

Imaging tinnitus using fMRI

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Research philosophy: In investigating a condition as poorly understood as tinnitus, we must proceed with systematic, logically designed experiments, but do so with an outward-looking, exploratory spirit. We anticipate that our research path will evolve as we learn more. For example, if we discover potentially groundbreaking leads in the data, we will pursue them immediately and aggressively. Similarly, we will re-evaluate and modify approaches that prove less fruitful.

Our current experimental plan has two main components:

(1) One is the separate and systematic comparison of different subgroups of tinnitus patients with hearing-matched control subjects. Here, we propose studying four tinnitus subgroups (people with normal hearing and people with three different patterns of hearing loss). This approach aims at providing data to understand both the similarities and variability among tinnitus patients. This understanding is crucial for understanding the physiological bases of tinnitus, as well as developing quantitative tinnitus biomarkers that can be used in drug discovery and treatment testing.

(2) The second component involves imaging tinnitus patients in two states: with and without tinnitus. Here, we propose studying (1) tinnitus patients who represent some of the “isolated few” who happen to respond to a particular medication or therapy (i.e., test them with and without medications on board), and (2) people whose tinnitus naturally varies over time (e.g., loud one day, soft the next). An ideal outcome from these experiments would be the identification of certain signature patterns of fMRI activation in people who respond to a particular treatment. Such findings would help us turn fMRI into a predictive tool that could be used to match treatments with patients.

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