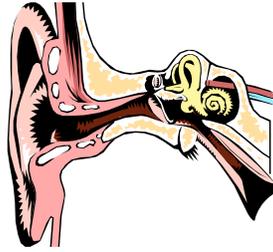


# *Understanding the Ear*



To understand the types and causes of hearing loss, it is helpful to understand the basic components of the ear. The ear is divided into three main parts: the outer ear, the middle ear, and the inner ear.

**Outer Ear:** The outside of the ear, plus the ear canal up to the eardrum or tympanic membrane.

**Middle Ear:** The cavity behind the tympanic membrane which houses three small bones that help conduct sound waves to the inner ear.

**Inner Ear:** The cavity behind the middle ear houses a series of channels known as the labyrinth, and a snail-shaped structure called the cochlea. The labyrinth is integral to the human balance system. The cochlea contains the thousands of nerves responsible for sensing sound and transmitting it to the brain for processing.

**Auditory Nerve:** The eighth cranial nerve, which is the pathway of sound from the ear to the brain.

## *Types/Causes Of Hearing Loss*

The type of hearing loss in any one person depends upon where in the ear the problem occurs. Among the common types of hearing loss are:

**Conductive:** Loss of hearing caused by a problem in the outer or middle ear. A conductive loss prevents sound from reaching the nerves in the inner ear. Common causes include:

- Deformity in the outer or middle ear structure.
- Ruptured eardrum.
- Wax buildup in the outer ear.
- Fluid buildup in the middle ear system.

**Sensorineural:** Hearing loss caused by damage to some or all of the nerves in the inner ear. Sensorineural losses cannot be reduced or eliminated by surgery.

There are many causes, differing by age of onset.

Before or During Birth:

- Perinatal infections such as rubella, herpes, toxoplasmosis, syphilis, cytomegalovirus (CMV)
- Heredity
- Asphyxia or lack of oxygen at birth.
- Possible association with birth weight of less than 1500 grams.
- Possible association with defects of the head and neck

Later Onset:

- Bacterial meningitis.
- Ototoxicity (drug induced).
- Intense or excessive noise.
- Physical damage to head or ear

**Mixed:** Hearing loss caused by any combination of the listed causes of conductive and sensorineural hearing loss.

## *Influence Of Varying Types Of Hearing Loss*



### **Conductive Hearing Loss**

Conductive hearing loss is generally a loudness difficulty. In children with a conductive hearing loss, the inner ear system is intact and ready to accept incoming sounds. The hearing loss is created by some kind of blockage that prevents sound from reaching the functioning inner ear. Once sound reaches the inner ear it is usually clear and undistorted.

Some implications of conductive loss are:

- The problem can usually be reduced or eliminated through medical treatment.
- The problem may or may not be temporary, depending on the nature of the blockage.
- If the hearing loss is of short duration, it should have no effect on language learning. If the blockage is chronic or repeated, it may influence speech and language development and educational performance.
- If the loss is due to a long-term problem, and cannot be resolved medically, habilitation may be necessary. Use of a hearing aid may be recommended to overcome the blockage so the child does not lose valuable language development and education time.
- Special Education programming is usually not necessary for children with conductive hearing loss.
- Routine monitoring of hearing is recommended for children who have repeated conductive or middle ear problems.
- Be aware that children who present classroom behavior problems and appear to not pay attention may have fluctuating conductive hearing loss.

### **Sensorineural Hearing Loss**

Sensorineural hearing loss is a difficulty that involves both distortion and loudness. Sensorineural loss may affect some or all of the hair cells or nerves in the inner ear responsible for sensing sounds of different pitches. This will cause varying degrees and configurations of hearing loss. Several characteristics are typical of most sensorineural hearing losses.

- The loss is permanent and cannot be surgically repaired.
- Early identification and intervention are necessary to enable children who are deaf or hard of hearing to learn language during the critical early years.
- Each deaf or hard of hearing child has unique language learning and communication needs. Various language development and educational approaches are chosen by families to address these needs.
- Hearing aids can benefit many children with sensorineural loss. There are different levels of benefit a child may receive from a hearing aid. Some children may benefit from a hearing aid to process spoken English or components of spoken English while other children may use a hearing aid only for more basic purposes such as alerting to sounds.

### **Mixed Hearing Loss**

Mixed hearing losses cause difficulty of both loudness and distortion. Since mixed losses combine the characteristics of conductive and sensorineural

loss, the extent of each component will determine its implications.

- If the conductive component is significant, with very little damage to the nerves of the inner ear, the disorder will center on loudness rather than distortion of sound.
- If the conductive component is minimal, with the sensorineural component more significant, the loss may carry a larger distortion factor.
- As conductive losses tend to fluctuate, depending on the nature of the loss, mixed losses may also fluctuate and the child's response behavior could vary from day to day.

### **Other Considerations:**

- The age of onset of hearing loss has a significant impact on a child's speech and language development. A child who is prelingually deaf (became deaf before acquiring language) and a child who is postlingually deaf (became deaf after exposure to and acquisition of language) will each present different circumstances in terms of language use and development.
- How quickly a child's hearing loss is diagnosed and how expediently the child is provided access to a clear language system will have a significant impact on the child's language development. It should be noted that Deaf children from Deaf families who have access to American Sign Language (ASL) from birth have been shown to acquire ASL at the same rate that hearing children develop spoken language.
- There are many degrees, types, and patterns of hearing loss. There is no one description or profile of a deaf or hard of hearing that fits all children.
- Even if two children have the same degree, type and pattern of hearing loss, it does not mean they hear and understand the same thing or benefit from a hearing aid in the same way. Each child's hearing and speaking capabilities are unique.
- Some causes of deafness (i.e.: rubella, cytomeglovirus, meningitis, etc...) have other associated conditions that may impact on a child's learning characteristics.
- Many deaf children have some residual (remaining) hearing.



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