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VA research on **HEARING LOSS**

Hearing loss affects more than 28 million Americans, including more than half of those over age 75. Hearing problems—including tinnitus—are by far the most prevalent service-connected disability among American Veterans.

ABOUT HEARING LOSS

- Some hearing loss can be reversed through surgery or medication. In other cases, hearing loss is permanent, but can be reduced through the use of hearing aids. Though almost all people with hearing loss could be helped by hearing aids, only about 1 in 5 who would benefit from them uses them, according to the [National Institute on Deafness and Other Communication Disorders](#).
- Conductive hearing loss, which is due to damage to the eardrum and middle ear structures, can often be reversed through surgery or medication. Sensorineural hearing loss, caused by damage to the inner ear and auditory nerve, is permanent, but can often be helped through the use of hearing aids.
- At the close of fiscal year 2015, more than 1 million Veterans were receiving [disability compensation](#) for hearing loss, and 1.45 million received compensation for tinnitus. In addition, many Veterans score normally on hearing tests but have difficulty understanding speech. This condition, called auditory processing disorder, is often associated with blast exposure.

VA RESEARCH ON HEARING LOSS: OVERVIEW

- VA researchers, engineers, and clinicians are studying ways to prevent, diagnose,

and treat hearing loss. They are also addressing a wide range of technological, medical, rehabilitative, and social issues associated with tinnitus and blast exposure.

- In 1997, VA established the National Center for Rehabilitative Auditory Research (NCRAR) to study hearing problems in Veterans, and to develop effective treatments. Researchers here work to alleviate communication, social, and economic problems resulting from hearing loss and tinnitus. Among the topics studied at the center are methods of early detection of hearing loss; the effects of certain diseases or conditions, such as diabetes and multiple sclerosis, on auditory functioning; and the impact of auditory problems on speech perception.
- NCRAR researchers and their colleagues throughout VA system also looking at ways to improve speech recognition in noisy areas for people with hearing impairments, and studying the combined effects of aging and noise exposure on hearing.

SELECTED MILESTONES AND MAJOR EVENTS

- 1992** – Began, with the National Institutes of Health (NIH), an innovative [collaboration](#) to support the development of advanced hearing aids
- 1996** – [Initiated](#), with NIH, the Hearing Aid

Clinical Trial to demonstrate the efficacy of three types of analog hearing aids in both quiet and noisy environments

1997 – Established the [National Center for Rehabilitative Auditory Research](#) (NCRAR) in Portland, Oregon

2000 – [Demonstrated](#), with NIH, that three types of analog hearing aids provided substantial improvements for users both in quiet and noisy environments.

2005 – Published a comprehensive protocol for the management of tinnitus, now referred to as [Progressive Tinnitus Management](#) (PTM)

2014 – [Linked](#) exposure to jet propulsion fuel to auditory processing problems

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Tinnitus is common in Veterans, but there are no objective tests to diagnose the problem.** NCRAR researchers and researchers from Oregon Health and Science University conducted three phases of testing to try to distinguish Veterans with tinnitus from those who do not have it. They found some differences between the groups, but also that no single test or series of tests could reliably diagnose the condition. ([Journal of Rehabilitation Research & Development](#), Vol. 50, No. 4, 2013)

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• **Exposure to jet propulsion fuel-8 (JP-8) is linked with auditory processing dysfunctions—changes that occur inside the brain rather than the ear.** In auditory processing dysfunction, people hear sounds properly, but the brain has a hard time deciphering the message. A research team from the VA Loma Linda Healthcare System in California believes that hydrocarbon chemicals in JP-8 may be the reason this occurs, and advocates for increased monitoring of the combined exposure of fuel and noise around aircraft. ([Journal of Toxicology and Environmental Health Part A](#), 2014)

• **Veterans with tinnitus frequently have anxiety, depression, or both,** according to researchers with VA and Loma Linda University Medical School. The team found that 71.9 percent of the 91 Veterans with tinnitus they studied also had a diagnosis of anxiety, 59.3 percent had depression, and 58.2 percent had both conditions. Patients with either or both conditions suffered from more severe tinnitus symptoms than patients without either condition. ([International Journal of Otolaryngology](#), 2015)

• **Frequency modulation (FM) may help Veterans who have normal hearing but problems understanding speech due to mild traumatic brain injury.** NCRAR and Tampa VA researchers

tested an FM system, which uses radio waves to transmit signals directly from a microphone to an earpiece to make a speaker’s voice more clear. They also tested a “brain training” computer program that has users follow instructions or interpret sound. Preliminary results showed improved outcomes among those using the system. ([Journal of Rehabilitation Research & Development](#), Vol. 52, No. 4, 2015)

• **Blast injuries can and do result in damage to the central auditory system,** but there is no common set of symptoms relating to problems with auditory processing experienced by Veterans exposed to blasts. NCRAR asked 99 Veterans exposed to blasts in Iraq and Afghanistan who reported problems hearing in difficult listening situations to participate in 10 performance-based tests that have been shown to uncover problems people may have in processing hearing signals. They found many of the participants had difficulty in one or more of the tests compared to non-blast exposed Veterans, but that they also performed well in other tests. ([Journal of Rehabilitation Research and Development](#), Vol 52, No, 3, 2015)

• **VA researchers are studying the effects of a treatment called transcranial magnetic stimulation**

(TMS) on tinnitus. In TMS, clinicians hold a magnetic coil, usually in the form of a figure eight, against the skull. The coil emits repetitive electromagnetic pulses that reach the brain cells under the scalp and change their activity pattern. In a recent NCRAR study, 32 Veterans received TMS treatments for 10 working days; another 32 received a placebo treatment. 56 percent of those who received the TMS treatment saw their tinnitus symptoms improve, compared to 22 percent of those who received a placebo treatment. ([JAMA Otolaryngology-Head and Neck Surgery](#), Aug. 14, 2015)

• **A device called OtoID allows patients to easily and reliably test their own hearing loss.** Designed by NCRAR researchers to help patients using chemotherapy drugs, OtoID runs on tablet computers and allows hearing test results to be transmitted to VA clinics. If hearing loss is detected, doctors will be able to adjust the dose of the drug the patient is taking, or perhaps use a different one. ([Journal of the American Academy of Audiology](#), October 2015)

For more information on VA studies on hearing loss and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

Though almost all people with hearing loss could be helped by hearing aids, only about 20 percent of those would benefit from them use them.

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