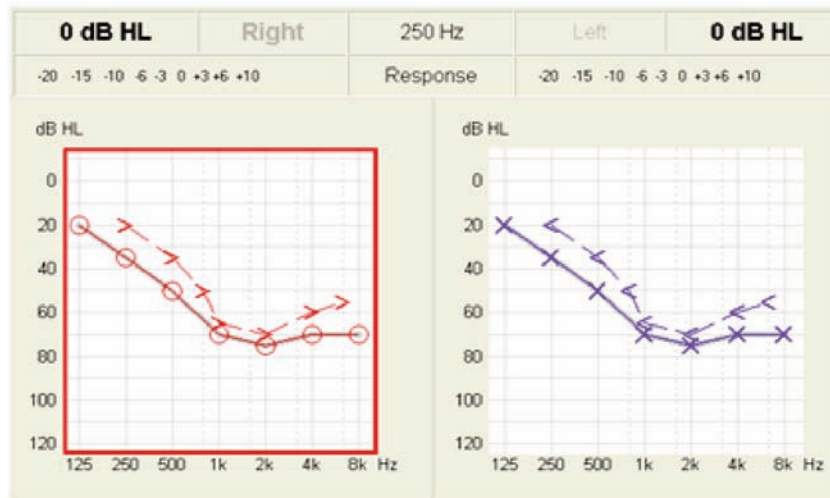


Sensorineural Hearing Loss



This is the most common type of hearing loss. It has its origin in the inner ear or along the auditory nerve. Most commonly, the damage occurs in the inner ear (cochlea). In this instance, the hair cells in the cochlea are damaged and cannot transmit neuro-electrical impulses to the brain. Sensorineural hearing loss can be congenital (present at birth) or acquired after birth.

Common congenital causes include:

- Hereditary factors
- Viral infections
- Prematurity
- Birth trauma such as anoxia

Acquired causes include:

- Reactions to ototoxic drugs (damaging to the hearing system)
- Ear infections
- Meningitis
- Encephalitis
- Head injury
- Noise exposure

The audiogram displays a sloping hearing loss from 20 dB HL in the low frequencies up to 75 dB HL in the higher frequencies and (nearly) equal in both ears. Such a hearing loss can usually be amplified sufficiently by using conventional hearing instruments.

If sensory hearing loss in speech relevant frequencies exceeds values of about 80 to 90 dB HL, it might become difficult to make speech adequately audible. The reason here is that even though the person suffers from profound hearing loss, he/she nevertheless regards extremely loud sounds as uncomfortable as a normal hearing person would. The challenge here is to fit the complete speech spectrum into the individual's residual dynamic range. If this range is reduced to 10–20 dB, conventional hearing instruments cannot provide sufficient amplification anymore.

In these cases a cochlear implant (CI) might be the solution. A cochlear implant processes sounds and transforms them directly into electric impulses. The cochlear implant replaces the functionality of the inner ear. The electric impulses directly stimulate the auditory nerve. The auditory process in the brain is thus triggered. However, for the brain to interpret sounds correctly, patients need to have adequate former listening experiences or should be treated with a CI within the first four years of life.

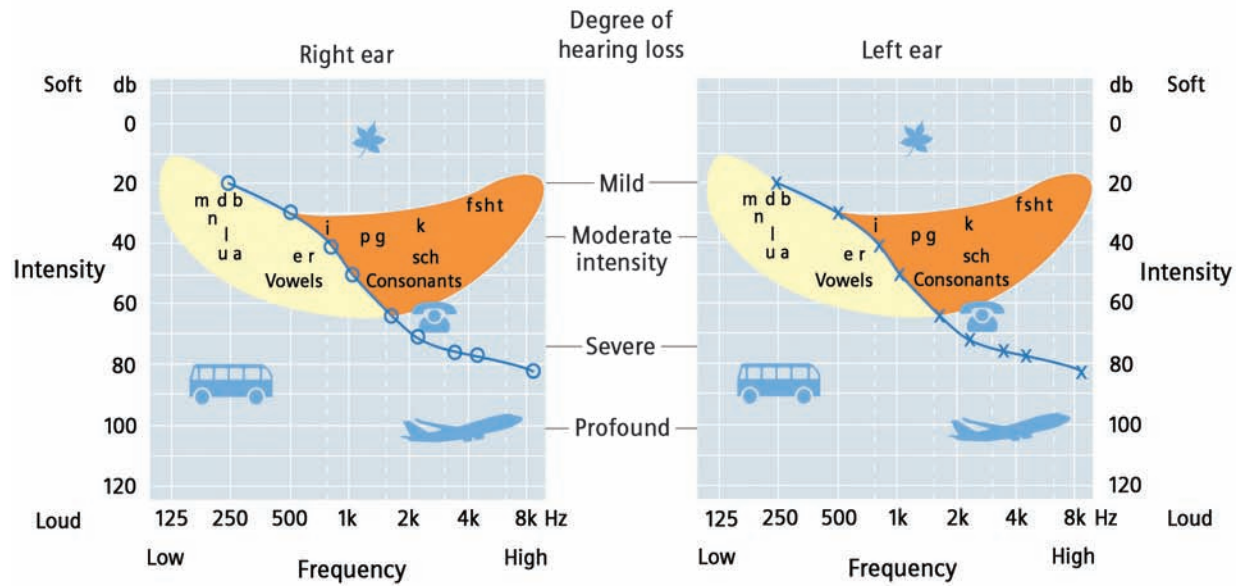
Even under ideal conditions, patients provided with a cochlear implant need a lot of auditory training and continuous support, and even then there is no guarantee that a CI works in every patient.

Fact Sheet

Sensorineural hearing loss.

SIEMENS

How to Read an Audiogram



Different levels of hearing loss are referred to as degrees, depending on the severity of impairment.

Degree of Hearing Loss	Hearing Threshold (in decibels, dB)	Ability to Hear Speech
None	0–25 dB	No perceptible difficulty.
Mild	26–40 dB	Difficulty hearing soft speech and conversations, but can understand in quiet environments.
Moderate	41–55 dB	Difficulty understanding speech, especially in the presence of background noise. Higher volume levels are needed for hearing TV or radio.
Moderate to severe	56–70 dB	Clarity of speech is considerably affected. Speech must be loud and possible difficulty in group conversations
Severe	71–90 dB	Normal speech is inaudible. Either difficulty with loud speech or comprehension only through shouted or amplified speech.
Profound	91+ dB	Even amplified speech is unclear.

An audiogram is a chart a hearing test is marked on. The degree of hearing loss is measured in dB/HL for defined key frequencies. The frequency is measured in Hertz. Curves displayed in dB HL generally describe the individual hearing threshold of a person compared to the normal hearing average, which is always related to 0 dB. Due to inter-individual differences, all thresholds up to 20 dB HL are considered as normal.

Symbols are placed on the audiogram that show the person's air conduction and bone conduction thresholds for each key frequencies. The audiogram

shows the softest level at which a sound is perceived. This is also referred to as the hearing threshold. Different symbols are used to distinguish between air conduction and bone conduction measurements as well as the side the measurement refers to.

You can see the level and frequencies of different sounds in the speech-banana. Vowels are low frequency sounds with a higher volume than consonants which are soft high frequency sounds. The vowels carry the loudness impression of speech whereas the consonants carry the meaning: e.g., house or mouse.

Siemens Hearing Instruments, Inc.

P.O. Box 1397

Piscataway, NJ 08855-1397

800-766-4500

www.usa.siemens.com/hearing