

Novel tinnitus therapy helps patients cope with phantom noise

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Patients with tinnitus hear phantom noise and are sometimes so bothered by the perceived ringing in their ears, they have difficulty concentrating. A new therapy does not lessen perception of the noise but appears to help patients cope better with it in their daily lives, according to new research led by Jay Piccirillo, MD, (left) at Washington University School of Medicine in St. Louis. The pilot study showed that patients with tinnitus, such as Jacqueline Richardson (right), may benefit from a new therapy combining computer-based cognitive training with a drug that helps boost the effectiveness of that training so patients can ignore the ringing in their ears. Credit: Robert Boston

Patients with tinnitus hear phantom noise and are sometimes so bothered by the perceived ringing in their ears, they have difficulty concentrating. A new therapy does not lessen perception of the noise but appears to help patients cope better with it in their daily lives, according to new research.

A [pilot study](#) at Washington University School of Medicine in St. Louis showed that [patients](#) participating in computer-based [cognitive training](#) and taking a drug called d-cycloserine reported greater improvements in the ability to go about their daily lives than patients who did the same cognitive training but took a placebo. The researchers note that the study was small, involving 30 patients.

The study appears Oct. 30 in *JAMA Otolaryngology-Head & Neck Surgery*.

"We suspect that both the problems and the solutions concerning tinnitus are in the [brain](#)," said senior author Jay F. Piccirillo, MD, professor of otolaryngology. "We don't know what causes the ringing. Many people with tinnitus have had ear trauma or hearing loss but not all. And at the same time, a lot of people with ear injuries or hearing loss don't have tinnitus."

Both groups performed the same cognitive training, which involved computer-based exercises focused on improving processing of sound, speech and memory. Piccirillo and his colleagues were interested in whether the drug could help patients experience the potential benefits of the cognitive training more quickly than a [placebo](#). D-cycloserine has been shown to encourage neuroplasticity, a state in which the brain is more amenable to change, whether in resolving irrational fears or in improving concentration, attention and executive function, a set of mental processes that govern tasks like planning, organizing, problem solving and decision making.

D-cycloserine originally was developed as an antibiotic and is still prescribed for drug-resistant tuberculosis. More recently, it has been used in psychiatric care to help treat phobias and as an anti-anxiety medication. The idea is that perhaps the drug can boost the effectiveness of [brain training](#) to help patients ignore tinnitus, even if the ringing or phantom noise persist.

"In people unable to ignore tinnitus, there is evidence that some brain networks, including areas of attention, executive function and emotion, are not working properly," said Piccirillo. "We think the cognitive therapy helps our patients change the wiring in the brain, which may help them direct attention away from the tinnitus."

Therefore, Piccirillo and his colleagues asked whether a drug that primes the brain for remodeling could help patients experience the benefits of cognitive training more quickly.

"To change the brain, you've got to challenge it," Piccirillo said. "If the challenge is too hard, you give up. But if it's too easy, you get bored. With these cognitive-training exercises, the program is designed to adjust the difficulty so that patients respond correctly about 80 percent of the time. It gets harder as they make progress, but they're always at about the 80 percent mark. The idea is that with d-cycloserine, patients will move more efficiently through the training program."

Piccirillo likens it to encouraging people to go to the gym. If patients notice a benefit from the training more quickly, they may be more likely to stick with exercising.

In the new study, the researchers saw a greater improvement in self-reported measures of brain function in the group that got the drug. In questionnaires, patients who got the drug reported fewer instances of forgetfulness and attention difficulties, though they did not perform

measurably better on tests of cognitive ability.

While the results were modest, Piccirillo pointed out the small sample size and the fact that they only asked patients to do the brain training two days per week rather than five. The researchers were concerned that if patients did training five days a week, each patient's performance would improve so much that it would not be possible to see any differences between groups.

"There is a lot of evidence that d-cycloserine can help people train their brains," Piccirillo said. "It facilitates neuroplasticity and is known to be effective in fear extinction, obsessive-compulsive disorder and anxiety disorders. And now we have evidence that it has some benefit in [tinnitus](#)."

"We would like to perform a larger study with the same brain-fitness program and d-cycloserine, to see if what we saw in this pilot study can be confirmed with more participants," he said.

More information: Krings JG, Wineland A, Kallogjeri D, Rodebaugh TL, Nicklaus J, Lenze EJ, Piccirillo JF. A novel treatment for tinnitus and tinnitus-related cognitive difficulties using computer-based cognitive training and d-cycloserine. *JAMA Otolaryngology-Head & Neck Surgery*. Oct. 30, 2014. doi:10.1001/jamaoto.2014.2669

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