Why it Matters

Hearing Loss

To prevent damage to their ears, people should wear ear protection when working with power tools.

About 10 percent of all Americans have some degree of hearing loss. There are three basic types of hearing loss. *Conductive hearing loss* is an impairment of the transmission of sound waves in the outer ear or transmission of vibrations in the middle ear. Conductive hearing loss is most often caused by improper development of the parts of the outer or middle ear or by damage to these parts of the ear by physical trauma or disease. Conductive hearing loss can often be corrected with medicine or surgery. *Neural hearing loss* is caused by problems with the auditory nerve, which carries signals from the inner ear to the brain. One common cause of neural hearing loss is a tumor pressing against the auditory nerve. *Sensory hearing loss* is caused by damage to the inner ear, particularly the microscopic hair cells in the cochlea.

Sensory hearing loss can be present at birth and may be genetic or due to disease or developmental disorders. However, the most common source of damage to hair cells is exposure to loud noise. Short-term exposure to loud noise can cause ringing in the ears and temporary hearing impairment. Frequent or long-term exposure to noise above 70 dB—including noise from familiar sources such as hair dryers or lawn mowers—can damage the hair cells permanently.

The hair cells in the cochlea are not like the hair on your head or skin. They are highly specialized nerve cells that cannot be repaired or replaced by the body when they are severely damaged or destroyed. Cochlear hair cells can recover from minor damage, but if the source of the damage recurs frequently, even if it is only moderately loud noise, the hair cells may not have time to recover and can become permanently damaged. It is therefore important to protect yourself from sensory hearing loss by reducing your exposure to loud noise or by using a noise-dampening headset or earplugs that fully block the ear canal when you must be exposed to loud noise.

Permanent sensory hearing loss usually occurs gradually, sometimes over 20 years or more. Because the hair cells that respond to higher-pitched sounds are smaller and more delicate, sensitivity to sounds with frequencies around 20 kHz is usually the first to be lost. Loss of sensitivity to sounds with frequencies around 4 kHz is often the first to be noticed because these frequencies are in the upper range of human speech. People who are starting to lose their hearing often have trouble hearing higher-pitched voices or hearing consonant sounds such as *s*, *t*, *p*, *d*, and *f*. As the hearing loss advances, loss of sensitivity to a wider range of sounds follows.

Although there is currently no true "cure" for sensory hearing loss, some remedies are available. *Hearing aids* act like tiny amplifiers, making any sounds that reach the ear louder. *Assistive listening devices* serve to amplify a specific small range of frequencies for people who have only partial hearing loss in that range. *Cochlear implants* use an electrode that is surgically implanted into the cochlea through a hole behind the outer ear. Electrical signals to the electrode stimulate the auditory nerve directly, in effect bypassing the hair cells altogether.