Noise is all Around and Your Ears Can't Tell the Difference

Hearing loss, in most cases, is the result of a lifetime of accumulation of exposure to noise from various sources. Although the damage caused by exposure to gunfire may be different from that caused by exposure to continuous noise (see "What Makes Firearm Noise So Dangerous", inside), the end result is the same — loss of your ability to hear. The total of all exposure to all hazardous noise adds up to the result in your ability — or lack of ability — to hear.

Exposure to continuous noise for long periods of time, like in a factory or on the farm, can damage hearing, too. Here are a couple of ways to determine whether the noise you are in, be it in your car, on the job, from using power tools at home, or in a nightclub, could result in damage to your hearing.

- If you have to **raise your voice** to be heard at a distance of three feet or so, sound levels are probably approaching 85 decibels or dB. That's about the level where regular long-term exposure can result in permanent damage.
- **Tinnitus** or ringing in the ears is a sign of potential damage. If you hear a ringing or rushing sound in your ears after leaving a noisy environment, it was probably too loud.
- **Temporary Threshold Shift** or TTS is a temporary loss of hearing. After exposure to loud noise, you may lose some hearing, then recover after a "rest period" in quiet. If conversation sounds muffled or unclear after leaving a noisy area, or if you have to turn up the radio in your car to make it sound the same as before, it's likely that you overloaded your hearing system.

Shooters are at Risk

Recreational shooting for hunting or sport purposes has become an increasingly popular leisure-time activity. In the US, as many as 60 million people engage in shooting activities, with firearm use ranging from a few shots per year for the casual hunter to 10,000 or more shots per year for avid competition shooters.

Although most serious shooters will use appropriate hearing protection devices (HPDs) during extended sessions on the firing range, many do not protect their hearing during shorter sessions. In addition, since the ability to hear all environmental sounds is paramount in hunting activities, few individuals are willing to use HPDs in the field.

Too often, exposure to firearm noise results in serious, irreversible harm to the shooter's hearing. This Practical Guide is intended to provide information to shooters and the hearing health professionals who help them so that they will understand the hazards of firearm noise and the actions they can take to protect their hearing.

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Guide #7

A practical guide to:

Firearm Use and Hearing

NHCA

National Hearing Conservation Association

The mission of the National Hearing Conservation Association is to prevent hearing loss due to noise and other environmental factors in all sectors of society.

What Makes Firearm Noise So Dangerous?

Unlike loud continuous noise that causes gradual hearing loss over a long period of time, firearm noise can cause severe instantaneous hearing loss with as little as one exposure.

Gunfire is an intensely loud impulse noise that shatters the acoustic environment with incredible concussion, generating a rapid change in pressure and extremely high sound levels.

Although impulse type noise only lasts for a few thousandths of a second, the extreme force it generates has the potential to destroy the delicate tissue in the inner ear if the sound level reaches a critical level.

This critical level varies from person to person, with some people more susceptible than others to noise-induced hearing loss (NIHL), whether it comes from steady industrial types of sound or the impulse noises associated with gunfire.

Why Can't I Understand My Family?

Because NIHL generally involves more hearing loss in high frequencies than in lower, bass ranges, a person with NIHL can usually hear louder, low frequency vowels better than softer, high frequency consonant sounds. This means that although they may be able to hear speech, they may not be able to understand it clearly. For example, the difference between "mine", "kind", and "time" is very hard for someone with NIHL to pick out.

Often, people with NIHL think that others mumble. People with NIHL sometimes give the impression that they are not listening, when in fact, they just don't understand. Many times people with NIHL also have a ringing or roaring in the ears called tinnitus that can be extremely annoying.

How Loud Is Too Loud?

Although there are no clearly defined allowable noise exposure limits for gunfire like those enforced in industrial settings, the Environmental Protection Agency (EPA) has estimated that exposure to one impulse noise per day over about 150 dB has the potential to damage hearing over time. Most shotguns, high power rifles, and pistols can produce sound levels that high or higher.

Large caliber, short-barreled guns that can be rapidly fired are the most dangerous to your hearing.

Modifying the barrel of a gun by drilling holes to reduce recoil (like a muzzle brake) increases sound exposure by sending the shock wave back toward the shooter instead of out of the front of the gun through the barrel. In addition, shooting from an enclosed structure like a duck or deer blind can significantly increase the noise levels reaching to the ear of the shooter.

During Target Practice

Most hearing protection devices (HPD) with a labeled noise reduction rating (NRR) on the package will be adequate for shooting situations when consistently and correctly utilized where hearing verbal communication or environmental sound is not critical. Choose an HPD that attenuates sound adequately and is comfortable to wear for long periods of time. For the ultimate in protection, wear insert type plugs under earmuffs. Using HPD can actually help improve your aim because you will flinch less in anticipation of the "big boom" of your gun.

Ask your audiologist or hearing health professional for more information

What Can I Do to Protect My Ears?

While Hunting

Because most hunting involves listening for approaching game, wearing conventional HPDs is not practical in the field. However, there are two solutions to this problem.

1 Use a specially designed level-dependent HPD with a filter or valve mechanism to let more low level sounds pass and yet provide increasing protection with increasing sound level.

2 A more costly option is to use electronic hearing protective devices (EHPDs). The basic EHPD consists of a microphone, amplifier, volume control, and battery, housed either in a headset, a behind-the-ear (BTE) device, or an in-the-ear (ITE) configuration. The amplifier increases low and moderate level sounds that can improve hearing ability, but is also equipped with a special circuit which prevents loud sounds from reaching damaging levels in the ear. Each type has advantages and disadvantages, as listed below.

EHPD Type	Advantages	Disadvantages
Headset	Least expensive, high amplification, good protection	Bulky, uncomfortable for long periods of use, excessive wind noise, poor localization of sounds
BTE	Moderate amplification, good localization of sounds	More expensive than headset, some types may be uncomfortable, some wind noise
ITE	Moderate amplification, good protection, good comfort, best localization of sounds, least wind noise	Most expensive