

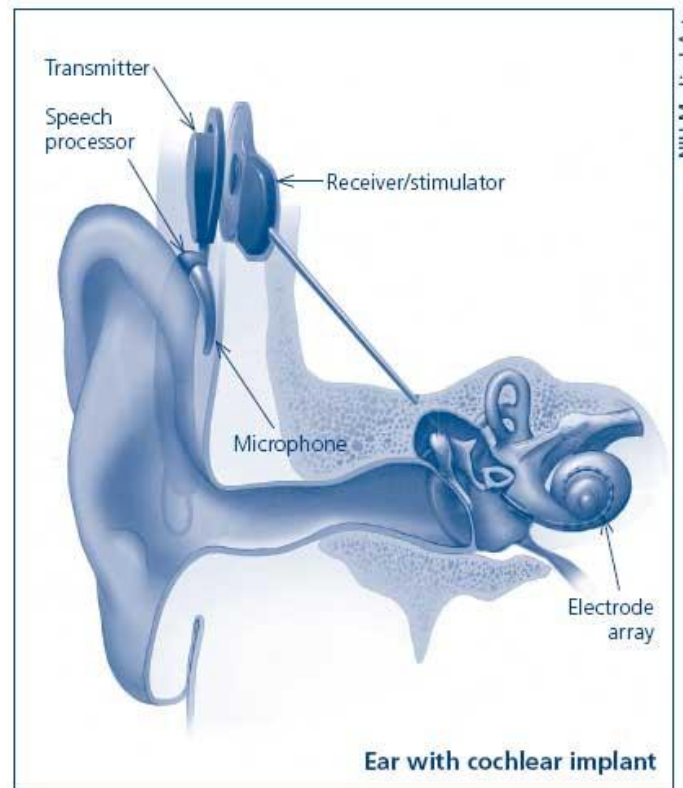


## COCHLEAR IMPLANTS

### What, Why, When, How?

#### What is a cochlear implant?

Cochlear implants have been available since the early 1980s. Cochlear implants are different than hearing aids. Hearing aids tune sound, make it louder and then deliver it into the damaged or different inner ear of someone with a permanent hearing loss. The person's inner ear, or cochlea, recognizes the sounds before sending them up to the brain for interpretation of what the sounds mean for understanding. A cochlear implant bypasses a person's different or damaged inner ear. It has two main parts, an internal part that is implanted and an external "processor." The internal part is an "electrode array" implanted into the cochlea. Outpatient surgery is needed to implant the electrode array in the cochlea. Sounds are picked up at the ear by a microphone, in an external "speech processor", which looks like a hearing aid, sorts and arranges the sounds digitally. The picked-up sounds go directly to a "receiver" under the skin of the head. The receiver changes the sounds into electric impulses and then delivers the impulses to the "electrode array". The array recognizes the electric impulses and then sends this representation of sound through the auditory nerve to the brain so it can be interpreted and understood. A cochlear implant does not restore normal hearing. It provides representation of sounds in the environment and makes them available for the brain to interpret.



#### Would my child benefit from cochlear implant(s)?

Cochlear implants are only for people who do not have enough hearing to understand all of speech when they are using the best hearing aids for their amount of hearing loss. Hearing aids do a good job of amplifying speech, but some people have too much hearing loss to be able to hear all of speech even with the most powerful hearing aids. If your child has worn hearing aids at least 3-6 months and they do not allow your child to hear all of the speech sounds at a conversational loudness in either ear then your child **may** be a candidate for a cochlear implant. Most cochlear implant users have severe to profound hearing loss (70 dB HL – 120+ dB) throughout most of the frequencies tested (500 Hz – 8000 Hz).

#### My child is deaf. Does he have to get cochlear implant(s)?

No. Deciding about a cochlear implant for your child is a family choice, based on several different factors. Every child needs access to a rich, full foundation of language learning to be ready for school. A child who is severely or profoundly deaf cannot hear spoken language clearly or loudly enough with hearing aids. Some families decide to get a cochlear implant for their child in order to help them learn to hear and use spoken language. Other families may decide to use Cued speech or signs to communicate as the way in which their child will access a rich language foundation. Either path will take extra effort on the part of all caregivers to facilitate the child's language development at the same rate as age-peers without hearing loss. It is up to the family to decide which path they want for their child and family. There is no right decision for all families.

### **When would be the best time for my child with permanent hearing loss need to receive a cochlear implant?**

The brain develops neural pathways to understanding the meaning of sounds as it receives input. Hearing loss limits sound input. Unless the hearing loss is addressed fewer pathways will form limiting future ability to understand spoken language. If you want your child to eventually use spoken language, the first step is for him to wear hearing aids all waking hours. Intensive work with the child must occur to help him develop an awareness of sound and understand that sound has meaning. If it appears as though a child is not developing sound awareness then it would be appropriate for your family to explore cochlear implantation by going to a Cochlear Implant Center. The Food and Drug Administration regulates how early children can be implanted. In general, children under the age of 12 months are not implanted. There have been exceptions though, that resulted in children being implanted a few months earlier.

Some people believe it would be fairer to the child to make his or her own decision about receiving a cochlear implant later. However, because of how the brain develops, the best speech and spoken language outcomes happen if a child is implanted before the age of three years, preferably by one year. There are increasing numbers of people from the Deaf community who are also receiving cochlear implants so that they can be more aware of sound in the environment. A child who learns and communicates with American Sign Language or Cued Speech may be implanted after the age of three, but current studies tell us that learning to listen to understand and use spoken language is much slower and more difficult for the child who receives an implant after the age of 3.

### **Will my child be able to talk if he has cochlear implant(s)?**

The answer to this important question is maybe, but not always. We know that some children do remarkably well with their cochlear implants, speaking and learning as well as or very similar to their age peers. Other children do not gain much more than sound awareness from their cochlear implant. There is no guarantee for how well any individual child will do. We are aware of some of the important ingredients of success: (1) Consistent hearing aid use followed by consistent cochlear implant use – the child always 'has his ears on' when he is awake. (2) Intensive therapy or intervention by someone who is experienced in helping families help their young children to develop listening and spoken language skills, starting as early as possible and especially after implantation. (3) Families who talk, read, and

surround their child with meaningful listening experiences every day – helping the child learn to listen and use spoken language is a priority for the whole family, at least for the first few years of the child’s life. Taking a child to therapy or having an early intervention provider in the home is important, but children learn by listening and practicing language and speech all day long. A child with cochlear implant(s) cannot be expected to learn to listen and talk just by wearing the device every day or by seeing a therapist or teacher weekly. The child must actively learn how to interpret sound, and that takes daily effort and patience by all caregivers if the outcome of spoken language and school readiness is to be achieved.

### **One implant or two implants?**

We use two ears together to tell where sound is coming from (localize) or to understand speech as well as possible in background noise. If your child is deaf in both ears, two cochlear implants may provide him with the same advantages of two ears. If your child has some useable hearing in one ear and none in the other, he may do very well with a hearing aid and a cochlear implant. This is something to discuss with the team of professionals at the Cochlear Implant Center.

### **Are there risks?**

Implanting the electrode array in the cochlea takes surgery. This surgery is relatively uncomplicated and almost always safe but complications can happen, as with any surgery. This is something to discuss with the team of professionals at the Cochlear Implant Center.

### **How would I pay for cochlear implant(s)?**

Because of the surgery and therapy needed, receiving a cochlear implant is most often covered by health insurance. This is something to discuss with the team of professionals at the Cochlear Implant Center.

### **Will my deaf child learn normally if he has cochlear implant(s)?**

Learning at the same rate as age peers can happen whether a child learns auditorily using a cochlear implant or visually using American Sign Language or Cued Speech. The key to learning success is starting school with a rich, full language base. Even children with cochlear implants who have average speech and language (or better) will encounter more learning challenges than students with typical hearing. This is because learning in a classroom can be noisy, the teacher can be distant and peer communication can occur very quickly and at a soft loudness. Classroom accommodations will still be needed to overcome some of these barriers and assistive technology will address others. Finally, the child will need to learn communication repair and self advocacy skills which will be of lifelong benefit.

### **Resources and Information**

- What should I expect? Setting Reasonable Expectations about Hearing Aid wear



Setting Reasonable  
Expectations About F

- National Institute for Deafness and other Communication Disorders (NIDCD)  
<http://www.nidcd.nih.gov/health/hearing/coch.html>
- American Speech and Hearing Association  
<http://www.asha.org/public/hearing/Cochlear-Implant/>
- American Academy of Audiology  
<http://www.howsyourhearing.org/cochlearimplants.html>
- Baby Hearing – cochlear implant information  
<http://www.babyhearing.org/HearingAmplification/Cochlear/index.asp>
- Kid's Health  
<http://kidshealth.org/parent/general/eyes/cochlear.html>
- US Department of Food and Drug Administration (regulate cochlear implants)  
<http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/ImplantsandProsthetics/CochlearImplants/default.htm>
- Website by parents of children with hearing loss; cochlear implant information  
<http://listen-up.org/ci/ci-information.htm>
- Your Guide to Your Child's Hearing - Better Hearing Institute  
[http://www.betterhearing.org/pdfs/e-Guides/Guide\\_to\\_Your\\_Childs\\_Hearing.pdf](http://www.betterhearing.org/pdfs/e-Guides/Guide_to_Your_Childs_Hearing.pdf)
- Your Guide to Financial Assistance for Hearing Aids - Better Hearing Institute  
<http://www.betterhearing.org/pdfs/e-Guides/YourGuideBuyingHearingAids.pdf>
- What Parents Should Know About Hearing Loss: Pointers for Parents - League for the Hard of Hearing  
[http://www.audiologyonline.com/articles/article\\_detail.asp?article\\_id=361](http://www.audiologyonline.com/articles/article_detail.asp?article_id=361)