

**NOISE-INDUCED HEARING LOSS (NIHL)  
FACT SHEET**

**DESCRIPTION OF NIHL:** When an individual is over-exposed to excessive sound levels, sensitive structures of the inner ear can be damaged. This can result in permanent noise-induced hearing loss (NIHL). These structures can be injured by exposure to a brief but intense sound, such as an explosion, or from regular exposure to excessive sound levels over time. NIHL can be prevented through the control of sound levels or proper use of hearing protection devices (HPDs), such as earplugs or earmuffs.

**MEASUREMENTS THAT DETERMINE WHICH SOUNDS CAUSE NIHL:** Sound pitch or frequency is measured in Hertz (Hz). Although the human ear collects sounds ranging from 100-20,000 Hz, the 2-5 kHz frequency range is where most of the spectral cues for speech are found. Sound pressure levels are measured in decibels (dB). Normal conversation is measured at a moderate noise level of 50-70 dB, while the extreme noise level of a rock concert might be measured at 100-120 dB. Over-exposure to high intensity sound is a leading cause of damage to sensory (“hair”) cells. Prolonged exposure to sounds above 85 dB may cause permanent hearing loss. Some examples of loud sounds that can cause NIHL are:

- Motorcycle/Hair dryer/Lawn mower/Leaf blower . . . . . 85-90 dB
- Wood shop/Chainsaw/Firecrackers (small) . . . . .100-110 dB
- Rock concerts . . . . . 100-120 dB
- Ambulance Siren/Jet Engine at Take-Off/Pneumatic Drill . . . . .119-140 dB

**EFFECTS OF NIHL:** When damage first occurs, it usually affects the part of the ear corresponding to the mid-frequency range of 3 to 5 kHz. On an audiogram, this type of hearing loss configuration is commonly referred to as a “noise notch.” These frequencies correspond to the region where our consonant sounds are heard. A person with this type of hearing loss may have trouble understanding speech because the speech sounds “muffled.” It is common for individuals with this type of hearing loss to report “I can hear you; I just can’t understand you.” This is because the louder, lower frequency vowels are audible but the softer high frequency consonants are made even more difficult to hear, due to reduced hearing sensitivity in that spectral region.

**EFFECTS OF  
NIHL:**

Hearing loss may or may not be accompanied by tinnitus – a ringing, buzzing or fluttering in one or both ears. While normal hearing people may also have tinnitus, it is usually symptomatic of some sort of high frequency hearing loss. Sometimes short duration exposure to sound may only cause temporary hearing loss. Temporary hearing loss is called a *temporary threshold shift*. This means that if a sound was first heard at some level of intensity, after over-exposure to loud sounds, that same sound would need to be louder in order to be heard. A temporary threshold shift usually disappears within 14-16 hours after over-exposure to loud sound. Cumulative over-exposure to loud sounds will eventually result in a “permanent threshold shift,” e.g. a permanent hearing loss.

**WARNING  
SIGNS AND  
SYMPTOMS OF  
NIHL:**

**WARNING SIGNS:**

- Temporary threshold shift
- Ear discomfort after exposure
- Ringing or buzzing sensation in the ears
- Difficulty hearing in noise

**EVIDENCE OF OVER-EXPOSURE:**

- Tinnitus or head noise
- High frequency hearing loss
- Hypersensitivity
- Loss of sensitivity

**TIPS FOR  
 PREVENTING  
 NIHL:**

**WHEN NOISE BECOMES A HAZARD:**

- Intensity of the sound signal
- Prolonged exposure to sound levels greater than 85 dB
- Repeated or cumulative exposure
- Individual susceptibility

**CONSERVATION TIPS:**

- Avoid hazardous sound environments.
- If you are in an environment where you must raise your voice to be heard, you are in a potentially hazardous environment for your hearing. This includes loud music performances (regardless of musical genre), and activities such as operating power tools, driving loud vehicles, or driving with the windows down, etc.
- Use hearing protection devices (HPDs) - such as foam earplugs, earmuffs or custom earplugs - whenever possible.
- Custom-molded earplugs offer “flat” attenuation and may make listening to loud music more enjoyable than standard earplugs that may filter more high frequencies than low frequencies.
- Musicians should avoid practicing at “concert hall levels” as much as possible.
- Monitor sounds in excess of 85 dB.
- Take 15-minute “quiet” breaks every few hours.
- Move away from on-stage monitors or amplifiers, or reposition yourself so you are not directly in front of the speaker while performing or listening.

**SAFE SOUND  
 LEVELS:**

The National Institute for Occupational Safety and Health (NIOSH) guidelines are stated in terms of the maximum time that you can safely be exposed to different time-weighted averages (TWAs) of sound pressure on a daily basis over a 40-year period.

<u>TWA Decibel Levels</u>	<u>Max. Exposure</u>
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 . . . . .	7-1/2 minutes
106 dB . . . . .	3-3/4 minutes

**Exposure to 115+ dB or greater may pose a serious health risk.**



**House Ear Institute**  
*Advancing Hearing Science*

**PUBLIC  
AWARENESS OF  
NIHL:**

More than 20 million Americans of all ages are regularly exposed to dangerous levels of sound. Exposure occurs at work, home and in recreational activities. We can damage our ears while listening to stereos or attending movies, concerts, bars, and health clubs where music and other sounds are amplified. Even wearing headphones can be dangerous if the volume is too loud.

**THINGS TO CONSIDER:**

- Of the 28 million Americans who have some degree of hearing loss, about one-third have damaged their hearing from excessive exposure to sound.**
- Not all hearing loss is caused by exposure to loud sound. Some types of hearing loss are reversible with medical intervention.**
- Some types of hearing loss may be signs of a medical condition.**
- If you notice a change in your hearing you should have an evaluation by an ear specialist, such as an otolaryngologist (ENT), otologist, neurotologist, or audiologist.**
- Keep track of your hearing sensitivity and changes over time.**
- If you constantly work around high levels of sound, you should have your hearing tested by a licensed audiologist at least once a year.**
- Hearing tests include pure tone threshold testing (the traditional hearing test), tests of middle ear function, otoacoustic emissions testing, and the “Hearing In Noise Test” (“HINT”), which assesses speech perception in noise, similar to an everyday listening situation. Otoacoustic emissions have been reported to be more sensitive to subtle damage in the inner ear than the pure tone threshold test. The HINT is better than pure tone threshold audiometry for indicating how well an individual hears in real-world situations. These tests together, however, can give your hearing care provider important information for assessing your hearing health.**

**CONTACT  
INFORMATION:**

Marilee Potthoff/Christa Spieth Nuber  
Marketing Department/Media Relations  
House Ear Institute (HEI)  
Phone: (213) 483-4431 / Fax: (213) 483-8789  
E-mail: [mpotthoff@hei.org](mailto:mpotthoff@hei.org) / [soundpartners@hei.org](mailto:soundpartners@hei.org)  
Website: [www.hei.org](http://www.hei.org)