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**NIOSH**

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# Sound Advice — Protect Your Ears in Noisy Work Environments



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*Editors' Note: This issue is a collaboration between the National Safety Council and the National Institute for Occupational Safety and Health. It is dedicated to hearing loss prevention.*

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# Sound Advice — Protect Your Ears in Noisy Work Environments



by **Stacie Zoe Berg**

**Y**our job shouldn't cause you to lose your hearing. Yet for many people, such as construction workers, farmers, mechanics and factory workers, years of exposure to excessive noises on the job has lead to permanent hearing loss.

"Work-related hearing loss is one of the most common occupational diseases in the United States," says Dr. Linda Rosenstock, director of the National Institute for Occupational Safety and Health (NIOSH).

According to NIOSH, 30 million Americans are exposed to hazardous noise at work. This has resulted in a permanent hearing

loss for about 10 million workers. If you are one of these people, you don't have to suffer hearing loss. Your supervisors can make changes to the equipment to eliminate or reduce noise. In many cases you can adjust your work schedule and job to avoid being around noisy equipment. Finally, when engineering or administrative controls can't eliminate your exposure to hazardous noise, you can wear hearing protection devices, such as ear plugs or ear muffs.

### **Now hear this**

Loud noises can cause hearing loss by damaging the delicate hair cells in the inner ear.

***Thirty million Americans are exposed to hazardous noise at work. This has resulted in a permanent hearing loss for about 10 million workers.***

Most of the time this damage happens gradually when prolonged exposure to loud sounds exhausts these hair cells, says Dr. Mark Stephenson, NIOSH audiologist. As noise levels increase, the tiny cilia at the top of the hair cells can be injured or broken off. Entire groups of these hair cells can even be



torn away. Hair cells don't repair themselves. So when enough hair cells are damaged, a hearing loss results.

Sound is measured in decibels. A normal conversation takes place at about 60 decibels. A woodshop noise level is about 100 decibels, and a chainsaw noise measures about 110 decibels, according to the National Institute on Deafness and Other Communication Disorders (NIDCD). Prolonged exposure to noise above 85 decibels can cause hearing loss.

A short, intense sound — an explosion, for example — may cause immediate hearing loss. But usually hearing loss occurs gradually after prolonged exposure to loud noise. It may occur so gradually you may not even realize you are losing your hearing. Over time, sounds may simply become muffled or distorted.

Tinnitus, a ringing or roaring sound, sometimes described as the sound of crickets in one or both ears, can accompany both immediate and gradual hearing loss.

Tinnitus occurs when the damage to hair cells hasn't gotten to the point where they produce nothing, says Don Morgan, vice president of clinical research and medical affairs for Decibel Instruments, a Fremont, Calif.-based hearing aid research and manufacturing company. Rather, the hairs produce ongoing sounds because they are partially damaged. That is,

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they are constantly stimulated because they are irritated. The brain perceives this constant irritation as sound.

Hearing loss can be progressive if you continue exposing yourself to the same noise, Morgan says. Today you may have a minor or moderate hearing loss, but after further exposure, the loss may become more severe. However, once you stop the exposure, the hearing loss won't get worse.

### *Muffle the roar*

The Occupational Safety and Health Administration (OSHA) requires employers to develop and implement a noise monitoring program when "information indicates that any employee's exposure may equal or exceed an 8-hour average exposure of 85 decibels." When this occurs, OSHA requires employers to notify employees, to establish and maintain a hearing test program, and to train workers how to prevent occupational hearing loss. When engineering controls have not yet eliminated hazardous noise, OSHA also requires employers to provide hearing protectors and ensure workers wear them.

Not every type of hearing protection is useful for every type of noise. Disposable foam earplugs may be fine for some noise

exposure while earmuff-type protection may be suitable for another.

But hearing protection doesn't work if you don't use it. According to a University of

***"Work-related hearing loss is one of the most common occupational diseases in the United States."***

***Dr. Linda Rosenstock, NIOSH***

Michigan study, construction workers said they wear ear plugs or ear muffs between 36 to 61 percent of the time when they are necessary. Not surprisingly, more than half believed they developed a hearing loss.

To see if you may be in an environment that could cause hearing loss, ask yourself the following questions:

- Is the noise at my workplace so loud that I have to raise my voice significantly for someone an arm's length away to hear me?
- When I leave work and am in a quieter environment, do my ears feel plugged? Or do I hear a mild ringing or whooshing noise that goes away after an hour or two?

If you answer yes to either of these questions, take some sound advice: Get your hearing tested and protect your ears. □

# Choose the Hearing Protection That's Right For You



3-FLANGED PREMOLDED



EARMUFFS



FOAM EARPLUGS



SEMI-INSERT  
EAR CANAL CAPS

2 POSITION PLASTIC BAND

**C**onfused about the right type of hearing protection for yourself? There are several main types of hearing protectors, and each type requires a slightly different fitting technique. NIOSH recommends that hearing protectors should be personally fit to each employee.

## *Expandable foam plugs*

These plugs are made of a formable material designed to expand and conform to the shape of each person's ear canal. Roll the expandable plugs into a thin, crease-free cylinder. Whether you roll plugs with thumb and fingers or across your palm doesn't matter.



What's critical is the final result — a smooth tube thin enough so that about half the length will fit easily into your ear canal. Some individuals, especially women with small ear canals, have difficulty rolling typical plugs small enough to make them fit. A few manufacturers now offer a small size expandable plug.

### *Pre-molded, reusable plugs*

Pre-molded plugs are made from silicone, plastic or rubber and are manufactured as either “one-size-fits-most” or are available in several sizes. Many pre-molded plugs are available in sizes for small, medium or large ear canals.

A critical tip about pre-molded plugs is that a person may need a different size plug for each ear. The plugs should seal the ear canal without being uncomfortable. This takes trial and error of the various sizes. Directions for fitting each model of pre-molded plug may differ slightly depending on how many flanges they have and how the tip is shaped. Insert this type of plug by reaching over your head with one hand to pull up on your ear. Then use your other hand to insert the plug with a gentle rocking motion until you have sealed the ear canal.

Advantages of pre-molded plugs are that they are relatively inexpensive, reusable, washable, convenient to carry, and come in a variety of sizes. Nearly everyone can find a plug that

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will be comfortable and effective. In dirty or dusty environments, you don't need to handle or roll the tips.

## Canal caps

Canal caps often resemble earplugs on a flexible plastic or metal band. The earplug tips of a canal cap may be a formable or pre-molded material. Some have headbands that can be worn over the head, behind the neck or under the chin. Newer models have jointed bands increasing the ability to properly seal the earplug.

The main advantage canal caps offer is convenience. When it's quiet, employees can leave the band hanging around their necks. They can quickly insert the plug tips when hazardous noise starts again. Some people find the pressure from the bands uncomfortable. Not all canal caps have tips that adequately block all types of noise. Generally, the canal caps tips that resemble stand-alone earplugs seem to block the most noise.

## Earmuffs

Earmuffs come in many models designed to fit most people. They work to block out noise by completely covering the outer ear. Muffs can be "low profile" with small ear cups or large to hold extra materials for use

in extreme noise. Some muffs also include electronic components to help users communicate or to block impulsive noises.

Workers who have heavy beards or sideburns or who wear glasses may find it difficult to get good protection from earmuffs. The hair and the temples of the glasses break the seal that the earmuff cushions make around the ear. For these workers, earplugs are best. Other potential drawbacks of earmuffs are that some people feel they can be hot and heavy in some environments.

## *Miscellaneous devices*

Manufacturers are receptive to comments from hearing protection users. This has led to the development of new devices that are hybrids of the traditional types of hearing protectors. Because many people like the comfort of foam plugs, but don't want to roll them in dirty environments, a plug is now available that is essentially a foam tip on a stem. You insert this plug much like a pre-molded plug without rolling the foam.

Scientists are developing earmuffs using high-tech materials to reduce weight and bulk, but still effectively block noise. On the horizon may be earplugs with built in two-way communication capability.

Still, the best hearing protector is the one that is comfortable and convenient and that you will wear every time you are in hazardous noise. □

# Health Talk

by Elizabeth Agnvall

## Avoid the Burn

More than one-third of adults in the United States suffer from heartburn. But a study published in *The Archives of Internal Medicine* finds that most sufferers don't know what causes it. Researchers called 2,000 Americans who say they've had heartburn and found that most didn't know the risk factors for heartburn. The causes include certain foods and drinks, body position (reclining and bending over), stress, cigarette smoking, alcohol consumption, obesity and medication. If people don't know what causes their heartburn, they're unlikely to make lifestyle changes to avoid the problem. Instead, the survey found that 45 percent of the respondents rely on medication. Interestingly, women were much more likely than men to know the causes of heartburn and to do something about it.

## Bad Back or Bad Gene?

Scientists have found a new cause for that aching back. A study published in the jour-



nal *Science* shows that a mutated gene may be responsible for some bad backs. Researchers at the University of Philadelphia and the University of Oulu in Finland studied 180 Finnish patients with sciatica, a chronic back pain often caused by a ruptured disk. They found that nine patients with sciatica were found to have a mutant gene, while none of the 230 pain-free patients in a control group had the gene. When the researchers looked into the relatives of the patients with the mutant gene, they found 23 relatives had the mutation and all suffered from slipped or ruptured disks. The researchers speculate that the gene prevents disks from forming into the correct shape. Eventually, the disk begins pinching the spine's sciatic nerve and causes pain. □



# Got a Question About Hearing Protection?

**W**orkers frequently ask what they can do to protect themselves from hearing loss. The answers to the questions below will give you some practical advice.

## *1. Don't we lose our hearing as we age?*

It's true that most people's hearing gets worse as they get older. But for the average person, aging does not cause impaired hearing before at least the age of 60. People who are not exposed to noise and are otherwise healthy, keep their hearing for many years. People who are exposed to noise and do not protect their hearing begin to lose their hearing at an early age. For example, by age 25 the average carpenter has "50-year-old" ears!

## *2. Can you poke out your eardrums with earplugs?*

That is unlikely for two reasons. First, the average ear canal is about 1 <sup>1</sup>/<sub>4</sub> inches long. The typical earplug is between <sup>1</sup>/<sub>2</sub> to <sup>3</sup>/<sub>4</sub> of an inch long. So even if you inserted the entire earplug, it would still not touch the eardrum. Second, the path from the opening of the ear canal to the eardrum is not straight. In fact, it is quite irregular. This prevents

you from poking objects into the eardrum.

***3. We work in a dusty, dirty place. Should I worry that our ears will get infected by using earplugs?***

Using earplugs will not cause an infection. Have clean hands when using earplugs that need to be rolled or formed with your fingers. If this is inconvenient, there are plenty of earplugs that are pre-molded or that have stems so that you can insert them without having to touch the part that goes into the ear canal.

***4. Can you hear warning sounds, such as backup beeps, when wearing hearing protectors?***

There are fatal injuries because people do not hear warning sounds. However, this is usually because the background noise was too high or because the person had a severe hearing loss. Using hearing protectors will bring both the noise and the warning sound down equally. If the warning sound is audible without the hearing protector, it will be audible when wearing the hearing protector.

***5. Since I already have hearing loss and wear a hearing aid, hearing prevention programs don't apply to me, right?***

If you have hearing loss, it's important to protect the hearing that you have left. Loud noises can continue to damage your hearing, making it even more difficult to communicate at work and with your family and friends. □

## **Coming up in the March issue of Safeworker:**

### **What to Do When Customers Become Unruly**

Learn to protect yourself from hostile and violent members of the public.

### **Be Heart Smart**

Exercise and a proper diet can keep your heart at a healthy beat.

### **Good Samaritans Wanted**

Would you know what to do if you were the first person at the scene of a crash?