

## Resting state neural network in monolateral and bilateral tinnitus

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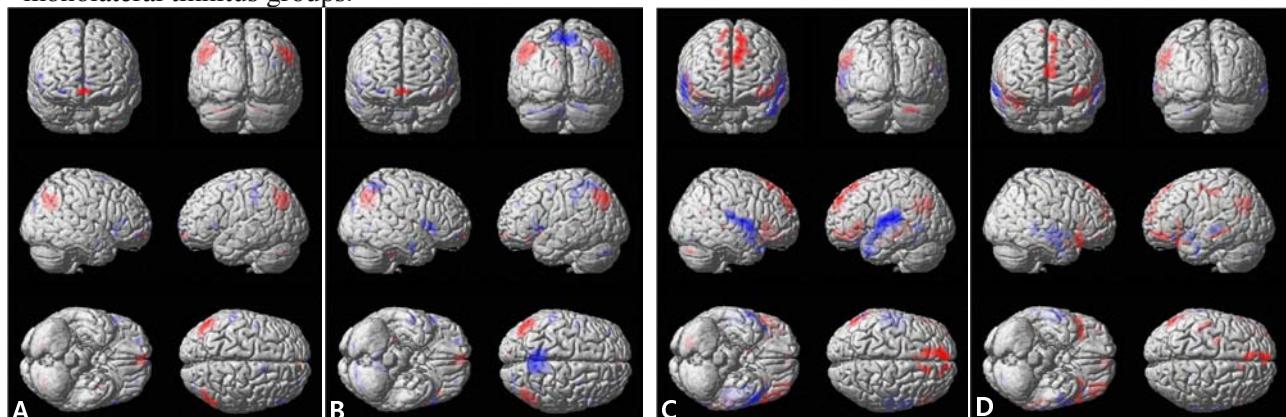
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Target audience: Otologist, Neuroradiologist, Neuropsychiatrist

**Purpose:** Most of investigation about the neuronal activity in tinnitus was the fMRI with task-base paradigm by using auditory or somatic modulation. However, few studies have investigated the neuronal activity of resting state in tinnitus. The objective of this study is identify the difference of default mode networks and auditory network between monolateral tinnitus and bilateral tinnitus by using resting state fMRI.

**Methods:** Total 73 age-matched subjects consisting of 18 left-sided tinnitus, 16 right-sided right tinnitus, 19 bilateral tinnitus, and 20 healthy controls underwent resting state fMRI scan. Using previously defined regions-of-interest, we computed the connectivity in default mode and auditory network, and the resting state network was compared by group independent component analysis.

**Results:** In default mode network, tinnitus groups had connectivity in anterior cingulate, bilateral inferior frontal, prefrontal gyri, and motorsensory area was found to be increased in tinnitus. Group of bilateral tinnitus had increased area at bilateral angular gyri and caudate nucleus compared with monolateral tinnitus and healthy control. Comparison of the auditory network of resting state indicate reduced functional connectivity of auditory network and increased functioning in additional brain region including prefrontal, and middle temporal regions. Bilateral tinnitus group showed greater activation in bilateral sup. frontal gyrus and lower activation in bilateral sup. temporal gyrus than monolateral tinnitus groups.



Default mode network comparison between right tinnitus and bilateral tinnitus (A) and between left and bilateral tinnitus (B). Blue color regions are higher activity in monolateral tinnitus than bilateral tinnitus. Red color regions are higher activity in bilateral tinnitus than monolateral tinnitus.

Auditory network comparison between right tinnitus and bilateral tinnitus (C) and between left and bilateral tinnitus (D). Blue color regions are higher activity in monolateral tinnitus than bilateral tinnitus. Red color regions are higher activity in bilateral tinnitus than monolateral tinnitus.

**Discussion:** These results suggested that the chronic tinnitus may be related to aberrant functioning of the default mode network. Alteration of default mode and auditory network between monolateral and bilateral tinnitus imply that the monolateral and bilateral tinnitus may have different mechanism.

**Conclusion:** Our research suggested that resting state fMRI would be useful to lateralize tinnitus and analyze the mechanism of the tinnitus without task-base paradigm.

### Reference

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