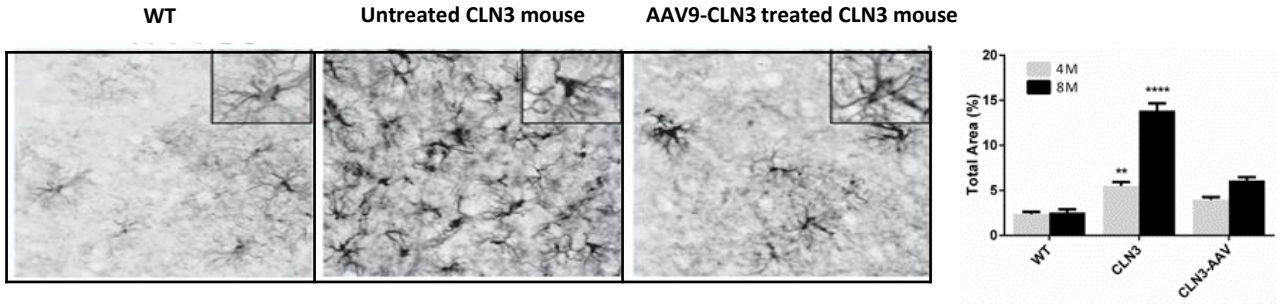


Source: Likhite 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, IND-enabling Preclinical Studies for Batten Disease Gene Therapy

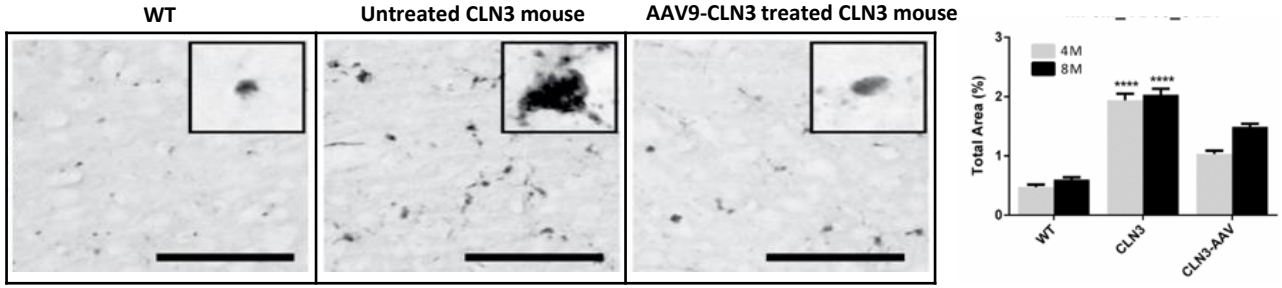
CLN3: Preclinical Mouse Data – Somatosensory Glial Activation

Single AAV9-CLN3 Administration Results in Reduction of Glial Activation

Astrocyte Activation: Month 8



Microglial Activation: Month 8

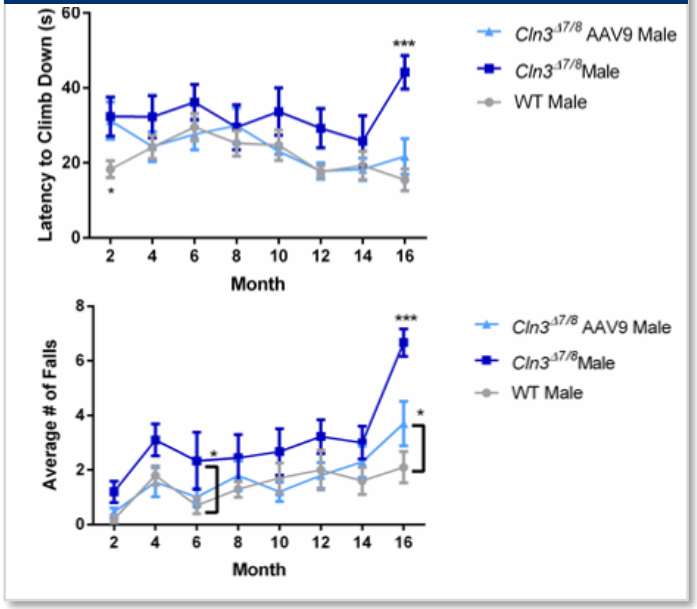


Source: Likhite 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, IND-enabling Preclinical Studies for Batten Disease Gene Therapy

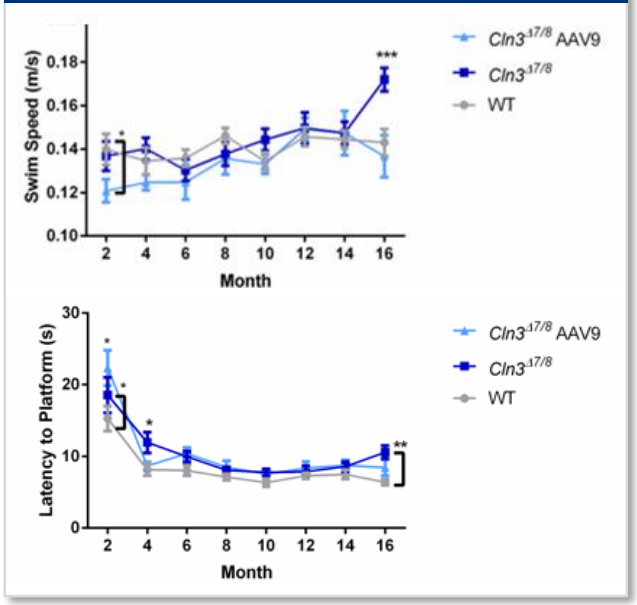
CLN3: Preclinical Mouse Data - Motor Performance & Cognitive Behavior

Single AAV9-CLN3 Administration Improves Motor Performance and Cognitive Behavior at Month 16

Motor Performance



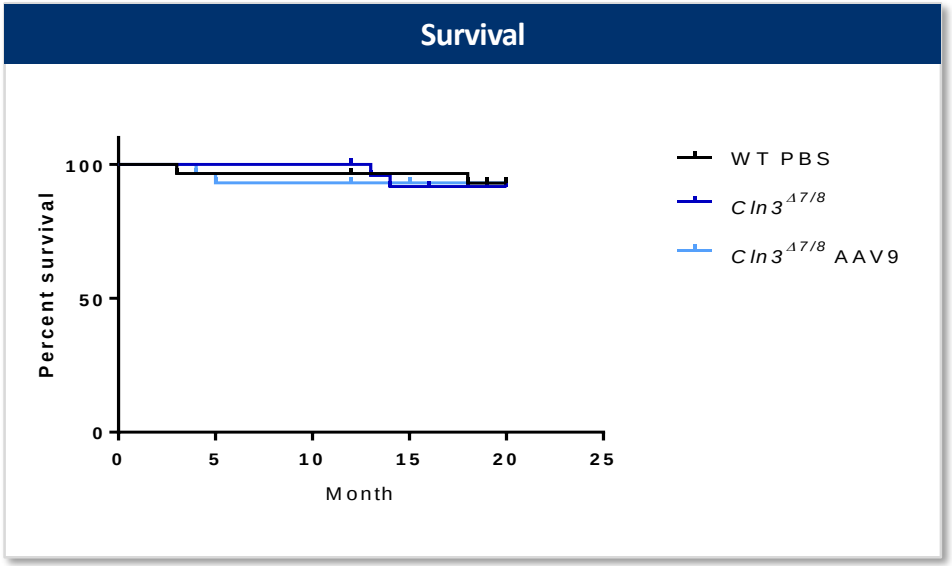
Water Maze Analysis



Source: Likhite 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, IND-enabling Preclinical Studies for Batten Disease Gene Therapy

CLN3: Preclinical Mouse Data - Survival

Effect of AAV9-CLN3 On Survival Cannot Yet Be Determined Given Minimal Phenotype in Mouse Model

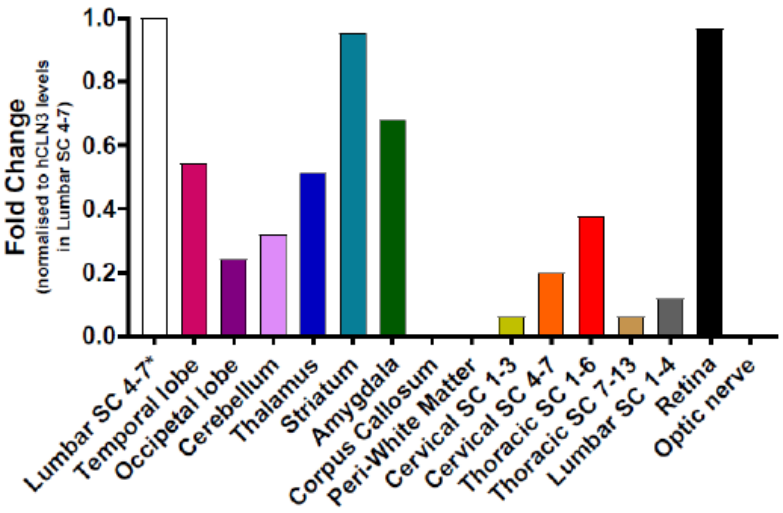


Source: Likhite 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, IND-enabling Preclinical Studies for Batten Disease Gene Therapy

CLN3 Expression in NHP Safety Study

Demonstrated Safety and Meaningful Transduction and Expression Throughout the Brain in NHPs

Reverse transcriptase qPCR on various brain regions of AAV9-CLN3 injected juvenile NHPs



Note: CLN3 Western blot -data were not assessable

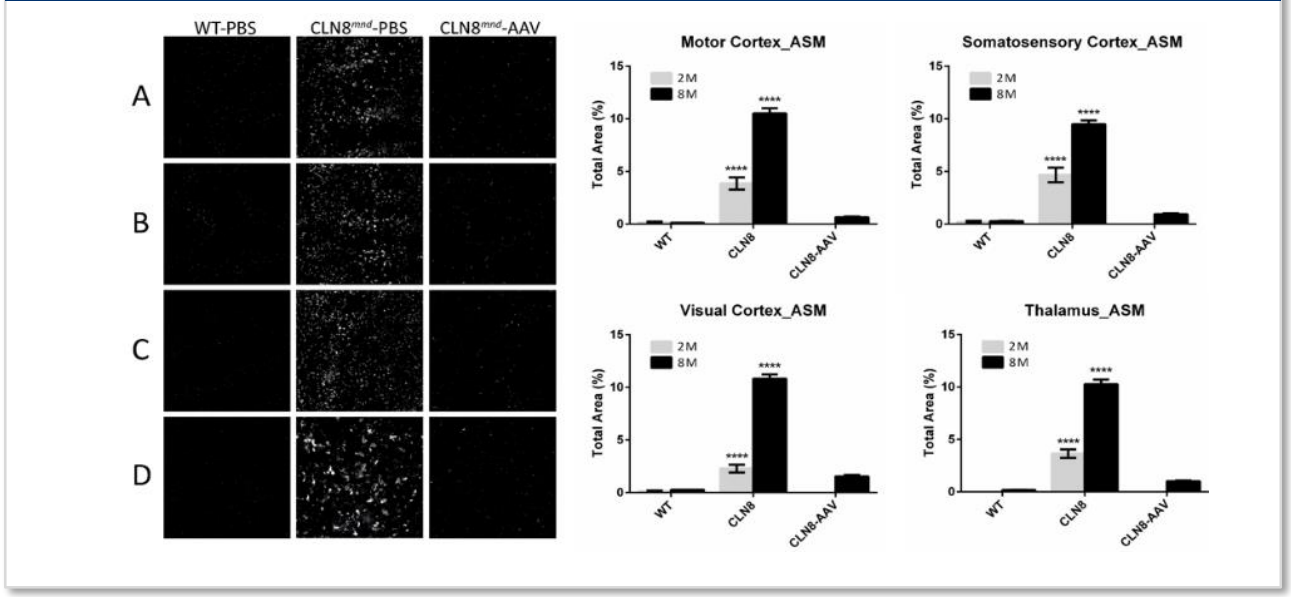
Source: Meyer 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, From mouse to human –Translating intrathecal gene therapy for NCLs

Preclinical Proof of Concept Data in CLN8 Batten Disease

CLN8: Preclinical Mouse Data – Autofluorscent Storage Material

Single AAV9-CLN8 Administration Results in Reduction of Autofluorescent Substrate Material Throughout the Brain

Autofluorescent Storage Material Accumulation

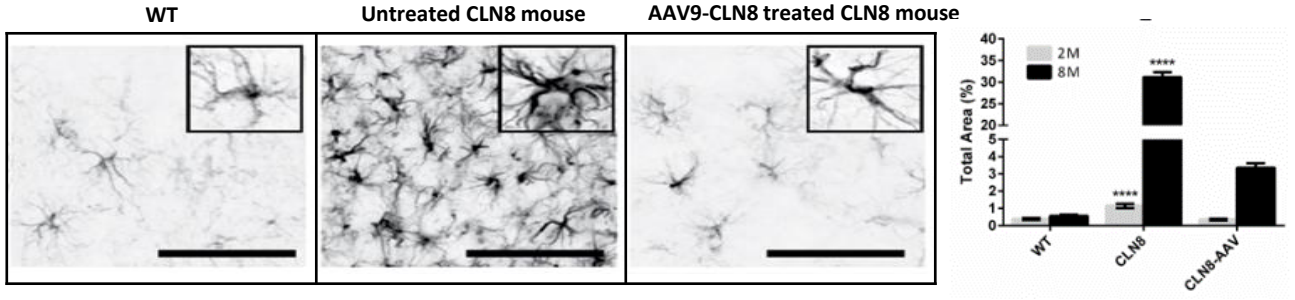


Source: Johnson 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, Testing the safety and efficacy of CLN8 gene therapy in the Cln8mnd mouse model

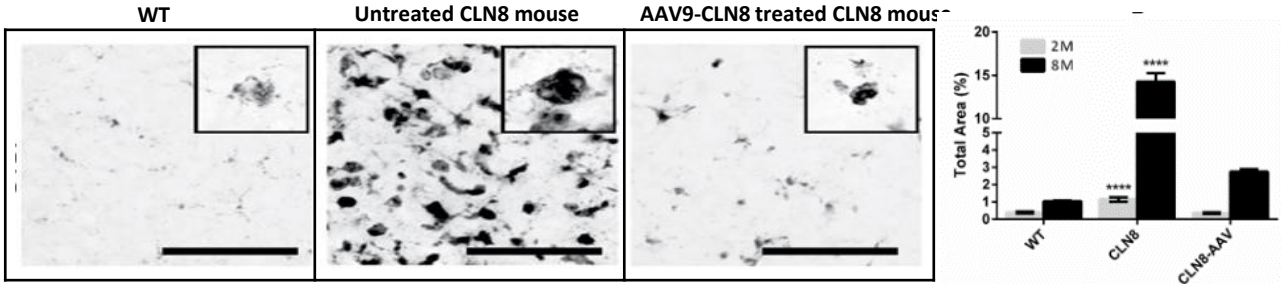
CLN8: Preclinical Mouse Data - Somatosensory Glial Activation

Single AAV9-CLN8 Administration Results in Reduction of Glial Activation

Astrocyte Activation: Month 8



Microglial Activation: Month 8

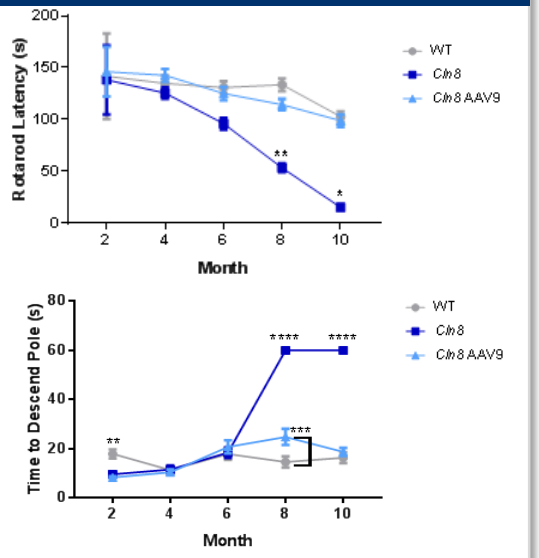


Source: Johnson 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, Testing the safety and efficacy of CLN8 gene therapy in the Cln8^{mnd} mouse model

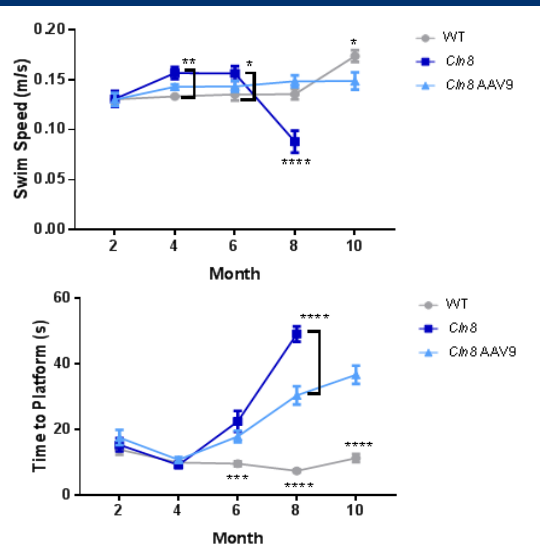
CLN8: Preclinical Mouse Data - Motor Performance and Cognitive Behavior

Single AAV9-CLN8 Administration Improves Motor Performance & Cognitive Behavior Out to Month 10

Motor Performance



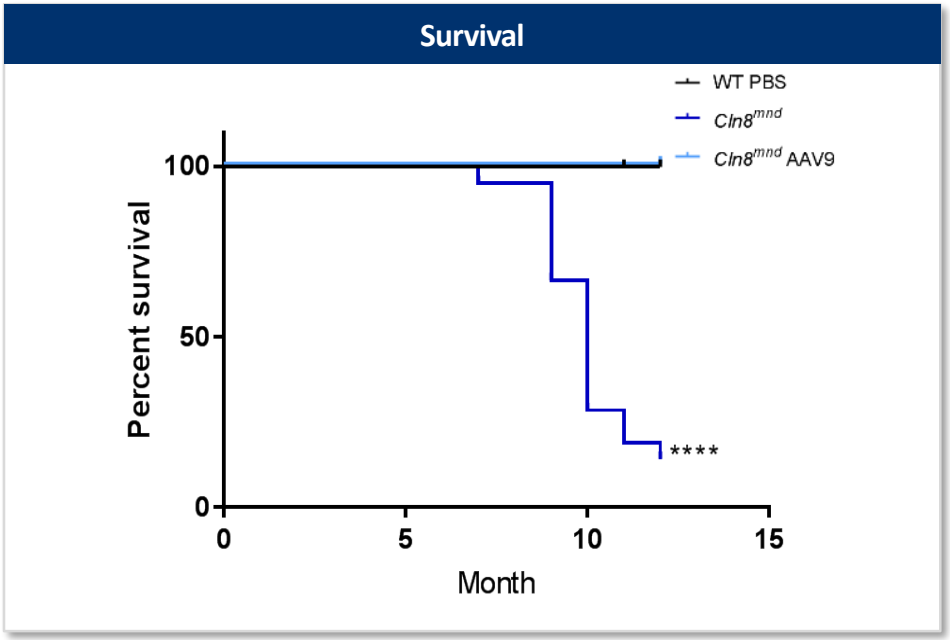
Water Maze Analysis



Source: Johnson 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, Testing the safety and efficacy of CLN8 gene therapy in the Cln8^{mnd} mouse model

CLN8: Preclinical Mouse Data - Survival

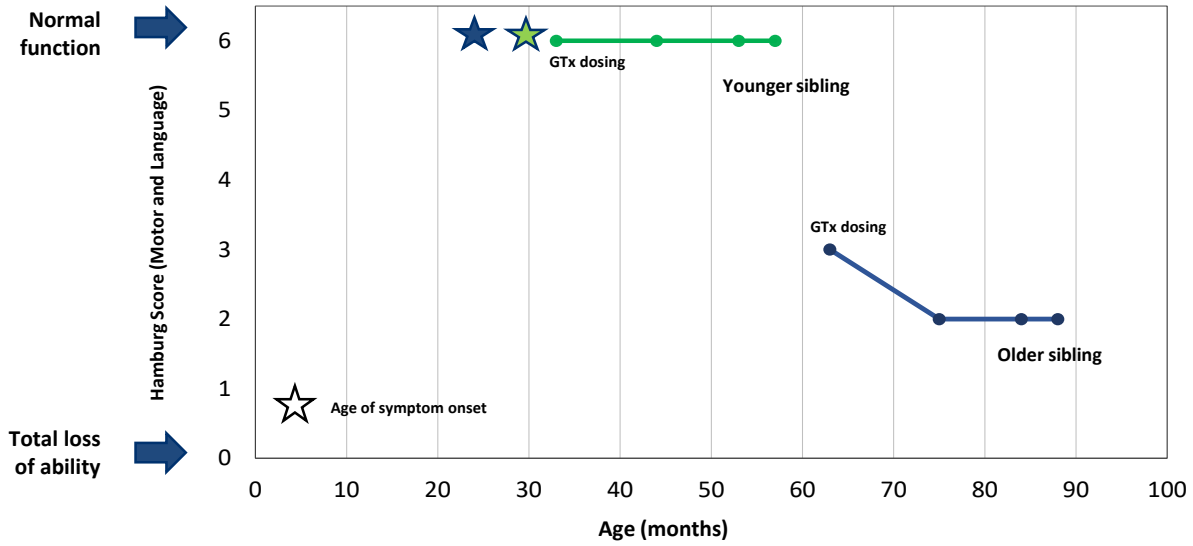
Single AAV9-CLN8 Administration Significantly Extends Median Survival



Source: Johnson 2018, 16th International Conference on Neuronal Ceroid Lipofuscinoses, Testing the safety and efficacy of CLN8 gene therapy in the Cln8^{mnd} mouse model

Efficacy Data: Matched Sibling Case Report

Encouraging Interim Efficacy Data in First Two Patients Treated with Gene Therapy with Two Years of Follow-up



- Two siblings (same genotype) treated with gene therapy at ages 2.8 and 5.3 years, respectively
- Two years post treatment, Hamburg motor and language scores indicate no disease progression in the younger sibling
- Disease progression in older sibling has shown evidence of stabilization

Source: Data on file

CLN6 Clinical Summary

Jay Barth, M.D.

CLN6: Clinical Data Summary

Encouraging Safety and Efficacy Data from an Ongoing Single-arm Phase 1/2 study

- Single-arm study with all patients receiving gene therapy
  - Single intrathecal administration
- Ten patients currently treated; additional patients in screening
- Generally well-tolerated
- Encouraging preliminary efficacy data
- Additional data to be presented in 2019

CLN6: Clinical Study Safety Summary Interim Data

Data from an Ongoing Single-arm Phase 1/2 Study Indicate Single AAV9-CLN6 Administration is Generally Well Tolerated

- Ten patients currently treated with single intrathecal administration
  - Average follow-up duration: 12 months (range 1-24 months)
- Adverse events (n=94 events reported)
  - Majority of adverse events (AEs) were mild and unrelated to treatment
  - Five Grade 3 (severe) AEs (defined as medically significant) reported in 4 patients
  - No Grade 4 (life-threatening) or Grade 5 (death) AEs reported to date
- T-cell response and antibody elevations not associated clinical manifestations
  - No changes in treatment required
- Data Safety Monitoring Board (DSMB) has permitted study to proceed and enroll additional patients

Acknowledgments

Nationwide Children's
When your child needs a hospital, everything matters.℠

The Ohio State University
College of Medicine

Charlotte + Gwenyth Gray Foundation
TO CURE BATTEN DISEASE

ForeBatten
FOUNDATION

Families of SMA
Support. Research. Hope.
www.curesma.org

FIGHT BATTEN DISEASE
FOUNDATION

the Sophia's Cure foundation
Miracles do happen. Let's make one.

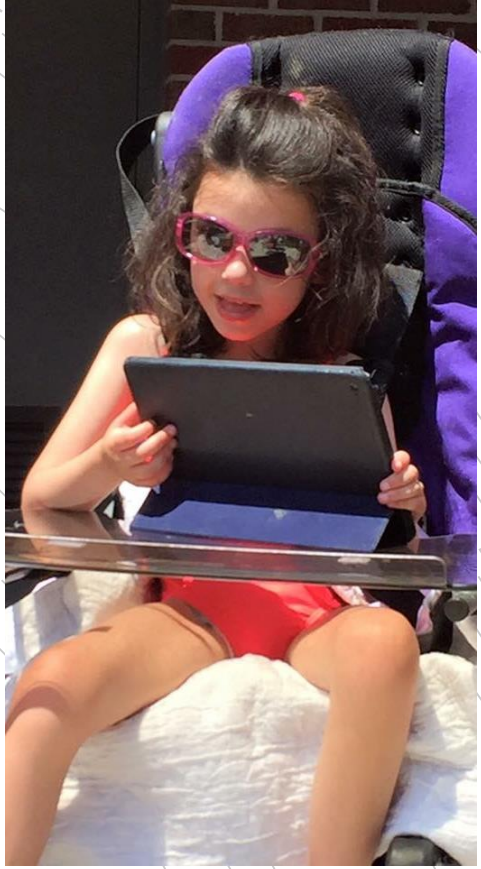
MDA®
For Strength, Independence & Life

National Institute of Neurological Disorders and Stroke

fightsma

Layla Graham





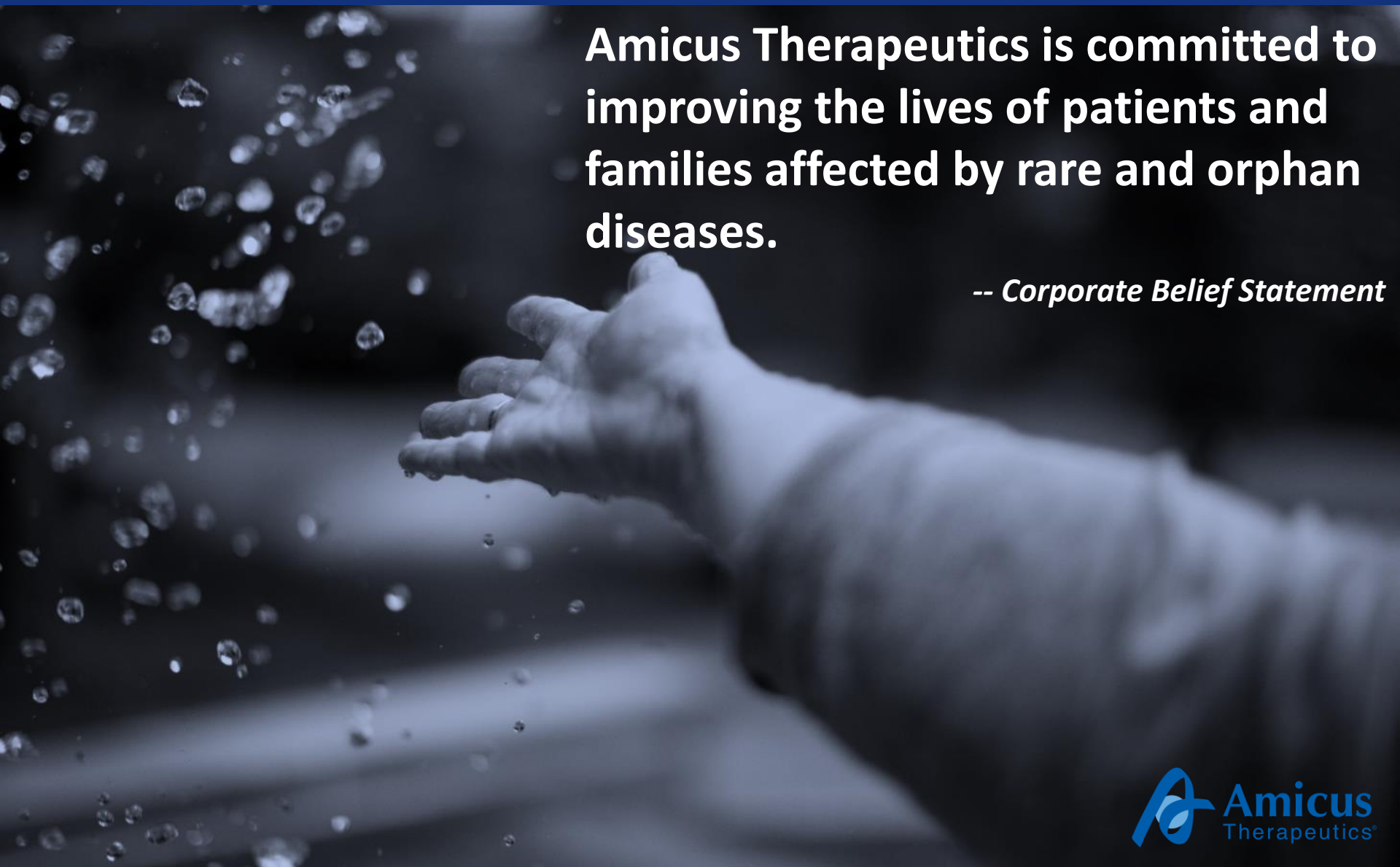

Layla Graham

Amicus Therapeutics®

Introduction to Amicus and Patient & Professional Advocacy

Jayne C. Gershkowitz
Chief Patient Advocate
Global Genes Batten Disease Rare Webinar
December 12, 2018

Amicus Mission

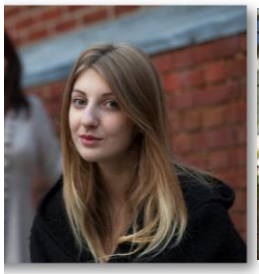


Amicus Therapeutics is committed to improving the lives of patients and families affected by rare and orphan diseases.

-- Corporate Belief Statement

Amicus Therapeutics®

Amicus History




2002
Amicus founded on pharmacological chaperone technology from Mt. Sinai School of Medicine

2006
First Fabry patient treated in Amicus clinical trials

2007
Amicus initial public offering (NASDAQ: FOLD)

2009
First Fabry patient in Ph. 3 study

2012
Proof of concept for chaperone-ERT combination (CHART technology)

2013
Callidus acquisition (Pompe ERT)

2014
- Migalastat positive data from two Ph. 3 studies
- Pompe ERT scale-up

2015
- International HQ
- MAA Submission
- Pompe ERT in clinic
- Scioderm acquisition (EB)

Global Company

2016-2018
- Galafold ™ EU + US approvals
- Biologics pipeline expansion (CDKL5)
- Entering Ph. 3 Pompe studies
- Celenex acquisition and UPenn collaborations advance gene therapy at Amicus with multiple new rare disease pipeline programs

Building a World Class Organization

Global organization of 500+ employees dedicated to create, manufacture, test and deliver medicines for rare metabolic diseases

Amicus Therapeutics

Amicus Vision: Delivering for Patients

To build a top-tier, fully integrated, global biotechnology company whose medicines treat 5,000+ patients by 2023

>350 Patients*

5,000 Patients*

YE17 → 2023

*, all figures approximate

NP-NN-ALL-

Amicus Therapeutics

You are part of the Community of Us

NP-NN-ALL-00091218

Community of us

At Amicus, we are driven by the journeys, experiences, involvement, relationships and outcomes of individuals and families living with rare disease.

At Amicus

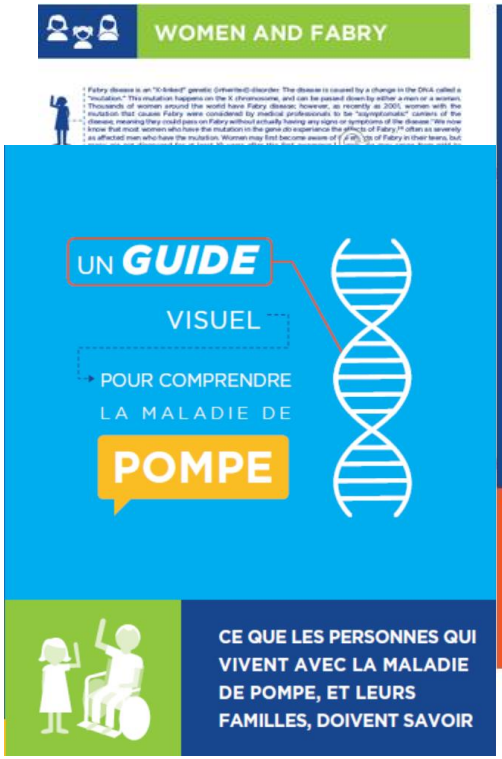
- Knowing the PAOs and understanding the patient community
- Developing relationships externally and internally
- Working collaboratively with our partners and cross-functionally
- **Mobilizing meaningful outcomes for patients, families, caregivers and healthcare professionals**

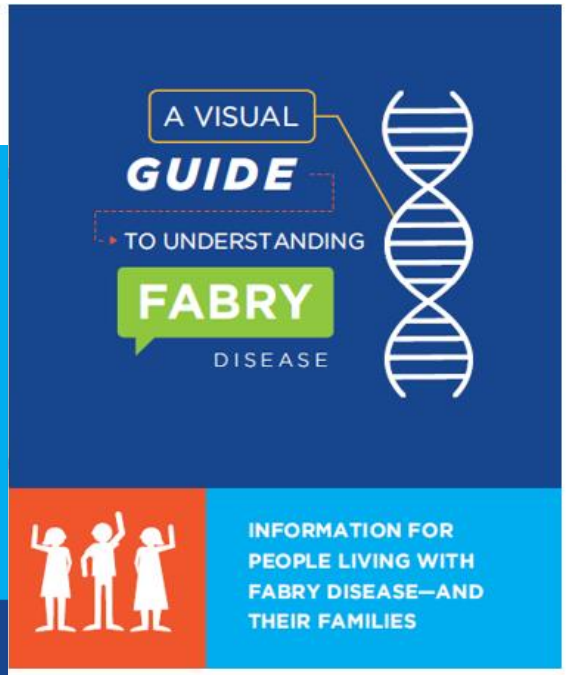
Community of us

Amicus Therapeutics

Educational Resources for Patient and Professional Communities

Disease awareness materials



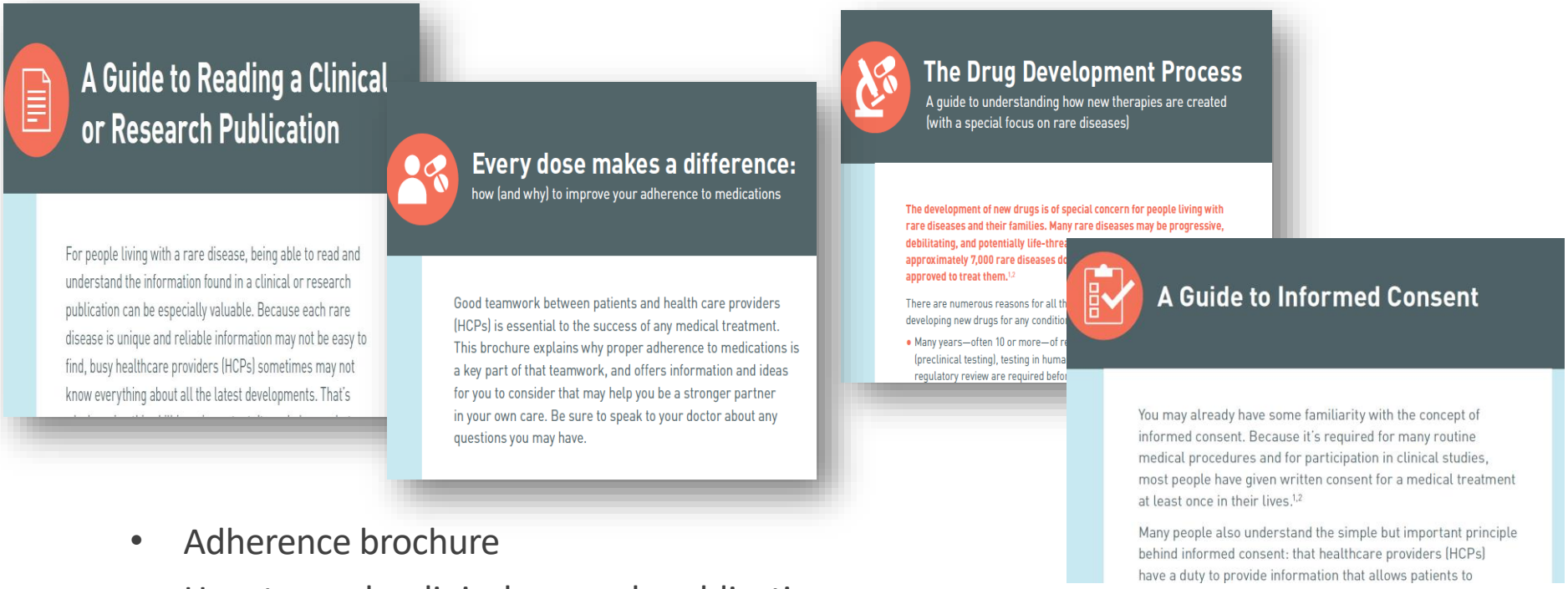


- Fabry and Pompe infographics
- Signs and symptoms brochures
- CLN6 and CLN3 infographics *in progress*
- CDKL5 infographics *in progress*

Amicus Therapeutics

Educational Resources for Patient and Professional Communities

General rare disease materials



- Adherence brochure
- How to read a clinical research publication
- Informed consent
- Drug development process
- Patient involvement in drug development

Amicus Therapeutics

Tell Us

Rare Disease Day Events

tell us

Congresses & Meetings

Patient Advisory Boards, Focus Groups

HBD Lunch & Learn Events

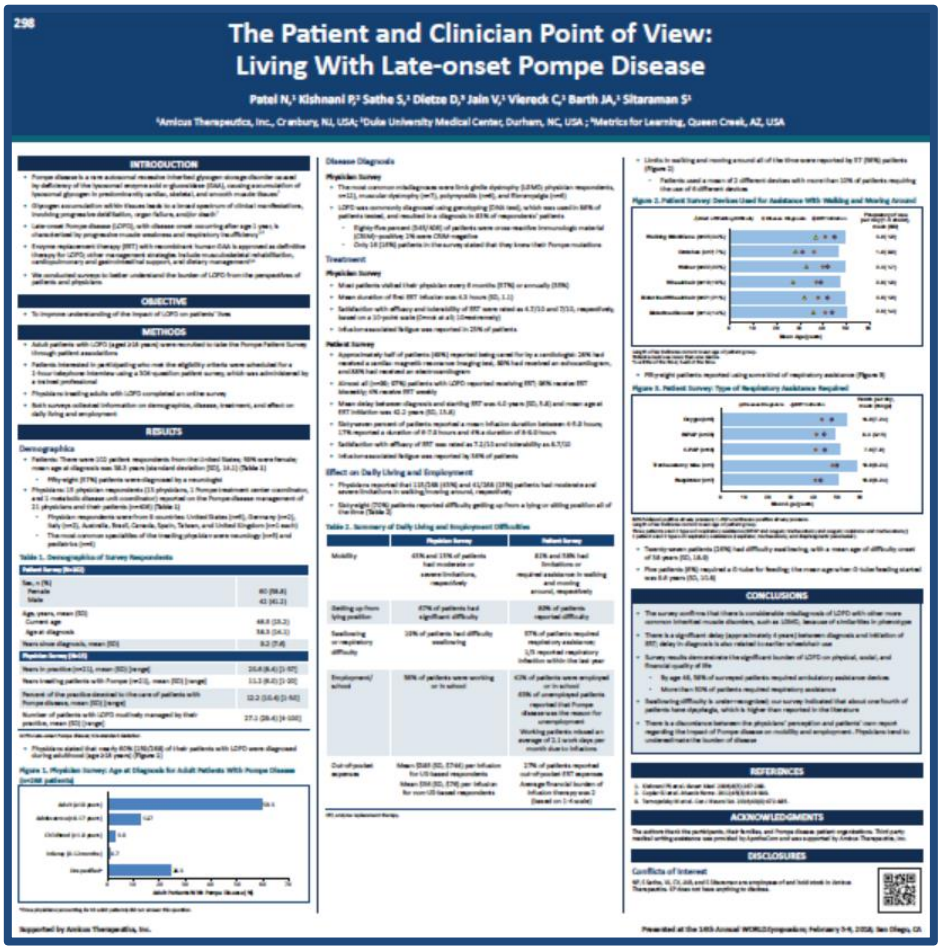
Patient Advisory Boards

- Informed persons affected by a rare disease representing self and community at-large
- Nomination/application process
- Two-year commitment
- ~Two meetings/year; interim communications as necessary
- Broad viewpoints encouraged
- Backgrounds diverse by geography, age, disease experience
- Provide Amicus with insights into diagnostic odyssey, disease management; clinical research, meaningful endpoints, protocol design; broad community engagement, and more

- Inputs may assist in clinical trials, patient advocacy, business planning, patient services, educational programs
- Completes advisory triad: Medical Advisory Board, Scientific Advisory Board, Patient Advisory Board

P&PA Initiatives

Surveys capture patient, caregiver and HCP experience



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The Patient and Clinician Point of View: Living With Late-onset Pompe Disease

Patel N,[1] Kishnani P,[2] Sathe S,[1] Dietze D,[3] Jain V,[1] Viereck C,[2] Barth JA,[1] Sitaraman S[1]

[1]Amicus Therapeutics, Inc., Cranbury, NJ, USA; [2]Duke University Medical Center, Durham, NC, USA ; [3]Metrics for Learning, Queen Creek, AZ, USA

INTRODUCTION

OBJECTIVE

METHODS

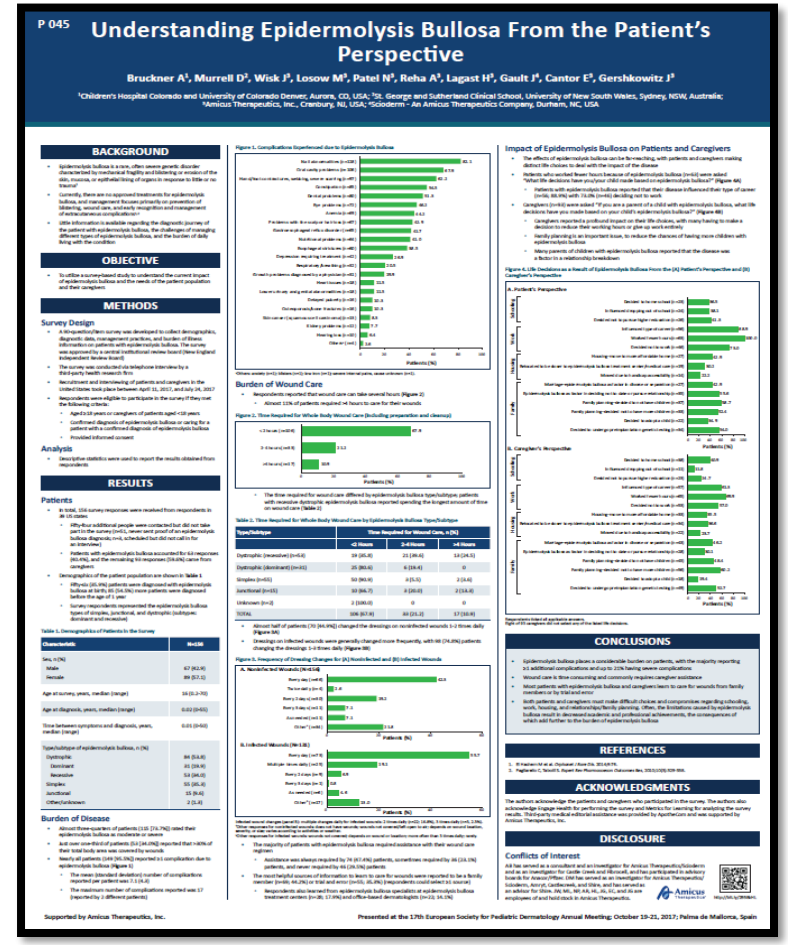
RESULTS

CONCLUSIONS

REFERENCES

ACKNOWLEDGMENTS

DISCLOSURES



P 045

Understanding Epidermolysis Bullosa From the Patient's Perspective

Bruckner A[1], Murrell D[2], Wisk J[3], Losow M[4], Patel N[5], Reha A[3], Lagast H[3], Gault J[4], Cantor E[5], Gershkowitz J[3]

[1]Children's Hospital Colorado and University of Colorado Denver, Aurora, CO, USA; [2]St. George and Sutherland Clinical School, University of New South Wales, Sydney, NSW, Australia; [3]Amicus Therapeutics, Inc., Cranbury, NJ, USA; [4]Scioderm - An Amicus Therapeutics Company, Durham, NC, USA

BACKGROUND

OBJECTIVE

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RESULTS

CONCLUSIONS

REFERENCES

ACKNOWLEDGMENTS

DISCLOSURE

Community Resources – Our Good Stuff Kit

One moment of appreciation each day is all it takes to develop a habit of positivity.

GoodStuff

—OUR—
GOOD
STUFF™

Being persistently positive in the face of rare disease™

MEET THE CARTERS

Tucked away on the southern coast of England is the city of Portsmouth, where Margot Carter and her family live. Margot has a husband, 2 sons, and a daughter; and they have all been influenced by her optimistic outlook on life.

The Carters have more challenges than the average family: Margot lives with epilepsy, and 16-year-old Naomi lives with Fabry disease. Recognizing the impact that chronic and rare disease can have, Margot looked for—and found—an opportunity to help herself and her family stay positive.

A SHIFT IN PERSPECTIVE

It began when Margot's oldest son was very young, and Margot wanted to show him that there was "good stuff" in his life to be grateful for. Every night before he went to sleep, she would help him reflect on at least 10 positive things that happened to him that day. Through this nightly practice, Margot witnessed the growing optimism in her son.

After Naomi was diagnosed with Fabry disease, Margot decided to expand the nightly practice with her son into a more active, "visible" experience that could be shared with her other children. This was the start of the "good stuff" jar.

Whenever something positive happens—big or small—the Carter family is encouraged to write notes about their achievements, thoughts, and activities to collect in a jar.

Initially, the Carters read the positive notes frequently, so that the family could see that even challenging days had good in them. And over time, reading aloud the "good stuff" became a less regular but still motivating event. Now they let the notes pile up throughout the whole year until the jar nearly overflows, and on every New Year's Eve, the family gathers to read through each note. The occasion has become a special tradition for the Carters, helping them reflect and celebrate all the good in the year gone by.

"Naomi had to physically see something good happening."
– Margot Carter

Amicus Therapeutics

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Amicus Therapeutics

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Amicus Therapeutics

Thank you

Q & A

Global Genes®

Global Genes Resources and Events

RARE TOOLKITS

RARE PATIENT ADVOCACY SUMMIT

San Diego, California
September 20 – 22, 2019

RARE WEBINARS

RARE DRUG DEVELOPMENT SYMPOSIUM

A partnership of Penn Medicine Orphan Disease Center and Global Genes

Philadelphia
June 7, 2019

RARE on the ROAD
Rare Disease Leadership Tour

Boston: March 30, 2019
Birmingham: May 4, 2019
Denver: May 18, 2019
Sioux Falls: July 13, 2019

RareUniversity

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Thank You

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