Jeanne Coburn, CCC-A/SLP, an implant audiologist, spends a great deal of time counseling patients and their families about realistic expectations about what cochlear implants can and cannot do.

Baystate's Cochlear Implant Program

A "Miracle" for the Hearing Impaired

By Scott P. Edwards

As a former elementary school band instructor, music means the world to Sally Lowell. However, after the birth of her second son in 1955 at age 30, she began to notice marked hearing loss and was diagnosed with otosclerosis, an abnormal growth of bone in the middle ear that prevents the ear from working properly. After she retired in 1987 and despite hearing aids, Ms. Lowell stopped going to concerts and started playing the piano strictly from sheet music, not by ear as she used to. Today, this 78-year-old Agawam resident, who became the first recipient last April of a cochlear implant at Baystate Medical Center, is again enjoying music. "The sounds are coming back and filling my life with music in all forms," she says. "Mine is a story of seven letters. M-I-R-A-C-L-E."

Cochlear Implant Device

Cochlear implants are the result of intense research and development over the last half-century. Since Alessandro Volta's discovery of the electrolytic cell in the late 18th century, scientists have attempted to provide hearing by electrical stimulation of the auditory nerve. The first crude insertion of electrodes in the cochlea to stimulate hearing occurred in 1964, and the first commercially marketed cochlear implant was developed in 1972.

The snail shell-shaped cochlea in the inner ear is the key to hearing, converting sound pressure impulses from the outer ear into electrical signals that are sent along the auditory nerve to the brain for interpretation as sound. When there are changes in how the cochlea works or how the auditory nerve transmits neural energy to the brain, the result is sensorineural hearing loss.

The cochlear implant device itself is very straightforward. An array of electrodes is surgically placed along the length of the cochlea, with wire leads connected to an electronics package implanted under the skin behind the ear. The external device includes a microphone, which picks up sound from the environment; a speech processor, which selects and arranges sounds picked up by the microphone; and a transmitter that beams the control signals to the implant. The implanted receiver/stimulator receives signals from the speech processor, converts them into electrical impulses, and delivers them to the electrodes. These electrical stimuli excite auditory nerve fibers, causing them to send impulses to the brain.

Recognizing the value cochlear implants offer to the hearing impaired, Baystate Medical Center was committed to bringing this technology to western

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Massachusetts. Previously, patients had to travel to Boston, but with the addition to the medical staff of Theodore Mason, MD, a specialist in otology/neurotology with Ear, Nose & Throat Associates of Springfield who trained at the California Ear Institute at Stanford University, Baystate was able to launch its own Cochlear Implant Program. Dr. Mason works with Jeanne Coburn, CCC-A/SLP, an implant audiologist who divides her time between Baystate's Cochlear Implant Program and Clarke School for the Deaf in Northampton. Other members of the treatment team include nurses, surgical technicians, anesthesiologists, child life professionals and each patient's referring physician. Dr. Mason noted that good family support is also essential for success. Since its inception last February, the program staff has performed 14 cochlear implants - 12 for adults and two for children.

The surgical procedure can often be performed on an outpatient basis; however, an overnight stay for observation may be required. "Post-surgical follow-up is essential," says Ms. Coburn. As an implant audiologist, her role is to "fine tune" the speech processor. These adjustments are necessary, she says, because "it takes time for the auditory nerve to adapt to the signals and for the brain to interpret the signals." She also spends a great deal of time counseling patients and their families about realistic expectations about what cochlear implants can and cannot do.

Implant Candidates

Aging and prolonged exposure to loud noise are the most common causes of high-frequency sensorineural hearing loss. Bacterial and viral illnesses and genetics may also contribute. While both low- and mid-pitch hearing are usually preserved, the inability to detect high-frequency pitches interferes with word understanding and verbal communication.

Cochlear Implant Device

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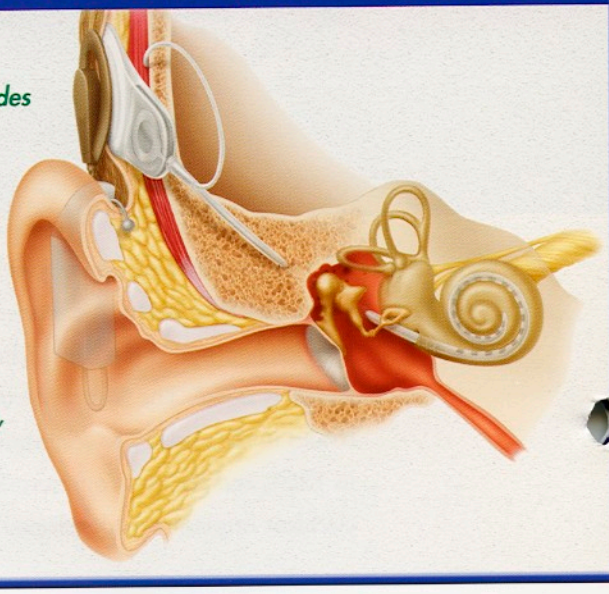

Sally Lowell of Agawam was the first recipient last April of a cochlear implant at Baystate Medical Center, and is again enjoying music.

Adult candidates for cochlear implantation at Baystate must be at least 18 years old, have severe to profound sensorineural hearing loss in both ears, and receive little or no benefit from appropriate hearing aids. "The candidate pool for adults is enormous," says Dr. Mason. "There is no upper age limit for adult candidates, provided they are healthy enough to undergo a 90 minute surgical procedure."

Children as young as 12 months old may also be candidates for implants if they have profound sensorineural hearing loss in both ears, have had an appropriate trial with hearing aids, and receive little or no benefit from traditional amplification.

Dr. Mason and Ms. Coburn determine an individual's candidacy after extensive audiological testing and education about the implants. Meetings with social workers, educators, or psychologists are occasionally required to fully determine candidacy as well.

Benefits for Older Adults

"Cochlear implants," says Dr. Mason, "are an amazing way to help people get their lives back. I see this especially with older patients who tend to withdraw from family, community and friends because it's too hard to communicate. Older patients with hearing loss tend to suffer from depression, but once they receive the implant, they become the 'center' of life again."

Dr. Mason gives an example an 87-year-old woman who received a cochlear implant. "She is the matriarch of the family, with six children and numerous grandchildren. She couldn't talk to or impart her wisdom on any of her grandchildren. Now that she's had her implant, she's talking to her grandkids on the telephone."

The link between hearing loss and depression is often overlooked by doctors, especially with older patients who wear hearing aids. Many of these seniors struggle unsuccessfully with powerful hearing aids, withdrawing from society and showing signs of depression. Through the Cochlear Implant Program, Dr. Mason hopes to educate area physicians about hearing loss and the options that exist, including cochlear implants, for hearing-impaired individuals.

"Older patients have a lot of auditory memory to draw on," says Ms. Coburn, "and because of this, they tend to do very well with cochlear implants. Because of this auditory memory, many older patients are having 'normal' conversations within one to three months of receiving their implants. It gives them a whole new lease on life and takes away a lot of the isolation of having hearing loss."

For more information or to refer a patient to the Baystate Cochlear Implant Program, please call Dr. Theodore Mason at (413) 732-7426.