ASNR Meet Our Members: Jessica Bath

Jessica Bath, DPT, PhD, is a recent PhD graduate and incoming Assistant Professor at the University of California, San Francisco (UCSF). She joined ASNR early in her PhD program in 2021 to take advantage of the excellent interdisciplinary and translational networking opportunities. Connecting with others from different backgrounds is critical when working at the intersection of clinical practice, neuroscience, and rehabilitation. Dr. Bath has appreciated the variety of study populations, techniques, and disciplines which ASNR spans, and it has introduced her to concepts and methods which are really insightful and relevant to her work.

1) How did you get interested in science, and what steps did you take to get to your current role?

An easy answer is that my father is a science teacher, and everything was (sometimes, annoyingly!) science-related growing up. I think the more accurate answer is that during physical therapy (PT) school, my grandfather was diagnosed with Parkinson's disease. Watching his experience with the disease while learning about neurological rehabilitation principles, (and later, my own experiences in the clinic with these individuals), I became aware of how much is not understood regarding fundamental questions relating to how human movement is controlled, how neurodegenerative diseases alter this neural circuitry, and the effects of interventions, including physical therapy. To get here, I earned a BS in Cellular and Molecular Biology and performed animal phylogenetics and physiology research at Humboldt State University. As an undergraduate student, I was also a collegiate runner and soccer player. From there, I started at UCSF's School of Pharmacy, but I left within a year, as I loved physiology but could not see myself practicing as a pharmacist. After some soul-searching and work in the running industry, I came back to UCSF for PT school. During my PT program, I assisted with research on fall-prevention outcomes and balance in multiple sclerosis (MS). After graduating, I practiced clinically for a year during COVID, then returned to UCSF for my PhD in Rehabilitation Sciences (Neuroscience) degree.

2) What is the focus of your current research, and what are some of your findings?

My dissertation work was performed under Dr. Doris Wang, MD, PhD, a neurosurgeon and researcher at UCSF. Our lab combines ambulatory, neurophysiological recordings from the pallidum and cortex in individuals with Parkinson's disease (PD) who have specialized deep brain stimulation devices implanted, and biomechanical data during concurrent motor activities (e.g. overground gait, turning) to characterize their neural modulation and the relationships

between these data and resulting motor performance. The goals of this research are to improve our understanding of the neural circuitry underlying these fundamental motor tasks, as well as develop adaptive neuromodulatory interventions to more effectively treat axial symptoms in PD, such as gait and balance issues. My dissertation examined postural instability in PD, particularly during gait initiation and turning tasks, since they are often affected in PD and linked to other negative sequelae (falls, freezing). While our results are not yet published, I will say that my study of postural instability suggests that these processes appear highly individualized, with variations among one's neural modulation, relationship to task metrics, and levodopa responsiveness. Please stay tuned for the rest!

3) What are your longer term career goals?

I would say I am still figuring that out, though I really enjoy the translational aspect of this research. I think my unique training and clinical experience lends itself to further investigation of combined neuromodulatory and evidence-based rehabilitation interventions, whether it be for neurological populations or individuals with chronic back pain, etc. I am also interested in characterizing the effects of PT and exercise on the neural circuits implicated in movement disorders and expanding on the results from my dissertation. Dr. John Krakauer's *Broken Movement* book also continues to provide me with an endless source of intriguing research questions relating to neurological rehabilitation parameters and optimization. More specifically, I am fortunate to be starting a faculty role at UCSF involving some teaching, a return to the clinic in a more-regular fashion, and continuing to perform research with Dr. Wang and some new collaborators, too.

Feel free to reach out to Dr. Bath by email or visit the website for Dr. Doris Wang's lab, where Dr. Bath works, to connect and learn more.