**Lay Summary of the Scientific Leg of: "Stronger Together: Nonprofit Groups Propelling Patient-Driven Research of Rare Neuromuscular Diseases"**

A "Triad" of patient advocacy organizations for ultra-rare congenital muscular diseases, Cure CMD (Cure Congenital Muscular Dystrophy or CMD), A Foundation Building Strength (AFBS, focused on Nemaline Myopathy or NM) and Team Titin (focused on Titinopathy or TTN) carried out successfully a tight but enlightening scientific agenda. We are largely satisfied with the outcome which matched our original objectives of bringing more than 80 researchers together, from basic to translational to clinical backgrounds, to synergize collective knowledge and experience to accelerate the bench-to-bedside pipeline toward clinical trials, treatments, and eventually, a cure.

We started the conference with a comprehensive lecture by three of the world leaders in research and care for congenital muscular diseases (CMDs): Professors Carsten Bönnemann, Alan Beggs, and James Dowling. To a diverse audience of international researchers, clinicians, health-related government officials, industry representatives, patient organizations' staffers and a group of affected individuals and caregivers, the speakers delivered an historical overview from the original descriptions of the different subtypes of CMDs to the current landscape on their pathophysiology and symptomatology, highlighting common and unique characteristics and disease mechanisms of each subtype. This kick-off session laid the groundwork to the rest of the conference that deepened in more focused talks and specific panel discussions.

We shifted gears to a back-to-back series of 15 individual talks from researchers carrying out projects funded by Cure CMD or Team Titin. We received from the speakers here, technical details and prolific preliminary results in some cases, strong data in others, also pitfalls, and future directions of their research. All presentations received expert audience feedback, which in most cases served or will serve to refine the experimental strategy and/or next steps to maximize their chances of success and drive research forward for these conditions. Individual talks touched upon all the five specific subtypes of congenital muscular dystrophies (ColVI, LMNA, LAMA2, SEPN1, and aDG), showing a wide assortment of specific animal and cell models as well as a diverse battery of therapeutic approaches with a strong preponderance on molecular therapeutics like oligonucleotide antisense, gene editing, and finally, gene therapy of different sorts. Presentations about Titin-related myopathies showcased the progress on this understudied giant sarcomeric protein and how lessons from other muscle disorders is catalyzing approaches to diagnosis and therapies.

The first day of the formal conference closed with a symposium focused on learning lessons from current or past clinical trials for neuromuscular conditions. Clinical trial leaders for the first-ever phase 1 clinical trial in congenital muscular dystrophies, Dr. R. Foley (Omigapil trial); for two different myopathies, RYR1 by Dr K. Meilleur (NAC trial) and X-MTM by Dr. N. Kuntz (Gene replacement therapy candidate AT132), and finally, trial experience in Duchenne MD and spinal motor atrophy, brought by Dr. L. Servais, re-energized the audience and influenced the idea that a success in one neuromuscular disorder is a success for all. The experiences described helped identify the challenges and conquered hurdles not only from the strict cold medical data obtained but as importantly, the invaluable input from the patients, families and caregivers participating in those trials.

At this point, a free-flowing poster session with 33 posters on display provided another format for exchange of data, knowledge and working hypothesis. The crowd was packed and conversations extended way over the time originally planned.

I would comment on the amazing warm interaction, exchange of experiences, questions asked and answered, laughs and tears and thank-you gestures among the diverse attendants during coffee, lunch and poster breaks but I don't want to provoke envy on the staffers that were busy in other organizational issues or you readers.

The second day of the scientific portion of the conference started with another back-to-back series of seven individual talks from researchers executing projects funded by AFBS. A wide research portfolio encompassing studies of classical pharmacology with new and repurposed small molecules, all the way to testing CRISPR Cas9 gene editing as a therapeutic strategy for nemaline myopathy (NM), caught the attention of the public. Researchers also presented new animal models of NM, both in zebrafish and mice, which will enrich the toolbox for fundamental pre-clinical investigations. Here again, the presentations triggered a profuse audience feedback which will generate nothing less than improvements in the experimental design moving forward.

The rest of the two-day scientific conference saw a growing climax with the next lively symposiums. Professors Bonnemann, Dowling, Oates, and Servais discussed examples of Natural History Studies (NHS) in neuromuscular conditions and how they were instrumental for clinical trial readiness. They analyzed and shared what we have and what we still need, to start in some cases or complete in others, NHS for each subtype of CMD our "triad" focuses on. They emphasized the pros and cons expressed by the study participants to incorporate in future NHS design. The topic and engaging skills of speakers drove open discussions on the best use of our patient registry, not only for recruitment but also to analyze retrospective data to inform prospective design of NHS and strategies to identify and/or improve outcome measures. This symposium was also educational for the patients, families, and caregivers present at the conference room.

Next, with all elements discussed previously we were ready for an overview and consideration of current therapeutic developments. Here, the overwhelming feeling that a whole scientific conference would be needed to explain and provide data on the myriad of potential therapies for CMDs was actually transformed into an exciting feeling that the community efforts, dedication, and collaboration is moving the bench-to-bedside pipeline on the right track and with increased speed. The panelists were clever in matching different CMD subtypes with specific therapeutic mechanisms, demonstrating that cross-sectional opportunities for therapies in CMDs are possible. This symposium flowed into opening the floor to patient community representatives in attendance. They asked questions and expressed comments about their views of what they witnessed as spectators, sparked a mock data exchange among researchers, learned about experimental tools and tricks, and generated collective understanding about disease mechanisms and devise treatments.

This wrap-up symposium reinvigorated all of us, and reminded the organizing "triad" that we are, in fact, stronger together. This two-day intense scientific conference provided the "triad" plenty of elements to elaborate short, mid- and long-term subtype-specific plans and set priorities for our next cycle of research/clinical grants call. We are already generating ideas for the next phase of our work in patient-centered research.

The second part of the conference were focused on building community and connections among affected individuals, families, caregivers, and researchers and clinicians. At registration, the staff of Cure

CMD, AFBS, and Team Titin greeted veteran and new community members, ushering them to a welcome reception where families formed new bonds, strengthened existing ones, and had the opportunity to speak one-on-one with the world's top experts in CMD.

Day one of the family conference started with a brief welcome and introductions, followed by a plenary session on Pulmonary Care -- an issue incredibly relevant to all communities in attendance. Breakout sessions followed with subtype-specific care and research updates, then attendees joined again toward the end of the day for sessions on Feeding and Nutrition led by Ajay Kaul, MD and Stephen Chavez, PhD and Orthopedics and Physical Therapy, led by Stephen Mardjetko, MD, FAAP and Meghan Burnstine, DPT.

The first full day of the family conference ended with a group dinner across the street in downtown Chicago, where more than 250 individuals enjoyed a buffet meal, followed by informal "after-hours" social time for specific age groups. SALT for Dads was a high-rated session that evening, where fathers and father figures gathered at the bar to discuss issues around caring for, and living with, children with special needs.

Day two of the family conference was all about creative "lifestyle" sessions tailored to the needs and requests of the community. Sessions included:

- 504/IEP: Getting the Most from Public School Support
- Adaptive Clothing
- Adaptive Sports
- Adaptive Vehicles
- Body Awareness Seminar (For Parents and Professionals)
- Caregivers: Self-Care
- College Experience
- Developing Tech for the Measurement and Care of Contractures
- Disability Travel
- Let's Talk about Sex (for affected Young Adults, Adults, and their Partners)
- Life Hacks & Navigating the Healthcare System
- Rare Disease Legislative Advocacy
- Sib Shop: The Sibling Experience
- Social Security Benefits Explained
- Special Needs Financial Planning
- Transitioning through the Teen Years (For Parents and Professionals)
- Transitioning to Adulthood (For Parents and Professionals)

The majority of these sessions have been recorded and will be available online via Cure CMD's dedicated YouTube channel.

The organizing "Triad" is still gathering conference evaluations but so far, feedback has been exceptional, with the majority of responders rating all aspects of the conference (overall, venue, location, speakers/presenters, content, and length) a five on a scale of one to five.