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## Neuropharmacological and cochleotoxic effects of styrene can worsen the noise impact

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It is well-known that occupational noise exposure can damage workers' hearing. It is also well accepted that a combined exposure to noise with cochleotoxic substances such as antibiotics, cisplatin, or chemicals (styrene, toluene and ethylbenzene) can exacerbate the noise effects. Although solvent-induced cochlear impairments can be only assessed after a long incubation period, the pharmacological impact of styrene on the central nervous system (CNS) can be rapidly objectified by measuring the threshold of the middle-ear acoustic reflex (MER) trigger. MER can be precious for preserving the hearing performances of workers. The aim of the study was to evaluate the effects of a noise (both continuous and impulse) and a low concentration of styrene [300 ppm < (threshold limit value x 10) safety factor] on the peripheral auditory receptor, and on the CNS in rats. The impact of the different conditions on hearing loss was assessed using distortion product oto-acoustic emissions, and histology studies of cochleae. Although the LEX, 8 h (8-hour time-weighted average exposure) of the impulse noise was lower (80 dB SPL sound pressure level) than that of the continuous noise (85 dB SPL), it appeared more detrimental to the peripheral auditory receptors. If the co-exposure to styrene and continuous noise was less damaging than the exposure to continuous noise alone, the traumatic effects of impulse noise on the organ of corti were enhanced by the co-exposure to styrene. The neuropharmacological effects of the solvent explain these surprising results. Actually the CNS effects of styrene may account for this apparent paradox. Based on the present results, the temporal structure of the noise should be reintroduced as a key parameter in hearing conservation regulations.

### Biography

Pierre Campo has completed his PhD in Nancy (France) and Postdoctoral studies at Hearing Research laboratory. Currently, he is the Head of Ototoxic and Neurotoxic laboratory at INRS (France). He has published more than 30 publications. He is an Associated Editor at International Journal of Audiology and a Specialist in noise and solvent interactions on hearing. He conceived the EchoScan audio, a new equipment to evaluate the auditory fatigue in factories after a workday.

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