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Differential tinnitus-related neuroplastic alterations of cortical thickness and surface area

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Abstract

Structural neuroimaging techniques have been used to identify cortical and subcortical regions constituting the neuroarchitecture of tinnitus. One recent investigation used voxel-based morphometry (VBM) to analyze a sample of tinnitus patients (TI, n=257) [1]. A negative relationship between individual distress and cortical volume (CV) in bilateral auditory regions was observed. However, CV has meanwhile been identified as a neuroanatomical measurement that confounds genetically distinct neuroanatomical traits, namely cortical thickness (CT) and cortical surface area (CSA). We performed a re-analysis of the identical sample using the automated FreeSurfer surface-based morphometry (SBM) approach [2]. First, we replicated the negative correlation between tinnitus distress and bilateral supratemporal gray matter volume. Second, we observed a negative correlation for CSA in the left peri-auditory cortex and anterior insula. Furthermore, we noted a positive correlation between tinnitus duration and CT in the left peri-auditory cortex as well as a negative correlation in the subcallosal anterior cingulate, a region collated to the serotonergic circuit and germane to inhibitory functions.
In short, the results elucidate differential neuroanatomical alterations of CSA and CT for the two independent tinnitus-related psychological traits distress and duration. Beyond this, the study provides further evidence for the distinction and specific susceptibility of CSA and CT within the context of neuroplasticity of the human brain.

*Equal contribution
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