

# Cochlear Implants

**Cochlear implants** are small, electronic devices that can be surgically implanted to enable profoundly deaf children and adults who are not helped by traditional hearing aids to hear better. The May 19, 2004, issue of *JAMA* includes an article about cochlear implantation in children, and the May 2004 issue of the *Archives of Otolaryngology–Head & Neck Surgery* is a theme issue devoted to this topic.

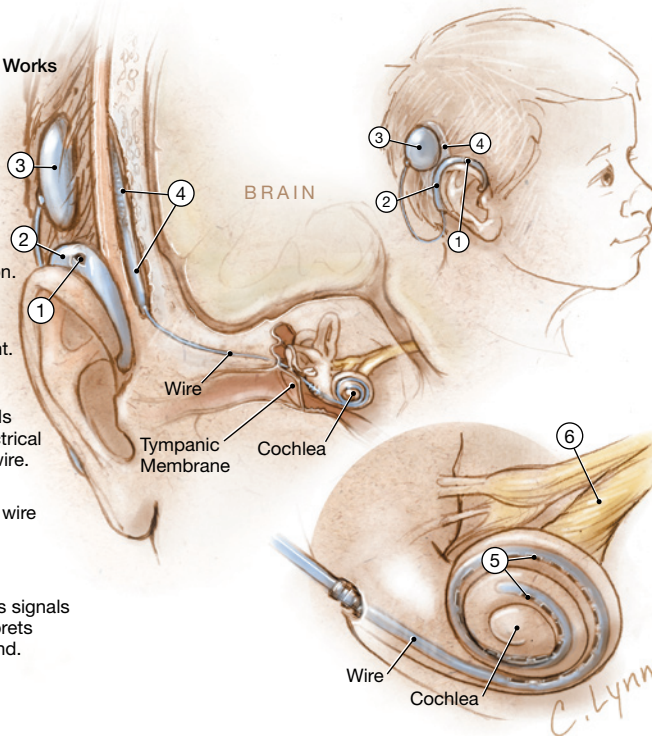
## HEARING

- Sound waves funneled into the ear cause the **tympanic membrane** (eardrum) to vibrate.
- These vibrations are transmitted across a bridge formed by 3 small bones to the **cochlea** of the inner ear.
- The fluid-filled **cochlea** contains hair cells that sense vibrations transmitted through the fluid.
- The hair cells trigger impulses in the **auditory** (hearing) nerve that transmit to the brain where they are interpreted as sound.

Most profound deafness is **sensorineural**—there is damage to the sensitive and vulnerable hair cells in the cochlea so that vibrations in the cochlea cannot be transmitted. Cochlear implants can restore hearing by bypassing the hair cells and stimulating the auditory nerve directly.

### How a Cochlear Implant Works

- ① Microphone receives sound.
- ② Speech processor processes sound into digital information.
- ③ Transmitter relays information to implant.
- ④ Implant receives information and sends it as a pattern of electrical impulses through a wire.
- ⑤ Electrodes at end of wire stimulate nerve cells inside cochlea.
- ⑥ Auditory nerve sends signals to brain, which interprets nerve signals as sound.



### FOR MORE INFORMATION

- American Speech-Language-Hearing Association  
1-800/638-8255  
TTY: 1-800/498-2071  
[www.asha.org](http://www.asha.org)
- Cochlear Implant Association, Inc  
[www.cici.org](http://www.cici.org)
- Self-Help for Hard of Hearing People  
Voice: 301/657-2248  
TTY: 301/657-2249  
[www.shhh.org](http://www.shhh.org)

### INFORM YOURSELF

To find this and other JAMA Patient Pages, go to the Patient Page link on JAMA's Web site at [www.jama.com](http://www.jama.com). A Patient Page on adult hearing loss was published in the April 16, 2003, issue.

Sources: Cochlear Implant Association, Inc, National Institute on Deafness and Other Communication Disorders, American Speech-Language-Hearing Association

### AFTER SURGERY

- After the patient recovers from surgery for about a month, the speech processor is placed and then adjusted as hearing improves in a process called **mapping**. As hearing gets better, further adjustments are made over time.
- Training with speech therapists or a teacher of the hearing-impaired will help patients learn how to use the cochlear implant. Children in their formative years need to be taught to understand new sounds and their meanings and to translate them into speech and language.

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