

**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



**George Burwood, Ph.D.**

Oregon Health & Science University

Burwood received his doctorate in auditory physiology from the University of Brighton in the U.K. He completed postdoctoral training at Oregon Health & Science University, where he is now a research instructor at OSU's Oregon Hearing Research Center. Burwood is a 2023 Emerging Research Grants recipient.

**COCHLEAR IMPLANTS** are electrical devices that stimulate the inner ear to partially restore hearing. Some cochlear implant (CI) patients are also fitted with a hearing aid which amplifies sound at the low frequencies. This hybrid implant approach maximizes the sound quality for these individuals who still have low frequency hearing.

**UNFORTUNATELY, SOME OF THESE PATIENTS** lose their low frequency hearing after surgery, and the mechanisms are unknown. One theory states that scarring caused by the presence of the CI disrupts the typical movement of sound waves through the inner ear. Using optical coherence tomography (OCT)—advanced imaging techniques that simultaneously measure nanometer scale vibrations—I aim to reproduce implantation-induced hearing loss in a rodent model and measure exactly how implantation and scarring influences the function of the inner ear at low frequencies.

**DURING MY POSTDOCTORAL WORK** with Alfred Nuttall, Ph.D., I studied the mechanics of the cochlear apex, and my colleague Lina Reiss, Ph.D., has a research interest in CIs. We'd collaborated on a project using OCT to analyze how cochlear blood flow changes during CI surgery. In conversation with Lina I learned more about the issues surrounding hybrid implants and hearing loss and how there may be a mechanical link.

**MY GRANDMOTHERS BOTH** suffered from age-related hearing loss while I was growing up, and I saw how losing their hearing later in life made them lonely and frustrated. To my mind it signaled that while longevity has benefited hugely from research and modern medicine, some aspects of quality of later life are lacking. This made me want to study how to improve therapies that treat hearing loss, such as CIs.

**AS THIS IS THE FIRST TIME**, to my knowledge, that the vibration of the inner ear has been measured in the presence of a CI, there is much to discover—such as measuring the efficacy of drugs that help to suppress scarring, as well as testing different electrode designs, and even extending to other inner ear conditions such as Ménière's disease. I believe that OCT has a big role to play in the future of basic hearing science and hearing restoration, not to mention new technologies on the way, such as optical CIs and fully implantable microphones.

**I ENJOY HIKING** Oregon's beautiful wilderness and have recently learned some mountaineering techniques, too. The peace of nature makes me think about the din we are constantly subjected to in our industrialized world, and how it affects our auditory health. Also, the wilderness environment was the evolutionary stage upon which our hearing systems were set. Perhaps this is why we are so maladapted to dealing with loud sound? Some of my earlier blood flow research might suggest so. —

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