

CAROL BAUER, M.D.

Translational Tinnitus

The best part of being an academic surgeon, says Carol Bauer, M.D., is getting to do it all: teach, treat patients and do basic and clinical research. "Working with the patients, I can listen to their problems, and that helps me formulate better research questions. Other researchers don't have that opportunity."

Dr. Bauer has used all those skills in her studies of the cause and treatments for tinnitus, chronic ringing in the ears, that afflicts 17 million U.S. citizens.



Dr. Bauer dissects cochleas as part of her tinnitus study.

In the past 12 years, she has acquired numerous grants, including two from NIH's National Institute on Deafness and Other Communication Disorders (NIDCD). Her tinnitus research has received more than \$350,000 in funding since 1996. Her research partner is her husband, SIU researcher Thomas J. Brozoski, Ph.D.

Each tinnitus project has built on the results of the previous one, Dr. Bauer says. From developing an animal model in 1992, she was able to create a behavioral model of chronic tinnitus with her first NIH grant, a key development for a disease that has no objective markers. "We developed a chronic model of tinnitus. Before, no one else in the world had a way to study tinnitus in animals over a long period of time." That was an R21 grant, funds aimed to support the early, conceptual stages of research project development.

The model involved training rats to press a lever for a food reward under conditions of background noise and to stop lever pressing when the sound is off. Then, one group of rats was exposed to acoustic trauma to develop tinnitus. "With the constant ringing of tinnitus, we could monitor changed behavior and measure the effects of treatments," Dr.

Bauer says. The logic behind the model is that tinnitus can sound like just about anything, except silence.

Her current NIDCD grant totals more than \$1 million, and the tinnitus research team will use the same animal model to continue to dig for answers about tinnitus development. "We are looking at neurosignals, the ways that neurons code for sound, to see what the tinnitus signal is in the brain," she notes. The project is an RO1 award, NIH's chief mechanism for funding established research protocols.

Among her achievements is the discovery that an existing drug, Neurontin®, can relieve tinnitus in some patients, a treatment that was revealed by the animal model. Collaborating with Dr. Caspary, SIU Dept. of Pharmacology, she is still investigating the potential of this and other drugs. "This is real translational research," Dr. Bauer says. "The knowledge from the earlier NIH study allowed us to discover the potential of Neurontin®." ■