**What do you know about Chemical Ototoxins?**

***Ototoxins*** are chemicals or medications that either cause hearing loss independently or work synergistically with hazardous noise to damage the inner ear. It is widely recognized that hazardous noise exposure in the workplace can cause noise-induced hearing loss, however many common workplace chemicals can cause hearing loss, tinnitus, deafness and vertigo, with workers often unaware of the health risks despite being at risk of exposure. Safety Data Sheets often do not contain warnings about potential hearing loss. Medication Ototoxins are a topic for another HTT.

It was not until the 1970s, when the ototoxicity of several industrial chemicals including solvents was recognized. Even if noise and chemicals are at or below their PEL’s exposure to both can do more damage than a higher exposure to just noise or chemicals alone.

Some chemicals show ototoxic effects at high airborne concentration but may not be ototoxic in the concentrations observed in typical workplaces. Ototoxins route of entry can be by inhalation, skin absorption and ingestion.  Those which can be absorbed through the skin are considered particularly hazardous because of the increased exposure risk.

Since the exposure effects for ototoxic chemicals alone are not generally known, audiometric monitoring is necessary to determine if the chemical is potentially also affecting the hearing of exposed workers.

Ototoxic chemicals, can be found in substances such as paints, thinners, degreasers, glues and engine exhaust, travel through the blood stream once they have entered the body and can result in damage to the auditory nerves or the cochlea in the inner ear.

The Army Public Health Command: in *FACT SHEET 51-002-0713* states that: “If there are dermal exposures to: toluene, xylene, n-hexane, organic tin, carbon disulfide, mercury, organic lead, hydrogen cyanide, diesel fuel, kerosene fuel, jet fuel, organophosphate pesticides and **IF** such exposures are known to have systemic dose **equivalent to 50% or more of the OEL**, (Occupational Exposure Limit) annual audiograms are recommended.” Audiometric tests are powerful tools that show hearing impairments, such as threshold shifts; however, they do not differentiate between noise & ototoxic causes.

Some experts further recommend that the 8-hour equivalent continuous **noise level** of workers exposed to any Ototoxins **be reduced to 80 dB(A) or below**

Exposure to both noise and ototoxins increases the likelihood of hearing damage; however, most OEL’s have not yet been revised to take this into consideration. This combination often results in hearing loss that can be temporary or permanent, depending on the level of noise, the dose of the chemical, and the duration of the exposure.

Substitution, isolation and local ventilation are some controls which should be applied to prevent or reduce harmful exposure, with personal protective equipment (PPE) appropriate to the chemical. Workers should also be given information on ototoxic chemicals.

A study sponsored by CPWR, (Center for Construction Research & Training) published in 2018, examined work history, health behavior, and hearing test results from more than 19,000 former construction workers to identify factors contributing to hearing loss. The researchers found that exposure to organic solvents along with exposure to loud noise on the job **and** smoking **each** **increased a worker’s risk of hearing loss by 15-20%.**

**In conclusion**: hearing loss prevention programs should take chemical exposures into account when monitoring hazards, assessing hearing and controlling the combined exposures.