SIU Medicine Scientist Receives DOD Grant To Advance Hearing Loss Treatments

by SIU School Of Medicine
February 7 2023 3:11 PM

SPRINGFIELD - The U.S. Department of Defense (DOD) has awarded a $1.5 million grant to SIU School of Medicine scientist Brandon Cox, PhD, to test compounds that are predicted to stimulate regeneration of cells used for hearing, called hair cells. The process could illuminate a path to restore human hearing.

Researchers have discovered that birds, fish and amphibians can regrow these auditory hair cells. The new hair cells form from adjacent supporting cells after damage.

Humans are born with roughly 12,000 of these specialized sound-detecting cells within the ear. Hair cell damage is a common cause of hearing loss, affecting about 1.5 billion people worldwide. Once hair cells are killed, it is believed the damage is irreversible and becomes cumulative as we age.

Hearing loss is the most common injury that affects men and women serving in the United States military. The damage can result from either intense or prolonged exposure to loud noise or exposure to specific medications. Members of other professions like farming, mining and construction also suffer from hearing damage as an occupational hazard.

Cox has been investigating the mechanism controlling hair cell regeneration throughout her career. During her post-doctorate training at St. Jude's Children's Research Hospital, she discovered that newborn mice had the ability to spontaneously regenerate these hearing cells. Her work at SIU School of Medicine since 2013 has expanded these findings to define the cellular pathways involved in the regeneration process, the maturation state of the new cells, and the capacity of different groups of neighboring support cells to create a replacement hair cell. Her lab is also doing research on the vestibular system that regulates balance.

For the DOD study, the screening process will include methods to distinguish the new replacement hearing cells that are derived from neighboring cells from the original surviving hair cells. Cox's team will use a unique breed of mice that have supporting cells in their inner ears marked with a red fluorescent protein. The protein can be seen under a microscope and helps distinguish a hair cell created from one of the red supporting cells from a pre-existing cell.

"There are currently no FDA-approved drugs for the treatment of hearing loss. Only two drugs for hair cell regeneration have ever reached clinical trials, but so far they have shown limited or no benefit," Cox said. "The ability to trace the supporting cells during the drug screening makes this process a promising route to discover which drug compounds have genuine regenerative properties for our hearing. It will increase the likelihood of identifying good therapeutic candidates more quickly for clinical trials."

Cox is an associate professor in SIU's Department of Pharmacology. Previously, she was awarded a $1.5 million DOD grant and $6.2 million in grants from the National Institute on Deafness and Other Communication Disorders (NIDCD) of the National Institutes of Health (NIH) for her research.

The mission of SIU School of Medicine is to optimize the health of the people of central and southern Illinois through education, patient care, research and service to the community. SIU Medicine, the health care practice of the school of medicine, includes

clinics and offices with more than 300 providers caring for patients throughout the region.