UCI Medical Center

FALL 2006

UCI Health www.ucihealth.com

The SOUND of HOPE

Imagine being unable to hear music, ringing telephones, laughter, or the sound of a loved one's voice.

The world is a silent place for more than 1 million Americans who are severely or profoundly deaf. But new approaches to this age-old problem are helping a growing number of people connect with the hearing world.

"Cochlear implants have come a long way since the mid-1980s when they were first approved by the Federal Drug Administration," says **Dr. Hamid Djalilian**, a UCI Medical Center otologist-neurotologist specializing in hearing, dizziness and skull base surgery. In a person with normal hearing, cochlear hair cells in the inner ear send electrical impulses directly to the auditory nerve. But if there's a break in this complex progression of events, deafness occurs. The cochlear implant substitutes for the faulty hair cells, bridging a critical gap.

New technology. "Current cochlear implant models stimulate the auditory nerve at higher speeds than previous versions and are equipped with up to 22 electrodes to extend the range of frequencies heard," says Djalilian. "They also have more sophisticated hardware and software." The result: better speech recognition by cochlear implant patients—and greater ease in connecting with their environment, including the ability to use the telephone.

To be eligible for a cochlear implant, patients must be able to hear no more than 50 percent of what's said while they're wearing a powerful hearing aid. They must also undergo extensive testing and counseling. Children as young as six months and adults as old as 85 years can be considered as implant candidates if both ears are severely affected.

The implant operation consists of placing the internal portion of the device under the skin behind the ear. About the size of a quarter, it consists of a titanium disk that houses a receiver, electrode system and magnet. The electrodes are surgically inserted into the inner ear with painstaking precision to stimulate the auditory nerve. Djalilian was the first surgeon in the United States to perform the procedure using a local anesthetic.

Sound check. Patients can't hear until they return several weeks later to receive the external portion of the implant. It consists of a miniature microphone, speech processor and transmitter. The microphone and speech processor look like a behind-the-ear hearing aid. The transmitter is held in place on the head by a small magnet that is attracted to the surgically implanted receiver. The microphone captures sound and sends it to the speech processor, which analyzes and digitizes the information, passing it on to the implanted transmitter.

Once the external components are activated, the implant is programmed. The words that a cochlear implant patient hears have an artificial, robot-like quality. "This is because 22 electrodes can't duplicate the complexity of 3,000 cochlear hair cells," says research director **Fan-Gang Zeng, Ph.D.**, a UCI Medical Center hearing scientist and bioengineer. Many months of intensive speech therapy are usually necessary to help patients interpret what they're hearing.

There are several other implantable hearing devices available to help deaf and hard-of-hearing people. Among them is the bone-anchored hearing aid, which is designed for patients with middle-ear hearing loss. It conveys sound directly to the inner ear through the skull bone, bypassing the middle ear. It's ideal for patients with single-sided deafness and those who can't use conventional hearing aids.

For an appointment with a UCI hearing specialist, call 714-456-7017.

Toll free 1-877-UCI-DOCS