Canadian Audiologist
The Official Publication of the Canadian Academy of Audiology

Why Can Normal Hearing People Hear Better In Very Noisy Places With Earplugs?

Published June 10th, 2025

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Many of us have experienced going to a concert and listening to the music from the tenth row back. Even if you know the words to the songs, it can be difficult to hear them. However, if we were to use hearing protection (such as Musicians' earplugs), the words are much more intelligible.

It really has everything to do with the dynamic range of the cochlea. Our cochlea responds amazingly well over an incredible range of sound levels with the cochlear amplifier assisting with lower levels of sound. For lower sound levels our neural tuning curves are quite sharp and we are able to have better frequency selectivity. However, at higher levels of input, tuning curves broaden out because the motor function of the cochlear amplifier is no longer effective, along with some other factors. This is of course not the case for quieter levels where the cochlear amplifier functions to enhance softer level sounds. At higher levels there is more spectral smearing and a higher level of physiological noise getting through the auditory system. That is, the cochlea only has a set dynamic range between the softest and the loudest sounds that it can transmit to higher level auditory centres without distortion.

With hearing protectors, the sound pressure levels are lower when the afferent inner hair cells receive the input such that the speech or music is within the normal dynamic range of the cochlea. This is equivalent to saying that the sound is received at levels where the tuning curves are narrower. Hearing protection not only will protect the user from potentially damaging noise and music levels, but also allow loud music to be heard within the normal dynamic listening range of the cochlea.