

Cochlear Implants: Frequently Asked Questions

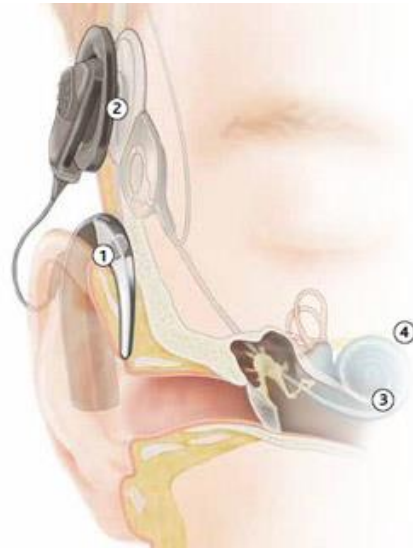
When were cochlear implants invented?

The first cochlear implants were performed in 1961, when Dr. William House implanted three single electrode devices in three patients. Improvements were made to allow for multiple electrodes in the 1960s. In 1984, the Food and Drug Administration approved the implant process in adults. Now children as young as six months of age can receive a cochlear implant.

How do cochlear implants work?

A cochlear implant works as follows (see diagram):

1. Sound is captured by the microphones on the speech processor and converted into digital information.
2. This information is transferred through the coil to the implant just under the skin.
3. The implant sends electrical signals down the electrode into the inner ear.
4. The hearing nerve fibers pick up the signals and sent them to the brain.



What are the benefits of Cochlear Implants?

We cannot predict who will perform the best with a cochlear implant; however, receiving a cochlear implant at a young age helps. Wearing the processor all waking hours and receiving speech therapy also helps to develop listening skills and speech and language. The cochlear implant is not an instant-fix and takes patience. Benefits include:

- Improved awareness of sounds
- Improved development of speech and language skills
- Improved quality of life
- Improved educational outcomes

What are the Risks of Cochlear Implants?

General Anesthesia Risks: General anesthesia is drug-induced sleep. Anesthesia may affect people differently. For most people, the risk of general anesthesia is very low. However, for some people with certain medical conditions, it is riskier.

Risks from the Surgical Implant Procedure

- Injury to the facial nerve --this nerve goes through the middle ear to give movement to the muscles of the face. It lies close to where the surgeon needs to place the implant and could be damaged during the surgery.
- Meningitis --this is an infection of the lining of the surface of the brain.
- Cerebrospinal fluid leakage --the brain is surrounded by fluid that may leak from a hole created in the inner ear during surgery.
- Perilymph fluid leak --the inner ear or cochlea contains fluid. This fluid can leak through the hole that was created to place the implant.
- Infection of the skin wound.
- Blood or fluid collection at the site of surgery.
- Attacks of dizziness or vertigo.
- Tinnitus, which is a ringing or buzzing sound in the ear.
- Taste disturbances --the nerve that gives taste sensation to the tongue also goes through the middle ear and might be injured during the surgery.
- Numbness around the ear.
- Reparative granuloma --this is the result of inflammation if the body rejects the implant.

There may be other unforeseen complications that could occur that we cannot predict.

Other Risks Associated with the Use of Cochlear Implants

People with a cochlear implant...

- May hear sounds differently. Sound impressions from an implant differ from normal hearing, according to people who could hear before they became deaf.
 - May lose residual hearing. The implant may destroy any remaining hearing in the implanted ear.
 - May not hear as well as others who have had successful outcomes with their implants.
 - May not be able to understand language well. There is no test a person can take before surgery that will predict how well they will understand language after surgery.
 - May have to have it removed temporarily or permanently if an infection develops after the implant surgery.
 - May have their implant may be damaged or fail. In this situation, a person with an implant would need to have additional surgery.
 - May not be able to have some medical examinations and treatments such as limiting the strength of an MRI.
 - Will depend on batteries for hearing. Some devices will take disposable batteries and others will have rechargeable options, but batteries will need to be replaced or recharged daily.
 - May find them expensive. Replacing damaged or lost parts may be expensive.
 - May develop irritation where the external part rubs on the skin and must remove it for a while.
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What can limit success with a Cochlear Implant?

Many things are involved in the success of a child with a cochlear implant. Some of the most common are:

- Educational setting/Mode of Communication: We support families using any communication modality and have therapists who have additional training in listening and spoken language,

American Sign Language, Signed Exact English, and augmentative communication. If it is the goal of the family that their child learns to use spoken language, children with a cochlear implant should be in an educational environment that emphasizes spoken language and listening.

- Parent/family involvement: Language programs must carry over into the home. The external equipment must be worn during all waking hours. Parents will need to make sure that the equipment is working.
- Behavior/cooperation: The child needs to participate in the programming process. It is more difficult if the child doesn't cooperate.
- Early hearing aid use: Early, consistent use of hearing aids in young children helps provide the central nervous system with sound prior to receiving a cochlear implant.
- Age of implantation: Research has shown that children who receive cochlear implants when they are very young perform better than those who are implanted at an older age. We strive to implant children by six months.
- Reason for hearing loss: We do not always know what caused the hearing loss, but we do know that with some conditions, success is more variable. Children with auditory neuropathy, an abnormally shaped cochlea, and/or small cochlear nerve can have extra challenges.
- Hearing levels: Children with "better" hearing prior to surgery often have better outcomes with a cochlear implant.
- Other conditions: It is estimated that about 30% to 40% of children who are deaf and hard of hearing have additional diagnoses. Many children with autism, CHARGE, cytomegalovirus (CMV), or meningitis receive cochlear implants but some of these conditions create additional challenges.