

Fiscal Year 2021 written testimony of Daniel Paul Perez, Co-founder, FSHD Society before U.S. House Appropriations Subcommittee on Labor, HHS, Education and Related Agencies for U.S. DHHS National Institutes of Health (NIH) funds for \$54 million towards research grants and programs on facioscapulohumeral muscular dystrophy (FSHD) March 23, 2020

Agency: National Institutes of Health (NIH) and other federal agencies as appropriate.
FY2021 report language: Scientific opportunities alongside community research defined priorities in facioscapulohumeral disease (FSHD) call for far more funding on the disorder. The Committee strongly encourages the NIH to increase its FSHD grant portfolio to at least \$54 million for basic and exploratory research and clinical trials readiness efforts.

Honorable Chairman DeLauro, Ranking Member Cole, and distinguished members of the Subcommittee, thank you for the opportunity to testify.

Facioscapulohumeral Disease (FSHD) is a heritable disease and one of the most common neuromuscular disorders with a prevalence of 1:8,000.¹ It affects 934,000 children and adults of both sexes worldwide. FSHD is characterized by progressive loss of muscle strength that is asymmetric and widely variable. Muscle weakness typically starts at the face, shoulder girdle and upper arms, often progressing to the legs, torso and other muscles. In addition to affecting muscle it can bring with it breathing issues, hearing loss, eye problems and cardiac arrhythmias. FSHD causes significant disability and death.

FSHD is associated with epigenetic changes at chromosome 4q35 in the D4Z4 DNA macrosatellite repeat array region leading to an inappropriate gain of expression (function) of the D4Z4-embedded double homeobox 4 (DUX4) gene². DUX4 is a transcription factor that kick starts the embryonic genome during the 2- to 8-cell stage of development³⁻⁵. Ectopic expression of DUX4 in skeletal muscle leads to muscle death. DUX4 is never expressed in ‘healthy’ muscle. FSHD has had few clinical trials^{6 7 8 9 10}, and currently there is no cure or therapeutic option available to patients. DUX4 requires and needs to activate its direct transcriptional targets for DUX4-induced gene aberration and muscle toxicity¹¹⁻²⁴. Blocking DUX4’s RNA or DUX4’s protein ability to activate its targets has profound therapeutic relevance²⁵.

NIH-supported basic research on muscle disease and muscular dystrophy over the past 25 years has improved health outcomes. Small molecule and genetically engineered therapies are now in the works for FSHD and on the market for several neuromuscular diseases!²⁶⁻³² Each year, the non-profit, private and public investment in research yields critical advances in FSHD. Together we foster new treatments, diagnostics, and intervention strategies that affect the health of our nation. Meticulous efforts by FSHD researchers/clinicians working with funding from FSHD Society, the NIH and others have brought forth significant advancements in epigenetic diseases. FSHD is the only human disease known to be caused by the contraction of repetitive “junk” DNA. The Society has funded approximately \$15 million in seed grants for research.

The FSHD scientific community listed 2020-2021 priorities as:

2020 Industry and Scientific Research Priorities

1. Clinical Trials Readiness Infrastructure and Therapeutics
2. Biomarkers, Direct and Surrogate
3. Genetic Testing, Genetics and Epigenetics
4. Imaging and Outcome Measures
5. Registries and Patient Reported Outcomes

Your Subcommittee and **Congress in partnership with NIH, patients and scientists have made truly outstanding progress in understanding and treating the nine major types of muscular dystrophy through the Muscular Dystrophy Community Assistance, Research and Education Amendments of 2001 (MD-CARE Act, Public Law 107-84).** The federal advisory committee mandated by MD CARE Act, called the MDCC, along with working groups of outside scientific experts in the field assembled the ‘*2015 NIH Action Plan for the Muscular Dystrophies.*’ It was presented by the Director of NIH to Congress. It specifies 81 objectives, in six sections (mechanism, screening, treatments, trial readiness, access to care, infrastructure including workforce) in need of funding and further development.³³ The genetics that give rise to FSHD are so remarkable, NIH Director Dr. Francis Collins emphasized its significance on the

front page of the *New York Times*, saying “If we were thinking of a collection of the genome’s greatest hits, this [FSHD] would go on the list.”³⁴

Madam Chairman, these advances in scientific understanding and epidemiological surveillance come at a significant cost. Since passing the MD CARE Act in 2001, NIH funding for FSHD has been unbalanced given the growth in discoveries and needs to be set right.

FSHD Research Dollars (in millions) & FSHD as a Percentage of Total NIH Muscular Dystrophy Funding

Sources: NIH/OD Budget Office & NIH OCPL & NIH RePORT RCDC (e=estimate, a=actual)

Fiscal Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
All MD (\$ millions)	\$56	\$83	\$86	\$75	\$75	\$76	\$78	\$77	\$79	\$81	\$85ea	\$83	\$88e
FSHD (\$ millions)	\$3	\$5	\$6	\$6	\$5	\$5	\$7	\$8	\$9	\$12.8	\$13.7a	\$17	\$17.7a
FSHD (% total MD)	5%	6%	7%	8%	7%	7%	9%	10%	11%	16%	16%	20%	20%

The NIH is the principal worldwide source of funding of research on FSHD. Currently active projects are \$16.552 million FY2021 (current actual), a 21% portion of the estimated \$80 million spent on all muscular dystrophies. (source: NIH Research Portfolio Online Reporting Tools (RePORT) keyword ‘FSHD or facioscapulohumeral or landouzy-dejerine’).

Without research on muscle disease, supported by the FSHD patient-advocacy groups in concert with the NIH biomedical research funding -- families with FSHD would be living shorter, less productive, and far less hopeful lives. Nearly 41,000 Americans have FSHD, a disease that can cause damage to skeletal muscle, hearing, vision, breathing and lead to death.

What we need. Viewing at the current portfolio alongside the areas in need of bolstering in FSHD the NIH needs to fast expand its portfolio. Specifically, NIH needs to increase funding by adding R01 and R21 style grants in areas outlined by hundreds of experts in the *DHHS NIH MD Plan*. The engine of federal research runs on the basic building blocks of workforce training, exploratory/developmental research grants (parent R21) and research project grants (parent R01). NIH can issue targeted funding announcements covering FSHD. A request for applications (RFA) on FSHD will yield results. These efforts will help convey to FSHD patients and allied researchers that NIH encourages more grant applications coming through its front door.

We request for FY2021, a tripling of the NIH FSHD research portfolio to \$54 million. We are very appreciative of the slow but steady year-to-year increases and thank NIH and Congress. At this moment in time, FSHD needs an infusion of NIH grants both submitted and funded -- investments in centers, collaborative research grants – and, most importantly, a rapid ramp up of basic/exploratory, preclinical and therapeutic research awards along with moderate expansion of post-doctoral and clinical training fellowships. FSHD research calls for and needs this additional funding in order to succeed. Madam Chairman, thank you again for your help and efforts.

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