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BETTER HEARING AND SPEECH MONTH

Toning down noise-induced hearing loss

New research challenges the misconception that brief exposure to loud noise is reversible and without sequelae

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The American Academy of Otolaryngology—Head and Neck Surgery (AAO-HNS) Hearing Committee works together with its Members and allied organizations to raise awareness, promote public policy, and advocate for hearing health in the U.S. May is the Better Hearing and Speech Month and as part of that campaign the AAO-HNS would like to draw attention to the important issue of noise-induced hearing loss (NIHL).

NIHL is a growing problem with broad public health implications. An estimated 22 million workers are exposed to potentially dangerous levels of noise each year and 10 million Americans are affected by irreversible NIHL.[1] Potentially harmful noise levels have been recognized and regulated in occupational settings since the 1974 passage of the Occupational Noise Exposure Standard.[2] Today, this standard limits the level and duration of noise exposure that workers can be exposed to, mandates provision of hearing protection, and enforces minimum safety standards (Table 1). More stringent standards have subsequently been proposed by the National Institute for Occupational Safety and Health (NIOSH).[3]

While noise exposure standards exist for the workplace, no such protections are in place for recreational noise exposure. Public awareness of NIHL caused by high sound levels from personal listening devices (PLDs), concerts, sporting events, or other leisure activities remains low (Figure 1). Environmental noise in recreational settings can be significant, for instance, in 2014 the Kansas City Chiefs of the National Football League recorded a record-setting crowd noise of 142.2 dB. The National Institute on Deafness and Other Communication Disorders (NIDCD) has specifically highlighted NIHL as an area in need of greater awareness and made it the target of their national public education campaign: *It's a Noisy Planet. Protect Their Hearing*.

New research is challenging a misconception that brief exposure to loud noise is reversible and without sequelae. Evidence now exists in mice and guinea pigs that a single loud-noise exposure that causes a reversible hearing threshold shift can cause both immediate and long-term structural damage within in the cochlea.[4,5] A similar injury profile has been found in human temporal bone specimens.[6] This new insight into inner ear pathology has

Table 1. OSHA Occupational Noise Exposure Standard

Duration per day (hours)	Sound level (dBA)
8	90
6	92
4	95
3	97
2	100
1	105
0.5	110
0.25	115

been termed "hidden hearing loss" because standard hearing tests often miss the underlying damage. With repeated noise trauma there is potential for cumulative inner ear damage that may accelerate age-related hearing loss and contribute to poor speech discrimination.

Teenagers and young adults are key targets for Better Hearing and Speech Month. This demographic, in whom awareness of NIHL and hearing protection remains particularly low, is the major consumer of digital music delivered through PLDs. In light of the aforementioned research, this youth demographic may benefit the most from conscientious noise protection. Data suggests that 8- to 18-year-olds average 7.5 hours a day on multimedia devices.[7] Additionally, 94 percent of college students own a PLD capable of playing music, and in one study 25 percent of teenagers had a preferred listening level considered "high risk" by NIOSH standards.[8,9] Conventional hearing assessment protocols may have underestimated the potential harm of PLDs. New research with extended high frequency audiometry (9-16 kHz) suggests that a preferred listening level of greater than 85 dB is associated with high-frequency hearing decline in young adults.[10]

One challenge of educating the youth on NIHL is the incorrect assumption that sensorineural hearing loss is an affliction only associated with aging. Data suggests that more young people are showing evidence of sensorineural hearing loss. According to the National Health and Nutrition Examination Survey, the prevalence of hearing loss among United States adolescents aged 12 to 19 years old was 14.9 percent from 1988 to 1994, but rose to 19.5 percent in the period between 2005 and 2006.[1] The role of NIHL and PLDs on this increase remains unknown.

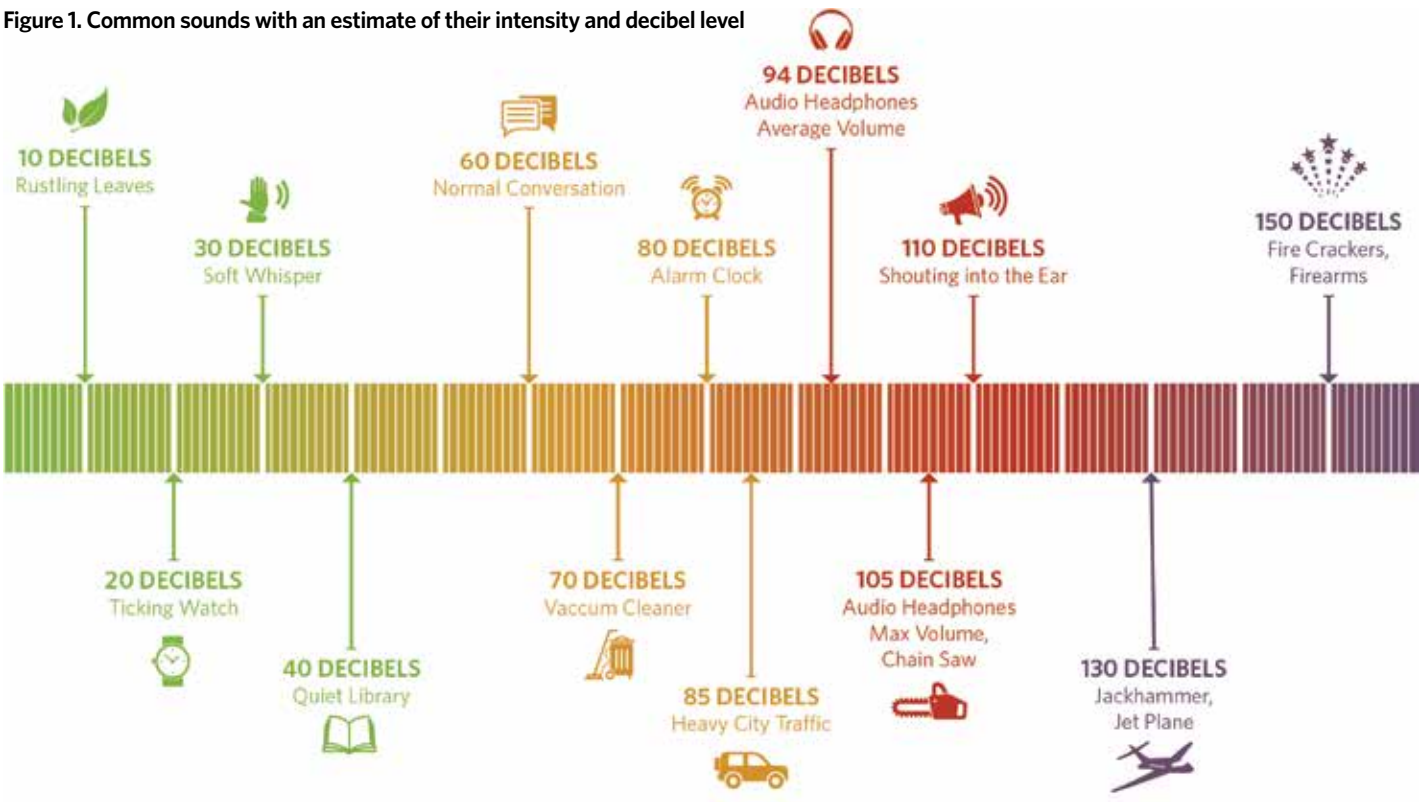
Numerous organizations, including the AAO-HNSF, are dedicated to increasing public awareness on NIHL and healthy listening practices. One award-winning program developed by the American Speech-Language-Hearing Association (ASHA) is called "Listen to Your Buds." This campaign educates children, parents, and educators on NIHL and healthy listening habits when using PLD (**www.asha.org/buds**). A more comprehensive list of partnership organizations working on NIHL prevention can be found on the NIOSH website (**www.cdc.gov/niosh/**).

In general, healthcare providers can reinforce three basics tenets of NIHL prevention: decrease exposure time, increase distance from the noise source, and buffer the noise when possible. Hearing protection devices are recommended whenever a noise is above 85 dB. A variety of hearing protection devices are available ranging from disposable foam inserts to earmuffs to customizable musician plugs. New inexpensive smartphone apps also make testing environmental noise easier than ever.

The Hearing Committee continues to track this and other critical issues in order to provide the AAO-HNS with expert input for its role in consumer advocacy and public policy making by governmental agencies. Please join us this May, during Better Hearing and Speech Month, to raise awareness about NIHL.

See full reference list at **www.entnet.org/bulletin**.

Figure 1. Common sounds with an estimate of their intensity and decibel level



Sources:
Reddy, S. Is Your Music Too Loud? Published by Wall Street Journal. Retrieved March 2015, from http://www.wsj.com/articles/is-your-music-too-loud-experts-say-yes-if-its-louder-than-a-microwaves-beep-1425921356
Noise Monitoring Services website. Retrieved February 2016, from http://www.noisemonitoringservices.com/decibels-explained/