

Micronutrients for Prevention and Improvement of Standard Therapy in Tinnitus

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In military personnel, the major causes of tinnitus include blast, intense noise and vibration. A few experimental data suggest that intense noise and vibration generate excessive amounts of free radicals and cause inflammation which damage cochlear hair cells. When hair cells are damaged, increased amounts of pro-inflammatory cytokines and glutamate are released. Glutamate can induce hyperactivity in the auditory cortex leading to the perception of phantom sounds (tinnitus). Some studies revealed that the levels of nitric oxide, peroxynitrite, oxidative stress, nuclear factor-kappa-beta (NF-kappaB), glutamate receptor (N-methyl-D-aspartate) and markers of inflammation were elevated in patients with tinnitus. A few experimental studies showed that antioxidants reduced oxidative stress and inflammation, and decreased the release and toxicity of glutamate. In addition, antioxidants reduced noise-induced hearing loss in animal models, and blocked toxicity of glutamate in neuronal cells in culture. It is interesting to note that about 34 % of tinnitus patients had post traumatic stress disorder (PTSD), and most patients with severe disabling subjective idiopathic tinnitus (SIT) exhibited neurodegeneration in the brain. Some of these changes resemble Alzheimer's disease (AD), suggesting some linkage of neuronal mechanisms associated with these disorders. Indeed, increased oxidative stress and chronic inflammation have also been found in patients with AD and PTSD. Limited published studies and our preliminary data suggest that antioxidants improve the efficacy of standard care in the management of tinnitus. A well –designed clinical study to test the efficacy of a standardized micronutrient formulation in prevention, and in combination with standard therapy such as glutamate antagonists, steroids, and sulpiride (a D2 antagonist of dopamine receptors) in the treatment of tinnitus, should be initiated.

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