

Mechanics and types of hearing loss

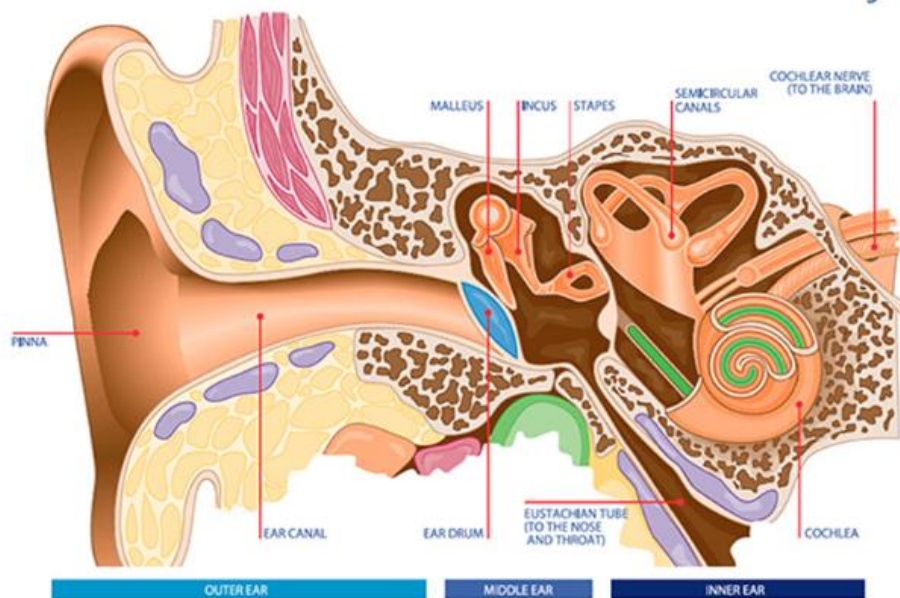


Image: ([Australian Hearing](#))

The ear is a complex organisation of skin, bones, fluids and nerve cells. It receives sound waves, processes them and sends them to your brain. The brain processes these signals which enables you to hear. This all happens almost instantaneously. Sound travels in invisible waves through the air when a moving or vibrating object causes a disturbance in the air around it, creating sound waves that travel outwards from the source.

When sound waves reach the ear, they travel down the ear canal and to the eardrum, making it vibrate. Three tiny bones in the middle ear (the smallest bones in your body) link the vibrating eardrum to a structure in the inner ear called the cochlea. The cochlea is filled with fluid that transfers the vibrations to thousands of tiny sensory hair cells. The movement in the fluid activates the auditory nerve that is connected to the brain, which turns the signals into what you hear.

Parts of the ear

The outer ear is made up of the pinna, which forms the visible external part of the ear we can see and touch, and the ear canal that leads down to the eardrum.

The middle ear begins at the eardrum and is about 2.5 centimetres inside the head. The middle ear includes the little bones (malleus, incus and stapes) that carry the sound vibration to the cochlea, where hearing really begins.

The inner ear is where these vibrations are changed into the signal that is carried to the brain, which you experience as sound. This part of the ear also controls balance.

What is hearing loss?

Hearing loss can be caused by any problem that disrupts the hearing pathway from the outer ear, middle ear or in the complex neural pathways that leads to the brain.

Hearing loss can be present at birth or soon after. This is called **congenital hearing** loss. If hearing loss develops later, it is known as an **acquired hearing loss**.

Types of hearing loss – sensorineural vs conductive hearing loss

Depending on which part of the hearing system is affected, hearing loss is categorised as conductive, sensorineural or a mixture of both which is called mixed hearing loss.

Conductive hearing loss

Conductive hearing loss is caused when there is a blockage or damage in the outer ear, middle ear or both. It leads to a loss of loudness, like having the volume turned down on your headphones. Common causes of a conductive hearing loss include ear infections, perforated eardrum or blockage of the ear canal by wax or foreign objects. The degree of a conductive hearing loss varies, but you cannot go completely deaf. Most conductive hearing losses can be treated by medical or surgical interventions like an operation, but a small proportion of conductive hearing losses will be permanent.

Sensorineural hearing loss

There are two components to sensorineural hearing loss. Primarily it is the result of damage to, or dysfunction of the cochlea (the sensory part). However there can also be damage to the auditory nerve or hearing pathways that results in hearing loss (the neural part). Sensorineural hearing losses typically result in a loss of loudness as well as a lack of clarity. It can be caused by the diseases such as meningitis, viruses such as mumps or measles, excessive noise exposure and the ageing process. There is rarely any medical treatment for sensorineural hearing loss, so it is permanent and devices like hearing aids or cochlear implants are often recommended. Half of the time we are unable to identify the exact cause of sensorineural hearing loss.

Mixed hearing loss

A mixed hearing loss means there are problems with both the conductive pathway (in the outer or middle ear) and in the nerve pathway (the inner ear). For instance, a mixed hearing loss may occur when there is a middle-ear infection causing a conductive loss in addition to a sensorineural loss.

These videos simulate what hearing loss is like:

Flintstones Hearing Loss: <https://youtu.be/TD5E88fFnxE>

Hearing Loss Simulator: https://youtu.be/_jpe0_v2nAc

Interventions and support

Hearing aids

When it is recommended that a child is fitted hearing aids, parents will meet with an audiologist, who will discuss their child's needs and recommend and fit the most effective type of hearing aid.

Modern hearing aids are small but highly complex devices that process sounds to make them louder. They also try to improve the clarity of the sound for children who have a sensorineural hearing loss. They cannot change a child's hearing and can't give them 'normal' hearing. What hearing aids can do is make more sounds loud enough for your child to hear, without making any sounds uncomfortably loud. It takes time to adjust to listening with hearing aids, but with consistent use and educational support, nearly all children fitted with hearing aids will progress their language and listening skills. Hearing aids are relatively unobtrusive and can be worn for normal childhood activities with the exception of in the bath, shower and when swimming.

Cochlear implants

Some babies and children will have a hearing loss that is too severe to be treated with hearing aids. For these children, a cochlear implant (CI) is often the best option. Hearing aids amplify sound and deliver this into the ear canal, whilst cochlear implants turn sounds into electrical signals and send these directly to the cochlea to stimulate the auditory nerve endings there.

In Australia there are more than 10,000 cochlear implant users and more than 350,000 people worldwide have cochlear implants.

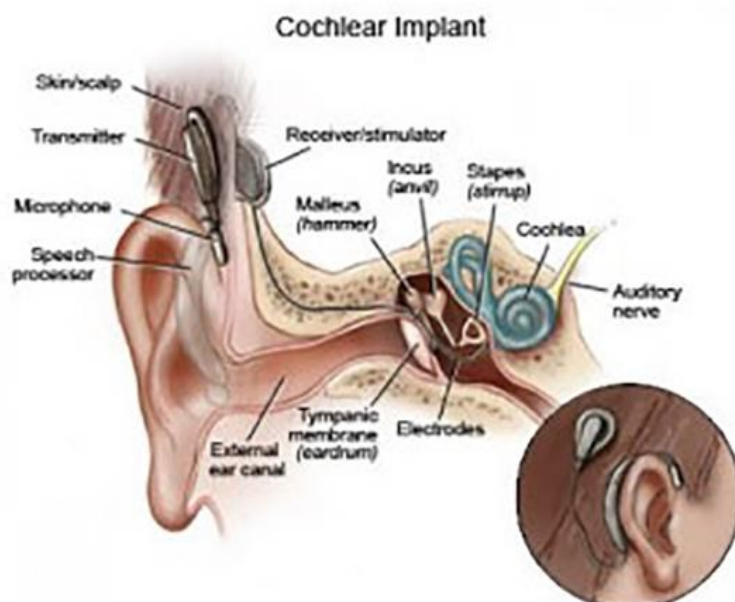


Image: ([Kids Health](#))

Auslan

Auslan (Australian Sign Language) is one of Australia's community languages, and its inventive tradition of storytelling, humour and drama is recognised. Many people who are Deaf who use Auslan consider themselves part of a cultural community.

Linguistic research has highlighted the benefits of Auslan for language development and it now is being taught alongside other languages in TAFE colleges, universities and adult education centres. There is no universal sign language, most countries have their own recognised sign language, and there can be many dialects within each language, in the same way that English speakers from different countries may have different regional dialects and accents.

For other assistive listening devices, see

<http://www.aussiedeafkids.org.au/assistive-listening-devices-2.html>

Useful links:

[Auslan Signbank](#)

[Aussie Deaf Kids](#)

[Hearing Australia](#)

[Ear Science Institute Australia](#)

[KIDS HEAR](#)

[Learning Auslan](#)

[Perth Children's Hospital](#)

[Perth Children's Hospital – Cochlear Implantation Guidelines](#)

[School of Special Educational Needs: Sensory](#)

[Telethon Speech and Hearing](#)

[Access Plus](#)

[WA Foundation for Deaf Children](#)