Cochlear Implants

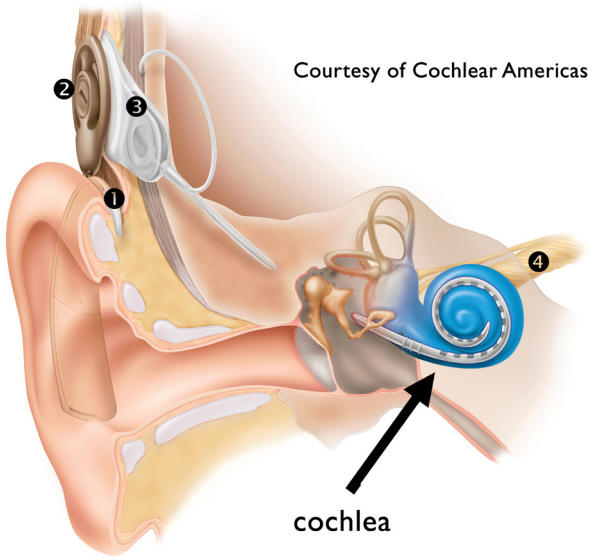
Overview

Cochlear implants (CIs) are complex electronic devices surgically implanted under the skin behind the ear. These devices utilize electrodes placed in the inner ear (the cochlea) to stimulate the auditory nerve of individuals with significant permanent hearing loss.

Cochlear implants may not be suitable for everyone. They are designed to provide useful hearing and improved communication ability to individuals who could not benefit from the most powerful hearing aids.

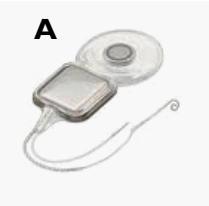
How cochlear implants work

Cochlear implants are not hi-tech hearing aids. For persons with a permanent significant hearing loss, hearing aids use amplified sound to stimulate the damaged hair cells of the auditory nerve in the cochlea. However, the damaged hair cells decrease the auditory nerve's ability to carry information to the brain. Cochlear implants bypass the damaged hair cells by providing direct electrical stimulation of the auditory nerve.



Every CI is comprised of the following:

- microphone
- sound processor
- signal coupler (transmitter and receiver)
- internal receiver
- electrode array(s)



Internal and external parts are shown:
A: Internal implant attached to an electrode array
B: Behind the ear speech processor and remote

How does a CI produce hearing?

1. The sound processor captures sound and converts it into digital code.

2. The sound processor transmits the digitally coded sound through the coil to the implant.

3. The implant converts the digitally coded sound to electrical impulses and sends them along the electrode array, which is positioned in the cochlea.

4. The implant's electrodes stimulate the auditory nerve, which then sends the impulses to the brain where they are interpreted as sound.

The brain's challenge is to interpret the electrical code as meaningful auditory information for environmental and speech cues.

Expectations

Cochlear implants will not restore hearing to "normal." When an individual is considered for a cochlear implant, the audiologist and otolaryngologist stress the fact that the implant will not result in hearing that is the same as biologic hearing. Benefits derived vary greatly among individuals. Some CI users only gain knowledge of environmental sound, while others gain ability to use the telephone and recognize music. It is important that recipients and the people surrounding them understand that cochlear implants do not enable a deaf person to function as a hearing person!

What are the impacts in postsecondary education?

Postsecondary education students may have received their first implant in preschool, elementary, high school,

or college. They may be a bilateral user with two implants. Different backgrounds have resulted in a broad range of listening, speech, speechreading, sign language, literacy, and cognitive abilities pre and post-implant.

Regardless of the benefit they derive from their cochlear implant, students will still require the use of support services. The support services requested may be the same as those for other deaf and hard of hearing students.

Some students will request sign language interpreters, oral interpreters, or Cued Speech transliterators. Still others will ask for speech-to-text services (e.g., C-print, CART). Notetaking services have frequently been requested.

Opportunities to listen in the classroom are invaluable for all students with CIs. Auditory input can be provided by listening to instructors, classmates, recorded lectures, DVDs/CDs, text to speech software, computer programs, etc.

Most students with CIs hear very quiet environmental sounds. Strategies used to improve the classroom's acoustics, (e.g., carpeting, drapes, closing the door/windows during instruction, etc.) may reduce the distractions in the classroom. The use of Assistive Listening Devices also plays a critical role in improving listening conditions.

Assistive Listening Devices

All cochlear implants are compatible with Assistive Listening Devices (ALDs). Just as hearing aids are often not sufficient to hear well in many settings so, too, do ALDs assist the CI user.

Some examples of ALDs for use with CIs include Personal FM systems, room loops, soundfield speaker systems, infrared systems, headsets, and others. Examples are shown here.

For more information, visit the following Website:
http://www.utdallas.edu/~thib/ASHACIFMHandout.doc

Some students with CIs are skilled at advocating for themselves. Others may need some type of peer support, mentoring, or counseling service to deal with issues that are a result of either having a CI or being late deafened, both of which make the individual stand out from his/her hearing and culturally deaf peers. It may be beneficial to identify other people in the community who have CIs and/or became deaf beyond the age of 16. These people are valuable resources, who should not be overlooked nor underestimated.

Other tips
DO face the person when talking.
DO speak clearly.
DO repeat a sentence exactly. If still not understood, then choose alternative phrases to express your thoughts.
DO provide preferential seating if requested.
DO monitor environmental noise.
DO monitor environmental light.
DO point out who is talking.
DO repeat questions/comments from the class.
DO be familiar with Assistive Listening Devices.
DO discuss communication access with the student.

DON'T turn away from the CI person's view when speaking.
DON'T over-exaggerate your speech.
DON'T attempt to talk over loud environmental noise: wait for the noise to stop or move to a quieter location.
DON'T speak while writing on the board.
DON'T shout when speaking.
DON'T speak with objects in or in front of your mouth.
DON'T pace around the room while lecturing.
DON'T assume that the student is aware of all the available support services. Refer the student to the Disability Student Services office when appropriate.

FM Receiver

Courtesy of Advanced Bionics

For more information, as well as other topics covered by the PEPNet Tipsheet series, visit PEPNet's Web site at http://www.pepnet.org.

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