

Background information for musicians on hearing loss and hearing protection

Musicians need to hear well, and safely, when they play. Standard industrial- type hearing protectors attenuate sound and frequently provide too much attenuation and occlusion to be acceptable for musicians. We would like to describe some more about earplugs especially for musicians.

Musicians experience significant sound exposures, and most will develop some degree of music-induced hearing loss. Other professionals in the music industry (eg, audio engineers, recording engineers, managers, disk jockeys, etc) also experience significant sound exposures, and they are also at risk for cochlear damage and hearing loss.

It is commonly known that an untreated hearing loss may also have serious negative psychological effects on a hearing impaired musician or other professional in the music industry, besides the problems caused for their future career. The psychological consequences may include the following; shame, guilt and anger; embarrassment; problems concentrating; sadness or depression; worry and frustration; anxiety and suspiciousness; insecurity; self-criticism and low self-esteem/ self-confidence.

Who is at risk for hearing loss?

Musicians are at high risk for hearing impairment due to their continuous exposure to loud sounds, specifically their music. Classical musicians are at just as much risk for hearing impairment as are rock musicians. At classical music concerts, in the audience, sounds have been recorded in excess of 120dB. That is about as loud as an airplane during take-off! The sources for sounds that are damaging to the ears come from amplifiers for rock musicians, and their own instrument or the instruments behind them for classical musicians.

Frequency

The frequency of a sound is the number of cycles of a sound wave in one second. The unit of measurement is hertz (Hz). The frequency of a sound increase as the numbers of cycles per second increase. Vibrations between 20 and 20.000 cycles per second are interpreted as sound by a healthy individual. A high- pitched sound could be a piccolo flute or a bird singing. Low- pitched sounds could be thunder heard from far away or tones from a bass guitar.

Decibel (dB)

The term decibel (dB) and the dB scale is used all over the world for the measurement of sound levels. The decibel scale is a logarithmic scale where a doubling of sound pressure corresponds to a 6 dB increase in level. It is very important to realize that the term dB has different meanings and is not a fixed value like the volt of the meter etc. The value of a dB depends on the context in which it is used.

The law protects us and states that noise level above 80 decibels damages health. Exposure to sounds at 100–110 dB can cause damage after approximately 15 minutes. At 110–120 dB damage can occur with exposures of less than 30 seconds duration. Many musicians are at risk of hearing loss because their ears can be exposed to average levels of 90 dB and peak levels of 110–120 dB during a musical performance. Generally speaking, whilst making music, musicians are practically always in an environment above the safe limit of 80 decibels.

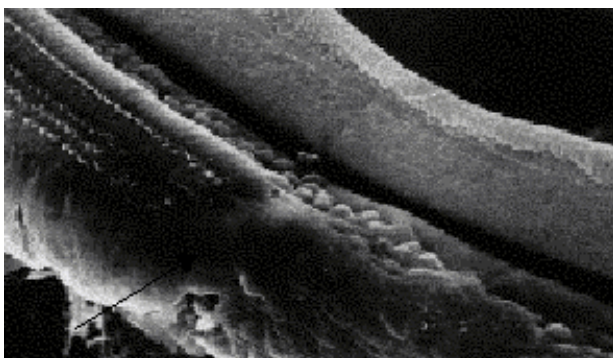
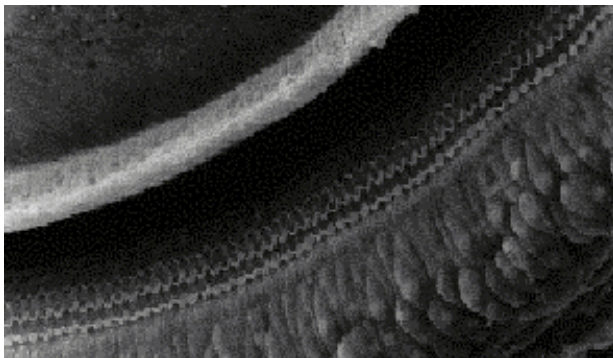
EVERY 3 DECIBEL RISE RESULTS IN A HALVING OF THE RESIDENCE TIME !

The overview below shows how long you can remain safely in a certain noise level.

Noise level	Max. residence time
80 decibel	8 hours
83 decibel	4 hours
86 decibel	2 hours
89 decibel	1 hours
92 decibel	30 minutes
95 decibel	15 minutes
98 decibel	7 minutes

What damage is done to the ears?

The ear can be divided into three sections, the outer ear, the middle ear, and the inner ear. The inner ear (Cochlea) contains the sensory ("hair") cells that are damaged by sound. Damage to, or destruction of, these cells and attached nerve fibres results in hearing loss.



Scanning electron micrographs (600 x magnification) of a normal (top) and sound damaged cochlea. In the bottom photo the arrow indicates an area of sensory cell damage.

Are there any warning signs of inner ear damage?

Your hearing system may not give any warning signs that damage is occurring. Some musicians may experience temporary tinnitus or muffled hearing (temporary hearing loss) following a performance. Tinnitus and temporary hearing loss are clear indicators that a persons hearing system is at risk for permanent damage should exposure to loud sounds continue.

What is the effect of inner ear damage?

Excessive sound exposure can lead to symptoms other than just a reduced ability to hear.

Symptoms of hair cell and nerve damage include:

Tinnitus – the perception of sound in the absence of any sound (e.g ringing in the head or ears).

Recruitment – reduced tolerance to loud sounds.

Hyperacusis – extreme intolerance to sounds (discomfort to everyday sounds).

Distortion – sounds are heard but lack clarity.

Diplacusis – sounds are perceived as being of a different pitch than they actually are.

How can a musician's hearing be protected?

After a loud concert or practice musicians should not expose themselves to loud music or other loud sounds (eg power tools) for 16–18 hours.

Monitor hearing with **regular hearing tests**. Some tests (otoacoustic emissions) indicate the health of the sensory cells. Changes in otoacoustic emissions can potentially provide an indication of sensory cell damage before a hearing loss is detected.

CONCLUSION

Wear hearing protection! The MusicSafe Pro® has been developed especially for attenuation of music and has three different exchangeable filter sets for music. These filters prevent exposure to excessive noise, while the music remains clear. The white filters offer a low attenuation, the silver filters offer a medium attenuation and the gold filters offer a high attenuation. The ear tips are produced in a durable, flexible thermoplastic polymer. Due to the heat of the ear, the protector adapts to the shape of the auditory duct within just a few minutes, making them very comfortable in the ear even for prolonged periods of use.

Fortunately, an increasing numbers of music professionals worldwide are becoming aware of the dangers of high sound exposure, and more are seeking help to protect their hearing by using the MusicSafe. With this proper hearing protection and audio logic care, music professionals can continue to enjoy their music while preserving their hearing and their ability to play and perform.