

Neural pathway missing in tone-deaf people

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Nerve fibers that link perception and motor regions of the brain are disconnected in tone-deaf people, according to new research in the August 19 issue of *The Journal of Neuroscience*. Experts estimate that at least 10 percent of the population may be tone deaf - unable to sing in tune. The new finding identifies a particular brain circuit that appears to be absent in these individuals.

"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 Psyche Loui, PhD, of Beth Israel Deaconess Medical Center and Harvard Medical School, one of the study's authors.

The authors used an MRI-based technique called diffusion tensor imaging to examine connections between the right temporal and frontal lobes. This region, a neural "highway" called the arcuate fasciculus, is known to be involved in linking music and language perception with vocal production. [Brain](#) images of 20 people were taken, half of whom had been identified as tone-deaf through listening tests.

The arcuate fasciculus was smaller in volume and had a lower fiber count in the tone-deaf individuals. More notably, the superior branch of the arcuate fasciculus in the right hemisphere could not be detected in the tone-deaf individuals. The researchers speculated that this could mean the branch is missing entirely, or is so abnormally deformed that it appears invisible to even the most advanced [neuroimaging](#) methods.

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

These findings add to previous work by the same researchers demonstrating that tone-deaf people could not consciously hear their own singing, and work by other researchers indicating abnormalities in brain regions that affect sound perception and production.

More information: www.jneurosci.org/

Source: Society for Neuroscience ([news](#) : [web](#))

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