

# ASSISTIVE TECHNOLOGY

*“The new electronic independence  
recreates the world in the image  
of a global village.”*



# Introduction

Assistive Listening Devices (ALD) are amplification systems specially made to help people hear better in many difficult listening conditions. Even hearing aids can be thought of as assistive listening devices. Most of these devices can be used with a personal hearing aid that has a telecoil (or t-switch), or by themselves to do the following:

- To help overcome background noise
- To decrease the negative impact and sound distortions of distance from the sound source

The basic function of an ALD is to improve the “signal to noise ratio” for the listener. This means that wanted sounds (signals) are amplified (increased), and not wanted sounds (noises) are made smaller.

The most common types of ALDs used with infants/children include Sound Field Systems, FM Systems, Infrared Systems, and Loop Systems. (See Terminology Section for definitions of these systems.)

The selection of the proper hearing aid is one of the first important tasks that you, as parents may or may not have to face. Therefore, it is critical that you understand what hearing aids will and will not do for your infant/child. Even though the hearing aid is essential, it is an aid and will only use your infant/child’s residual hearing, or the hearing that he/she does have. A hearing aid is not a cure. It will not allow a child to hear “normally.”

*“My advice to you is to buy great hearing aids. It will pay off. Stand up for your child, it might take a little extra effort, but is well worth the time. Don’t get bothered by having to repeat some things, don’t say ‘forget it’. Hard of hearing people are normal people who have a slight disability.”*

— Douglas (age 11)

# Facts About Telecommunications Relay Services

The Americans with Disabilities Act (ADA) of 1990 went into effect on July 26, 1993. Title IV of the ADA requires all telephone companies across the United States to provide telecommunications relay services.

A telecommunications relay service (TRS) allows people who are deaf, hard of hearing, or speech impaired to communicate through a communications assistant (CA) with people who use a standard telephone. A CA relays the TTY (text telephone or telecommunications device for deaf and hard of hearing people) input to the telephone user and types that person's response back to the TTY user. Telecommunications relay services can be reached by dialing 711.

Just as you can dial 411 for information, you can dial 711 to access all telecommunications relay services anywhere in the United States. The 711 access eliminates the difficulties that individuals have in finding and remembering various relay numbers from state to state. The relay service is free.

CAs are trained to be as unobtrusive as possible during a call. A CA's responsibility is to relay the conversation exactly as it is received. All relay calls are confidential.

Regardless of which long-distance company or organization is providing a state's relay service, callers can continue to use the long-distance company of their choice.



Two options when using a telephone relay service are voice carry-over (VCO) and hearing carry-over (HCO). VCO allows a person with a hearing impairment to speak directly to the other party and then read the response typed by a CA. HCO allows a person with a speech impairment to hear the other party and relay the TTY response back to the telephone user through the CA. This service allows people with communication disorders to communicate with all telephone users.

For more information on telecommunications relay services, please visit the Federal Communications Commission at [www.fcc.org/cib/consumerfacts/trs.html](http://www.fcc.org/cib/consumerfacts/trs.html).

# Hearing Aids - Frequently Asked Questions

## What is a hearing aid?

A hearing aid is an electronic, battery-operated device that amplifies (increases) and changes sound to allow for better communication. Hearing aids receive sound through a microphone, which then change the sound waves to electrical signals. The amplifier increases the loudness of the signals and then sends the sound to the ear through a speaker.

## How can hearing aids help?

On the basis of the hearing test results, the audiologist can figure out whether hearing aids will help. Hearing aids are very useful in improving the hearing and speech understanding for people with sensorineural hearing loss. When choosing a hearing aid, the audiologist will consider your infant/child's hearing ability, work and home activities, physical limitations, medical conditions, and what you would like regarding the way the hearing aid(s) look on him/her. For many people, cost is also an important factor. You and your audiologist must decide whether one or two hearing aids will be best for your infant/child. Wearing two hearing aids may help balance sounds, improve understanding of words in noisy situations, and make it easier to locate the source of sounds.

## What are the different kinds of hearing aids?

There are several types of hearing aids. Each type offers different advantages, depending on its design, levels of amplification, and size. Before purchasing any hearing aid, ask whether it has a warranty that will allow you to try it out on your infant/child. Most manufacturers allow a 30 to 60 day trial period during which aids can be returned for a refund.

There are four basic styles of hearing aids for people with sensorineural hearing loss:

- *In-the-Ear (ITE)* hearing aids fit completely in the outer ear and are used for mild to severe hearing loss. The case, which holds the parts that make up the hearing aid, is made of hard plastic. ITE aids can accommodate added technical mechanisms such as a telecoil, a small magnetic coil contained in the hearing aid that improves sound transmission during telephone calls. ITE aids can be damaged by earwax and ear drainage, and their small size can cause adjustment problems and feedback. They are not usually worn by infants/children because the casings need to be replaced as the ear grows.
- *Behind-the-Ear (BTE)* hearing aids are worn behind the ear and are connected to a plastic ear mold that fits inside the outer ear. The parts are held in a case behind the ear. Sound travels through the ear mold into the ear. BTE aids are used by people of all ages for mild to profound hearing loss. Poorly fitting BTE ear molds may cause feedback, a whistle sound caused by the fit of the hearing aid, or by buildup of earwax or fluid.
- *Canal Aids* fit into the ear canal and are available in two sizes. The In-the-Canal (ITC) hearing aid is customized to fit the size and shape of the ear canal and is used for mild or moderately severe hearing loss. A Completely-in-Canal (CIC) hearing aid is largely concealed in the ear canal and is



In-The-Ear Aid  
(ITE)



Behind-The-Ear Aid  
(BTE)



Body Aid

used for mild to moderately severe hearing loss. Because of their small size, canal aids may be difficult for the user to adjust and remove, and may not be able to hold additional devices, such as a telecoil. Canal aids can also be damaged by earwax and ear drainage. They are not typically recommended for children.

- *Body Aids* are used by people with profound hearing loss. The aid is attached to a belt or a pocket, and connected to the ear by a wire. Because of its large size, it is able to incorporate many signal processing options, but it is usually used only when other types of aids cannot be used.

### Do All Hearing Aids Work the Same Way?

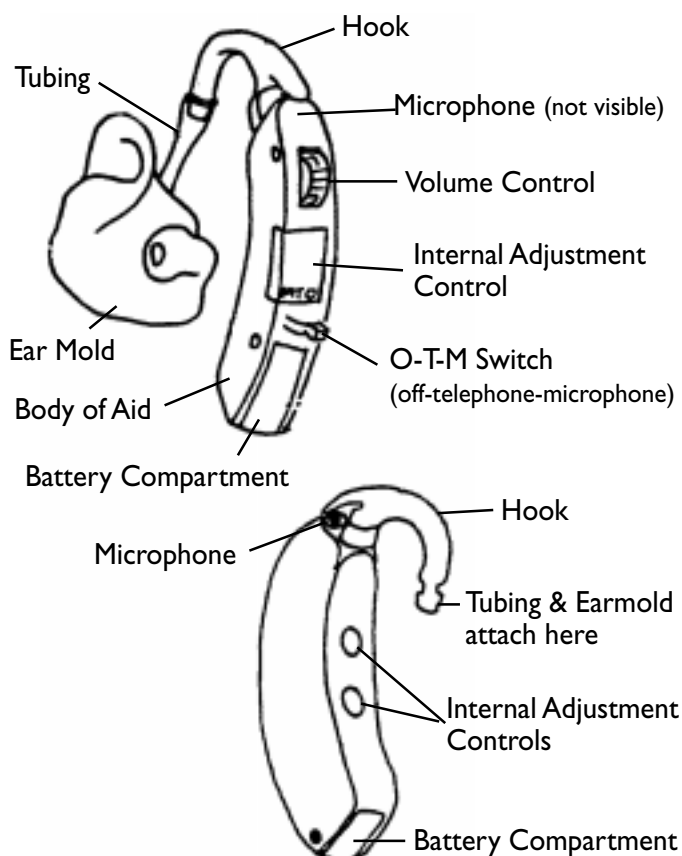
The inside mechanisms, or parts, of hearing aids vary among devices even if they are the same style. Three types of circuitry, or electronics, are used:

- *Analog/Adjustable*: The audiologist determines the volume and other specifications you need in your hearing aid, and then a laboratory builds the aid to meet those specifications. The audiologist has some flexibility to make adjustments. This type of circuitry is generally the least expensive.
- *Analog/Programmable*: The audiologist uses a computer to program your hearing aid. The circuitry of analog/programmable hearing aids will accommodate more than one program or setting. If the aid is equipped with a remote control device, the wearer can change the program to accommodate a given listening environment. Analog/programmable circuitry can be used in all types of hearing aids.
- *Digital/Programmable*: The audiologist programs the hearing aid with a computer and can adjust the sound quality and response time on an individual basis. Digital hearing aids use a microphone, receiver, battery, and computer chip. Digital circuitry provides the most flexibility for the audiologist to make adjustments for the hearing aid. Digital circuitry can be used in all types of hearing aids and is typically the most expensive.

### What questions should I ask before buying hearing aids for my infant/child?

Before you buy a hearing aid, ask your audiologist these important questions:

- Are there any medical or surgical considerations or corrections for my infant/child's hearing loss?
- Which design is best for my infant/child's hearing loss?
- What is the total cost of the hearing aid?
- Is there a trial period to test the hearing aids? What fees are nonrefundable if they are returned after the trial period?
- How long is the warranty? Can it be extended?
- Does the warranty cover future maintenance and repairs?
- Can the audiologist make adjustments and provide servicing and minor repairs? Will loaner aids be provided when repairs are needed?
- What instruction does the audiologist provide?
- Can assistive devices such as a telecoil be used with the hearing aids?



## **What Are Some Tips for Taking Care of My Infant/Child's Hearing Aids?**

The following suggestions will help you care for your infant/child's hearing aids:

- Keep hearing aids away from heat and moisture.
- Replace dead batteries immediately.
- Clean hearing aids as instructed.
- Do not use hairspray or other hair care products while wearing hearing aids.
- Turn off hearing aids when they are not in use.
- Keep replacement batteries and small aids away from pets.

## **How long each day does my infant/child have to wear hearing aids?**

Your infant/child should wear the hearing aids all day, every day except when bathing or sleeping. Wearing both hearing aids during all possible waking hours will give your infant/child the best opportunity to listen to all the sounds around him/her.

## **How do I take care of the hearing aids?**

- Hearing aids are tough but not unbreakable.
- Be sure to keep the hearing aids away from excessive heat (for example, glove box of car, heaters, windowsill).
- Do not put them in water.
- Keep hearing aids away from animals. A dog or cat can chew the hearing aids and ear molds.
- Have a set routine every day and night for the care of the hearing aids.
- Store the aids in a specific place when not worn.
- Dispose of hearing aid batteries safely as they are dangerous if swallowed. If your infant/child does swallow a battery, take him/her to the emergency room immediately.

## **What do I need to know about caring for ear molds?**

It is important that ear molds fit tightly and comfortably so that the hearing aid can perform as well as possible. For infants, ear molds may have to be made frequently. As your infant/child gets older and growth slows down, ear molds will fit for a longer time period. After a few weeks, the ear mold may turn a yellowish color around the canal portion (the area that goes into the ear canal). This is a stain caused by cerumen (earwax) and is not harmful. You

can wash ear molds with warm soapy water (do not use alcohol unless your infant/child has a “draining ear”) and be sure they are completely dry before putting them back onto the hearing aid. If the tubing attached to the ear mold becomes yellow and brittle, it can affect the sound. Your audiologist can replace the tubing.

## **How do I make sure my infant/child's hearing aid is properly fitted?**

A properly fitted hearing aid should be expected to do the following:

- Increase sounds to a level that the infant/child can hear.
- Be tailored to the infant/child's hearing loss so that frequencies that need to be louder to be heard are made louder more than the frequencies that can be heard at softer levels.
- Be designed to wear comfortably and at the same time be protected from damage.
- Be powerful enough to be useful, but avoid extreme loudness that can further damage hearing.

## **What tools do I need to keep the hearing aids working their best?**

Your audiologist should show you the various tools needed to maintain your infant/child's hearing aids. Some useful and inexpensive tools include:

- A listening stethoscope (to check for problems with the sound quality and for volume and on/off controls that may not be working)
- A battery tester
- A dehumidifier (to store the hearing aids each night to remove excess moisture)
- An ear mold blower (to remove moisture from the ear mold tubing after it is washed)
- Cleaning tools such as a brush and a wax loop (to remove cerumen)
- Extra batteries

## **What kind of hearing aid will my infant/child need?**

There are many different styles of hearing aids. They can be classified into two main categories: (1) in-the-ear (ITE), and (2) behind-the-ear (BTE). Your audiologist may discuss these types with you, however, infants and children generally wear BTE hearing aids. (For more information about BTE's, see earlier question about different types of hearing aids.)

## **What is the difference between the different hearing aid technologies?**

Hearing aids have improved greatly over the years. Most infants/children, even those with profound hearing loss, can be helped to some degree with hearing aids. There are several different types of technology available and your audiologist will discuss which is best for your infant/child's specific hearing loss. Here is a summary of the various types:

- **Conventional Technology:** Conventional hearing aids take the sound in, then amplify it or simply, make it louder. This is done by the use of an amplifier receiver and microphone, and is called analog technology. This type of hearing aid can be very powerful and help even profound hearing losses with usually some benefit. The hearing aid can be adjusted to your infant/child's hearing loss through the use of screwdriver control settings. Conventional hearing aids are less costly, but not as flexible as more advanced technology. Conventional aids increase all sounds the same so background noise cannot be filtered out and may interfere with the ability to hear speech in many settings.
- **Programmable Technology:** Programmable hearing aids can be adjusted more precisely to your infant/child's hearing loss through the use of a computer and can be re-adjusted if changes are picked up in the hearing level over time. These hearing aids can also be programmed with many memories for different listening settings (for example, quiet vs. noise). Programmable hearing aids are more costly, but can make what your infant/child will hear clearer both in quiet and noisy situations. Programmable hearing aids can be fit on nearly any type or degree of hearing loss. They use both analog and digital technology to process the sound.
- **Digital Technology:** Digital hearing aids have the same abilities as programmable technology but the sound is processed in a way similar to that of a compact disc. The sound is changed into a digital code before it is increased. This makes the sound clearer. Digital technology is far more sophisticated than the other types, and is more beneficial in almost all listening settings, especially

in noisy surroundings. Digital hearing aids can also be fit on nearly every type and degree of hearing loss. Digital hearing aids are usually the most costly of all the different technologies.

## **Will my infant/child understand everything with hearing aids?**

How much your infant/child hears with the hearing aids may be related to the type of hearing loss he/she has, the type of technology being used, and how faithfully the hearing aids are worn. Hearing aids cannot replace natural hearing, so your infant/child will always have difficulty in some places.

## **What are "sensory aids" for infants/children who are deaf or have a hearing loss?**

Your audiologist may recommend and/or discuss with you a sensory aid or aids for your child. For example, sensory aids include the following:

- Hearing aids
- Cochlear implants
- FM systems

Sensory aids are designed to maximize available hearing primarily to help with the development and understanding of spoken language. Sensory aids are assistive technology that may be helpful, depending upon the individual child and the educational approach chosen. The assistive technology does not "cure" the hearing loss and the child who uses assistive technology will usually still need special services and programs.

## **My infant/child's hearing aids are always ringing or buzzing. What can I do?**

Your infant/child's ear mold may be loose. As your infant/child grows, the ear increases in size, leaving gaps between it and the ear mold. Your infant/child will need new ear molds roughly every 3-6 months. Sound leakage from the hearing aid causes ringing and buzzing when it is picked up by the hearing aid's microphone, and increased a second time. However, buzzing and ringing is not always due to loose ear molds. It can also be a sign of a problem inside the hearing aid called feedback. This can be caused by an ear mold that isn't in the ear correctly, by an ear mold that is too small, by a crack in the tube that goes between the ear mold and the hearing aid, or by an actual breakdown of the hearing aid. Contact

your audiologist to have both the hearing aids and the ear molds checked.

### **How do I make the feedback stop?**

Try pushing on, or reinserting the ear mold. If this does not take care of the problem, contact your audiologist to determine what the actual cause is and what needs to be done. Do not turn down the volume on the hearing aids lower than the recommended setting as an answer. This may stop the feedback, but your infant/child will not be able to hear.

### **How should I check my infant/child's hearing aid to make sure it works?**

A quick test to make sure a hearing aid is actually providing a signal is to listen for a squeal as the volume control is turned up. Holding the hearing aid and ear mold in your cupped hand will alert you sooner that the hearing aid is indeed working. If you do not hear a squeal with the volume control turned all the way up, or if the squeal is much softer than usual for a given position on the volume wheel, make sure the ear mold is not blocked with earwax. Either check the hearing aid battery with a battery checker, or replace it with a new one. There are many other accessories available to keep your infant/child's hearing aid working well such as dehumidifiers and wax cleaning tools. If you have any concerns about how well a hearing aid is working, take it to your audiologist for a complete check in a special test box.

### **How long do hearing aid batteries last and where can I purchase them?**

Hearing aid batteries last approximately one to two weeks depending on the type of hearing aid and how long your infant/child wears it each day. Batteries can be purchased at local drug stores, your audiology or hearing aid clinic, and grocery stores.

### **How can I keep my infant/child's hearing aids in the ears? He/she keeps taking them off.**

First, make certain that the ear mold is comfortable. Are there any red spots or other signs of irritation in your infant/child's ears? Secondly, check with your audiologist to make sure the hearing aid is working well and providing enough hearing improvement for the child to notice and want to wear it. Finally, identify if your infant/child has a fever with a possible ear infection.

If your infant/child is healthy, and nothing is wrong with the hearing aid, the audiologist may suggest two-sided tape or "huggie aids" to hold the aid. Covering up the hearing aid with a hair band or hat, and finding ways to distract your infant/child with favorite toys may work. Teach your infant/child the hearing aid must be left on, just as you teach him/her not to touch breakables. As your infant/child gets older, help him/her learn that if there is a problem with the hearing aids, or they need to be taken off for any reason, he/she should come to you and let you remove or check the aids. To keep from losing the aids, the best thing is to attach the hearing aids to the child's clothing by use of a string and clip. A parent support group may also be helpful, especially with issues of behavioral modification to keep the aids in the ears.

### **Can hearing aids be insured?**

Hearing aids are expensive. You can purchase loss and damage insurance on your infant/child's hearing aid/s. This is sometimes offered through the hearing aid manufacturer or can be purchased separately. Your audiologist can give you the names of companies that specialize in hearing aid insurance or check with your own insurance company.

### **How can I pay for my infant/child's hearing aid/s?**

Your audiologist and Early Intervention Specialist will guide you. They will try your health insurance company first. For the future, consider getting a rider on your insurance if possible. There are also several foundations and organizations that will assist in finding financial aid for purchasing hearing aids. (For more information, see Resources section). Loaner hearing aids are also available through the State of Alaska, Department of Health & Social Services, Division of Public Health, Section of Maternal Child & Family Health, if certain eligibility criteria are met. Contact your audiologist for complete details.



# Cochlear Implants - Introduction

Parents of infants/children who are deaf are sometimes offered the choice of obtaining a cochlear implant for their child. Before this choice is made, it is important for parents to gather as much information as possible regarding the technology and to understand what can realistically be expected from a cochlear implant. A cochlear implant is an electronic device with both outer and inner parts. The outer parts are made up of a microphone, sound processor, transmitter, transmitting cable, and battery. The inner parts are made up of a receiver and an electrode array. These parts are set into a infant/child's head behind the ear during surgery. The cochlear implant mechanism operates by picking up sounds through the outer parts, digitally changing them into electrical signals, and sending them into the implanted parts and to the auditory nerve, which carries them to the brain. Surgery to implant the inner device is usually done on an outpatient basis, requires general anesthesia, and takes about two to three hours. The outer parts of the implant are fitted four to six weeks after surgery when healing is complete. The speech processor unit of the implant is computer programmed or "mapped" specifically for each individual with an implant. The cochlear implant destroys all remaining hearing in the implanted ear. In comparison to traditional hearing aids, cochlear implants provide improved sound awareness to infants/children with severe to profound hearing loss. As is the cases with hearing aids, intensive, appropriate follow up therapy and ongoing observance of the device is essential to helping infants/children make sense of the many sounds in their surroundings that are picked up through the implant. While a cochlear implant may provide sound detection at close to normal listening levels, the outcomes and rate of development an infant/child may realize in relation to understanding and using spoken language, will vary due to a number of factors. A cochlear implant does not give an infant/child normal hearing and does not guarantee spoken language development similar to that of hearing infants/children.

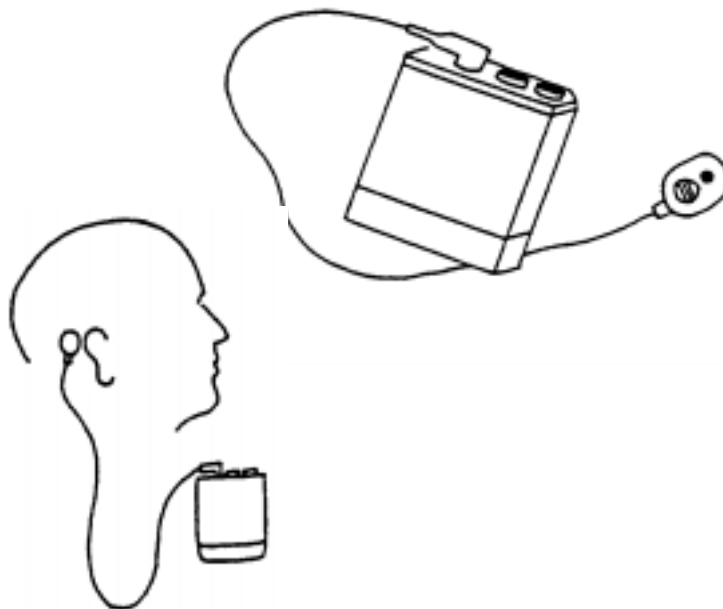
Parents who decide to have their infant/child implanted may do so because they believe it will help the infant/child in listening and speaking, and that

these skills will help their infant/child fit in better with their family and with the "hearing world" in general. They also may do so to help the infant/child develop a greater awareness of the sounds surrounding him/her.

Parents who decide against a cochlear implant for their infant/child may do so because of:

- Concern about the medical risks
- Concern that the child will not be "successful" with the implant
- Satisfaction with how the child is progressing with hearing aids
- Satisfaction with the child's progress using sign language
- Satisfaction with the child's membership in the deaf community

While in the past, a family's choosing a cochlear implant for their infant/child suggested that a family did not desire contact with the deaf community, this attitude is fading. Increasing numbers of families choose use of this technology for their infant/child and continue to use sign language and participate in the deaf community. If you are interested in cochlear implants, talk with other families and parents whose children have had the procedure done.



# Cochlear Implants - Questions to Consider

You may be wondering if choosing the implant is the right decision for your infant/child and family. Here are some questions parents facing this issue have asked themselves:

## **Has my infant/child had a meaningful trial with hearing aids?**

Proper fitting of hearing aids is an inexact science. Young children don't have the ability to describe the sounds they are hearing, or to be aware of sounds they are not hearing. Therefore, it may be difficult to tell how much benefit a young child is receiving from hearing aids. Further, high technology hearing aids may not be available to a child because many insurance plans do not pay for hearing aids.

## **How much time can I devote to therapy?**

The ability to interpret the sounds coming through a cochlear implant does not come automatically. It requires a significant time commitment to therapy with trained specialists in the therapy room as well as work at home by family members.

## **What is my definition of "success" for the implant?**

What will I do if my version of success is not achieved?

## **What is my perspective of the cochlear implant in relation to the overall needs of my infant/child?**

The cochlear implant is a tool that can provide sound awareness to deaf individuals with the hope of having that infant/child achieve spoken language use with years of training.

## **What about the child's language development, ability to communicate, social-emotional development, and academic progress during the time while spoken language skills are developing?**

## **How much do I know about the deaf community?**

Members of the deaf community are found in all levels of education and employment, and they experience the full range of personal rewards and challenges regardless of their use of technology. Many parents



of with infants/children who have been newly identified as having a hearing loss, are not aware of the potential achievements of deaf children and adults.

## **Is it possible for my infant/child to use sign language and maintain his deaf identity and use the cochlear implant?**

While some medical professionals discourage families from using sign language with their implanted infant/child, many families value the continued role of sign language for their children. In addition, more professionals are beginning to see the benefits of using sign language *and* participation in the deaf community for implanted infants/children.

## **How much of an influence do portrayals of implant "miracles" and pressure from medical practitioners and others have on me?**

Outcomes among children with cochlear implants vary widely, and the decision whether to implant an infant/child is a serious and individual one. It should be made only after careful consideration of the facts.