



NOISE INDUCED HEARING LOSS AND OTHER HEALTH HAZARDS OF NOISE

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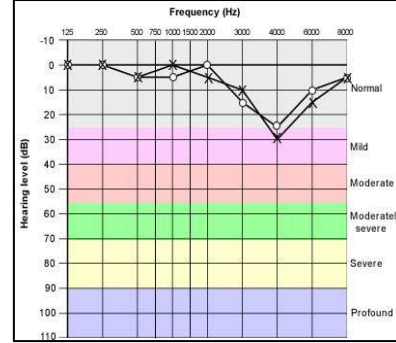
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Make Listening Safe

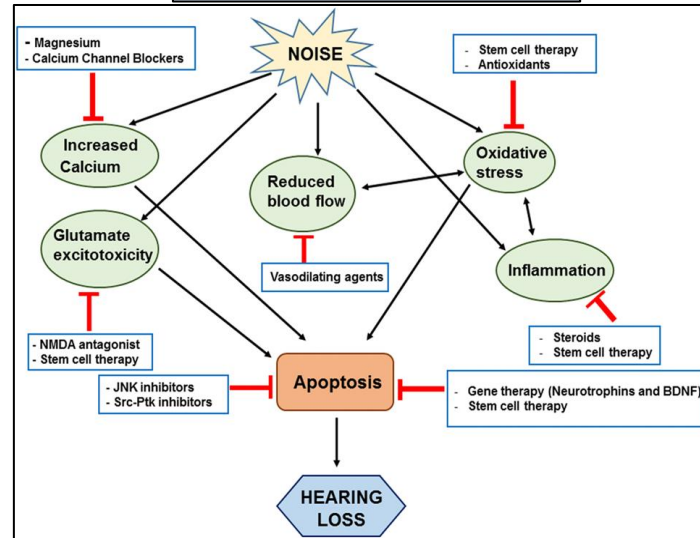
Introduction

- Noise is the insidious of all industrial pollutants, involving every industry and causing severe hearing loss in every country in the world.
- Occupational hearing loss includes acoustic traumatic injury and noise-induced hearing loss (NIHL) and is defined as a partial or complete hearing loss in one or both ears as the result of one's employment.¹
- Exposure to excessive noise is the major avoidable cause of permanent hearing impairment worldwide.
- About 16% of the disabling hearing loss in adults is attributed to occupational noise, ranging from 7 to 21% in the various subregions across the world.¹
- The effects of the exposure to occupational noise are higher in the developing regions.²



A typical NIHL is of a sensory neural type involving injury to the inner ear. It is bilateral and symmetrical, usually affecting the higher frequencies (3k, 4k or 6k Hz) and then spreading to the lower frequencies (0.5k, 1k or 2k Hz).

Pathophysiology of NIHL



Primary Effects

- Hearing loss
- Tinnitus
- Hyperacusis
- Auditory fatigue
- Sleep disruption
- Elevated blood pressure
- Cardiovascular disease
- Cognitive problems
- Psychological problems
- Possible metabolic disturbances, e.g., diabetes, obesity
- Interference with animal communication, feeding, mating, and protective behaviors
- Poor environmental quality

Secondary Effects

- Social isolation, depression, dementia, loss of productivity/wages, discrimination
- Medical resource use, learning difficulties, diminished civilian and military performance, loss of productivity
- Reduced wildlife survival, loss of biodiversity, Loss of property value

Treatment	Theory/Effects
Corticosteroids (synthetic hormones)	Improve the microcirculation in the cochlea after acute noise trauma.
Blood flow promoting drugs (e.g. epinephrine, dextran pentoxifylline and hydroxyethyl starch)	Increase the blood flow through the cochlea when administered after acute noise trauma.
Oxygen	Reduces hearing threshold shifts and hair cell loss following impulse noise trauma.
Neurotrophins (e.g. nerve growth factor, brain-derived nerve growth factor, neurotrophin-3 and glial cell line-derived neurotrophic factor)	Stimulate auditory nerve re-growth and protect from sensorineural hearing loss.
Anti-oxidants and scavengers	Remove reactive oxygen species which might be involved in noise trauma.
Glutamate receptor antagonists	It is thought that the glutamate receptors are over-stimulated during noise trauma. Antagonists will reduce this over-stimulation and also any negative effects on hearing.
Gene therapy	Uses viral vectors or liposomes to deliver nucleic acids (e.g. transgenic neurotrophin) to the cochlea.

What is NIHL

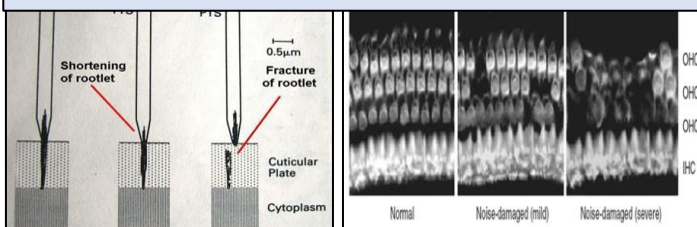
NIHL is generally used to denote the cumulative, permanent loss of hearing that develops gradually after months or years of exposure to high levels of noise

Preventing Hearing Loss: 8 Tips for Noisy Environments

- Wear **hearing protection** such as earmuffs or earplugs.
- Move away from **noise sources** such as speakers.
- Research the noise level ahead of time via **online review sites**.
- Visit noisy establishments at **off-peak** times.
- Download a **smartphone app** that monitors noise level.
- Take periodic **listening breaks**.
- Ask managers to **reduce the noise** in **too-loud** restaurants, health clubs, etc.
- Leave immediately if you feel **pain or ringing** in your ears.



Effects of Noise on outer hair cells in Cochlea



Occupational Safety & Health Administration regulations

Sound Intensity	Permitted exposure	Sound Intensity	Permitted exposure
85 dBA	16 hours	105 dBA	60 minutes
90 dBA	8 hours	110 dBA	30 minutes
95 dBA	4 hours	115 dBA	15 minutes
100 dBA	2 hours	> 115 dBA	< 1 second

References

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