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Tone Deafness Possibly Linked To Bad Brain Wiring

Posted on: Wednesday, 19 August 2009, 13:30 CDT

Tone-deafness appears to be attributed to poor wiring between certain regions of the brain, researchers reported Wednesday.

Writing in the August 19 issue of The Journal of Neuroscience, Psyche Loui and colleagues said tone-deafness appears to be a neurological condition.

"The anomaly suggests that tone-deafness may be a previously undetected neurological syndrome similar to other speech and language disorders, in which connections between perceptual and motor regions are impaired," said Loui, of Beth Israel Deaconess Medical Center and Harvard Medical School.

Researchers used an MRI-based method known as diffusion tensor imaging to analyze the arcuate fasciculus – a neural pathway between the right temporal and frontal lobes known to be involved in linking music and language perception with vocal production.

The team performed tests on 20 participants. Half of those participants were found to be tone-deaf according to listening tests.

Loui's team noted that the arcuate fasciculus was smaller and had a lower fiber count among tone-deaf participants.

Researchers added that the superior branch of the arcuate fasciculus in the right hemisphere could not be detected in tone-deaf participants. This could mean that the superior branch was missing altogether or it could be deformed so that it appears to be invisible.

"The findings are clear," said Nina Kraus, PhD, at Northwestern University, who was unaffiliated with the study.

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"They show that the arcuate fasciculus, a structure long-known to join perceptual and motor areas, has reduced connectivity in individuals with tone deafness. Beyond improving our understanding of the anatomical underpinnings of tone-deafness, this study provides new insight into a person's ability to detect pitch," Kraus said.

The study was funded by the National Science Foundation, the National Institutes of Deafness and Communication Disorders, and the Grammy Foundation.

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