

Tinnitus and the autonomic nervous system

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The role of the autonomic system in tinnitus is hardly being investigated, even though it might offer a potential target for tinnitus treatment. Most people who have tinnitus can effectively cope with it, however a small percentage of tinnitus sufferers demonstrate maladaptive coping. It has recently been suggested that maladaptive coping would suggest a sympathetic hyperactivity, whereas an effective coping attitude might be the result of a parasympathetic dominance. Neuroimaging and neurophysiological studies reveal a neural emotional 'stress' circuit consisting of the medial prefrontal, anterior and posterior cingulate, caudate, putamen, thalamus, (para)hippocampus, amygdala and insula. These studies also demonstrated a sympathetic lateralization in the right hemisphere and, parasympathetic predominance in the left hemisphere. Neuroendocrine studies demonstrate that patients with an uncoping stress profile show increased catecholamine plasma levels with altered noradrenaline/adrenaline ratio, increased plasma cortisol and increased free serotonin. Heart rate variability (HRV) can be used as a simple and non-invasive quantitative marker of autonomic function. The proposed study aims at visualizing an important part of the autonomic neural circuit involved in tinnitus as well as its neuroendocrine counterpart, using LORETA EEG, blood tests, HRV and questionnaires (tinnitus, coping, depression questionnaires), based on the hypothesis that maladaptive coping demonstrates signs of sympathetic activation and adaptive coping signs of parasympathetic activation. In a second phase the signs of maladaptive tinnitus coping will be analysed before and after tinnitus suppression, using auditory cortex stimulation.

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