amda
Acid Maltase Deficiency Association

IPA
International Pompe Association

2024 AMDA/IPA International Pompe Patient & Scientific Conference

San Antonio, Texas
May 3 - 5th, 2024

Holiday Inn - Riverwalk
217 North St Mary's St
San Antonio, TX 78205-2303

CONTENTS

HELPFUL TIPS AND INFORMATION

All Conference Sessions and Workshops Will Be Held on the 7th Floor of the Holiday Inn Riverwalk.

Conference Rooms:

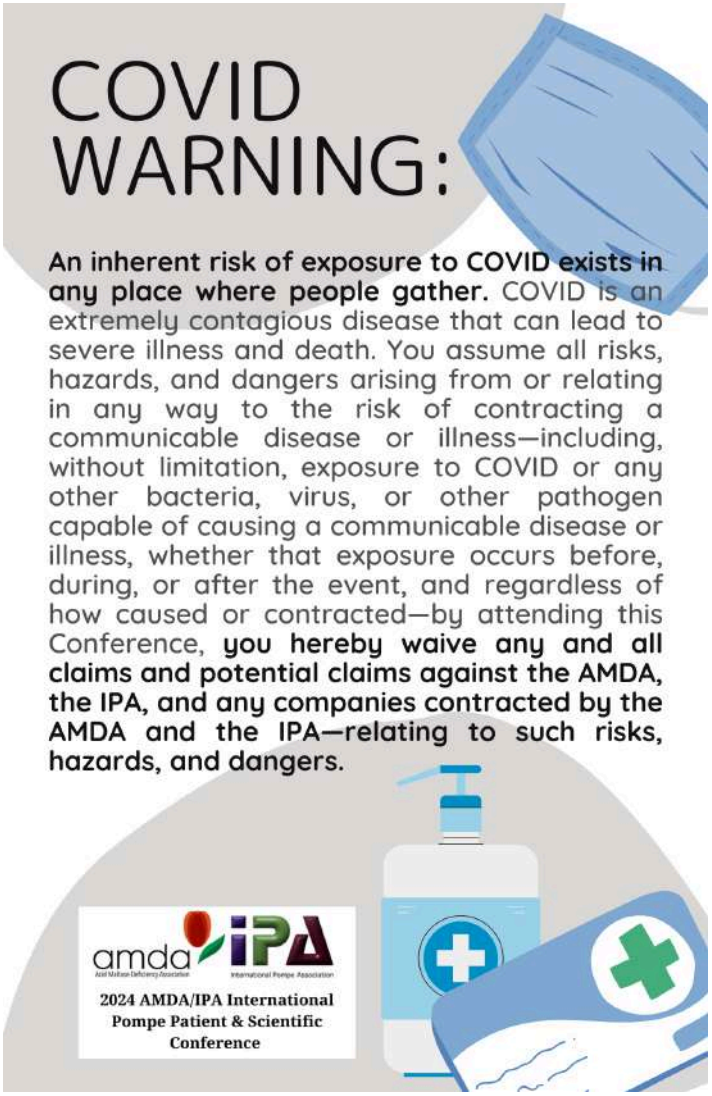
Exhibit Room - Rumba
Interview Room - Bolero 1
Family Room - Bolero 2
Main Sessions - Tango Ballroom

There will be a **"Family Room"** located in **Bolero 2 room**. No babysitting will be provided, but there will be someone available to help with crafts, and other activities for children to do.

If you are attending the Exercise Recommendations LOPD Workshop on May 3rd/Friday afternoon, it is recommended to bring/wear fitness/workout attire.

Ground Rules:

- Please turn your cell phones OFF during the Sessions.
- Please use a microphone when asking questions
- Be concise in questions and discussions to allow for contributions from as many people as possible.
- Please help us stay on time and stick to the schedule.



Holiday Inn WiFi

Username (UN): **GREAT MEETINGS**
Password (PW): **HISATRW2024**

Friday Night Dinner

The **Friday Night Welcome Dinner** will be held at a special offsite location with activities, photo ops, and entertainment:

- Transportation to and from the event will be provided
- **Everyone will meet in the lobby no later than 5:30 PM!**
- The buses will leave the event to return to the hotel at 9pm.
- ***Casual Western wear is recommended***

Saturday Night Reception

The Saturday Night Reception will be held from 6:30pm-9pm in the **Atrium (7th Floor)**, where the conference participants can network with industry and get to know each other better.

We will provide:

- Heavy hors d'oeuvres
- Cash bar

Welcome to the Conference!

2024 AMDA/IPA International Pompe Patient & Scientific Conference

On behalf of the Acid Maltase Deficiency Association (AMDA), the International Pompe Association (IPA), and the city of San Antonio, I would like to welcome you all to the 2024 AMDA/IPA Pompe Patient and Scientific Conference!

I am very excited to announce that we are expecting over 225 Conference participants in-person from over 12 countries at the Conference this year! And, for the first time, we are also offering a hybrid option for those who are not able to attend in person. As the saying goes, everything is bigger and better in Texas—and between the virtual and in-person attendees, this will be the biggest (and hopefully best) AMDA/IPA Pompe Patient and Scientific Conference in history!

In addition to now offering a virtual option for attendees, we have also expanded our Conference Program to start on Friday afternoon with a series of workshops for patients and their families on topics such as “Mental Health and Pompe” and “Exercise for Pompe.” By taking these important topics and devoting a full hour to them, instead of a shorter presentation during the meeting, it is allowing us to cover even more topics over the course of the main Conference.

So . . . hold onto your (cowboy) hats! It’s going to be a busy weekend!

Tiffany House

AMDA President
IPA Chair

AGENDA - FRIDAY: MAY 3, 2024

WORKSHOPS 1:00 - 4:30 PM

First Session 1:00 - 2:00 PM

- Mental Health
  - Caregivers Breakout Room — Room: Tango 1
    Group Leader: Julie Wells (United States)
  - Patients Breakout Room — Room: Tango 2
    Group Leader: Dr. Hannerieke van den Hout (the Netherlands)
  - Parents Breakout Room — Room: Tango 3
    Group Leader: Julienne Williams (United States)

Break **2:00 - 2:15 PM**

Second Session 2:15 - 3:15 PM

- How to Monitor LOPD Patients Diagnosed Through NBS — Room: Tango 1
  Dr. Benjamin Cocanougher (United States, **Amanda Joost (United States)**, and **Erin Huggins (United States)**
- Transitioning from Pediatric Care to Adult Care — Room: Tango 2
  Dr. Hannerieke van den Hout and **Zach DuMond (United States)**

Break **3:15 - 3:30 PM**

Third Session 3:30 - 4:30 PM

- Exercise Recommendations for IOPD — Room: Tango 1
  Dr. Laura Case (United States)
- Exercise Recommendations for LOPD — Room: Skyline Atrium
  Dr. Hannerieke van den Hout and **Keyuna (Coach K) Milam (United States)**

END OF WORKSHOPS

*Welcome Dinner** **5:30 - 9:00 PM**

* meet in the Lobby of the Holiday Inn for departure

Breakfast **7:00 - 8:00 AM**

Welcome Address 8:00 - 8:10 AM

Pompe Disease: Into the Future 8:10 - 8:40 AM
Dr. Arnold Reuser (the Netherlands)

NATURAL HISTORY OF POMPE VS. NEW HISTORY WITH ERT 8:40 - 10:05 AM

Chair **Dr. Priya Kishnani (United States)** 8:40 - 8:50 AM

Charting the Evolution: From Natural History to New Frontiers in Classic Infantile Pompe Disease 8:50 - 9:10 AM
Dr. Hannerieke van den Hout (the Netherlands)

Enzyme Replacement Therapies: Changing the Natural History of LOPD 9:10 - 9:30 AM
Dr. Mark Roberts (United Kingdom)

The Impact of Newborn Screening on Altering the Natural Course of Infantile and Late-Onset Pompe Disease 9:30 - 9:50 AM
Dr. Yin-Hsiu (Nancy) Chien (Taiwan)

Question and Answer 9:50 - 10:05 AM

Break **10:05 - 10:25 AM**

THE WHOLE PATIENT - MONITORING OF PATIENTS 10:25 - 12:00 PM

Chair **Dr. Benedikt Schoser (Germany)** 10:25 - 10:30 AM

Integrative Care of Pompe Patients 10:30 - 11:00 AM
Dr. Andreas Hahn (Germany)

Monitoring of Patients: Biomarkers 11:00 - 11:15 AM
Dr. Giancarlo Parenti (Italy)

Monitoring of Patients: Muscle MRI 11:15 - 11:30 AM
Dr. Jordi Díaz-Manera (United Kingdom)

Monitoring of Patients: Muscle Ultrasound 11:30 - 11:45 AM
Dr. Neha Regmi (United States)

Question and Answer 11:45 - 12:00 PM

Lunch - in the Atrium **12:00 - 1:00 PM**

MANAGEMENT AND CARE OF POMPE PATIENTS 1:00 - 2:50 PM

Chair **Dr. Ans van der Ploeg (the Netherlands)** 1:00 - 1:05 PM

Respiratory management of late-onset Pompe disease (LOPD) 1:05 - 1:20 PM
Dr. Grazia Crescimanno (Italy)

Respiratory Muscle Training Project 1:20 - 1:35 PM
Elena Compalati (Italy) and **Rosario Di Marco (Italy)**

Utilizing Nutritional Ketosis to Improve the Infantile Onset Pompe Disease Phenotype in C57/BL6 NJ Mice 1:35 - 1:50 PM
Dr. Dominic D'Agostino (United States)

Diet and Exercise Interactions for the Treatment of Pompe Disease 1:50 - 2:05 PM
Dr. Mark Tarnopolsky (Canada)

AGENDA - SATURDAY; MAY 4, 2024

MANAGEMENT AND CARE OF POMPE PATIENTS CONT. **1:00 - 2:50 PM**

Current Understanding of Speech Impairments in Pompe Disease 2:05 - 2:20 PM
Dr. Harrison Jones (United States)

Pain Management for Pompe 2:20 - 2:35 PM
Dr. Heidi Peters (Australia)

Question and Answer 2:35 - 2:50 PM

Break **2:50 - 3:10 PM**

EXPERT ROUNDTABLE: 25 YEARS OF TREATMENT AND CARE OF POMPE PATIENTS **3:10 - 4:15 PM**

Chair - Tiffany House (United States) 3:10 - 4:15 PM

Panel: Open Discussion with Audience
Dr. Priya Kishnani (United States), Dr. Mark Roberts (United Kingdom),
Dr. Benedikt Schoser (Germany) and Dr. Ans van der Ploeg (the Netherlands)

CHALLENGES OF MANAGING POMPE - THE PATIENT PERSPECTIVE ROUNDTABLE **4:15 - 5:15 PM**

Chair - Ria Broekgaarden (the Netherlands)

Panel: Open Discussion with Audience
Fabio Di Pietro (Italy), Wilma Treur (the Netherlands), Coburn Burroughs (United States),
Krystal and **Haley Hayes (United States)**

END OF DAY 1

SATURDAY NIGHT RECEPTION **6:30 - 9:00 PM**

(In the Atrium)

Breakfast	**7:00 - 8:00 AM**
Next Generation Therapies: Presentations from Industry	**8:00 - 9:35 AM**
Chairs - Dr. Federico Mingozzi (United States) and **Dr. Nina Raben (United States)**	8:00 - 8:10 AM
Amicus **Brian Fox (United States)**	8:10 - 8:20 AM
M6P Therapeutics: Co-Expressing GAA with S1S3 PTase Generates a rhGAA (M021) with a Unique Glycosylation Profile **Russell Gotschall (United States)**	8:20 - 8:30 AM
What's Next for Pompe from Sanofi **Dr. Nadia Daba (United States)**	8:30 - 8:40 AM
Introduction to Gene Therapy	8:40 - 8:50 AM
Astellas **Shannon K. Barrett (United States)**	8:50 - 9:00 AM
LentiCure B.V.: Development of lentiviral gene therapy for Pompe disease for affordable and transparent pricing **Dr. Pim Pijnappel (the Netherlands)**	9:00 - 9:10 AM
Regeneron **Katherine Cygnar (United States)**	9:10 - 9:20 AM
Question and Answer	9:20 - 9:35 AM
Break	**9:35 - 9:55 AM**
IPA/Erasmus Survey and Pompe Registries	**9:55 - 11:00 AM**
Chair - Brad Crittenden (Canada)	9:55 - 10:00 AM
Report on IPA/Erasmus Pompe Survey/Mutation Database **Dr. Nadine van der Beek(the Netherlands)**	10:00 - 10:15 AM
Report from Genzyme's Pompe Registry **Dr. Tiziana Mongini (Italy)**	10:15 - 10:25 AM
Report from French Registry **Dr. Pascal Laforêt (France)**	10:25 - 10:35 AM
Where Do We Go From Here and Why Is It Important? **Dr. Benedikt Schoser (Germany)**	10:35 - 10:45 AM
Question and Answer	10:45 - 11:00 AM
Break	**11:00 - 11:20 AM**

AGENDA - SUNDAY; MAY 5, 2024

FUTURE RESEARCH	11:20 - 1:00 PM
Chair - Dr. Ans van der Ploeg (the Netherlands)	11:20 - 11:30 AM
How to Fast Track Preclinical Testing New Treatments for Pompe Disease **Dr. Nina Raben (United States)**	11:30 - 11:50 AM
Substrate Inhibition with GYS1 Antisense Oligonucleotides for Pompe disease **Dr. Virginia Kimonis (United States)**	11:50 - 12:10 PM
PS Gene-editing for Pompe Disease **Dr. Chester Whitely (United States)**	12:10 - 12:30 PM
Muscle on a Chip: Creating Patient-derived Mini Muscles for the Development and Testing of Therapies **Dr. Pim Pijnappel (the Netherlands)**	12:30 - 12:50 PM
Question and Answer	12:50 - 1:00 PM

CONFERENCE CLOSE **1:00 - 1:30 PM**

*Boxed lunches available in the Skyline Atrium - Enjoy & safe travels!

That's All Folks!

Thank You from the AMDA and the IPA

Please email questions or feedback to:
info@amda-pompe.org

Shannon K. Barrett, MS, CGC

Astellas

Shannon completed her undergraduate work at University of Iowa and earned her Master's in Human Genetics/Genetic Counseling at Sarah Lawrence College in Bronxville, NY. After graduation, she spent a decade as the Senior Genetic Counselor/Division Manager in Pediatric Genetics at Maimonides Medical Center in Brooklyn, NY, before moving to industry.

Shannon has extensive experience in the treatment of rare diseases including: enzyme replacement for lysosomal storage disorders (LSDs) at Genzyme (now Sanofi), gene therapy for spinal muscular atrophy at AveXis (now Novartis Gene Therapies) and gene therapy for LSDs at AVROBIO. She joined Astellas in September 2021 as a US Regional Medical Director focused on the development of gene therapies for XLMTM and Pompe disease.

Ria Broekgaarden

Vereniging Spierziekten Nederland (VSN), International Pompe Association

Ria started her journey with Pompe as a project leader for Spinal Muscular Atrophy (SMA) and Pompe Disease at Vereniging Spierziekten Nederland (VSN), a Dutch Neuro Muscular Disease Patient organization. She was also involved with Facioscapulohumeral muscular dystrophy (FSHD) and Muscular Dystrophy (MD) at the VSN. In addition, Ria is a founder of the International Pompe Association (IPA) and continues to serve as an adviser to the IPA. Ria is also a former FSHD board member and a Founder of FSHD Europe. She has experience in drug development from the first development to availability (Pompe/SMA). She went through all stages and had to deal with supply and reimbursement issues, negative press, small/broad label, start stop criteria etc in Pompe Disease. Since her retirement from the VSN, Ria has remained very active in the Pompe Community and continues to serve as an Advisor the the IPA Board..

Coburn Burroughs, J.D.

United States

Coburn Burroughs is a native of South Louisiana. Following the aftermath of Hurricane Katrina, he and his family relocated to the mountains of Asheville, North Carolina.

Coburn is the older brother of Morgan Burroughs (28, Asheville, NC) who was diagnosed in 1998 with late-onset Pompe. She began enzyme replacement therapy in 2003 at the age of 7 years old, during a time when enzyme replacement treatment for Pompe was still in its infancy. Morgan holds a Bachelors Degree in Political Science and also holds a degree in Paralegal studies. Coburn is privileged to be included to advocate on behalf of his sister and all individuals who live with Pompe. Coburn is a practicing attorney licensed in the states of Louisiana, Texas and North Carolina.

Laura Case, PT, DPT, MS, PhD, PCS, C/NDT

Duke University Medical Center

Dr. Case has been a physical therapist for over 40 years, working with children and adults with childhood onset diagnoses. Board Certified in Pediatric Physical Therapy since 1993, she has a BS in PT from Ithaca College; MS in Pediatric PT from UNC-Chapel Hill, DPT from MGH; and PhD in Pediatric Science from RMUoHP. Associate Professor in the Duke DPT Division in the Department of Orthopedics, with a secondary appointment in the Pediatrics Department at Duke, she teaches pediatric content in the Duke DPT program, works clinically at Duke Children's Hospital, is active in research in neurological and neuromuscular disorders with their onset in childhood, and teaches nationally and internationally on topics in Pediatric PT. She joined the Pompe team at Duke in 1999 and has been the lead PT on the Duke team, participating in studies that led to the approval of ERT for Pompe disease, and studying emerging phenotypes of Pompe disease with ERT, early phenotypes in LOPD allowed by newborn screening, and long-term complications and management of Pompe. She's also active in clinical care, research, and teaching in Duchenne muscular dystrophy (DMD), spinal muscular atrophy, cerebral palsy, and other disorders, has participated in guideline development for management of DMD, Pompe disease, GSDIII, GSDIV, and hypophosphatasia, has published 66 peer reviewed articles and a book chapter, and received the Duke Presidential Award for Meritorious Service in 2002.

Professor Yin-Hsiu (Nancy) Chien, MD, PhD

National Taiwan University Hospital, Taiwan

Dr. Yin-Hsiu Chien is Clinical Professor at the Department of Pediatrics at the National Taiwan University, Taiwan, and Attending Physician of the Department of Medical Genetics and Pediatrics at the National Taiwan University Hospital. She undertook pediatric residency training, and completed her fellowship in Pediatric Allergy, Immunology & Rheumatology before then completing her fellowship in Medical Genetics and Metabolism, all at National Taiwan University Hospital. She participates in research on Pompe disease, focusing especially on the early diagnosis and the improvement in the treatment. She is the director of the newborn screening center at National Taiwan University Hospital, which routinely screens around one third of newborn infants in Taiwan.

Benjamin Cocanougher, PhD

Duke University Medical Center

Dr. Benjamin Cocanougher is a Physician-Scientist at Duke University. He is deeply committed to advancing the understanding and treatment of rare genetic disorders, particularly Pompe Disease. He is currently in his last year of clinical training at Duke in Medical Genetics and Genomics, where he is also completing postdoctoral training in biochemistry with Nobel Laureate Robert Lefkowitz. Prior to training at Duke, he completed his MD with distinction in research at the University of Rochester. Dr. Cocanougher was a Gates Cambridge Scholar at the University of Cambridge, where he completed his PhD in neuroscience. During his current clinical training at Duke, he is being mentored by Priya Kishnani for clinical and research related to rare glycogen storage disorders. Driven by a desire to make a meaningful impact in the lives of patients and their families, he continues to push the boundaries of medical science, offering hope and support to patients and families affected by Pompe Disease.

PRESENTER BIOGRAPHIES

Elena Compalati, Respiratory Physiotherapist

IRCCS Fondazione Don Gnocchi, Italy

Ms. Compalati is a 25 years-old Italian Cardio-Respiratory Physiotherapist. She graduated in 2021 as a Physiotherapist (Insubria University, Varese, Italy) and in 2022 started working at a Cardio-Respiratory Rehabilitation center in Milan (IRCCS Fondazione Don Gnocchi – ONLUS). Soon after she got accepted to a postgraduate master for Cardio-Pulmonary disease Rehabilitation in Milan (Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico), which ended in May 2023. She is now attending an advanced course in statistics applied to clinical questions.

To date, Ms. Compalati is still working at the IRCCS Fondazione Don Gnocchi – ONLUS in Milan, and is also participating in various courses and congresses as a learner and speaker. Her main goal is to aim for continued professional and personal growth.

Grazia Crescimanno, MD

Palmero's National Research Council Institute for Biomedical Research and Innovation, Italy

Grazia Crescimanno, MD, works as a researcher at Palermo's National Research Council Institute for Biomedical Research and Innovation (IRIB-CNR). From 2013 to 2022, she worked as the coordinator and scientific director of Villa Sofia-Cervello Hospital's regional center for the prevention and treatment of respiratory complications associated with neuromuscular genetic rare illnesses, Department of Pneumology. Now, she collaborates with the University of Palermo at the center for diagnosis and management of neuromuscular diseases (NMD).

Her principal research interests are the therapy of cardio-respiratory complications associated with NMD, non-invasive ventilation, polysomnography, and capnographic monitoring of sleep-related respiratory abnormalities.

Katherine Cygnar

Regeneron Pharmaceuticals, Inc.

Katherine Cygnar is currently Senior Director in Regeneron Genetic Medicines and head of the Enzyme Replacement Therapies and Non-viral Delivery Technologies teams at Regeneron. She earned her BS from the University of Minnesota studying developmental biology and genetics, and her PhD from The Johns Hopkins University studying sensory neurobiology. She completed additional postdoctoral studies at The Johns Hopkins University before joining Regeneron in 2011. At Regeneron, her work has focused on applications of bispecific antibodies, therapies for rare diseases, and immunomodulation strategies for enzyme replacement and genetic medicines. In 2022, concurrent with the establishment of the Regeneron Genetic Medicines division, she established the first Therapeutic Focus Area at Regeneron focused on lysosomal diseases.

Dominic D'Agostino, PhD

University of Southern Florida

Dr. D'Agostino is a tenured Associate Professor at the University of South Florida (USF) Morsani College of Medicine in the Department of Molecular Pharmacology and Physiology. He teaches medical neuroscience, medical physiology, nutrition, and neuropharmacology. He is also a Senior Visiting Research Scientist at the Institute for Human and Machine Cognition (IHMC) to assist with their efforts towards optimizing the safety, health and resilience of the warfighter and astronaut. His primary research focuses on developing and testing nutritional and metabolic-based therapies for a variety of disease states and advancing the use of metabolic-based therapies from basic science research into human clinical applications.

Nadia Daba, MD, MBA

Sanofi

Accomplished MD and MBA professional with over 26 years of diverse experience in pharmaceutical management and consultancy roles, Dr. Daba's career journey has been marked by a dedicated focus on spearheading medical affairs initiatives for rare diseases. Beginning with smaller regions like the Maghreb countries, she expanded her scope to encompass the Middle East and North Africa countries. Subsequently, she took on the challenge of overseeing international projects, with a specific emphasis on Pompe disease and diagnostic endeavors for rare diseases within this region.

Her expertise spans across medical affairs, clinical development, and Real-World Evidence (RWE), with a specialized knowledge in metabolic and rare diseases. In 2020, she joined the esteemed global Pompe medical affairs team, and in August 2023, she transitioned to a pivotal role within the rare diseases early pipeline team. Here, Dr. Daba is at the forefront of leading groundbreaking medical projects focused on LSDs, with a particular focus on Pompe disease.

Rosario Di Marco, Respiratory Physiotherapist

Freelance Respiratory Physiotherapist, Italy

Mr. Di Marco is a Physiotherapist from Palermo, Italy. He earned a Bachelor degree in Physiotherapy in 2019, and worked in Respiratory ICU during the pandemic (2020-2022). Mr. Di Marco is currently working in home-based settings with neuromuscular patients and he is currently studying cardiorespiratory rehabilitation at the University of Milan.

Fabio Di Pietro

AIG-IPA Board, Italy

Mr. Di Pietro is a 45 year old Late-Onset patient from Sicily, Italy. He serves as the Secretary of the International Pompe Association, and is also responsible for leading its Community Advisory Board Program. Mr. Di Pietro is also a Board Member of Associazione Italiana Glicogenosi.

Professor Jordi Díaz-Manera, MD, PhD

Newcastle University, United Kingdom

Professor Díaz-Manera is a Professor of Neuromuscular Diseases at the John Walton Muscular Dystrophy Research Center in Newcastle University in the UK. He is also an adult neurologist by training, with a keen interest in clinical and basic research. Pompe is one disease close to his heart as he has been involved in the diagnosis and management of patients for many years. Professor Díaz-Manera is especially interested in muscle MRI, and he has used this technology to diagnose and monitor patients with Pompe disease.

Zack DuMond

United States

Zack DuMond was diagnosed with Pompe's Disease in 2007 at the age of 12. His personal hobbies include Video Games, Photography, and Cooking. After 20 years of living through the struggles and hardships of Pompe disease, he's decided to give voice to his journey in hopes of making others' path an easier road to travel. He graduated from California State University, Fullerton in 2019 with a degree in Health Sciences. He currently works at a leading Biotech company specializing in gene sequencing instruments. His personal journey and individual experiences uniquely equip him to better understand the gap between patient experience and biomedical research. He hopes to have meaningful discussions regarding muscular dystrophy and he looks forward to meeting you.

Brian Fox

Amicus Therapeutics

Brian Fox is a part of the Global Medical Affairs team at Amicus Therapeutics where he has worked since 2018. In his time at Amicus, Brian has been focused entirely on the Pompe franchise and helps lead the development of publications and congress presentations, internal trainings, and other cross-functional and cross-geography activities. Brian has a PhD in Cell and Molecular Biology from Fordham University in New York City and currently resides in Brooklyn, NY with his partner, Alba and their two rescue dogs, Teddy and Dora.

When not at work, Brian enjoys spending as much time outdoors as possible which means he can often be found taking long hikes, exploring caves or simply doing yard work.

Russell Gotschall

M6P Therapeutics

Russell Gotschall, Vice President of Research and Development, brings over 25 years of drug discovery and development to M6P Therapeutics. Prior to joining M6PT, Russell was VP of R&D at Amicus Therapeutics, where he managed pre-clinical R&D and helped build a discovery and research organization that maximizing protein engineering and analytics capabilities in the developing of a robust pipeline of novel enzyme replacement therapies and gene therapy programs. Russell is also a member of Fore Batten Foundation's Scientific Advisory Board. Russell has had an extensive career in the clinical and biopharmaceutical industry utilizing his glycobiology expertise to support the development of analytical assays to understand pediatric pharmacology and to support drug development of advanced therapeutics for rare Diseases.

His experience spans multiple indications including lysosomal storage diseases, cardiovascular, mineral metabolism disorders, and chronic kidney disease. Russell is a graduate of Wichita State University with a Master's Degree in Biology with an emphasis in glycobiology.

Professor Andreas Hahn, MD

Justus-Liebig-University, Giessen, Germany

Professor Andreas Hahn is Professor of Pediatrics at the Justus-Liebig-University in Giessen, Germany, and chief senior physician of the Department of Child Neurology since 2002. He is also the leading physician of the Center for Rare Diseases in Giessen and the deputy head of the Hessian Neuromuscular Center. Professor Hahn started his training as child neurologist in 1991 in Göttingen, spent one year as research fellow in the Department of Rehabilitation at Poitiers, France, and worked from 1993-2001 in the Department of Neuropediatrics in Kiel, and in the North-German Epilepsy Centre in Raisdorf, Germany. He is a member of the German Neurophysiological Society and has completed special training programs in epileptology and neurophysiology. His special fields of interest are paediatric epilepsies, neuromuscular disorders, and neurometabolic diseases. Professor Hahn authored or co-authored more than 200 publications in peer-reviewed journals and book chapters.

Krystal and Hayley Hayes

United States

Krystal and Haley have been navigating through the rare disease space since 2006, when Haley was diagnosed with infantile onset Pompe Disease. Krystal is a Registered Nurse that has a passion for advocacy and newborn screening. Haley is a senior in high school and loves to attend concerts. Krystal and Hayley are also both members of the International Pompe Association's Community Advisory Board. Their family resides in Southern Virginia and loves to travel.

PRESENTER BIOGRAPHIES

Erin Huggins, MS, CGC

Duke University Medical Center

Erin Huggins is a board-certified genetic counselor at Duke University in the Division of Medical Genetics, Department of Pediatrics. She received her B.S. in Biology from Coastal Carolina University in 2016 and her M.S. in Genetic Counseling from the University of South Carolina in 2018. She provides clinical genetic counseling for patients across the lifespan with a variety of inherited diseases including glycogen storage diseases, lysosomal diseases, and other inborn errors of metabolism. In addition to her clinical role, Erin is a member of Dr. Priya Kishnani's research team and is involved in a number of research activities related to metabolic disease. Her primary areas of interest are newborn screening for Pompe disease and clinical variant interpretation in rare diseases.

Harrison Jones, PhD

Duke Univeristy Medical Center

Harrison N. Jones, PhD, is Associate Professor in the Department of Head and Neck Surgery & Communication Sciences (HNSCS) at the Duke University School of Medicine and a Clinical Speech Pathologist at Duke University Hospital. His clinical background is in speech pathology, and, in this role, he evaluates and treats communication and swallowing disorders in medically complex adults and children. His research interests include speech and swallowing disorders in patients across the lifespan. Much of this work has been conducted in Pompe disease including the first reports detailing speech and swallowing impairments in pediatric survivors of infantile-onset Pompe disease, the presence of tongue abnormalities and swallowing disorders in adults with late-onset Pompe disease, and the use of respiratory muscle training to treat respiratory muscle weakness in these populations. He currently serves as Director for the HNSCS Clinical Research Unit.

Amanda Joost, MLS

Marshall's Mountain

Amanda Joost is a parent and caregiver of a child with Pompe disease. Her youngest child was diagnosed with late-onset Pompe disease (LOPD) in December of 2019 as a result of his newborn screening panel in Ohio, United States. In 2020, Amanda and her husband started a non-profit organization, Marshall's Mountain. Through her work at Marshall's Mountain, she has given educational talks for students ranging from grade school to medical school. She has experience with rare disease legislative advocacy at both the state and federal levels. Amanda is also a member of the Community Advisory Board for the International Pompe Association.

Her professional background is as a medical laboratory scientist (MLS). She has worked in most areas of the clinical laboratory and currently holds a position in molecular microbiology. Additionally, Amanda is a full-time faculty member at Bowling Green State University in the Medical Laboratory Science program. As an Associate Clinical Professor, she teaches a wide range of courses in the MLS program as well as a transcultural health care course for applied health science majors and an introductory course for the public health program within the College of Health and Human Services. Along with her work as an MLS and professor, Amanda is also a doctoral candidate in the Health Education doctoral program at the University of Toledo. Currently, Amanda is working to develop three different research studies. Two with the aim of shortening the diagnostic odyssey for those with Pompe disease that were not diagnosed via newborn screening and the other explores the prognostic capacity of laboratory values in patients with late-onset Pompe disease.

Virginia Kimonis, MD

University of California - Irvine

Dr. Kimonis is currently a Clinician Scientist and tenured professor in the Division of Genetics and Genomic Medicine, Department of Pediatrics, UC Irvine, and Children's Hospital, Orange County. Dr. Kimonis received her medical degree from Southampton Medical School, United Kingdom and trained in general practice and pediatrics in the UK before moving to the US. She completed a residency in pediatrics at Massachusetts General Hospital, Boston, and fellowship training in Clinical and Biochemical Genetics at the National Institutes of Health, Johns Hopkins and Washington D.C. National Children's Hospital. She is board certified in Pediatrics, Clinical and Biochemical Genetics. She previously served as the Chief of Genetics at Southern Illinois University School of Medicine. She worked at Boston Children's Hospital/Harvard Medical School before joining UC Irvine in 2006 as the Chief of the Division of Genetic Medicine and Genomic Medicine until 2012.

Dr. Kimonis' clinical interests are varied. She participates in comprehensive service in Clinical and Biochemical Genetics. She specializes in the diagnosis and management of children and adults with neuromuscular, neurodegenerative, dysmorphic features, and other complex disorders. She is the principal investigator of the UC Irvine Lysosomal Disease Program registry study in a large cohort of patients with Pompe disease. Dr Kimonis is an active tutor and lecturer and teaches genetics fellows, residents, and medical students, genetic counseling graduate and undergraduate students. Additionally, she mentors postdocs and other trainees in their laboratory projects.

She has an active clinical research and laboratory program that primarily focuses on novel therapies for inherited muscle disorders including VCP and HSP vacuolar myopathy, and Pompe disease. She has received funding from the NIH, MDA, AMDA, Paget Foundation, hIBM and other foundations for her research. Dr. Kimonis' goal is to advance clinical and laboratory translational research, to find treatments for Rare Genetic Diseases.

Priya Kishnani, MD

Duke University Medical Center

Dr. Priya Kishnani, MD, is Chief of the Division of Medical Genetics in the Department of Pediatrics, and Professor of Molecular Genetics and Microbiology at Duke University Medical Center. She holds American Board of Medical Genetics and American Board of Biochemical Genetics certifications. At Duke University Medical Center, she is Director of the Glycogen Storage Disease Clinical and Research Program, Director of Clinical Trials, and Director of the YT and Alice Chen Center for Genomic Research and the Metabolic Clinic.

Her passion is to establish highest-quality care and treatment by understanding the emerging natural history of individuals with glycogen and lysosomal storage disorders through investigator-initiated studies and clinical trials. She has published numerous articles, reviews, and textbook contributions on these conditions.

Dr. Kishnani participated in the clinical development of alglucosidase alfa to treat Pompe disease (PD), which attained US Food and Drug Administration (FDA) approval in 2006, in the development of avalglucosidase alfa-ngpt, approved by the FDA in 2021 and also Pombiliti and Opfolda in 2023. She also focuses on other next-generation therapies, including gene therapy.

Dr. Kishnani and her team were integral to the nomination and approval for the addition of PD to the United States Recommended Uniform Screening Panel for newborn screening in 2015.

Professor Pascal Laforêt, MD, PhD

Raymond-Poincaré Hospital, France

Professor Pascal Laforêt, MD, PhD, is a professor of Neurology at the Versailles-Saint Quentin University, consultant specialized in neuromuscular disorders (myasthenia gravis, muscular dystrophies, and metabolic myopathies) in the Neurology department of Raymond-Poincaré hospital, and coordinator of North/East/Ile de France neuromuscular center and FHU Phenix dedicated to translational research in neuromuscular disorders. He is affiliated to U1179 INSERM-UVSQ laboratory, dedicated to biotherapies of neuromuscular system diseases. Major focus of his research activities are metabolic myopathies (pathophysiology and clinical trials), and he coordinates the French registries for sarcoglycanopathies, adult mitochondrial disorders, glycogenosis type III, and Pompe disease. He is a member of the French Myology Society (SFM), French Society of Inherited Metabolic Disorders (SFEIM), and boards of the French Glycogenosis Association (AFG) and Garches Fundation.

Federico Mingozzi, PhD

United States

Federico Mingozzi is the Chief Executive Officer of a startup biotechnology company developing genome medicines. His career journey in gene therapy and immunology began in 2000 as a scientist in Philadelphia, working at the Children's Hospital of Philadelphia and the University of Pennsylvania. Following this, he moved to France to take on the role of an independent investigator at the French National Institute of Health and Medical Research (INSERM) and the R&D institute Genethon. In 2017, he returned to Philadelphia, joining Spark Therapeutics as the Chief Scientific Officer.

Federico serves as the treasurer and a board member of the American Society of Gene and Cell Therapy (ASGCT). He is also a member of scientific advisory boards for non-profit organizations and biotech companies. In the past, he was a faculty member at Pierre and Marie Curie University in Paris, France, and the Universitat Autonoma of Barcelona, Spain. His educational background includes a bachelor's degree in biology and a Ph.D. in biochemistry and molecular biology from the University of Ferrara in Italy. He also completed an M.B.A. at Drexel University.

Professor Tiziana Mongini, MD

University of Torino, Italy

Professor Tiziana Mongini received her MD degree with honors from the University of Torino, Italy in 1981 and completed her residency in Neurology at the same university in 1985.

She was appointed Research Fellow at the H. H. Merritt Clinical Research Center for Muscular Dystrophy in Columbia University, New York, under the supervision of prof Salvatore Di Mauro; then she returned to Torino, where she kept working on research and care organization for neuromuscular disorders. Her present position is Associated Professor in Neurology, Head of the Neuromuscular Unit, at the Department of Neurosciences at the University of Torino, providing routine diagnostic and clinical services as referring Center for the North-West Region of Italy. Since 2017, the Center is part of the European Network for Rare Diseases (EURO-NMD ERN).

Her main research focuses are muscular dystrophies and metabolic myopathies, particularly glycogenosis type II; since 2006 she is the co-coordinator of the Italian Study Group for Pompe Diseases in the Italian Myology Association. She actively collaborates with several patients Association in Italy (UILDM, AIGlico, Mitocon, Famiglie SMA, Parent Project)

She is author of over 200 publications on indexed journals and several chapters on neurology textbooks.

PRESENTER BIOGRAPHIES

Professor Giancarlo Parenti, MD

Federico II University, Naples

Giancarlo Parenti earned his medical degree in 1980 at the School of Medicine, Federico II University, Naples and completed his residency in Pediatrics in 1984 (Department of Pediatrics, Federico II University, Naples).

He trained as a researcher at the Department of Pediatrics, Federico II University, Naples, at the Department of Cell Biology and Genetics, Erasmus University, Rotterdam, the Netherlands, (1985-86), and at the Institute of Medical Genetics, Baylor College of Medicine, Houston, Texas, USA (1994).

He is currently Full Professor at the Department of Translational Medical Sciences, Federico II University, Naples, coordinator of a Metabolic Unit at Federico II Hospital, and Investigator TIGEM (Telethon Institute of Genetics and Medicine), Pozzuoli.

Giancarlo Parenti's research activity has been mainly focused on inborn errors of metabolism, including lysosomal storage diseases (Pompe disease, mucopolysaccharidoses, multiple sulfatase deficiency). He is currently working on the identification of biomarkers and on the development of novel therapeutic approaches for lysosomal storage diseases (pharmacological chaperone therapy, modulation of cellular pathways).

He is member of scientific societies and international networks, including SSIEM (Society for the Study of Inborn Errors of Metabolism); the European Study Group for Lysosomal Storage Diseases (ESGLSD); the European Consortium for Pompe Disease (EPoC); the European Reference Network for metabolic diseases (MetabERN); SIMMESN (Italian Society for the Study of Inherited Metabolic Diseases); the Italian Society of Pediatrics (SIP).

Heidi Peters, MBBS, FRACP, PhD

Royal Children's Hospital, Australia

Dr. Peters works as the Clinical Lead in the Department of Metabolic Medicine at the Royal Children's Hospital in Melbourne. She trained as a pediatric metabolic geneticist and undertook a PhD in the gene therapy laboratory at the MCRI. She currently cares for pediatric patients with inborn errors of metabolism including lysosomal disorders and Pompe disease. She has undertaken laboratory research investigating novel therapies for a number of metabolic conditions and has been the PI in a number of clinical trials including those for Pompe disease.

Professor Pim Pijnappel, PhD

Erasmus University Medical Center

Dr. W.W.M. Pim Pijnappel is a professor at the Erasmus MC and has a broad expertise ranging from basic to clinical science. He performed his PhD research at the Hubrecht Laboratory (Utrecht, the Netherlands), and post-doctoral research at the EMBL Heidelberg and TU Dresden (Germany). His research group at the Center for Lysosomal and Metabolic Diseases at Erasmus MC in Rotterdam, the Netherlands, focuses on basic, translational, and clinical aspects of lysosomal storage disorders including Pompe disease and Hunter syndrome. The aim of his research is to obtain a better understanding of disease mechanisms, to develop novel treatment options, and to understand genotype/phenotype relationships. He has published >80 peer reviewed scientific articles and holds 11 patents on therapies and biomedical technology.

Nina Raben, MD, PhD

M6P Therapeutics, Inc.

Nina Raben was born in Moscow, Russia (the former Soviet Union). She received her medical degree from the Moscow Medical Institute, and her Ph.D. degree in Biochemistry from the Academy of Medical Science, Moscow. She joined the National Institutes of Health in 1987, and since then has been working on inflammatory and metabolic myopathies. The major focus of her research is Pompe disease. The studies include development of several knockout and transgenic mouse models, investigation of the role of autophagy in the pathogenesis of muscle damage, and pre-clinical studies with recombinant human enzymes and gene therapy. After more than three decades at the NIH, she recently joined the company, M6P Therapeutics, to continue working on Pompe disease.

Neha Regmi, MBBS, MD

Duke University Medical Center

Neha Regmi is a Postdoctoral Associate at Duke University in the Division of Medical Genetics, Department of Pediatrics. She completed her Pediatrics Residency from PGIMER, India in 2023 and has been working on clinical research after graduation, aspiring to become a physician focused on academia and research.

She is interested in Pediatric Neurology with special interests in Neurogenetic and Neuromuscular disorders. She is a member of Dr. Priya Kishnani's research team, contributing to various research initiatives centered around neurological pathologies and neuromuscular aspects of Pompe disease.

Arnold Reuser, PhD

Erasmus University Medical Center - IPA

Dr. Arnold Reuser studied chemistry at the University of Amsterdam and graduated in biochemistry in 1973. He became Lecturer at the Medical Faculty of the University of Rotterdam, later called Erasmus MC University Medical Centre. There he obtained his PhD degree in 1977 with a thesis on the Clinical, Biochemical and Genetic Heterogeneity in Pompe disease and related lysosomal storage disorders. As young 'postdoc' -Research Associate at the Institute for Cancer Research, Fox Chase, Philadelphia, USA- he pioneered the development of mouse models for human genetic diseases in the laboratory of Dr. Beatrice Mintz. In 1980, he continued his career at Erasmus MC where he became head of the Lysosomal Study Group and professor in Cell Biology and Histology. His research interests remained focused on Pompe disease.

Research by the team members of the 'pompecenter' at Erasmus MC, Rotterdam, The Netherlands, has led to the cloning of the GAA gene, the making of the first mouse models of Pompe disease, the production of recombinant human GAA in CHO cells and milk of transgenic mice and rabbits, and ultimately to enzyme replacement therapy for Pompe disease.

Profs. Ans van der Ploeg and Pim Pijnappel are currently heading the 'pompecenter' at Erasmus MC-Sophia Children's Hospital and the Department of Clinical Genetics, Rotterdam, the Netherlands.

Professor Mark Roberts, MSc, MBChB, FRCP, MD

Salford Royal NHS Foundation Trust, United Kingdom

Professor Mark Roberts was appointed Consultant in Adult Neurology and Muscle Disease in 2000 in Manchester. He has developed MDT working across the North West of England including Joint Respiratory &Ventilation, Rheumo-myology, Metabolic Myopathy clinics. He has lectured and published widely on metabolic and Neurological disorders. He is considered a National expert in Metabolic Myopathies. He has seen over half of all adult patients with Pompe Disease in the UK.

Professor Benedikt Schoser, MD, PhD

Friedrick-Baur-Institute, Germany

Professor Dr Benedikt Schoser is a trained neurologist, neurophysiologist, neurointensivist, palliative medicine doctor, and muscle pathologist. He is a professor of Neurology, senior consultant neurologist, and co-chair of the Friedrich-Baur Institute, Dep. of Neurology, Ludwig-Maximilians-University Munich, Germany. He is executive section editor of the journal Neuromuscular Disorders and a member of the editorial board of Current Opinions in Neurology, Acta Myologica, and the European Journal of Neurology. He became a fellow of the EAN in 2017 and served as a board member of the educational panel, Rare Disease panel, and Scientific Muscle and Neuromuscular panel of the EAN. Professor Schoser was co-chair of the Joint Educational Board of the EAN/UEMS and organizer of the European Neurology board exam. He is a World Muscle Society executive board member and organizes the WMS teaching course. Since 2015, he has been chairing the European Pompe Consortium (EPOC). He authored more than 340 peer-reviewed publications (>70 in the field of myotonic dystrophies, >70 on glycogen storage diseases) in clinical and translational science. Professor Schoser's special interests are multisystemic neuromuscular disorders, translational research, and molecular therapy.

Mark Tarnopolsky, MD, PhD

McMaster Children's Hospital, Canada

Dr. Tarnopolsky is a neuromuscular and neurometabolic clinician-scientist who received an MD and PhD (Cell Biology and Metabolism) from McMaster University. He currently holds an endowed chair from McMaster Children's Hospital Foundation in the area of neuromuscular and neurometabolic genetic disorders and follows over 1500 patients with myopathies, mitochondrial disorders and other neurogenetic disorders. He has published over 500 peer reviewed papers and has an h-index of 142. His research focuses on pharmacological, nutraceutical and exercise therapies for neuromuscular and neurometabolic disorders, aging, obesity and other disorders that affect the mitochondria and muscle function. He is the founder, CEO and CSO of Exerkine Corporation which is a bio-technology/nutraceutical company developing therapies for aging, obesity, muscular dystrophy and mitochondrial disorders.

Wilma Treur

IPA Board, the Netherlands

Wilma Treur was diagnosed with Pompe in 2004. At that time she became a member of the Spierziekten Nederland (VSN), a Dutch neuromuscular organization. In 2005, as a Volunteer, Wilma began organizing the VSN's annual Pompe Day for patients and their families. She continued her advocacy work by joining the International Pompe Association (IPA) in 2009 and began to work for the VSN as well. Wilma currently serves as Treasurer of the IPA. She also works for a local municipal in the Netherlands were she helps people with mental and / or physical problems.

Linda van den Berg, MD

Erasmus University Medical Center

Linda van den Berg was born on May 9th, 1979 in Bergen op Zoom, the Netherlands. In 1997 she graduated from the Mollerlyceum (pre-university education) in Bergen op Zoom, and started studying Health Sciences at Maastricht University. After finishing her research project on exercise training in type II diabetes, she obtained her degree in Human Movement Sciences in 2002.

One year early, in 2001, she started her medical training at the Erasmus University Rotterdam (nowadays Erasmus MC University Medical Center). In August 2007 she obtained her medical degree and started as a PhD-student at the Center for Lysosomal and Metabolic Diseases at Erasmus MC University Medical Center under supervision of Prof. dr. A.T. van der Ploeg and dr. A.J.J. Reuser. During her PhD-training she worked as Movement Consultant and Club Doctor for the youth teams of the soccer club, Sparta Rotterdam.
Between January 2013 and December 2017 she did her trainingship in Sports Medicine in MC Haaglanden in Leidschendam under supervision of R.F. van Oosterom.

Since 2018 she works as a sports medicine physician in the Erasmus MC University Medical Center. Her research focusses on healthy physical activity and life style interventions for patients with chronic diseases.

Linda lives in Tholen with her husband Jules, daughter Juliette and son Olivier.

Hannerieke van den Hout, MD, PhD

Erasmus University Medical Center

Dr. Hannerieke van den Hout is an assistant professor and consulting child neurologist at the Center for Lysosomal and Metabolic Diseases of the Erasmus MC University medical Center in Rotterdam, The Netherlands. After her training in paediatrics and child neurology, she specialized in neurometabolic diseases, with a special focus on Pompe disease. Currently she serves as a Child Neurologist and Medical Coordinator at the Centre for Lysosomal and Metabolic Diseases, working under the leadership of Prof. A. van der Ploeg. In this collaborative centre, she collaborates with specialists across disciplines, including paediatrics, clinical genetics, neurology, internal medicine, pharmacy, and basic science, to advance treatment and care for Pompe disease patients.

Dr. van den Hout commenced her doctoral research in 1998, concentrating on pioneering treatment for classic infantile Pompe disease through the utilization of recombinant alpha-glucosidase sourced from rabbit milk. Her current research investigates the long-term effects of enzyme replacement therapy on children with Pompe disease, with a particular emphasis on classic infantile Pompe disease. In recent years, she has explored in depth the emerging phenotype and unmet medical needs in classic infantile Pompe disease, specifically exploring the long-term consequences for brain function and cognition.

Utilizing advanced imaging techniques such as standard MRI and DTI, along with biomarkers like neurofilament light, Dr. van den Hout has shed light on the long-term neurological implications of the disease. Her studies on long-term follow-up through cognitive tests have provided valuable insights into the impact of classic infantile Pompe disease on cognition. Additionally, Dr. van den Hout is involved in translational research into the development of antisense oligonucleotides (AON) and lentiviral gene therapy for Pompe disease. Her work significantly contributes to our understanding of the therapeutic effects and emerging phenotype in classic infantile Pompe disease, serving as a benchmark for future innovative treatments, including those targeting the brain.

Dr. van den Hout is a member of the European Pompe Consortium (EPOC) and has participated in scientific advisory boards for various industries and the European Medicines Agency.

Nadine van der Beek, MD

Erasmus University Medical Center

Dr. Nadine van der Beek is an assistant professor and consulting neurologist at the department of Neurology / Center for Lysosomal and Metabolic Diseases of the Erasmus MC University Medical Center in Rotterdam, the Netherlands. As a neurologist, she is involved mainly in the care for children and adults with neuromuscular diseases.

Her current scientific work focusses on the long-term effects of enzyme-replacement therapy in children and adults with Pompe disease, and the development and validation of new outcome measures. She is also involved in the translational research into the development of AON and lentiviral gene-therapy for Pompe disease. She has participated in multiple clinical trials in Pompe disease, and other neuromuscular diseases.

She is an active member of the European Pompe Consortium (EPOC), leading the work-package on patient-reported outcomes (PROs), and has participated in several industry advisory boards. Furthermore she is a board member of the Dutch Neuromuscular Center and a co-chair of the muscle working group of the European Reference Network for rare neuromuscular diseases (EURO-NMD).

Professor Ans van der Ploeg, MD, PhD

Erasmus University Medical Center

Ans van der Ploeg, Professor of Metabolic Diseases, is Chair of the Center for Lysosomal and Metabolic Diseases at the Erasmus MC University, Rotterdam, and Chair of the department for metabolic diseases of Leiden University Medical Center, the Netherlands. The Center for Lysosomal and Metabolic Diseases is a joined initiative of the departments of Pediatrics, (Child)Neurology, Internal Medicine, Clinical Genetics and Hospital Pharmacy to improve treatment, care and diagnosis of children and adults, to stimulate translational research, to provide education and to disseminate information. It serves as the national center of expertise for treatment with enzyme replacement therapy of patients with Pompe disease, MPS I, MPS II, MPS VI and CLN2. The research performed by the center mainly focuses on lysosomal storage disorders and in particular Pompe disease, and includes clinical research as well as development of innovative therapies (Gene and cell based therapies).

She received her MD “with honors” in 1985 at the Erasmus University. From 1985 till 1989 she worked at the Department of Cell Biology and Clinical Genetics on the feasibility of enzyme replacement therapy in cellular models for Pompe disease. Since then she has been involved in the multiple steps leading to the development of enzyme replacement therapy.

Professor van der Ploeg is leader of the rare disease profiling area at Erasmus MC – Sophia Children’s Hospital. She is the representative of Erasmus MC in the national rare diseases working group of the Dutch Federation of Hospitals . She is vice-coordinator of the European Pompe Consortium (EPOC), MetabERN and coordinator of the LSD subnetwork of MetabERN. She is a member of several scientific advisory boards. She was chair and organizer of the symposium Society of the Study Group of Inborn Errors of Metabolism (SSIEM) named “Building bridges” held in the Doelen in Rotterdam in 2019, which was attended by more than 3000 participants from 86 countries. The symposium focused in particular on innovative therapies such as gene therapy, regenerative medicine, RNA based therapies and potential benefits from other fields of medical science. She has published over 200 publications in peer reviewed international journals and books.

Julie Wells

Give an Hour

Julie Wells joined the Give and Hour team in August 2022 as a consultant exploring the impact of peer support in the healing of survivors of mass violence. In May 2023, she returned to Give an Hour to elevate the support for rare caregivers and in September 2023, transitioned into the role of Director of Program Development. For 30 years, from community advocacy to institutional change, Julie has immersed herself in non-profit culture and issues that affect disenfranchised populations. She began her career working with students with developmental disabilities, moved into work with students in the criminal justice system and has created replicated models of programs that support the most vulnerable populations in central North Carolina. Julie is also the founder of the UNITY Fellowship, a capacity building and strategic leadership development program for nonprofit leaders designed to address the over-saturation and underdevelopment of the non-profit community. Through the creation of the UNITY Fellowship, she worked with 30 small non-profits- mostly led by women and BIPOC Executive Directors- to define their theory of change, their impact, and how to create funding strategies and growth metrics that are sustainable. She has led 2 successful non-profit mergers and spent 18 months with the Latino Community Credit Union leading community impact and partnership development.

Julie is also the mother to two powerful young women and spends every moment she can in the mountains of North Carolina around backyard fires, hiking local trails and living as simply as possible.

Chester Whitely, MD, PhD

University of Minnesota

Chester B. Whitley, PhD, MD is a Professor of Human Genetics at the University of Minnesota, His career objective has been to develop treatments for lysosomal diseases. Upon joining the faculty, he undertook the seminal clinical trials of bone marrow transplantation for Hurler syndrome (1983) and other lysosomal diseases. In these conditions, pathologic accumulation of lysosomal substrates begins prenatally, and very early intervention is critical for positive outcomes. These early studies provided the first systemic treatment for lysosomal conditions and established a highwater mark in the field. He also discovered the first pseudodeficiency genes for Hurler syndrome and invented the instant test for mucopolysaccharides (glycosaminoglycans).

He conceived and initiated the First International Symposium on MPS and Related Diseases (May 15-18, 1988, Minneapolis, USA) which has continued to the 17th international meeting being April 4-7, 2024, Wurzburg, Germany.

In the 1990’s, he led NIH program project grant "Gene Therapy for Metabolic Disorders" which during its 18 years accomplished the first gene therapy clinical trial for a mucopolysaccharidosis disease (1995), and with collaborators, developed Sleeping Beauty Transposon and AAV gene therapies.

In 2003, he founded the international WORLDSymposium research and CME meeting which fostered development of the NIH-funded Lysosomal Disease Network (LDN; 2008-2026), a component consortium of the Rare Disease Clinical Research Network. He is co-director of the Minnesota Pompe Disease Consortium coordinating follow-up of patients affected with Pompe disease identified by the state’s newborn screening program.

Recently, his collaborative group provided the proof-of-concept studies in the murine models of Hurler syndrome and Hunter syndrome for Sangamo’s ZFN-nuclease gene-editing which led to the very first in vivo gene-editing treatment of a human patient (November 13, 2017). Currently, Dr. Whitley aims to bring the new PS Gene-editing platform to clinical trials, and with the intent to provide a single-infusion treatment for a large number of lysosomal conditions, and other diseases.

Julienne Williams

AMDA

Joining in 2021, Julienne (Juls) Williams is a member of the AMDA Team supporting both the AMDA and the IPA. A mother to a daughter with Chron's Disease and whose sibling passed from ALS, she understands and empathizes with the caregiver and parent roles in providing support, care, and love to those affected and extended family members.

Recognizing the lack of support groups to share stories and experiences, as well as the lack of resources for mental health and women's issues for Chron's (and Pompe), she is committed to finding and providing these resources for the respective communities. She and her daughter are requested panelists at an annual Irritable Bowel Disease (IBD) Patient Education Conference in Oklahoma to offer both patient and parent perspectives, as well as transitioning from pediatric to adult providers, and navigating the day-to-day.

Paralleling, Juls is a strong advocate for changes in legislation and actively supports Step Therapy or "Fail First' and the Safe Step Act (H.R. 2630), and actively fundraises for more research for more effective treatment options and awareness. Juls is from a proud military family to include her husband and his. She grew up in Hawaii and has 15 years of civil service experience with the government working in Japan and San Antonio, Texas.

Keyuna Milam

Wanna Go Fit LLC

Keyuna Milam aka Ms. Wanna Go Fit is owner of Wanna Go Fit LLC. Ms. Milam began her physical fitness business as On the Go Fitness in 2007. Always a lover of fitness, this was a way to combine her passion of fitness and a way to be available to her children. Becoming certified as Personal Trainer, she began providing in-home and mobile training in Atlanta, GA. A military spouse of 20 years she wanted to make sure that she was able to be present for her children in the absence of her spouse while also earning an income.

Including group fitness into the mix and yet another location change Ms. Milam returned to school. During that time she pursued Occupational Therapy & Physical therapy. Eventually she returned to what she loved, personal training. Rebranding as Wanna Go Fit, she used her therapeutic skill set to enhance her clients experience and assistance in rehabilitation of injuries and daily life activities. This journey also included "non-traditional" clientele of people needing therapeutic services. Assisting people with cerebral palsy, Ehlers Danlos Syndrome, Fibromyalgia and now Pompe Disease. Ms. Milam's goal while assisting these particular members of her client population is to decrease her clients pain while increasing mobility & strength if possible.

Wanna Go Fit, LLC provides Personal Training services via Online, In-Person & In-home. Other services provided are Nutritional Coaching, Group Fitness & CPR Certifications via the American Red Cross. Ms. Milam began a health & wellness education series in 2023 following the death of a close friend. Through this series and community & corporate education workshops she is doing her part to Save the World One Pound at a Time! Educating the world on learning to use the tools in their toolbox to be the healthiest version of themselves.

A very warm and special Thank You to all of our Presenters!

Workshop Session 2

How to monitor LOPD patients diagnosed through NBS

Diagnosis and Management of Children with Late-Onset Pompe Disease Diagnosed via Newborn Screenings: The Duke Experience

Erin Huggins, MS, CGC

Duke University Medical Center, United States

This workshop will provide an overview of the history and current practices of newborn screening (NBS) for Pompe disease in the United States. NBS allows for the earliest possible intervention with life-saving enzyme replacement therapy in children with infantile-onset Pompe disease (IOPD). However, children with LOPD are typically asymptomatic at birth and thus do not require immediate intervention. However, these children are at risk to develop symptoms over time, but symptom onset and severity is highly variable in LOPD and can often be subtle. In this workshop, we discuss the current guidelines for clinical follow up of LOPD and provide an overview of our experience at Duke University in diagnosis, management, and outcomes of patients with LOPD diagnosed via NBS.

Transitioning from Pediatric Care to Adult Care

Bridging the Gap: Transitioning form Pediatric Care To Adult Care (Physician and Patient Perspectives)

Hannerieke van den Hout, MD, PhD and Zack DuMond*

**Center for Lysosomal and Metabolic Diseases, Erasmus University Medical Center, the Netherlands*

Join us for an insightful presentation on the crucial journey of transitioning from pediatric to adult healthcare services. This session will explore the challenges, strategies, and best practices involved in ensuring a smooth and successful transition for young patients with chronic illnesses or disabilities. Hosted by Dr. Hannerieke van den Hout (Physician) and Zachary DuMond (Patient), we hope to cover any and all concerns that may surround transitioning from Pediatric to Adult care.

Workshop Session 3

Exercise Recommendation for IOPD

Pediatric Therapy and Pompe disease

Laura Case, PT, DPT, MS, PhD, PCS, C/NDT

Duke University Medical Center, United States

This workshop will present information on the following:
IOPD: Phenotypes and management in IOPD including potential residual motor involvement with ERT, such as weakness and secondary musculoskeletal issues; management over time to optimize movement and function, including assessment and intervention and the use of orthotic intervention and equipment as needed.

LOPD: Newly emerging understanding of potential early motor involvement in LOPD allowed by newborn screening (NBS) including early motor signs, PT assessment, and PT intervention including optimizing strength and function and musculoskeletal management and optimization over time.

Exercise Recommendations LOPD

Exercise Training for Patients with Pompe disease

Linda van den Berg, PhD

Erasmus MC University Medical Center, the Netherlands

Since the introduction of enzyme replacement therapy (ERT) for the treatment of Pompe disease in 2006, patients and medical specialists have been searching for treatments additional to ERT which may further support patients' fitness and physical functioning. Therefore in 2011 we started our research on the safety and efficacy of an exercise training program in mildly affected adult patients with Pompe disease. Patients followed a standardized training program, consisting of aerobic training, muscle strength training and core stability training, 3 times a week for 12 weeks under supervision of physiotherapists near their home. After 12 weeks we could conclude that the exercise training could be performed safely and that it helped to improve endurance, core stability and muscle function. Furthermore patients were less fatigued and experienced less pain after the training period.

More recently we investigated the long-terms effects of this exercise training program and long-term physical activity to the WHO norm. We were able to show that patients who met the 2010 WHO healthy physical activity norm performed better on endurance, muscle strength and function compared to patients not meeting this norm. The majority of outcomes, including endurance and muscle strength, tended to be higher in the active patients of the 2011 training cohort who continued the program compared to the active control patients.
So, now we know, that long-term healthy physical activity leads to physical benefits and a personalized exercise training program may have additional favorable effects in mildly affected adult Pompe patients, but how is this for the more severely affected patients and children with Pompe disease?

So, now we know, that long-term healthy physical activity leads to physical benefits and a personalized exercise training program may have additional favorable effects in mildly affected adult Pompe patients, but how is this for the more severely affected patients and children with Pompe disease?

In this workshop results of more personalized lifestyle interventions consisting of exercise training and high-protein diet from different research groups will be discussed. Furthermore we will discuss how to implement a healthy physical active lifestyle in daily living and future research.

Welcome Address

What Do We Know, and What Is Left To Learn

Pompe Disease: Into the Future

Arnold Reuser, PhD and Nina Raben, MD, PhD***
**Center for Lysosomal and Metabolic Diseases, Erasmus MC University Medical Center, the Netherlands*
***M6P Therapeutics, United States*

The most elementary facts of Pompe disease will be known to you. Nevertheless, given the number and complexity of the different subjects that will be addressed during this meeting, and given the number of speakers from various countries who may be using different terminology when referring to 'the same', I will start with presenting the names that are given to Pompe disease and the names that are given to the enzyme that is crucial for glycogen metabolism, deficient in Pompe disease, and administered to patients with Pompe disease as Enzyme Replacement Therapy (ERT). Around the globe, different names are also used for describing the clinical spectrum of Pompe disease. For instance, Adult (onset) Pompe disease is not the same as Late Onset Pompe Disease (LOPD).

Following the simplest explanation of how a genetic defect leads to the known clinical symptoms of Pompe disease, topics of the Conference program will be highlighted with an eye to the future.

Natural History vs. New History with ERT

Infantile-Onset

Charting the Evolution: From Natural History to New Frontiers in Classic Infantile Pompe Disease

Hannerieke van den Hout, MD, PhD
Center for Lysosomal and Metabolic Diseases, Erasmus University Medical Center, the Netherlands

Twenty-five years ago the advent of treatment with recombinant human alpha-glucosidase unlocked a future for patients with classic infantile Pompe disease. This pioneering treatment dramatically changed the prospects of patients. Untreated this progressive myopathy deprives patients from ever attaining the ability to walk and leads to a demise typically within the first year of life due to a hypertrophic cardiomyopathy and respiratory insufficiency. However treatment with enzyme replacement therapy (ERT) enabled these patients to survive and to achieve the milestone of learning to walk, altering the natural course of disease.

After registration of rhGAA in 2006 a growing body of research highlighted significant enhancements in survival rates, alongside the reversal of hypertrophic cardiomyopathy and attainment of the ability to walk in a majority of patients. Important steps forward were achieved by elevating the dose to 40 mg/kg/week, antibody management and early intervention facilitated by newborn screening initiatives in selected regions in the world. Presently, second-generation ERTs aim to refine treatment efficacy further.

As treatment efficacy evolves, a novel phenotype of classic infantile Pompe disease emerges in survivors, marked by altering patterns of muscle weakness encompassing not only proximal but also distal muscles, including foot flexor impairment. Residual muscle weakness precipitates ambulatory loss, spinal misalignments, bone density concerns, and facial myopathy, impacting speech and swallowing and heightening aspiration and airway infection risks. While cardiac dimensions normalize for most, arrhythmias like supraventricular tachycardia may manifest.

Furthermore, the impermeability of the blood-brain barrier presents a significant limitation to ERT efficacy in addressing cerebral glycogen accumulation. Increasingly, studies are uncovering a spectrum of slowly progressive cerebral involvement and cognitive alterations in survivors, highlighting the need for innovative approaches to comprehensively address the evolving needs of patients, including targeting the nervous system.

In conclusion, the evolving phenotype of classic infantile Pompe disease underscores the ongoing imperative for innovation to meet the unmet medical needs of patients comprehensively.

Late-Onset

Enzyme Replacement Therapies: Changing the Natural History of LOPD

Professor Mark Roberts, BSc, MBChB, FRCP, MD
Salford Royal NHS Foundation Trust

LOPD is a heterogenous, multisystem disorder which slowly worsens. The age of symptoms and later diagnosis correlates with the degree of GAA enzyme deficiency. Following the development of CHO derived recombinant humanised GAA algucosidase alfa (ALG) as Enzyme Replacement therapy (ERT) the LOTS trial demonstrated improved pulmonary function and motor function compared to placebo. After initial benefits of ALG for 3-5 years patients unfortunately decline. The rationale for enhanced ERT to address this unmet treatment needs is addressed, and the trials programme for avalglucocidase alfa (AVAL) and the cipaglucocidase alfa combined with Miglustat (CIPA MIG) is reviewed.

Effects of Newborn Screening

The Impact of Newborn Screening on Altering the Natural Course of Infantile and Late-Onset Pompe Disease

Yin-Hsiu Chien, M.D., Ph.D.
National Taiwan University Hospital, Taipei, Taiwan

Newborn screening (NBS) for Pompe disease has been successfully integrated into numerous universal screening programs, reaching over 11 million newborns. Prompt initiation of enzyme replacement therapy (ERT) following diagnosis of classical infantile-onset Pompe disease (IOPD), marked by severe cardiac involvement at birth, has significantly improved treatment response, notably reducing respiratory failure and mortality rates. Similarly, NBS enables proactive management for infants with late-onset Pompe disease (LOPD), facilitating early detection of subtle musculoskeletal signs and initiation of ERT to better preserve muscle function. Our recent follow-up study, spanning up to 15 years, indicates that approximately 20% of newborns initially classified as LOPD via NBS eventually develop symptoms and receive ERT, yet maintain sustained good physical performance. Advances in genotyping knowledge, muscle imaging tools, and the integration of individuals' biochemical parameters and physical therapy evaluations now provide us with a better ability to predict phenotype severity. Continuous research efforts are crucial to refine screening and treatment protocols, ultimately enhancing long-term outcomes for Pompe disease patients.

The Whole Patient- Monitoring Patients

Integrative Care of Pompe Patients

Integrative Care of Pompe Patients

Professor Andreas Hahn, MD
Justus-Liebig-University, Giessen, Germany

Late Onset Pompe disease (LOPD) is a rare progressive metabolic myopathy mainly affecting respiratory and motor function. Infantile Onset Pompe Disease (IOPD) is a multisystemic disorder. Enzyme replacement therapy (ERT) in IOPD substantially improved survival and resulted in a so-called new phenotype characterized by residual muscle weakness, language and swallowing difficulties, hearing loss, cardiac arrhythmia, scoliosis and other orthopedic problems, as well as cognitive difficulties. In addition, a better understanding of the disease led to treatment modifications such as immunomodulation in CRIM-negative patients, implementation of newborn screening in some countries, and application of much higher doses than initially recommended. Treatment of patients with IOPD and LOPD by far exceeds mere ERT. Especially in IOPD, the multisystemic features require a close collaboration of many medical and non-medical disciplines such as metabolic specialists, child neurologists, neurologists, cardiologists, pulmonologists, ear, nose and throat specialists, gastroenterologists, anesthetists physiotherapists, speech therapists, social workers, and many others. Because of the complex phenotype and the sophisticated therapy patients with Pompe disease should be in charge of or supervised by an institution specialized in treating such patients.

Monitoring of Patients: Biomarkers

A Multi-omics Approach to Identify Biomarkers For Pompe Disease

Giancarlo Parenti, Antonietta Tarallo, Carla Damiano, Anna Valanzano
Department of Translational Medicine, University of Naples "Federico II", Naples, Italy, Telethon Institute of Genetics and Medicine (TIGEM), Pozzuoli, Italy

An important issue in the management and treatment of Pompe disease (PD) patients is the need for reliable, measureable, and objective markers of disease. In a previous study we started a search for novel markers of PD.
We performed a multiomics integrated analysis in plasma samples from PD patients (mirnome, proteome, lipidome, metabolome) and in tissues from the PD mouse model (mirnome, transcriptome). The analysis was focused on markers that show coordinated changes in comparison with controls, and that reflect specific aspects of PD pathophysiology, such as secondary derangement of pathways and functions (autophagy, oxidative stress response, mitochondrial function). In this way, we identified a panel of potential plasma biomarkers (miRNAs, proteins, complex lipids) for PD.
We plan to test whether these markers, if used in combination, may help capture different aspects of the disease, including disease severity and progression, response to standard-of-care therapy, and correction of tissue pathology. Multiple correlated and integrated biomarkers may also provide information about the efficacy of novel treatments that are currently in pre-clinical and clinical development, such as second-generation enzyme replacement therapies, substrate reduction therapy, gene therapies.

Monitoring of Patients: Muscle MRI

Muscle MRI in Pompe Disease

Professor Jordi Díaz-Manera, MD, PhD
John Walton Muscular Dystrophy Research Center, Newcastle University, United Kingdom

Muscle MRI has demonstrated to be useful for the diagnosis and follow-up of patients with Pompe disease. In my talk, I am going to review the published evidence on the utility of MRI for the diagnosis of patients and the monitoring of the disease in clinics and trials. Moreover, I will highlight the unmet needs of MRI in Pompe disease and discuss future directions.

Monitoring of Patients: Muscle Ultrasound

Role of Muscle Ultrasound in the Setting of Pompe Disease

Neha Regmi, MBBS, MD
Duke University Medical Center

Pompe disease, once deemed a fatal glycogen storage disorder, saw a significant shift in trajectory of disease progression with the FDA approval of ERT in the year 2006, leading to considerable prolongation of lifespan and clinical manifestations. However, despite these improvements, the penetration of enzyme replacement therapy (ERT) into muscle tissues remains below 1%, contributing to a secondary decline in muscle function among long-term survivors.

Consequently, meticulous monitoring of muscular function, even before symptoms manifest, is imperative for promptly initiating ERT, evaluating treatment effectiveness in ERT recipients, adjusting dosages as needed, and contemplating Next generation ERT and alternative therapeutic options when appropriate.

To effectively monitor the muscle status and pathology, there is a requirement for a device that is cost-effective, time-efficient, non-invasive, and globally accessible. Muscle ultrasound emerges as a promising option fulfilling these criteria, capable of identifying muscle pathology efficiently even before onset of clinical symptoms. Additionally, when combined with another modality like electrical impedance myography (EIM), it could serve as a potential biomarker for monitoring muscle damage.

Non-Invasive Ventilation for Pompe

Respiratory Management of Late-Onset Pompe disease (LOPD)

Grazia Crescimanno, MD
Palmero's National Research Council Institute for Biomedical Research and Innovation (IRIB-CNR)

Pompe disease (PD) is a neuromuscular disorder caused by a deficiency of acid alpha-glucosidase (GAA), a lysosomal enzyme responsible for the hydrolysis of glycogen. The lack of GAA leads to an accumulation of glycogen in the lysosomes, resulting in a disruption of the cell structure. The severity of PD is directly related to the degree of GAA deficiency. Patients with late-onset PD (LOPD) patients (onset between 12 months and adulthood) have higher GAA activity than patients with early-onset (onset before 1 year of age), but also show a significant deterioration in respiratory function. This is despite the fact that the FDA approved enzyme replacement therapy in 2006. However, ERT slows the progression of the disease rather than reversing it, so there are still many unmet medical needs. These include respiratory failure, which remains a major cause of morbidity and death. Respiratory complications include respiratory muscle weakness, sleep-related breathing problems, nocturnal hypoventilation, and impaired cough and airway clearance. My aim is to provide an overview of respiratory pathology and emphasize the importance of early diagnosis and appropriate management.

Management and Care of Pompe Patients

Respiratory Muscle Training Project

Impact of Supplementary Air-Stacking (AS) on the Effect of Inspiratory Muscle Training (IMT) In Patients with Late Onset Pompe Disease (LOPD): Preliminary Results from A Multicenter Cross-Over Randomized Trial.

Elena Compalati and Rosario Di Marco, Respiratory Physiotherapist
IRCCS Fondazione Don Gnocchi – ONLUS;

The presentation will cover preliminary data of an on-going multicenter cross-over randomized study, regarding the effects of IMT alone and with the implementation of Air-stacking in patients with LOPD. How and if this kind of intervention can help this specific population to improve their whole function capacity and their quality of life.

Utilizing Nutritional Ketosis to Improve the Infantile Onset Pompe Disease Phenotype in C57/BL6 NH Mice

Utilizing Nutritional Ketosis to Improve the Infantile Onset Pompe Disease Phenotype in C57/BL6 NH Mice

Dominic D'Agostino, PhD
Morsani College of Medicine, University of Southern Florida

The presentation will cover the findings of an ongoing study to address whether Ketone Metabolic Therapy (KMT) given as nutritional ketosis via ketogenic diet, ketogenic agents, or the combination improves the phenotype of a mouse model of IOPD. The mouse model used is the IOPD Pompe mouse model (C57BL/6NJ-Gaaem1Jhng/J) compared to the Wild Type Control (C57/BL6 NJ). Assessment of body weight changes, blood glucose and ketone metabolites, behavioral measures, and cardiovascular function tests were done on mice give KMT and compared to mice eating standard mice chow. Significant changes in body weight, metabolites, motor behavior, and cardiovascular function were observed, and their statistical significance is being analyzed. Further investigation, analysis and molecular studies are being done to characterize the efficacy of KMT on these parameters in Pompe mice.

Diet and Exercise Interactions for the Treatment of Pompe Disease

Diet and Exercise Interactions for the Treatment of Pompe Disease.

Mark Tarnopolsky, MD,PhD
McMaster Children's Hospital, Hamilton, ON, Canada

Pompe disease is associated with impairments in skeletal muscle autophagy, mitochondrial function, inflammation, oxidative stress and protein synthesis that contribute to progressive muscle weakness. All of these processes are improved with exercise training but have only recently been applied to Pompe patients. Studies have clearly shown that endurance and resistance exercise training lead to variable improvements in fitness, function (i.e., 6-MWT), and strength in LOPD patients. Our work in older adults suggests that the optimal exercise training program is a combination of endurance and resistance exercises (ENDUREX). Several studies have shown impairments in muscle protein synthesis in aging and in muscular dystrophy patients that result in a need for a higher amount of dietary protein. One open label study suggested improved function in LOPD patients with a high protein diet. Protein intake for LOPD patients should be >1.2 gPRO/kg/d and patients should try to consume proteins with higher biological value (eggs = milk > meats and fish > plant > collagen), get at least 25 grams per meal and try to consume at least 25 g after an exercise session. Vitamin D and B12 deficiency are the most common nutrient deficiencies and should be checked and replaced. The role of the anti-oxidant and mitochondrial supplements has been studied in vitro and in the Gaa-/- Pompe mouse model and are being studied in an AMDA sponsored study this year. The ketogenic diet has been proposed as a way to enhance autophagy and induce substrate reduction therapy (SRT) but we found no benefit in the Gaa-/- mouse; however, a ketone precursor, 1,3 butandiol was very effective at improving autophagy and function.

Disclosure: Dr. Tarnopolsky is the CEO of Exerkine Corporation and they have filed a patent for the use of 1,3 butandiol and a mitochondrial enhancer for Pompe disease/LSD.

Speech Pathology

Current Understanding of Speech Impariments in Pompe Disease

Harrison Jones, PhD
Department of Head and Neck Surgery & Communication Sciences (HNSCS), Duke Univeristy Medical Center

Weakness of the respiratory and orofacial muscles is common in Pompe disease (PD), resulting in flaccid dysarthria (i.e., speech disorders resulting from neuromuscular weakness) that can affect all speech subsystems including articulation, resonance, and phonation. In children with infantile-onset Pompe disease (IOPD), overall severity of speech involvement ranges from mild to severe and is characterized by articulation errors, hypernasality, and voice quality impairments. In contrast, children with late-onset Pompe disease (LOPD) present with minimal to no speech involvement in terms of overall severity and, when speech is affected, voice quality impairments predominate. Speech disorders in adults with LOPD are underrecognized and have received little systematic attention, although clinical experience suggests overall severity ranges from moderate to no speech involvement with voice quality impairments occurring most frequently. Our research suggests that the comprehensive assessment of speech disorders in PD should include a wide variety of auditory-perceptual, acoustic, and physiologic measures in order to define patterns of involvement, determine severity, and inform therapeutic approach. This approach may also be used in clinical trials to assess the effects of medical treatments on speech function in PD. Future research needs include more data on speech involvement in children and adults with LOPD, determination of the longitudinal changes in speech function, and examination of the impact of speech impairments on activity limitations and participation restrictions.

Pain Management for Pompe

Pain in Pompe Disease

Heidi Peters, MBBS, FRACP, PhD
Department of Metabolic Medicine, Royal Children's Hospital, Melbourne

This presentation will review the experience of pain in Pompe disease and the impact it has on everyday functioning for those living with Pompe disease (both IOPD and LOPD). Current management strategies will be explored.

Next Generation Therapies: Presentations from Industry

M6P Presentation

Co-Expressing GAA with S1S3 PTase Generates a rhGAA (M021) with a Unique Glycosylation Profile Enabling More Efficient Glycogen Reduction and Possible an Alternative Pompe ERT Dosing Strategies

Kylie Gray1, Riley Marcinczyk1, Jonathan Roberts1, Linda Lyons1, Uday Wanninayake1, Vaughn Weaver1, Michael DiGruccio1, Shou Liu1, Madison Chao2, Nastry Brignol2, Osman Sheikh2, Steven Ortemier3, Clarissa Booth3, Kathrine White3, Hung Do1, Russell Gotschall1
1M6P Therapeutics Inc, St. Louis MO 2Amicus Therapeutics, Philadelphia PA, 3Sanford Research, Sioux Falls SD

Pompe disease is caused by deficient acid α-glucosidase (GAA) activity resulting in defective lysosomal glycogen catabolism. Alglucosidase alfa enzyme replacement therapy (ERT) using recombinant human GAA (rhGAA) has provided irrefutable clinical benefits, but the therapy is sub-optimal due to poor cellular uptake in skeletal muscles. It is estimated that only 1% of rhGAA ERT reaches the interstitial space surrounding muscles yielding nanomolar enzyme concentrations post-dosing which necessitates an efficient cellular uptake mechanism. Mannose 6-phosphate (M6P), particularly bis-phosphorylated N-glycan structures which have the highest affinity for the cation-independent M6P receptor (CI-MPR) is needed for receptor binding at low enzyme concentrations to enable uptake of exogenous ERT into muscle cells. rhGAA is inherently poorly phosphorylated and there hasn't been a reliable way to modulate N-glycan processing within cells to produce rhGAA with high levels of bis-phosphorylated N-glycans. M6PT has developed an innovative process to co-express rhGAA with a hyper-active GlcNAc1-phosphotransferase (S1S3 PTase) to produce a novel rhGAA (designated as M021) with >67% of total N-glycans bis-phosphorylated. M021 also contains very low levels (<1%) of neutral glycans (non-phosphorylated high mannose or de-sialylated complex structures) for reduced non-productive clearance of ERT by liver and other non-target tissues. Every other week dosing of M021 was substantially better than standard of care (SOC) for reducing accumulated glycogen in cardiac and skeletal muscles and quickly normalizes muscle grip strength of treated Gaa KO mice to that of wildtype mice by 2-3 months and maintained over 6 months while SOC could not. M021 was also shown to rapidly debulk glycogen in Gaa KO mice with only six weekly administrations. Subsequent monthly maintenance dosing following debulking achieved the same correction in grip strength observed with M021 bi-weekly dosing schedule. These data suggest that M021 may enable a monthly dosing strategy after initial debulking for Pompe ERT.

LentiCure Presentation

LentiCure B.V.: Development of Lentiviral Gene Therapy for Pompe Disease for Affordable and Transparent Pricing

Dirk van Asseldonk1, W.W.M. Pim Pijnappel1-4, Giacomo Zundo2-4, Tessa Huizer2-4, Isabel Gordaliza Alaguero1-4, Bodil Willumsen4, Ans van der Ploeg2,4, Hannerieke van den Hout2,4, Michelle Kruijshaar2,4, Nadine van der Beek2,5, Pieter van Doorn2,5.
1LentiCure B.V., Erasmus MC University Medical Center: 2Center for Lysosomal and Metabolic Diseases, 3Department of Clinical Genetics, 4Department of Pediatrics, 5Department of Neurology

Enzyme therapy is effective in Pompe disease by also has a number of drawbacks including its invasive nature, the inability to stop disease progression, a heterogeneous response, the inability to reach the brain, the development of neutralizing antibodies that can interfere with treatment efficacy and safety, and a high price which threatens its reimbursement by national healthcare payers. It is therefore imperative to develop alternative treatment strategies.

We have developed hematopoietic stem and progenitor cell mediated-lentiviral gene therapy (HSPC-LVGT) in a mouse model for Pompe disease. In this form of gene therapy-fundamentally different from AAV gene therapy-, a classical bone marrow transplantation using cells from the patient him/herself is performed in which stem cells of the bone marrow are treated in the laboratory to permanently insert a copy of the GAA gene into the DNA of the stem cells. The stem cells are transplanted back into the patient, and will secrete the GAA protein to correct the brain. HSPC-LVGT can also provide immune tolerance to the GAA protein, thereby preventing the formation of neutralizing antibodies. In a mouse model for Pompe disease, we developed a modified version of HSPC-LVGT with improved efficacy that is able to completely correct the heart, muscles, and brain. HSPC-LVGT has an expected life-long efficacy after a single intervention. It has shown to be safe and effective in a number of diseases, and has resulted in approval for the treatment of metachromatic. leukodystrophy (LIbmeldy), a disease affecting the brain and closely related to Pompe disease.

Certain gene therapies have been developed for use in patients by the industry for very high prices, in the millions of dollars range. It is unknown how these prices have been established and what the actual costs have been. The high prices pose a challenge for healthcare payers to cover the costs. This has already led to certain patient groups to be expelled from eligibility or specific countries not granting reimbursement for a therapy. This problem is expected to get worse over time with the development of gene therapies for increasing number of disorders. These drawbacks have caused a change in the business strategy of companies and have already resulted in their withdrawal from the field of gene therapy for rare diseases.

For this reason, we have established LentiCure B.V. as a spin off company that is 100% owned by Erasmus MC. The aim of LentiCure is to bring gene therapies to patients for reasonable and transparent pricing. This public company aims to be funded by non-commercial parties, margins and profit will be in a socially acceptable range, used to maintain the company or to invest, e.g. in gene therapies for additional diseases. Finances are based on alternative sources including foundations and philanthropy. LentiCure in collaboration with Erasmus MC is currently preparing for the first in-human trial of HSPC-LVGT for Pompe disease. It aims to provide a platform for the development of lentiviral gene therapies for multiple rare genetic disorders.

IPA/Erasmus Survey and Pompe Registries

Report on the IPA/Erasmus Pompe Survey and Erasmus Mutation Database

Beyond the numbers: the patients' voice of the IPA/Erasmus MC survey, and detailing genetic information in the Pompe variant database.

Nadine van der Beek, MD
Center for Lysosomal and Metabolic Diseases, Erasmus University Medical Center, the Netherlands

For many years, the interaction with patients and the patient organizations has been important in deepening our understanding of Pompe disease. Using patient-reported outcome measures ("the patients' voice") the IPA/Erasmus MC Pompe survey, initiated in 2002, has provided a large body of new information on children and adults with Pompe disease with regard to the disease spectrum, impact on daily living, and the effect of ERT on survival and risk for wheelchair dependency.1-5

This survey also was the 'backbone' for the development of a new patient-reported outcome measure: the Rash-built Pompe-specific Activity (R-PAct) scale, specifically suited to quantify the effects of Pompe disease on patient's ability to carry out daily life activities and their social participation,6,7 which has been used in the key clinical trials investigating next-generation treatments and is now available in multiple languages.

Further expanding this worldwide platform will enable us to address new questions arising form the Pompe community, as has recently been done by means of a one-time questionnaire about the impact of the Covid-19 pandemic on the lives of patients with Pompe disease.8

The Pompe Variant Database contains a vast wealth of information on the genotype-phenotype correlation in Pompe disease, which can help clinicians in making treatment choices, especially as more and more patients are diagnosed by newborn screening.9,10

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Report from Genzyme's Pompe Registry

Report from Genzyme's Pompe Registry

Professor Tiziana Mongini, MD
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The Pompe Disease Registry is a long-term, international, voluntary observational study (NCT00231400, www.clinicaltrials.gov) sponsored and administered by Sanofi Genzyme since 2004. It has been designed to collect comprehensive clinical data about the natural history and the treatment outcomes of this rare and complex disorder. It is the largest patient Registry dedicated, including data from over 2500 patients across about 240 Centers from 47 Countries groups in four geographic regions Sections: Europe, North America, Latin America, and the Asia- Pacific Region. Over the years, data collection forms have been periodically revised and improved, to include updated biomarkers and clinical outcomes in an electronic format. Patients reported outcomes (PROs) will be also implemented.

United States, Italy, and Germany are the largest contributors to the Registry, which includes a majority of Late Onset Pompe Disease (LOPD) Caucasian patients, with an equal distribution of males and females. Over 2000 GAA gene variants are reported; most patients are on ERT therapy. Studies about diagnostic delay, respiratory function, scoliosis, genetic variants and phenotypes, and population-specific epidemiology were published over the years, contributing to a better understanding of how the disease and its treatment affect different people. Among the challenges of large data collections, it is important to ensure a high quality of data entries, and to limit their variability influenced by patient needs, regional practices, resources, and capabilities.

Report from the French Registry

The French Pompe Registry

Professor Pascal Laforêt, MD, PhD
Neurology department, Raymond-Poincaré teaching hospital, Nord/Est/Ile de France Neuromuscular Reference Center and PHENIX FHU, AP-HP, Garches. INSERM U1179, Versailles Saint-Quentin-en-Yvelines, Paris Saclay University, France.

The French Pompe disease registry was created in 2004. This registry makes it possible to perform sustained standardized monitoring and data collection in one of the largest cohorts of Pompe patients in the world, with the support of financial contributions from industry and research grants. More than 250 patients have been included in the French registry, among 31 hospital-based French neuromuscular or metabolic centers. Close collaboration between the French reference centers for rare neuromuscular (FILNEMUS) and metabolic (G2M) diseases provides an additional guarantee that the data collected are of high-quality and exhaustive. The French Pompe disease registry, which was initially designed as a tool for following the natural course of disease in patients, rapidly shifted focus to become a major tool for assessing the long-term efficacy of ERT following the market release of alglucosidase alfa, and since a few years next-generation ERT.

IPA/Erasmus Survey and Pompe Registries Continued . . .

Where Do We Go From Here and Why is it Important?

Where Do We Go From Here And Why Is It Important?

Professor Benedikt Schoser, MD, PhD
Friedrich-Baur Institute, Dep. of Neurology, Ludwig-Maximilians-University Munich, Germany

POMPE Federated Database
Federation or functional partitioning splits databases by functions. The federation architecture makes multiple distinct physical databases appear as one logical database to users. All the components in a federation are tied together by one or more federal schemas, in our case, a harmonized HPO-tagged electronic clinical case report form that expresses the commonality of data throughout the Pompe community. These federated reports specify the information the components can share and provide for any stakeholder.

Data federation provides a unified view of data derived from multiple registries. Federated systems can use databases and other structured and unstructured data forms.

A federated approach has the following characteristics: Transparency: A federated database masks user differences and implementations of underlying data sources. Therefore, users do not need to be aware of where the data is stored. Heterogeneity: DAta sources can differ in many ways. A federated database system can handle different hardware, network protocols, and data models. Extensibility: New stakeholders may be needed to meet the changing needs of the scientific community. A federated database system must make adding new sources easy. Autonomy: A federated database does not change existing data sources; interfaces should remain the same. Data integration: A federated database can integrate data from protocols and management systems. Significant advantages of federated databases are flexible data sharing, autonomy among the database components, and unified access to heterogeneous data. There is no tight coupling of applications with legacy databases. Federated databases have some disadvantages: hardware needs and the first step of joining databases. Considering the needs of patients, researchers, doctors, and industry, I see only a Federated Pompe database under the umbrella of IPA as the future solution, which needs to be embedded at legal authorities like FDA, EMA, etc.

Future Research

How to Fast Track Preclinical Testing New Treatments for Pompe disease

How to Fast Track Preclinical Testing New Treatments for Pompe Disease

Naresh K. Meena,1 Yeap Ng,2 Nina Raben1
1Cell and Developmental Biology Center, NHLBI, NIH, 2 Center for Cancer Research, NCI, NIH, Bethesda, MD, USA.

Preclinical testing of new investigational drugs in mouse models, including Pompe models, is a lengthy undertaking that requires a large number of animals and involves a wide range of biochemical/molecular biology techniques to analyze tissue samples ex vivo (outside of the living body). High-resolution intravital microcopy offers a possibility to observe and quantify biological processes in live animals within the natural tissue context. Our research over the past two decades has shown that the reversal of massive autophagic buildup in the diseased muscle can be used as a sensitive readout to evaluate the efficacy of therapeutic agents. Here, we have used a reporter mouse model of the disease expressing green fluorescent protein (GFP) fused to autophagosomal marker LC3 to directly visualize the limb muscle damage and response to therapy in anesthetized live animals. Furthermore, we demonstrate that the disease progression and the treatment outcome can be monitored in vivo by noninvasive imaging of the clinically relevant tongue muscle. These results indicate that the reporter model provides a platform for speedy preclinical testing of different therapeutic interventions in Pompe disease.

Substrate Reduction Therapy in Pompe

Substrate Inhibition with GYS1 Antisense Oligonucleotides for Pompe Disease

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1Division of Genetics and Metabolism, Department of Pediatrics. 2Department of Neurology, 3Department of Pathology. University of California, Irvine, 4 Ionis Pharmaceuticals, Carlsbad, CA,

Pompe disease (PD) is a progressive myopathy caused by the aberrant accumulation of glycogen in skeletal and cardiac muscle resulting from the deficiency of the enzyme acid alpha-glucosidase (GAA). Administration of recombinant human GAA as enzyme replacement therapy (ERT) works well in alleviating the cardiac manifestations of PD but many patients continue to have progressive muscle weakness due to glycogen accumulation in skeletal muscle produced by glycogen synthase (GYS1). Previous substrate reduction strategies aimed at knocking down muscle specific GYS1 expression represented a promising avenue to improve Pompe myopathy. Antisense oligonucleotides (ASOs) are chemically modified oligomers that hybridize to their complementary target RNA to induce their degradation with specificity. We have shown that ASO-mediated muscle specific Gys1 knockdown in the Gaa-/- mouse model of PD led to a robust reduction in glycogen accumulation in skeletal and cardiac muscle. In addition, combining Gys1 ASO with ERT further reduced glycogen content in muscle, eliminated autophagic buildup and lysosomal dysfunction, and improved motor function in Gaa-/- mice. Our results provide a strong foundation for further validation of the use of Gys1 ASO, alone or in combination with ERT, as a therapy for PD. Additionally the recent report by Ullman et al, 2024 of a small molecule inhibitor of GYS1 supports this strategy as a promising venue to pursue. We propose that early administration of Gys1 ASO either as monotherapy or in combination with ERT may be an effective safe treatment strategy in PD.

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Future Research Continued . . .

PS Gene-editing System

The PS Gene-editing System

Chester B. Whitley, PhD, MD, Michael J. Prybilla, PhD, Li Ou, PhD and Jeanine R. Jarnes, PharmD MSc
University of Minnesota

My lysosomal diseases, such as Pompe disease, are single-gene conditions resulting from deficient substrate reduction due to a deficiency degradative enzyme. Replacement of the deficient enzyme activity is often an effective treatment for the condition, especially when systemic enzyme replacement is of a very early and continues regularly for the lifetime of the patient.

As we have demonstrated in three murine models of lysosomal disease, the PS Gene-editing (PSG) System will effectively integrate the coding sequence of a therapeutic transgene into a unique site in intron 1 of the human albumin gene. Thereafter, the native human albumin promotor in a small number of hepatocytes produces a constant supply of therapeutic enzyme which is secreted into the blood stream and circulated systemically. To accomplish this safe, permanent insertion of a therapeutic gene, a CRISPR-based molecular payload, encapsulated in lipid nanoparticles (LNP), is administered by a single intravenous infusion. This approach, exploiting the “plug-and-play” PSG therapeutic platform has been prioritized by the FDA and also encouraged by a recent NIH initiative, i.e., the Somatic Cell Gene Therapy program’s RFA-RM-001 seeks demonstration of such therapeutic platforms to treat multiple diseases, thereby reducing the FDA’s regulatory burden and accelerating FDA approval as empowered by the Omnibus Appropriations Act of 2023 (Section 2503. Platform Technologies). Our PSG system will take the lead in bringing single-infusion, lifetime therapies for patients with lysosomal diseases.

This PSG-LNP approach offers several innovations not possible by current therapies: increased efficiency of regulatory approval by evaluating multiple diseases using a single IND and clinical trial; single-treatment lifetime therapy compared to weekly or fortnightly life-long FDA-approved enzyme replacement therapies; enables repeat dosing to increase the therapeutic effect; provides a more ‘natural’ continuous production of therapeutic protein which can be tolerizing in contrast to pulsatile, immuno-stimulatory infusions; reduces treatment-related morbidity and mortality compared to hematopoietic stem cell transplant (HSCT); introduces “gain-of-function” gene editing capability to the field of otherwise disruptive “loss of function” gene editing; increases the flexibility in formulation including tissue-targeting; reduces the ongoing costs of production after approval; creates opportunities for supplemental therapies such as chaperone drugs, e.g., OPFOLDSATM (miglustat) and small activating RNA (saRNA); reduces the risk of oncogenic cell transformation due to random integration of over-expressing promotors; should be safe enough for future administration to young children and newborns; may be safe enough for one-time in utero treatment with lifetime efficacy.

By creating a blood-brain barrier (BBB) penetrating form of the therapeutic enzyme, this approach may also extend treatment to the neurodegenerative aspects, with a BBB-penetrating form of the enzyme thus extending treatment into the central nervous system.

Stem Cell and Muscle Regeneration in Pompe

Muscle on a Chip: Creating Patient-Derived Mini Muscles for the Development and Testing of Therapies

Alessandro Iuliano, Stijn in ‘t Groen, Federico Silvestri, Carlo Castiglione, Anjali Bholasing, Erik van der Wal, Pablo Herrero Hernandez, Atze Bergsma, Gerben Schaaf, Pim Pijnappel
Erasmus MC University Medical Center, Center for Lysosomal and Metabolic Diseases, Department of Clinical Genetics, Department of Pediatrics

The development of therapies for muscle disorders like Pompe disease is challenging; muscle appears to be a difficult-to-correct tissue. Standard methods used in the laboratory utilize non-muscle cells in culture or animal models. The use of muscle cells derived from muscle biopsies is very limited as these cells can only be cultured for a very short period.

For this reason, we have developed a protocol for the generation of human muscle stem cells from hiPSCs. hiPSCs are stem cells that can be generated in the laboratory from any cell type, for example from a skin biopsy, using a Nobel prize-winning protocol developed by Shinya Yamanaka in Japan. We termed the hiPSC-derived muscle stem cells MPCs, for Myogenic Progenitor Cells. The advantage of MPCs is that they can be expanded to large quantities. To illustrate this: one preparation would sink through the Erasmus MC building if we would keep all expanded cells in a container, as they would be too heavy.

When grown in a petri dish in 2D, MPCs form beautiful muscle fibers. However, the fibers are not organized like they are in a real muscle, and after a few days, they do what they are supposed to do: they contract, thereby pulling themselves from the plate into a useless muscle ball. Therefore, we have developed 3D-muscle on a chip technology, in which we grow mini muscle tissues in 3D between two tendon-like flexible pillars. These mini muscles can contract like a real muscle, and the contractile force can be measured, thereby providing a functional read out. Such mini muscles can be generated from every individual, allowing personalized testing. In other words, we can now create a patient's muscle-in-a-dish to test the efficacy and safety of therapies. In collaboration with the Leiden University Medical Center and the company Optics 11life, we have built a unique device termed the Cuore that is able to measure contractile forces of multiple mini muscles in real time at very high sensitivity. In this way, we are able to study the long-term effects of therapy and we can test multiple conditions at the same time, thereby accelerating progress.

We have generated mini muscles for multiple muscle diseases including Pompe disease to investigate the mechanisms that underlie muscle pathology, and we are testing novel therapies. In addition, we are interested to develop a muscle regenerative therapy, based on the transplantation of MPCs to generate new muscle in patients that have lost their muscle due to disease. We have already shown that MPCs can be used to generate new human muscle in a living laboratory mouse. The next step is to increase the efficiency of the engraftment procedure in order to obtain a clinically relevant method. Progress on the laboratory developments will be discussed.

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