

<http://www.dangerousdecibels.org/hearingloss.cfm>

Dangerous Decibels

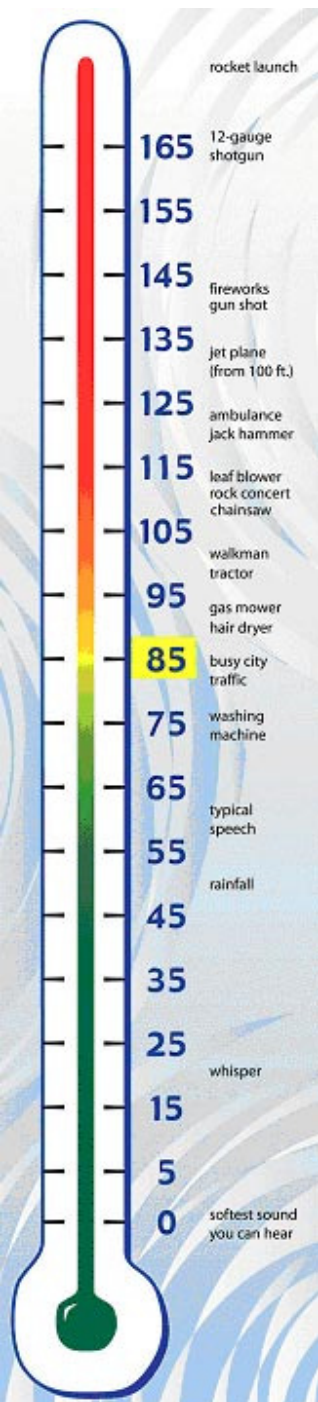
a public health partnership for the prevention of noise induced hearing loss

Types of Hearing Loss

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There are many different causes of hearing loss. The following are the general categories into which hearing loss falls:

- Otosclerosis - is a disease that causes bony growth on the ossicles and causes the stapes to become immobile, thus not allowing sound to be transferred into the cochlea. This is the result of a disease that affects the movement of the stapes, located in the middle ear.
- Meniere's disease - is a problem involving fluid pressure within the cochlea. It causes the sufferer to experience intermittent episodes of hearing loss, dizziness, and tinnitus. These episodes can occur anytime and for varying amounts of time. They are often associated with stress.
- Drug induced - some medications can result in damage to the auditory system with prolonged use. They are called ototoxic. Here are a few drugs that are known to cause hearing loss: aminoglycoside antibiotics (such as streptomycin, neomycin, kanamycin); salicylates in large quantities (aspirin), loop diuretics (lasix, ethacrynic acid); and drugs used in chemotherapy regimens (cisplatin, carboplatin, nitrogen mustard).
- Tumors - one of the common tumors in the ear is called a vestibular schwannoma. These tumors develop around the 8th cranial nerve, which is also known as the auditory nerve.
- Trauma - trauma to the ear can include fractures of the temporal bone, puncture of the eardrum by foreign objects, sudden changes in air pressure, and very loud noises.
- Presbycusis - this hearing loss is caused by natural aging of the human body and begins after age 20, but often it is not noticed until the ages of 55 to 65.



Presbycusis affects the high frequencies in the speech range, making understanding and hearing speech difficult.

- Noise-induced hearing loss (NIHL) - this is hearing loss due to exposure to either a sudden, loud noise or exposure to loud noises for a period of time. A dangerous sound is anything that is 85 dB (sound pressure level - SPL) or higher.

Dangerous Decibels focuses on noise-induced hearing loss.

Noise-Induced Hearing Loss (NIHL)

Of the roughly 40 million Americans suffering from hearing loss, 10 million can be attributed to noise-induced hearing loss (NIHL). NIHL can be caused by a one-time exposure to loud sound as well as by repeated exposure to sounds at various loudness levels over an extended period of time. Damage happens to the microscopic hair cells found inside the cochlea. These cells respond to mechanical sound vibrations by sending an electrical signal to the auditory nerve. Different groups of hair cells are responsible for different frequencies (rate of vibrations). The healthy human ear can hear frequencies ranging from 20Hz to 20,000 Hz. Over time, the hair cell's hair-like stereocilia may get damaged or broken. If enough of them are damaged, hearing loss results. The high frequency area of the cochlea is often damaged by loud sound.

Sound pressure is measured in decibels (dB). Like a temperature scale, the decibel scale goes below zero. The average person can hear sounds down to about 0 dB, the level of rustling leaves. Some people with very good hearing can hear sounds down to -15 dB. If a sound reaches 85 dB

or stronger, it can cause permanent damage to your hearing. The amount of time you listen to a sound affects how much damage it will cause. The quieter the sound, the longer you can listen to it safely. If the sound is very quiet, it will not cause damage even if you listen to it for a very long time; however, exposure to some common sounds can cause permanent damage. With extended exposure, noises that reach a decibel level of 85 can cause permanent damage to the hair cells in the inner ear, leading to hearing loss. Many common sounds may be louder than you think...

- A typical conversation occurs at 60 dB - not loud enough to cause damage.
- A bulldozer that is idling (note that this is idling, not actively bulldozing) is loud enough at 85 dB that it can cause permanent damage after only 1 work day (8 hours).
- When listening to music on earphones at a standard volume level 5, the sound generated reaches a level of 100 dB, loud enough to cause permanent damage after just 15 minutes per day!
- A clap of thunder from a nearby storm (120 dB) or a gunshot (140-190 dB, depending on weapon), can both cause immediate damage.

In fact, noise is probably the most common occupational hazard facing people today. It is estimated that as many as 30 million Americans are exposed to potentially harmful sounds at work. Even outside of work, many people participate in recreational activities that can produce harmful noise (musical concerts, use of power tools, etc.). Sixty million Americans own firearms, and many people do not use appropriate hearing protection devices.

Decibel Exposure Time Guidelines

Accepted standards for recommended permissible exposure time for continuous time weighted average noise, according to NIOSH and CDC, 2002. For every 3 dBs over 85dB, the permissible exposure time before possible damage can occur is cut in half.

Continuous dB	Permissible Exposure Time
85 db	8 hours
88 dB	4 hours
91 db	2 hours
94 db	1 hour
97 db	30 minutes

100 db	15 minutes
103 db	7.5 minutes
106 dB	3.75 min (< 4min)
109 dB	1.875 min (< 2min)
112 dB	.9375 min (~1 min)
115 dB	.46875 min (~30 sec)

NIHL and Veterans

NIHL is of particular concern to veterans. Because NIHL is not immediately apparent (having a gradual onset), many veterans leaving the service are unaware of the full extent of hearing damage. Although governments are now realizing the link between military service and NIHL, it took a long time and many lawsuits before any compensation was given to the affected veterans. In 1999 the USA alone distributed \$291.6 million in compensation for NIHL to some 56,792 veterans. The annual cost of compensation to veterans in France is estimated to be \$60 million. In Belgium two thirds of all payments made to veterans with disabilities correspond to NIHL. Many veterans damage their hearing during service. They can, however, prevent more damage from occurring and they can save their remaining hearing after their military duties are completed.