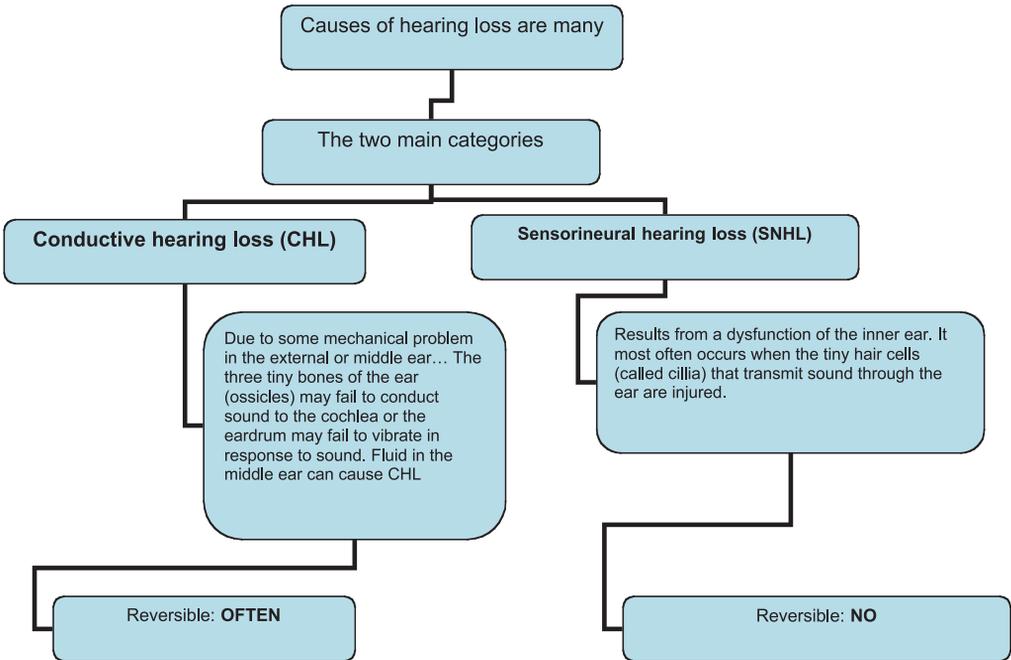
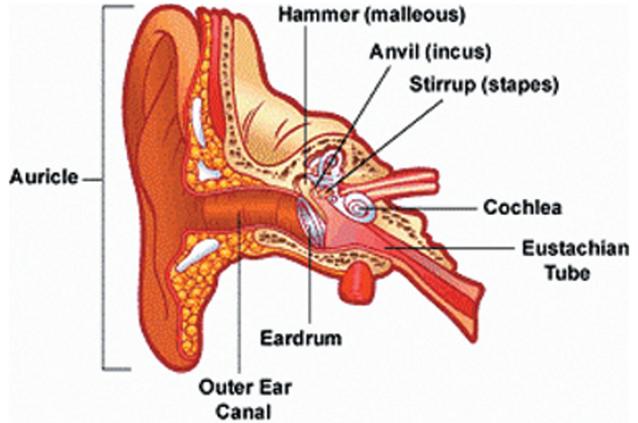


Hearing Loss in Children: Sensorineural Hearing Loss (SNHL)

Deafness in children is most frequently caused by sensorineural hearing loss (SNHL), i.e. the loss of the sensory hair cells that transduce sounds into neural signals. SNHL is caused by many known factors, such as genetic mutations, viral or bacterial infections, traumatic injury, and immunologic responses.

Your ears are in charge of collecting sounds, processing them, and sending sound signals to your brain. And that's not all - your ears also help you keep your balance. The ear is made up of three different sections: the outer ear, the middle ear, and the inner ear. These parts all work together so you can hear and process sounds.



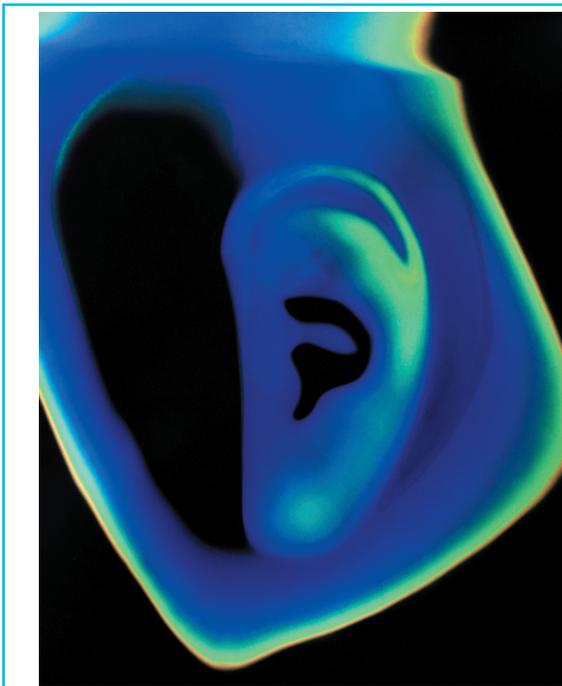
Hearing loss, by definition, is the total or partial inability to hear sound in one or both ears.

Screening ...When?

In the first few years of life, hearing is a critical part of a child's social, emotional, and cognitive development. Even a mild or partial hearing loss can affect a child's ability to speak and understand language.

Most children who are born with a hearing loss can be diagnosed through a hearing screening. It's important to have your child's hearing evaluated on a regular basis as he or she grows.

If your baby does not pass the hearing screening, it doesn't necessarily mean that he or she has a hearing loss. Because debris or fluid in the ear can interfere with the test, not infrequently that these tests have to be



redone in order to confirm a diagnosis.

If your newborn doesn't pass the initial hearing screening, it's important to get a retest within three months, in order to start treatment right away. Treatment for hearing loss can be the most effective if it's started by the time a child is six-months old.

Childhood sensorineural hearing loss (SNHL) that fluctuates or is progressive, increases parental concern and complicates medical management, hearing aid selection, and individualized educational planning for the affected child. Despite intensive multidisciplinary evaluation and intervention, continued threshold fluctuation or a gradual decline in auditory acuity

may proceed unabated in a significant percentage of these youngsters. With the adoption of universal newborn hearing screening mandates, any challenges to the accurate determination of auditory thresholds must be addressed within the first few months of life.

High-risk criteria for neonates (birth to 28 d)

1. Family history of congenital or early SNHL
2. Congenital infection known to be associated with SNHL
3. Craniofacial anomalies
4. Birth weight less than 1500 g (<3.3 lb)
5. Hyperbilirubinemia over exchange level
6. Ototoxic medications
7. Bacterial meningitis
8. Low Apgar scores at birth
9. Prolonged mechanical ventilation

Definition of SNHL

Sensorineural hearing loss involves malformation, dysfunction, or damage to the inner ear (cochlea) or nerve of hearing and is rarely due to problems with the auditory cortex of the brain. The most common type is cochlear hearing loss and this may involve a specific part of the cochlea (inner hair cells or outer hair cells or both). It usually exists at birth. It may be hereditary or may be caused by a number of medical problems, but sometimes the cause is



unknown. This type of hearing loss is usually permanent.

The degree of sensorineural hearing loss can be mild, moderate, severe, or profound. Sometimes the loss is progressive (hearing gradually becomes poorer) and sometimes unilateral (one ear only).

"In about half the children with SNHL, the cause is genetic. Some children may be born with normal hearing, but develop sensorineural hearing loss after birth because of significant, often life-threatening illness.

It has been found helpful to monitor the hearing of children who have risk factors at birth, even if they pass a newborn hearing test. It is recommended to repeat testing every 6 to 12 months for several years in order to look for the onset of a delayed sensorineural hearing loss.

How is the hearing test performed?

The method chosen depends in part on the child's age, development, or health status. The examination with an audiologist can help in many ways. Audiologists can identify the kind of hearing loss a child has and sometimes the cause. The audiologist also may recommend further medical attention



Hearing loss can be inherited (genetic) or can be caused by illness or injury. In some cases, the cause of hearing loss is not known. About 90 percent of babies with congenital hearing loss are born to hearing parents.

Genetic factors are believed to cause about 50 percent of cases of congenital hearing loss.

- Auditory brainstem response (ABR) test
An infant is sleeping or sedated for the ABR. An infant may be sleeping naturally or may have to be sedated for this test. Additionally, older, cooperative children may be tested in a silent environment while they are visually occupied. Tiny earphones are placed in the baby's ear canals. Usually, click-type sounds are introduced through the earphones, and electrodes measure the hearing nerve's response to the sounds.
- Otoacoustic emissions (OAE) test

This test is performed with a sleeping infant or an older child who may be able to sit quietly. In this brief test, a tiny probe is placed in the ear canal. Numerous pulse-type sounds are introduced, and an "echo" response from the outer hair cells in the inner ear is recorded.

ABR or OAE tests are often used at hospitals to screen newborns. If a baby fails a screening, the test is usually repeated. If the screening is failed again, the baby is referred for full hearing evaluation.

Treatment

A child with a congenital hearing loss should begin receiving treatment before 6 months of age. Studies suggest that children treated this

early are usually able to develop communication skills (using spoken or sign language) that are as good as those of hearing peers.

There are a number of treatment options available, and parents will need to decide which are most appropriate for their child.

Children with sensorineural hearing loss in both ears need to be identified and fit with hearing aids as soon as possible. It is important that the degree of hearing loss in each ear be diagnosed as accurately as possible.

Most kids with hearing loss who are benefiting from the aids tend to wear them because it "connects" them to the environment around them.





learn a combination of spoken and sign language. Written language also is very important because it is the key to educational and vocational success.

If your child is learning sign language, you and your immediate family also must learn it so that you would be able to communicate with your child.

Deaf and hard-of-hearing children can develop language skills that help them communicate freely and learn at the same rate as their hearing friends.

Children with bilateral sensorineural hearing loss often benefit from therapy focused on assisting them in developing listening and spoken language abilities. Intensive therapy that focuses on development of listening skills and hearing skills (auditory skill develop-

ment) is especially important for children who have a greater degree of hearing loss.

Children with bilateral sensorineural hearing loss in the severe-to-profound range are potential candidates for cochlear implantation

Cochlear Implants

A cochlear implant does not restore

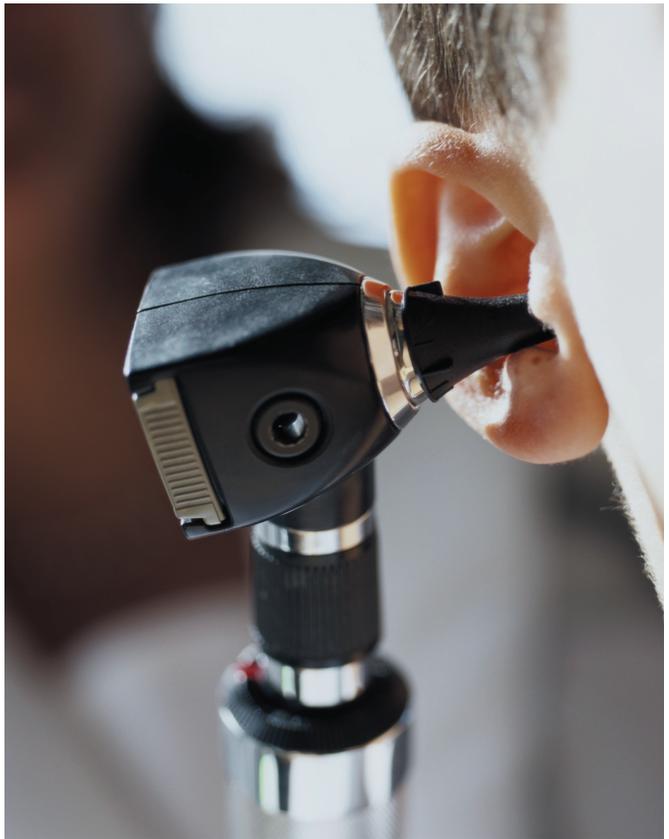
There are no exact rules for use of hearing aids - it depends on a child's individual situation

Parents of children with sensorineural hearing loss usually are most concerned about whether their child will learn to talk. The answer is that all children with a hearing impairment can be taught to speak but not all will learn to speak clearly. Most

hearing but rather transmits sound information past the damaged cochlea directly to the nerve of hearing. It is intended for children with profound hearing loss who do not benefit from hearing aids.

The earlier deaf infants or toddlers receive a cochlear implant, the better their speech by the time they're three and a half years old, a U.S. study finds.

"Cochlear implants" help a person to become aware of sounds. They do not restore hearing nearly well enough for the child to learn spoken language without additional help, including



hearing aids to amplify sounds, as well as special education and parent counseling.

Researchers from the Washington University School of Medicine in St. Louis and from the Southwestern Medical School at the University of Texas in Dallas tested the spoken language skills of 76 children, all 42 months old, who had cochlear implants.

The results of the spoken language tests were compared to the length of time each child had had his or her cochlear implant. The study found an association between longer implant time and richer vocabulary, longer, more complex sentences, and more frequent use of irregular words.