

How Loud is “Too Loud” for Your Hearing?

To measure the loudness of sound, a unit of measurement called a decibel (dB) is used. A decibel is one tenth of a bel (B), or the unit of measurement devised by engineers of the Bell Telephone Laboratory to quantify the level of sound reduction when a tone is transmitted over one mile (1.6 km) of standard telephone cable. Since the bel proved to be too large for most common sound measurements, the use of the smaller decibel became more popular.

The decibel is used in a wide variety of scientific measurements related to acoustics and electronics. This unit of measurement places a physical value – usually of noise or light intensity – in which a doubling of actual intensity causes perceived intensity to always increase by roughly the same amount. Specifically, a 3 dB increase is about equal to an approximate doubling of sound. This is important to understand because when you look at the dB values given in the following charts and text, you will understand a relatively small numerical increase of 10 dB between the sound of rainfall and a sewing machine accounts for the significantly greater noise level. It also shows that the 110dB sound of a screaming child is only several times less intense than a thunderclap or a rock concert.

Sound reference chart

0	Rustling leaves
20	Ticking watch
30	Quiet whisper
40	Refrigerator hum
50	Rainfall
60	Sewing machine, typical conversation level speech
70	Washing machine
80	Alarm clock (two feet away)
85	Average traffic
90	Gas lawnmower
95	MRI testing
100	Tractor, hair dryer, subway train
105	Power mower, chainsaw
110	Screaming child
120	Rock concert, ambulance, thunderclap
130	Jackhammer, jet engine plane (100 feet away)
140	Fireworks
165	12 gauge shotgun blast

Noise in the workplace

The National Institute for Occupational Safety and Health (NIOSH), a branch of the U. S. Centers for Disease Control and Prevention, reports that ear injury can develop in workers if exposed to 85 dB or more over eight hours. As a result, this 85 dB exposure limit for an eight-hour workday has become a standard in the mining, construction, oil-gas well drilling, and agriculture industries, as well as the U.S. Air Force and Army. Loss of hearing caused by excessively loud or prolonged noises is called NIHL, or noise induced hearing loss.

Injury to the cilia cells

Sounds of less than 80 dB do not often result in hearing loss, even after long or repetitive exposure. It is not possible to predict how an individual will respond to loud noises, since each person possesses a different hearing sensitivity. Yet, exposure to a single loud noise or continuous noise exposure can result in temporary hearing loss. This temporary loss is known as temporary threshold shift, and it will typically resolve 16 to 48 hours after the end of exposure.

Hearing loss can be permanent if the offending sound is loud enough to damage or destroy the delicate inner ear cells, called cilia, or stereocilia, that are found in the cochlea of the inner ear. These cilia cells respond to mechanical sound vibrations by sending an electrical signal to the auditory nerve. The mechanism of injury to cilia is purely physical; excessive vibration results in microscopic tearing or breaking of the cilia. There are many cilia located in the cochlea of the ear; the more that are damaged, the more profound the deafness. Once cilia cells are chemically or physically

damaged or destroyed, they will not regenerate or repair themselves.

Protect your hearing

A commonsense recommendation to avoid hearing loss due to excessively loud noise is to either wear hearing protection or remove yourself from the sound source.

Use either earplugs, earmuffs or other protection devices when exposed to sounds above 85 dB. Since you cannot always be certain when your sound environment places you at risk, use this rule of thumb: If you are talking to someone three feet away from you and you cannot clearly hear what is being said, the noise level around you could be damaging your hearing.

Do the obvious, and simply walk away when sounds are too loud or turn down the volume of the sound source if possible. It is also possible to limit the sound intensity by not standing directly near its source. Time spent in a loud environment is important to the health of your hearing, so limit the time you expose your ears to loud noises. Cover your ears with your hands or cross the street when you hear someone operating a leaf blower or when you are near a jackhammer.

Tinnitus Treatment Institute

Since NIHL, or noise induced hearing loss, can result in tinnitus due to injury of the cochlear ciliary cells, the Tinnitus Treatment Institute has great interest in prevention of injury by sound exposure. Prevention is always preferable to treatment. For more information about tinnitus and NIHL, visit the website of the Tinnitus Treatment Institute.

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About the Author

Dr. Robert Rogers began the Tinnitus Treatment Institute (TTI) in 2004 while practicing at the world-famous Pioneer Medical Clinic in Chicago, Illinois. Learn from a doctor who understands what it is like to have tinnitus, and knows what it takes to correct it. <http://www.tinnitus-treatment-insitute.com>