In January 2006, Louisiana resident John Kiel Patterson filed a federal lawsuit against Apple Computer, Inc., claiming that Apple’s iPod® personal music systems are “inherently defective in design and are not sufficiently adorned with adequate warnings regarding the likelihood of hearing loss.” The lawsuit contended that iPods can generate more than 115 decibels— a noise level that can damage hearing if the user is exposed to it for more than short bursts of time. The suit stated further that while Apple had already reworked the iPod to comply with noise restrictions in France, where such devices are limited to 100 decibels, the company had not made any such changes to iPods sold in the United States. According to Patterson’s complaint, Apple also contributed to hearing loss in iPod users by including phrases such as “crank up the tunes” and “bring in the noise” in lesson manuals related to the device.

In March 2006, Apple Computer announced a new tool that lets iPod users— or more likely, their parents— cap the music player’s volume and lock that setting with a password. However, this attempt to muffle the roar of technology surely will be defeated by computer-savvy children armed with superior programs. For example, a free, downloadable computer program called goPod enables users to circumvent volume controls in order to “release the sound of your iPod,” according to the goPod Web site. Clearly, parents and potentially liable corporations need to find new strategies to protect children against loud noise exposure.

Loud music is just one of the many sources of excessive noise to which children are exposed today. Others include loud music, real or toy firearms, power tools, fireworks, loud toys, snowmobiles or other loud engines such as jet skis or motorcycles. Dr. James Blair and his colleagues at Utah State University reported that 97 percent of third graders they surveyed had already been exposed to hazardous sound levels. Drs. Gail Chermak and Elizabeth Peters-McCarthy reported
that 43 percent of the elementary school students they studied routinely listened to a personal stereo system or television at a loud volume. Thirty percent of these students said they sometimes participated in other noisy activities (such as shooting firearms or attending auto races); however, only 5.5 percent of the students ever used hearing protection while engaged in these activities.

When humans of any age are repeatedly exposed to hazardous sound levels without using adequate hearing protection, the common result is noise-induced hearing loss (NIHL). Several studies have demonstrated that the prevalence of NIHL among children is increasing. Amanda Niskar and her colleagues at the Centers for Disease Control and Prevention (CDC) estimate that 12.5 percent of all children ages six to 19 in the U.S. have noise-induced hearing threshold shifts in one or both ears. By extension, this means that more than five million of our nation’s children already exhibit evidence of excessive noise exposure.

What will this mean for those children? Because the effects of excessive sound exposure are cumulative, a 16-year-old high school student with a mild, high-frequency hearing loss may well be debilitated by hearing loss in later life. Consequences of NIHL include communication difficulties, lower academic performance, reduced productivity, social isolation, depression and tinnitus (the perception of ringing, buzzing or hissing sounds in the ears or head). At least 10 million Americans are currently afflicted with NIHL and this number continues to grow daily due to toxic noise in our jobs and at play.

**Prevention Is Key**

Unlike many other causes of hearing loss, nearly all cases of NIHL can be prevented with a few simple precautions. For more than 30 years, numerous experts have recommended teaching hearing loss prevention practices to children in schools. In 1990, at the National Institutes of Health conference, “Noise and Hearing Loss,” a panel of experts recommended that existing hearing conservation programs should be supplemented with a comprehensive education program which is specific to the causes and prevention of NIHL and targeted directly toward school-age children. In 1997, a World Health Organization conference, “Prevention of Noise-Induced

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**Sound Exposure Time Guidelines**

<table>
<thead>
<tr>
<th>Sound source</th>
<th>Loudness of sound (dB SPL)</th>
<th>Damage to hearing begins...*</th>
</tr>
</thead>
<tbody>
<tr>
<td>City traffic</td>
<td>85 dB</td>
<td>after 8 hours</td>
</tr>
<tr>
<td>Gas lawn mower</td>
<td>90 dB</td>
<td>after 2 hours</td>
</tr>
<tr>
<td>Stereo headphones / earphones</td>
<td>100 dB</td>
<td>after 15 minutes</td>
</tr>
<tr>
<td>Chainsaw, leaf blower, rock concert</td>
<td>115 dB</td>
<td>in less than 30 seconds</td>
</tr>
<tr>
<td>Jet airplane 100 feet away</td>
<td>130 dB</td>
<td>instantaneously</td>
</tr>
<tr>
<td>Fireworks, small rifle</td>
<td>140 dB</td>
<td>instantaneously</td>
</tr>
<tr>
<td>Shotgun</td>
<td>160 dB</td>
<td>instantaneously</td>
</tr>
</tbody>
</table>

* if ear plugs or ear muffs aren’t worn to prevent noise-induced hearing loss.
Hearing Loss,” echoed those recommendations, stating that public awareness of the harmful effects of noise on hearing and the prevention of NIHL should be included in school and all health educational programs. In 2000, the Department of Health and Human Services published Healthy People 2010. Calling NIHL a “fully preventable condition,” Healthy People 2010 also advocated for increased public education to promote hearing health. “Prevention of noise-induced hearing loss is necessary for people both on and off the job,” the report said, and offered these objectives:

✔ Increase the use of appropriate ear protection devices, equipment, and practices
✔ Reduce NIHL in children and adolescents aged 17 years and under
✔ Reduce adult hearing loss in the noise-exposed public.

Clearly, part of the solution to preventing NIHL in young people is educating children and youth about how hearing works; sources of loud sounds; how loud sounds damage hearing; consequences of noise-induced hearing loss; and strategies to protect themselves from excessive sound exposure.

**Getting the Word Out**

Despite the urgings of hearing health experts, there are still no policies requiring hearing conservation practices to be taught in our nation’s classrooms and basic hearing loss prevention information remains conspicuously absent from most school curricula.

Why aren’t hearing loss prevention practices taught in schools? State departments of education and health look to the CDC for guidance about which health topics to address in our nation’s schools.

CDC’s Healthy Youth! Web site states: “Establishing healthy behaviors during childhood is easier and more effective than trying to change unhealthy behaviors during adulthood. Schools have a critical role to play in promoting the health and safety of young people and helping them establish lifelong healthy behavior patterns because each school day is an opportunity to teach behaviors to America’s 54 million students, and America’s 121,000 schools provide many opportunities for students to practice healthy behaviors.” If elementary school children are educated about NIHL and hearing loss prevention, they will be more likely to protect their hearing in future occupational and recreational settings.

Unfortunately, the reality is that hearing health is not a priority of the CDC’s Healthy Youth! program – in fact, it is not even on the radar screen. Although teachers, parents, administrators, members of school districts and school boards might be aware that excessive noise exposure is hazardous for children and adults, the CDC’s Division of Adolescent and School Health provides no information or guidelines for educators about this significant problem.

In 1987, hearing conservation specialists Elliott Berger and Julia Royster made the following statement about occupational hearing conservation programs: “In large part, what is needed is not the development of new solutions but rather the broad dissemination of existing techniques.” In other words, we already know what causes occupa-
tional hearing loss; we need to get the word out about prevention. This statement also applies to educating children about the consequences of excessive noise exposure. There is an abundance of hearing loss prevention curricula and materials that have already been developed for children and evaluated for effectiveness; however, there is a lack of dissemination of this important information to our children.

Teaming up Against Dangerous Decibels

Seven years ago, clinicians and researchers at the Oregon Hearing Research Center teamed with educators at the Oregon Museum of Science and Industry (OMSI) to develop the Dangerous Decibels project. Dangerous Decibels is a public health campaign designed to reduce the incidence and prevalence of NIHL and tinnitus by changing knowledge, attitudes and behaviors of school-aged children. Dangerous Decibels consists of four components that were funded by grants from the National Institutes of Health and several private foundations:

Museum Exhibit – A permanent Dangerous Decibels exhibit opened at OMSI in June 2002.

Educational Outreach – Classroom programs for kindergarten through 12th grade students; teacher education and training materials for schools and communities.

Epidemiological and Evaluative Research – Results of the educational outreach programs showed that they were effective in changing the knowledge, attitudes and intended behaviors of children and adults.

Web-based Outreach – Eight of the museum exhibits were converted to virtual exhibits on display at www.dangerousdecibels.org.

These components work in concert to teach children about the sources of dangerous sounds, protection from toxic noise and the consequences of exposure to it.

One of the most successful and rewarding aspects of the Dangerous Decibels project involved training teams of high school students to deliver the curriculum to fourth grade classrooms. To date, 30 high school students have presented the curriculum to more than 2,000 fourth-graders in Oregon. The results were extremely encouraging: The fourth grade students and their teachers
enjoyed the presentations and found them informative, and the students exhibited significant improvements in knowledge, attitudes and intended behaviors related to excessive sound exposure and hearing protection. Additionally, their mentors, the high school student presenters, also showed significant improvements in knowledge, attitudes and intended behaviors on the subject. For high school students considering additional training or careers in teaching, science, medicine or research, this experience proved invaluable.

Although Dangerous Decibels is a well-developed and effective educational program, its distribution is miniscule compared to the number of school children across the nation who should hear such messages on a regular basis. In addition to muffling their noisy products, perhaps electronics and power tools manufacturers should sponsor programs to educate people about NIHL. The ultimate goal of hearing loss prevention education programs is to reduce the prevalence of NIHL among children and adults. Though determining the efficacy of prevention education takes years, most experts in hearing science agree that these efforts should receive attention and resources similar to those allocated for anti-smoking, anti-drug, teen pregnancy and sexually transmitted disease education programs that are routine in public schools.

A clear statement of priority from the CDC about hearing health education would make a great impact on the state departments of education and health that look to the CDC for guidance. These larger initiatives are needed to bring hearing loss prevention education to all our nation’s schools.

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