General Information on Cochlear Implants

From: http://www.nidcd.nih.gov/health/hearing/coch.asp

What is a cochlear implant?

A cochlear implant is a small, complex electronic device that can help to provide a sense of sound to a person who is profoundly deaf or severely hard-of-hearing. The implant consists of an external portion that sits behind the ear and a second portion that is surgically placed under the skin (see figure). An implant has the following parts:

- ☐ A microphone, which picks up sound from the environment.
- ☐ A speech processor, which selects and arranges sounds picked up by the microphone.
- ☐ A transmitter and receiver/stimulator, which receive signals from the speech processor and convert them into electric impulses.
- ☐ An electrode array, which is a group of electrodes that collects the impulses from the stimulator and sends them to different regions of the auditory nerve.

An implant does not restore normal hearing. Instead, it can give a deaf person a useful representation of sounds in the environment and help him or her to understand speech.

How does a cochlear implant work?

A cochlear implant is very different from a hearing aid. Hearing aids amplify sounds so they may be detected by damaged ears. Cochlear implants bypass damaged portions of the ear and directly stimulate the auditory nerve. Signals generated by the implant are sent by way of the auditory nerve to the brain, which recognizes the signals as sound. Hearing through a cochlear implant is different from normal hearing and takes time to learn or relearn. However, it allows many people to recognize warning signals, understand other sounds in the environment, and enjoy a conversation in person or by telephone.

Who gets cochlear implants?

Children and adults who are deaf or severely hard-of-hearing can be fitted for cochlear implants. According to the Food and Drug Administration's (FDA's) 2005 data, nearly 100,000 people worldwide have received implants. In the United States, roughly 22,000 adults and nearly 15,000 children have received them.

Adults who have lost all or most of their hearing later in life often can benefit from cochlear implants. They learn to associate the signal provided by an implant with sounds they remember. This often provides recipients with the ability to understand speech solely by listening through the implant, without requiring any visual cues such as those provided by lipreading or sign language.

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Cochlear implants, coupled with intensive postimplantation therapy, can help young children to acquire speech, language, and social skills. Most children who receive implants are between two and six years old. Early implantation provides exposure to sounds that can be helpful during the critical period when children learn speech and language skills. In 2000, the FDA lowered the age of eligibility to 12 months for one type of cochlear implant.

How does someone receive a cochlear implant?

Use of a cochlear implant requires both a surgical procedure and significant therapy to learn or relearn the sense of hearing. Not everyone performs at the same level with this device. The decision to receive an implant should involve discussions with medical specialists, including an experienced cochlear-implant surgeon. The process can be expensive. For example, a person's health insurance may cover the expense, but not always. Some individuals may choose not to have a cochlear implant for a variety of personal reasons. Surgical implantations are almost always safe, although complications are a risk factor, just as with any kind of surgery. An additional consideration is learning to interpret the sounds created by an implant. This process takes time and practice. Speech-language pathologists and audiologists are frequently involved in this learning process. Prior to implantation, all of these factors need to be considered.

What does the future hold for cochlear implants?

With advancements in technology and continued follow-up studies with people who already have received implants, researchers are evaluating how cochlear implants might be used for other types of hearing loss.

NIDCD is supporting research to improve upon the benefits provided by cochlear implants. It may be possible to use a shortened electrode array, inserted into a portion of the cochlea, for individuals whose hearing loss is limited to the higher frequencies. Other studies are exploring ways to make a cochlear implant convey the sounds of speech more clearly. Researchers also are looking at the potential benefits of pairing a cochlear implant in one ear with either another cochlear implant or a hearing aid in the other ear.

Where can I get more information?

NIDCD maintains a directory of organizations that can answer questions and provide printed or electronic information on cochlear implants. Please see the list of organizations at www.nidcd.nih.gov/directory.

Use the following keywords to help you search for organizations that are relevant to cochlear implants:

- ☐ Cochlear implants
- ☐ Assistive technology
- ☐ Assistive listening device

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For more information, additional addresses and phone numbers, or a printed list of organizations, contact:

NIDCD Information Clearinghouse
1 Communication Avenue
Bethesda, MD 20892-3456
Toll-free Voice: (800) 241-1044
Toll-free TTY: (800) 241-1055
Fax: (301) 770-8977
E-mail: nidcdinfo@nidcd.nih.gov

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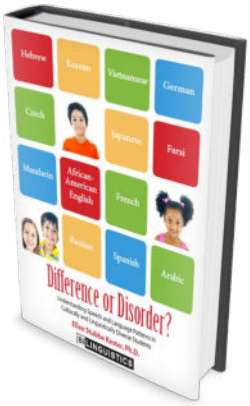

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