Hearing Health Foundation

ERG | Emerging Research Grants

Emerging Research Grants (ERG)
As one of the only funding sources available in hearing and balance science, HHF's ERG program is critical. Without our support, these scientists would not have the needed resources for innovative approaches toward preventing, researching, and finding better treatments for hearing and balance conditions.

Meet the Researcher

Wei Sun, Ph.D.

University at Buffalo

Sun received his doctorate in audiology from the University at Buffalo, where he is an associate professor in the department of communicative disorders and sciences. His 2024 Emerging Research Grant was generously funded by Hyperacusis Research.

Hyperacusis is a condition where an individual is unable to tolerate everyday noise levels without discomfort or pain. It is a common symptom in children with neurological disorders such as autism spectrum disorders, Williams syndrome, and Rett syndrome. The cause of hyperacusis in these neurological disorders has not been fully discovered.

I have been working on noise-induced tinnitus and hyperacusis models for many years. I was never able to find a genetic animal model of these disorders. My University at Buffalo colleague, Soo-Kyung Lee, Ph.D., a professor in the department of biological sciences, contacted me to test audiogenic seizures (seizures caused by loud sounds) on FOXG1 gene variant mice, a novel mouse model that her lab just created to study FOXG1 syndrome. FOXG1 syndrome is a recently defined, rare, and devastating neurodevelopmental disorder. Dr. Lee and her husband, Jae W. Lee, Ph.D., also a professor in the same department, are parents to a daughter, Yuna, who was born in 2010 with FOXG1 syndrome.

Learning about this new mouse model, my first question was whether children with the FOXG1 gene variant also have audiogenic seizures and reduced sound tolerance. We learned that many children with FOXG1 syndrome show symptoms of autism spectrum disorders, and some do report reduced sound tolerance such as becoming startled, upset, and even experiencing seizures from loud sounds.

It inspired us to test sound behaviors in the FOXG1 gene variant mice. In our preliminary data, we found that the new mouse model shows hyperactivity in noisy environments. The model also shows a unique firing pattern of sound-evoked auditory cortex responses compared with the hyperacusis model induced by noise exposure.

This project will allow us to find a novel neurological mechanism causing hyperacusis in FOXG1 syndrome, and it may also apply to hyperacusis in autism spectrum disorders. It may point toward a novel neurological model of hyperacusis compared with the current "central gain" theory. The findings can help us understand the role of the central auditory system in hyperacusis as well as design clinical studies to look at drug treatments and therapies for hyperacusis in children with FOXG1 syndrome and other neurological disorders.

Growing up in China, I was interested in the natural sciences when I was young and I wanted to become an engineer to invent devices. After I worked as a bioengineer for several years in the department of otorhinolaryngology at a hospital in Beijing, I became interested in medicine and audiology and and pursued a master's in each discipline, followed by a doctorate in audiology.

HYPERACUSIS RESEARCH
Stop Noise-Induced Pain

Wei Sun, Ph.D., is generously funded by Hyperacusis Research. We thank them for their support of studies that will increase our understanding of the mechanisms, causes, diagnosis, and treatments of hyperacusis and severe forms of loudness intolerance.

We need your help funding** the exciting work of hearing and balance scientists. Please consider donating today to Hearing Health Foundation to support groundbreaking research.* ***Visit hhf.org/how-to-help.