Electrophysiological Auditory Measures to Identify Potential Cortical Markers of Tinnitus

**Date:** Friday, April 16, 2021  
**Time:** 9:00am

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Abstract

**Background:** Approximately 10% of the United States population experiences tinnitus symptoms. Despite this high prevalence, the underlying mechanisms of tinnitus are not fully understood, and as a result there is currently no objective test that can be used to diagnose tinnitus, nor any treatment options to ameliorate symptoms with 100% efficacy.

**Method:** The proposed research will collect both behavioral and electrophysiological data from participants with tinnitus and control participants matched for age, gender, and hearing status. Participants will complete audiometric testing to assess hearing thresholds, tinnitus pitch matching (for tinnitus participants), and electroencephalography testing that will collect auditory evoked late responses using the pitch matched frequency, and mismatch negativity potentials and P300 responses utilizing the oddball paradigm that incorporates the participant’s tinnitus frequency. Each matched control subject will receive the same stimuli as their paired tinnitus subject during electroencephalography testing.

**Data analysis:** A one-way multivariate analysis of variance will be used to determine if there are differences between tinnitus participants and matched controls for MMN amplitude, latency, and area under the curve; P300 amplitude and P300 latency. Amplitudes for P1N1, N1P2, and P2N2 are highly correlated, and thus will be analyzed using a repeated-measures ANOVA. Finally, a linear mixed effect model will be used to examine the relationship between tinnitus participant responses on questionnaires assessing the perceived impact of their tinnitus on daily quality of life and the amplitude and latency measures for the MMN and P300. It is expected that individuals with tinnitus will exhibit smaller MMN and P300 amplitudes compared to their matched controls as they are allocating attentional resources towards their tinnitus, thereby reducing the novelty of the deviant stimulus located at the tinnitus frequency. It is also expected that there will be correlations between higher levels of perceived tinnitus severity and MMN and P300 amplitude and latency values.

**Significance:** This study will further the collective knowledge of the underlying neurological differences between individuals with and without tinnitus and perhaps contribute to the development of an objective diagnostic test battery that will aid in the objective diagnosis of tinnitus.