

Minnesota Medicine

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## **PULSE**

### **Music to Their Ears?**

**Long an occupational hazard for rock musicians, hearing injury is as much of a risk for classical musicians.**

By Trout Lowen

During an amplified pops concert at Orchestra Hall in 2006, cellist Janet Horvath felt a sudden and serious pain in her left ear. As she played, the pain grew, radiating down her neck and into her face, tongue, and jaw. A long-time advocate for workplace safety for musicians, Horvath knew what was happening. She was experiencing a temporary threshold shift, hearing loss brought on by exposure to excessively loud sound. In this case, the sound was coming from an on-stage speaker situated near her chair and pointed back at the orchestra. After the performance, Horvath's ear felt plugged, and she experienced painful spasms. She had an acoustic shock injury.

Almost everyone who has attended a blaring rock concert or thunderous sporting event has experienced tinnitus, or ringing in the ears, at one time or another. Usually, the effect is short-lived, disappearing after a several hours of quiet or a good night's sleep.

Horvath wasn't so lucky. The next morning, she was back at work, rehearsing for the orchestra's upcoming performance of Carmen. For the first time in her career, she says, she found the volume on stage intolerable. She needed to wear an earplug to get through the rehearsal and the performance, and for months afterward.

Eventually, the ringing subsided, but other, more distressing symptoms continued. Her inner ear was overreacting to sound, not just on stage, but in daily life: women talking, dishes clattering, even the sound of her own voice caused Horvath's ear to spasm and send pain shooting down her neck. She was diagnosed with hyperacusis, a hearing injury that causes oversensitivity to all sound. She is currently on leave from her job with the Minnesota Orchestra because of the condition.

Horvath's situation is not unique. Although hearing damage is considered almost a given for rock musicians, there is a growing awareness that classical musicians, too, suffer hearing injury and loss. No statistics are available, but the number of classical musicians affected appears to be growing as performance schedules intensify and volumes increase. A survey of British symphony musicians published in the 2008 report "A Sound Ear II" found that 79 percent have experienced pain stemming from loud noise, and 14 percent experience it frequently.

Even so, many classical musicians are reluctant to talk about their hearing issues, Horvath says. They're afraid that coming forward might cost them their jobs. "We have come a really long way in the field of performing arts medicine," she explains. "It's now an established medical field.... But the one area that is still not out of the closet is hearing."

Horvath has done a lot herself to advance the field of performing arts medicine. After developing overuse injuries while still in college, she organized the first Playing (Less) Hurt conference in 1986 at the University of Minnesota. It brought together more than 500 musicians, physicians, and music educators to discuss the problem of occupational injuries of musicians and how to prevent them.

In 2002, she wrote an injury prevention guide of the same name (it can be purchased at [www.playinglesshurt.com](http://www.playinglesshurt.com)) specifically for musicians. Now she is one of the biggest public advocates for hearing protection for musicians. The most recent edition of her guide includes a chapter on hearing-related issues. "The world has become so toxically noisy that there is never a break from noise, from sound," Horvath notes. "Wherever you go, the decibel levels are absurd. So even if a musician is aware of the large decibels on stage, they have to take tremendous steps to protect their ears outside of the stage."

Exposure to just one loud blast can cause temporary or permanent hearing loss or damage, as can repeated exposure to excessive sound, such as listening to music too loudly through headphones or ear buds or the noise from a lawn mower, leaf blower, or other machinery.

### **The Inner Ear**

Although we "hear" sound, our ears actually experience sound as pressure. The louder it is, the greater the pressure exerted on the stereocilia, the tiny, hair-like structures embedded in the cochlea that transmit electrical impulses through the auditory nerve to the brain.

Stereocilia can be bent or flattened by excessively loud sound, but they usually spring back after a day or two. Over time, however, they can lose their ability to rebound. They also can break or become permanently bent or flattened.

The louder the sound, the greater the risk, says Richard Levinson, M.D., a pediatric otolaryngologist with Ear, Nose, and Throat Specialty Care of Minnesota, P.A. And the longer or more frequent the exposure and the closer the person is to the source, the more likely it is that damage will occur and be irreversible, something he learned first-hand while playing guitar in a rock band in the 1960s.

"Noise damage to the inner ear is like sun damage to your skin," Levinson explains. "You just add to it with further successive insults. So the key is education and protecting yourself."

That includes knowing how much sound exposure is too much and how long is too long. The federal government estimates that 30,000 people a year are exposed to excessive noise levels at work. The National Institute for Occupational Safety and Health recommends that workers be exposed to no more than 85 dBA over eight hours, and that for every additional 3 dBA, exposure time be cut by half. For example, at 100 dBA, the maximum recommended safe exposure time is less than 15 minutes per day.

"Orchestras have peaks that routinely go up to 110 dBA, even 115 dBA," Horvath says. "There can be instantaneous hearing loss. That's happened in our orchestra to a couple of people."

The 15 minutes before a rehearsal, when musicians are warming up on stage, can be the loudest, she says. "It would regularly approach 110 dBA. So you already get your daily exposure before the seven-hour rehearsal even begins."

Hearing loss isn't the biggest problem for musicians, Horvath says. In fact, a number of studies have shown that classical musicians don't experience hearing loss in greater numbers than the general public. The bigger problem is hearing injury, which can manifest in a variety of ways including tinnitus, recruitment (a condition in which there is a rapid increase in the perceived loudness of sound, which can cause pain), and hyperacusis

(decreased sound tolerance). Musicians with hearing injury also can have difficulty discerning pitch, intonation, and timbre, significant liabilities for those who play in a symphony.

Ellen Dinwiddie Smith, who plays the French horn, is convinced that a seating change at the Minnesota Orchestra is the cause of her Meniere's disease. In 2003, the orchestra's seating arrangement was altered, placing the horn section directly in front of the percussion section. That's when Dinwiddie Smith began suffering from intermittent hearing problems and began routinely wearing earplugs.

"Your ear is literally at the same level as a snare drum," she says. "If they're 10 feet away from you, you can feel it in your ear. Many times, the bass drum is right behind me, and not only can I feel it in my ear, the sound will actually come up the bell of my horn and hit me in the face." The force can be so intense that it knocks her mouth piece away.

Dinwiddie Smith initially attributed her hearing problems to sinus trouble. "I couldn't figure out why my ears felt so stuffy. And then [the doctors] would look in there and say they were fine. That happened maybe two or three times. It wasn't until I had an absolute moment of nausea combined with that that they were really able to put it together."

Physicians don't know what causes Meniere's disease, but Dinwiddie Smith thinks her problem stems from playing while wearing earplugs, which she likens to performing an extended Valsalva maneuver. "When playing loud and high, I simply put so much pressure on my ears that it made me dizzy, caused "whooshing" sounds, loss of midrange sounds, and double vibration issues that I have now when I am having a Meniere's 'attack,'" she says.

As Dinwiddie Smith's experience illustrates, where a musician sits, the instrument he or she plays, and what instruments are nearby all matter. About half of a musician's exposure to sound comes from their own instrument. Those that produce higher sound frequencies cause more damage. According to the survey of British musicians, brass and woodwind players suffer hearing injury, particularly hyperacusis and recruitment, more frequently than other musicians.

### **Toning Down the Noise**

There are things musicians can do to reduce their exposure to noise. Horvath suggests playing with mutes, if possible; practicing more quietly or wearing earplugs while practicing; practicing in larger rooms that have surfaces that absorb sound; limiting exposure to outside noise; and avoiding noisy activities the day after a big concert in order to give their ears a rest.

In Minnesota and elsewhere, orchestras are taking steps to reduce noise exposure, supplying musicians with professional earplugs that can reduce overall volume by up to 25 dBA, changing the spacing between musicians or rotating their seat assignment, seating some musicians on risers so the sound goes over their colleagues' heads, and even using Plexiglas noise shields to redirect sound.

But the response to musicians' concerns varies from orchestra to orchestra.

Horvath says it's not just professional musicians who need to hear the message about hearing protection. People who attend concerts, music instructors, and parents of young

musicians also have to understand the consequences of noise exposure. Young musicians have less control and tend to play louder, but most junior and senior high school music rooms are full of hard, noise-reflecting surfaces.

She says schools need to find ways to incorporate sound- absorbing materials such as wall hangings and carpet into practice rooms. "If the principals, the teachers, and the parents are informed that this can be dangerous to their kids' health, then we'll get some action," she says.