

What is the Difference?

Analogue Hearing Aids	Digital Hearing Aids
Convert sound into electrical signals that are amplified and passed to the earphone on the hearing aid	Convert sound to digital signals that are processed precisely by a tiny computer
Cannot be reprogrammed if hearing deteriorates	Can be reprogrammed for changes in hearing loss
Cannot distinguish between voices and noise	Can distinguish between voices and noise
Make sounds louder but may not discriminate between them	Suppress background noise so that speech is easier to hear and understand especially in noisy environments

Whilst digital aids offer the latest technology in terms of processing sound they are not necessarily the solution for everyone. It is important to find a hearing aid that suits your particular hearing loss and suits you! Some people still prefer to wear analogue hearing aids.



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Cork Deaf Association
5 MacCurtain Street
Cork
Tel: 021 4505944
Fax: 021 4506190
Email: mail@corkdeaf.ie
www.corkdeaf.ie
www.facebook.com/corkdeaf

Analogue versus Digital

Like the modernisation of television the world of hearing aids has changed dramatically over the last few years. Analogue hearing aids are increasingly being replaced by digital aids, which essentially have revolutionised the world of hearing aids. They both look quite similar but the way they both process sounds is vastly different.

Analogue hearing aids use conventional electronics. A microphone picks up the sound which is amplified and then reproduced by a receiver which basically is a very small loudspeaker.

Digital hearing aids use a tiny computer to process sound which makes it possible for the device to be programmed to suit your particular type of hearing loss. Some digital aids can be pre-programmed for different listening situations according to your lifestyle. Some digital aids will adjust automatically to cope with different sound environments. If your hearing loss deteriorates your hearing aid can be reprogrammed to compensate for this decrease. Many digital aids also incorporate directional microphones that allow you to hear and focus on sounds coming from the front more easily.

ing aid picks up the sound which is processed electronically into signals. These signals are then amplified by a receiver into louder sounds that you can hear. In addition some hearing aids can also reduce background noise which can be helpful in loud environments. Some hearing aids have been developed to assist particular types of sensorineural hearing loss or conductive loss. An audiologist will be able to give you more information about specific types of hearing aids and information about which type is most suitable for your hearing loss. The table below gives a brief overview of some types of hearing aids available.

Type of Hearing Aid	Description
Behind-the-Ear (BTE)	This hearing aid sits behind the outer ear and connects via a plastic tube to a custom-made ear mould that sits in the ear canal and delivers sound into the ear.
In-the-Ear (ITE)	ITE aids sit in the ear. They are very discreet and hardly visible. They are custom made to fit an individual's ear.
Bone Anchored Hearing Aids (BAHA)	This is surgically implanted and uses the skull to conduct sound to the inner ear.
Invisible in Canal Hearing Aids (IIC)	This hearing aid fits deeper into the canal than other types. It is generally not suitable for elderly people.

How Does Hearing Work?

Sound is a form of energy which consists of vibrations of air that move in a pattern called waves. The ear is able to pick up these vibrations and convert them into electrical signals that are sent to the brain where they are translated into meaningful sound.

Hearing loss

Because hearing loss in adults often takes place gradually the symptoms of hearing loss are usually not first noticed by the sufferer. It's quite likely that those around you will notice it first, remarking that the television is too loud or noticing that you ask them to repeat things. But hearing loss can also happen very abruptly (known as Sudden Deafness) perhaps as a result of a viral infection in the inner ear.

The most common symptom of hearing loss is the inability to hear soft sounds. Depending on the degree of their hearing loss some people may have difficulty hearing conversational sounds or even loud sounds. Some people may hear speech sounds but they may not understand their meaning. This is especially noticeable in noisy places.

Symptoms of Hearing Loss

You may have a hearing loss if:

- You hear people speaking but you have difficulty understanding what they are saying
- You are frequently having to ask people to repeat what they have said
- You feel left out of conversations
- You complain that others are mumbling
- You need to ask colleagues about the details of a meeting or presentation you attended
- You miss jokes because you didn't hear all of what was said
- Friends and family need you to turn the TV or radio down
- You do not hear the telephone and/or doorbell
- You have difficulty working out where sounds are coming from
- You have a history of exposure to loud noise e.g. working in the construction industry
- You understand more of what is being said if you are looking at the person speaking to you
- Soft sounds seem to have disappeared altogether in speech

Causes of Hearing Loss

Hearing loss can broadly be defined as resulting from any one (or

Speech:

Some of you may complain that you can hear sound but cannot understand what people are saying: this is because your hearing loss occurs at the particular frequency that is responsible for a particular sound i.e. the f, s, th sounds are lost if you have a mild hearing loss in the high frequencies (See Fig. 2). Any hearing loss that occurs within this banana shape will result in a loss of clarity of the corresponding sound.

What are your treatment options?

Your GP, ENT doctor or audiologist will be able to advise on the appropriate treatment for your hearing loss depending on its cause. Some conductive hearing losses can be treated with medication or by surgery e.g. antibiotics can be used for infection, blocked ears can be cleared and damaged ear drums or fused ossicular bones may be repaired by surgery.

However most cases of sensorineural hearing loss and some conductive losses are permanent and cannot be resolved through medical or surgical intervention. If this is the case, hearing aids worn in one or both ears can be beneficial for most people suffering a hearing loss that cannot be cured.

There are many different types and make of hearing aid but essentially they all work in a similar way. A microphone in the hear-

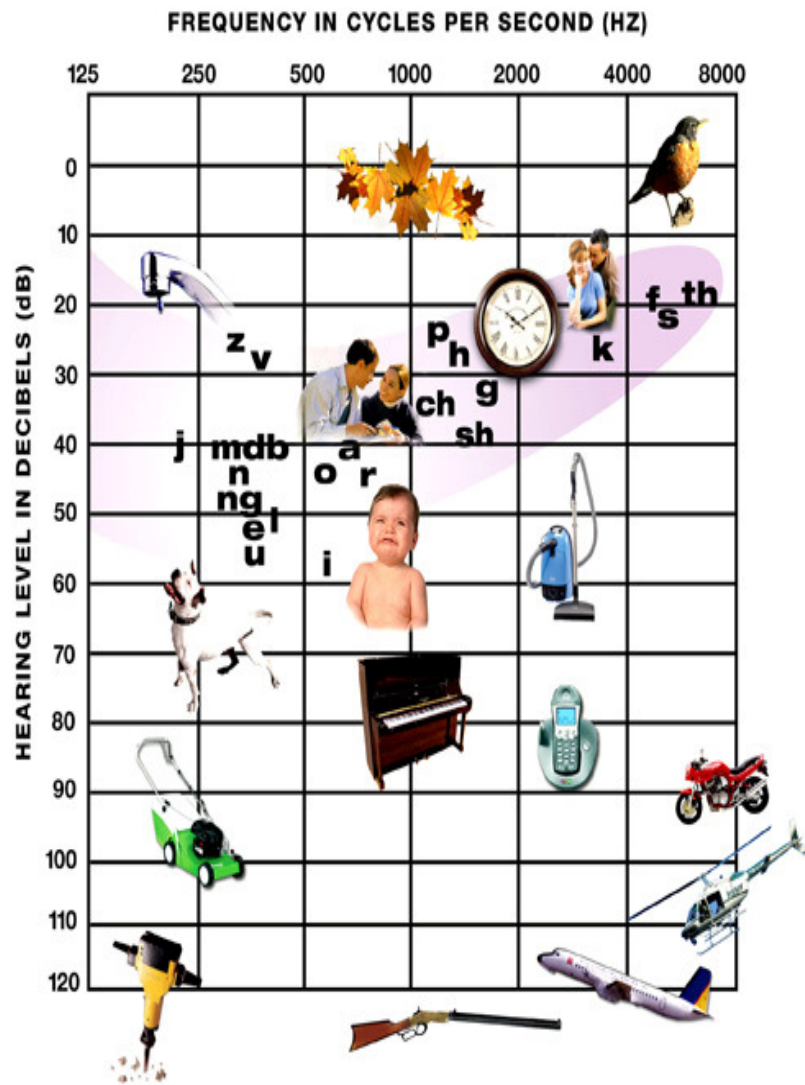


Fig. 2 Banana shape

more) of the following factors:

- The aging process
- Ear Infections
- Genetic Conditions
- Exposure to noise
- Medications that are toxic to the auditory system
- Head or ear trauma
- Diseases

Generally the causes of hearing loss symptoms are categorised according to which part of the auditory system is not working or has been damaged. There are three basic types of hearing loss:

- Conductive hearing loss
- Sensorineural hearing loss
- Mixed hearing loss

Conductive hearing loss occurs when sound is not conducted efficiently through the ear canal to the small bones of the middle ear.

Sensorineural hearing loss occurs when there is damage to the inner ear (cochlea) or to the auditory nerve (pathway from the cochlea to the brain).

The term *mixed* hearing loss is used to describe a hearing loss that is a combination of conductive and sensorineural loss: in other words affecting both the outer/middle and inner ear.

Hearing Tests

Some hearing test problems are temporary and may simply be due to a build-up of wax or a minor infection. If you experience some difficulty with your hearing the first step is to visit your GP who will look in your ears. Depending on the result of the hearing test your GP may refer you to an audiology clinic.

You will then be seen by an ENT (Ear, Nose and Throat) doctor and/or an audiologist who will ask about the background to your hearing loss problems, carry out a physical examination and complete a series of hearing loss tests to determine the type and degree of your hearing loss.

The hearing test will produce sounds (via headphones) at varying volumes and pitch (frequencies). By listening through the headphones you will be asked to indicate (for each ear) when you can hear the sound produced. The results are plotted on a chart called an *audiogram* which is a record of your hearing.

Hearing loss is measured in decibels hearing level (dBHL) and is defined by the quietest sound that a person can hear across a range of frequencies. The level at which a person cannot hear a sound of a certain frequency is called the threshold. The degree or level of hearing loss is categorised into five types of loss.

Type of Loss	Description according to thresholds
Normal	Quietest sounds heard are 0-20 decibels
Mild	Quietest sounds heard are 20-39 decibels
Moderate	Quietest sounds heard are 40-69 decibels
Severe	Quietest sounds heard are 70-94 decibels
Profound	Quietest sounds heard are 95 decibels or more

How to Read Audiograms

Hearing loss problems can be described by their shape or configuration. This refers to the degree of hearing loss at each frequency (Hertz) and the overall picture of hearing that is created on the *audiogram*. A hearing loss that only affects the high frequencies would be described as a high-frequency loss (See Fig. 1).

Its configuration would show good hearing in the low frequencies and poor hearing in the high frequencies. On the other hand if low frequencies are affected the line would start low on the graph and climb up accordingly.

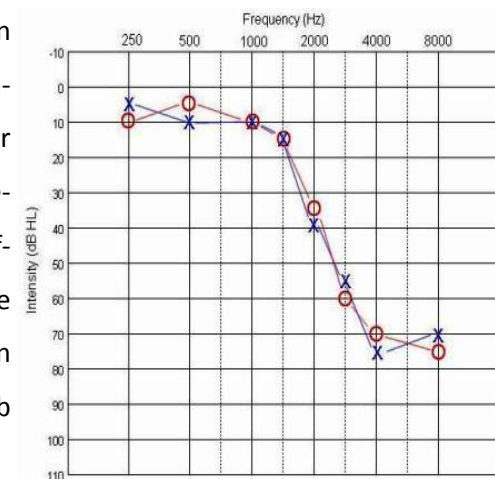


Fig. 1 High Frequency Loss