

All Ears

“Did you know that your ears produce sound?” asks Kathleen Campbell, Ph.D., professor and director of Audiology, part of SIU’s Department of Surgery.

Yes, it’s true — ears don’t just receive sounds, but they also can make their own.

Called otoacoustic emissions, they occur when the cochlea produces acoustic signals. Most infants and about 40 percent of adults produce otoacoustic emissions, which have allowed audiologists to test hearing in infants and even comatose patients to ensure that the cochlea is functioning normally. SIU’s audiology clinic was a pioneer in Illinois in the use of otoacoustic emissions to test patients.

The audiology clinic, established by Dr. Campbell in 1989, sees approxi-

mately 3,000 patients per year in its location at the St. John’s Hospital Pavilion in Springfield.

“We see everyone from infants to adults,” says Dr. Campbell. The clinic team includes otolaryngologists, licensed audiologists and nurses. “One of the most important things in life is maintaining communication. And a large part of communication depends on hearing.”

More than 21 million Americans suffer from some degree of hearing

loss, although only a small portion use some kind of assistive hearing device and/or hearing aid.

For those needing auditory assistance, the clinic offers a wide variety of hearing aids, which have come a long way since the ear horn.

“In the past, patients often complained about constantly readjusting the volume levels of their hearing aids in different locales,” says Dr. Campbell. Digital hearing aids have virtually eliminated this complaint,



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since many are programmable for each individual's comfortable volume level, so no volume control is needed. Plus, the hearing aids can automatically adapt to the sound's decibel level. With the push of a remote control button, wearers can adjust the devices for different environments such as at home, at work, or in the car. Anti-feedback circuits now reduce or eliminate the hearing aid whistling that used to be annoying and embarrassing for those with hearing aids.

The sizes of hearing aids vary, from some tiny enough to fit inside the ear canal to slightly larger ones fitted behind or in the ear. Even disposable hearing aids are now available. "We talk with the patients about their physical and aesthetic needs," says Dr. Campbell.

Jacque Morton, M.A., is a clinical audiologist specializing in hearing aids. She takes a no-nonsense approach to her patients. "I'm straight with them and let them know that a smaller hearing aid may not work as well for them. Some emphasize appearance, some optimal hearing." She enjoys the challenges of audiology. "I like being able to help people enjoy their surroundings again." Ginger Derrick, M.A., Kathleen Faloon, M.S., M.A., and Kendra Watts, M.A., are the clinic's other audiologists.

"For adults," says Watts, "hearing

loss often leads to depression as they withdraw from life activities. It's frustrating and tiring both mentally and physically to struggle to hear. Hearing aids definitely improve their quality of life."

In addition, the clinic helps patients obtain other assistive devices, including amplified telephones, flashing alarm clocks and light-activated doorbells.

"Most permanent hearing loss is in the inner ear," says Dr. Campbell. "Noise, aging, poor nutrition and lack of exercise all may contribute. Approximately 80 percent of adult hearing loss is not correctable, but it is manageable with hearing aids and assistive devices."

Dr. Campbell recommends a healthy, active lifestyle to maintain good hearing. "Physically fit people are more resistant to noise-induced hearing loss," she says. "General health relates to the sensory system and affects the vascular systems of the body."

She recommends that healthy individuals get their hearing checked every five years. Those with hearing loss should be checked annually.

Testing infants' hearing is vitally important for normal development, stresses Dr. Campbell. "We can test hearing at birth, and we can fit infants with hearing aids by the time they're two months old." Prior to routine prenatal hearing screening, says

Dr. Campbell, the average age at which children with hearing loss were first referred was 2 1/2 years. "By that age, bonding between the child and parent will have been severely affected, and the child will be permanently behind on speech and language skills." The reason for this is that the neuropathways in the ear that carry sound must be stimulated in order to develop. The longer the neuropathways go without stimulation, the less likely they are to ever fully develop.

Lawmakers have recognized the importance of infant hearing tests. As of December 31, 2002, every baby born in Illinois must have a hearing screening. "That means we'll need to offer more services," says Dr. Campbell, who notes that there has been a 60 percent surge in compliance — months before the law will be enforced. She is working with audiologists in southern Illinois to make sure that people will be able to get the services they need. "We want to determine how we can form a collaborative network," she says.

In addition to caring for patients, Dr. Campbell and cell biologist Robert Meech, M.A., have done extensive research with a promising agent called D-Methionine, finding that it can protect the body against the side effects of chemotherapy. "Certain chemotherapeutic agents cause hearing loss,"

says Dr. Campbell. "Our studies, which have been replicated at other institutions, have found that D-Methionine protects against hearing loss when it is given prior to platinum-based chemotherapy." The School of Medicine patented the agent for this procedure.

Dr. Campbell, the primary investigator of this agent, has led further studies that have shown that D-Methionine, used in conjunction with chemotherapy, also protects the kidneys and the nervous system and may protect patients from severe weight loss.

Though this was a significant breakthrough, experts feared that by reducing the ototoxicity in patients, D-Methionine might decrease the anti-tumor action of the chemotherapy. Dr. Campbell has not found that to be true. "D-Methionine is an antioxidant, a detoxification unit that promotes other antioxidants in the body and helps fight the negative effects of chemotherapy."

In fact, D-Methionine is not alien to the human body. "D-Methionine is actually a micronutrient found in cheese," says Dr. Campbell, adding that patients "would have to eat more than five pounds of cheese a day to get the effects we're pursuing in the lab!"

Methionine is used to counteract acetaminophen overdosing, to control urinary odor and diaper rash, and in



Hearing aids have come a long way since the days of the ear horn. These hearing aids use computing techniques to process sound.

intravenous nutritional supplements.

In addition to chemotherapy, further studies have shown that D-Methionine works for other types of drug-induced hearing loss caused by aminoglycoside antibiotics used for severe infections. The School owns patents for this finding as well. "We want to let people stay on their drug treatment protocol and not have to alter treatment because of hearing loss," says Dr. Campbell.

She and her team of research collaborators also have found that D-Methionine prevents noise-induced hearing loss, and they have received another NIH grant to develop that research. SIU is in the process of patenting this discovery. "It's very important that researchers patent their work," says Dr. Campbell. "Without patents, the drug may never reach patients." These studies have been partly funded through the School of Medicine's Central Research Committee.

Dr. Campbell currently is exploring partnerships with pharmaceutical companies and clinical test sites to pursue clinical trials for D-Methionine.

Upcoming projects for the audiology program include studying central auditory processing in children. "Some children can process sounds

such as instructions, but they can't remember the order," says Dr. Campbell. "It's not a lack of intelligence," she stresses. "It's a central processing problem in the auditory pathways. It can be a type of learning disorder. For example, some patients can't fuse together different frequencies coming in at the same time, and others cannot remember an auditory sequence." Ginger Derrick, M.A., and Dr. Campbell are developing the project, which will include testing and counseling the children. Children's Miracle Network has provided funding. Dr. Campbell hopes to have it up and running by the year's end.

SIU audiology is recognized nationally and internationally. In the last year, Dr. Campbell has been elected to the National Board of the American Academy of Audiology, has received a Special Presidential Citation from the American Academy of Audiology and was made a Fellow of the American Speech Language Hearing Association.

The audiology clinic at SIU hears what its patients need. And that sounds good. ■