

# Audiology and Speech-Language Pathology

## COCHLEAR IMPLANT SURGERY

AT CHILDREN'S HOSPITAL OF PITTSBURGH OF UPMC, we believe parents and guardians can contribute to the success of this surgery and invite you to participate. Please read the following information to learn about the surgery and how you can help.

### Fast Facts About Cochlear Implants

- A cochlear (CO-klee-ur) implant may be recommended if your child is 12 months or older; has severe to profound hearing loss in both ears; and his or her ability to hear and recognize speech did not improve through the use of traditional hearing aids.
- A cochlear implant can help a child with a hearing loss to receive sound information, but it cannot restore normal hearing. An electrical signal stimulates the hearing nerve directly, bypassing the damaged part of the ear.
- A cochlear implant consists of the outside parts that look like a hearing aid, and an inside part that must be placed under your child's skin and inside your child's ear by an otolaryngologist (ENT surgeon.)
- The cochlear implant surgery will be done as an outpatient procedure through the Same Day Surgery Center, but your child will be admitted to the hospital as an inpatient for an overnight stay.
- Your child will need to have general anesthesia medication to make him or her sleep throughout the surgery. This medication will be given by a pediatric anesthesia doctor.
- When anesthesia medication is needed, there are important rules for eating and drinking that must be followed in the hours before the surgery. *If these rules are not followed, the surgery cannot be done that day.*
- The surgery itself will last about 2 to 4 hours, but the entire procedure may take up to 6 hours, due to the recovery time.
- The cochlear implant surgery is only the first step in helping a child with hearing loss—it will take months of listening before your child will be able to use the sound provided by the cochlear implant. Your child will need to make many visits to the audiologist and receive education support in order to make full use of the cochlear implant.

### How Does Hearing Work?

As sound moves through the ear canal and strikes the eardrum, sound waves cause the eardrum to vibrate. These vibrations move the tiny bones in the middle ear, causing fluid inside the inner ear, or cochlea (CO-klee-uh), to move the hair cells. The movement of the hair cells triggers electrical impulses, which are sent to the hearing nerve inside the brain. The brain processes the impulses and you hear the sound.



When a child has severe to profound hearing loss, it usually means that there is damage to the hair cells inside the cochlea. If the electrical impulses can't get beyond the hair cells to the hearing nerve, the child is unable to process or hear the sound.

### What Is A Cochlear Implant?

A cochlear implant is a device designed to bypass the damaged parts in the inner ear. It can provide a sense of hearing to a child with severe to profound hearing loss. The cochlear implant does not restore normal hearing.

The cochlear implant consists of both internal and external parts. The "implant" is surgically placed under the skin behind the ear and electrodes are placed inside the inner ear or cochlea. The external parts are a speech processor, which looks like a hearing aid, and a cable/coil that sends a signal to the electrodes and is held in place by a magnet.

When sound enters the microphone on the outside of the ear, the processor captures the sound and converts it to electrical signals. The external transmitter sends the signals to the internal electrode inside the cochlea. The electrode stimulates the hearing nerve by skipping the damaged hair cells in the cochlea and sending the signals directly to the hearing nerve where the brain perceives the signals and interprets the sensations as sound.

## COCHLEAR IMPLANT SURGERY cont'd

A cochlear implant is different from a hearing aid. Hearing aids basically amplify sounds, or make them louder—but a child who has a profound hearing loss may be unable to process the sound information no matter how loud the sound is. Instead of making the sound louder, the cochlear implant bypasses the damaged part of the ear—the hair cells inside the cochlea—and sends the sound sensations directly to the hearing nerve in the brain.

### Home Preparation For Anesthesia

When general anesthesia is needed, there are important rules for eating and drinking that must be followed in the hours before the surgery. One business day before your child's surgery, you will receive a phone call from a nurse between the hours of 1 and 9 p.m. (Nurses do not make these calls on weekends or holidays.) Please have paper and a pen ready to write down these important instructions.

- The nurse will give you specific eating and drinking instructions for your child based on your child's age. Following are the usual instructions given for eating and drinking. No matter what age your child is, *you should follow the specific instructions given to you on the phone by the nurse.*

#### For children older than 12 months:

- After midnight the night before the surgery, do not give any solid food or non-clear liquids. That includes milk, formula, juices with pulp, coffee and chewing gum or candy.

#### For infants under 12 months:

- Up to 6 hours before the **scheduled arrival time**, formula-fed babies may be given formula.
- Up to 4 hours before the **scheduled arrival time**, breastfed babies may nurse.

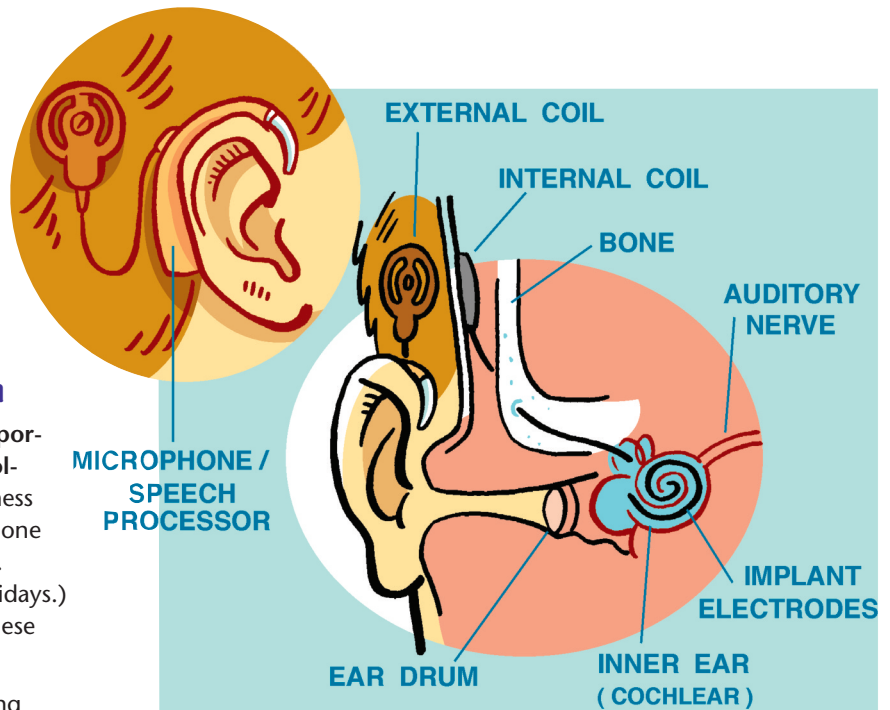
#### For all children:

- Up to 2 hours before the **scheduled arrival time**, give only clear liquids. Clear liquids include water, Pedialyte®, Kool-Aid® and juices you can see through, such as apple or white grape juice.
- In the 2 hours before the **scheduled arrival time**, give nothing to eat or drink.

### The Cochlear Implant Surgery

You will need to register your child at the Same Day Surgery Center. You and your child will be called to meet with a nurse, who will take your child's vital signs, weight and medical history. As the parent or legal guardian, you will be asked to sign a consent form before the sleep medication is given.

- The anesthesiologist will meet with you and your child to review your child's medical information and decide which kind of sleep medication he or she should be given.



- If your child is very scared or upset, the doctor may give a special medication to help him or her relax. This medication is flavored and takes effect in about 10 to 15 minutes. If you wish, you may stay with your child as the sleep medication is given.
- Younger children will get their sleep medication through a "space mask" that will carry air mixed with medication. Your child may choose a favorite scent to flavor the air flowing through the mask. There are no shots or needles used while your child is still awake.
- Older children may choose between getting their medication through the mask or directly into a vein through an intravenous (IV) line.
- Your child will be moved to the operating room.
- When your child is asleep, the surgery will begin.
- The surgeon will shave a little bit of hair around the ear where the implant will be placed.
- A small incision (cut) will be made in the skin behind the ear, and a small "seat" will be created in the bone behind the ear to hold and protect the implant.
- The surgeon will make a small hole in the bone and insert the electrode into the cochlea.
- The implant will be secured in place behind the ear, and the skin will be closed with several stitches. These stitches will dissolve on their own and do not need to be removed.
- When the surgery is over, your child will be moved to the recovery room, and you will be called so that you can be with your child as he or she wakes up.

## COCHLEAR IMPLANT SURGERY cont'd

### Waking Up/Going Home

Your child will stay in the recovery room until the anesthesia medication wears off. The length of time it will take the medication to wear off will vary, as some children take longer than others to become alert.

- Your child will then be sent to an inpatient floor for an overnight stay. Your child may still be groggy and should take it easy for the day.
- After your child is discharged, he or she may resume normal eating and drinking at the rate he or she is comfortable with when you get home.
- You will need to make a follow-up appointment for your child for 1 week after the surgery.
- Your child's surgeon will tell you when your child may return to normal activities, such as school, play, gym and sports.

### Cochlear Implant Follow-up

Our Cochlear Implant Team, which consists of the cochlear implant surgeon, audiologist (hearing specialist), speech/language pathologist, child development specialist and social worker, will evaluate your child before surgery to determine if an implant is right for your child, and afterward to check your child's progress and set therapy goals. Your child will need your dedicated support to learn how to use the new "sound" that he or she will receive through the cochlear implant. Your child will need frequent programming sessions with the audiologist, as well as hearing therapy with the speech/language pathologist. Your child also will need intensive hearing and speech therapy through early intervention or school-age services, with professionals who are trained in the development of hearing skills with a cochlear implant. Your follow-through at home to support your child's therapy goals will be an important part of your child's success with his or her cochlear implant.



### Special Needs

If your child has any special needs or health issues you feel the surgeon needs to know about, please call the Department of Audiology and Speech-Language Pathology at Children's Hospital *before* the appointment and ask to speak with an audiologist. It is important to notify us *in advance* about any special needs your child might have.

Audiology and Speech-Language Pathology  
**Children's Hospital of Pittsburgh of UPMC**  
One Children's Hospital Drive  
4401 Penn Ave.  
Pittsburgh, PA 15224  
412-692-5580

---

To see the list of all available patient procedures descriptions, please visit [www.chp.edu/procedures](http://www.chp.edu/procedures).