



[National Institute of Diabetes and Digestive and Kidney Diseases \(NIDDK\)](#)

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Hearing Loss Is Common in People with Diabetes

Hearing loss is about twice as common in adults with diabetes compared to those who do not have the disease, according to a new study funded by the National Institutes of Health (NIH).

"Hearing loss may be an under-recognized complication of diabetes. As diabetes becomes more common, the disease may become a more significant contributor to hearing loss," said senior author Catherine Cowie, Ph.D., of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), who suggested that people with diabetes should consider having their hearing tested. "Our study found a strong and consistent link between hearing impairment and diabetes using a number of different outcomes."

The researchers discovered the higher rate of hearing loss in those with diabetes after analyzing the results of hearing tests given to a nationally representative sample of adults in the United States. The test measured participants' ability to hear low, middle, and high frequency sounds in both ears. The link between diabetes and hearing loss was evident across all frequencies, with a stronger association in the high frequency range. Mild or greater hearing impairment of low- or mid-frequency sounds in the worse ear was about 21 percent in 399 adults with diabetes compared to about 9 percent in 4,741 adults without diabetes. For high frequency sounds, mild or greater hearing impairment in the worse ear was 54 percent in those with diabetes compared to 32 percent in those who did not have the disease.

Adults with pre-diabetes, whose blood glucose is higher than normal but not high enough for a diabetes diagnosis, had a 30 percent higher rate of hearing loss compared to those with normal blood sugar tested after an overnight fast.

The study, published early online June 17, 2008, in the *Annals of Internal Medicine*, was conducted by researchers from the NIDDK, the National Institute on Deafness and Other Communication Disorders (NIDCD), components of the NIH, and Social & Scientific Systems, Inc., which provides support on public health topics to NIH and other government agencies.

The researchers analyzed data from hearing tests administered from 1999 to 2004 to participants in the National Health and Nutrition Examination Survey (NHANES) conducted by the National Center for Health Statistics, part of the Centers for Disease Control and Prevention (CDC). Half of the 11,405 survey participants aged 20 to 69 were randomly assigned to have their hearing tested, and nearly 90 percent of them completed the hearing exam and the diabetes questionnaire. The hearing test, called pure tone audiometry, measures hearing sensitivity across a range of sound frequencies.

"Using the data from the hearing tests, we measured hearing impairment in eight different ways. Also,

participants responded to questions about hearing loss in the questionnaire, which asked whether they had a little trouble hearing, a lot of trouble hearing, or were deaf without a hearing aid," said Cowie. In addition, 2,259 of the participants who received hearing tests were randomly assigned to have their blood glucose tested after an overnight fast.

Earlier U.S. studies that examined diabetes and hearing loss found a weaker association or no association, but these studies were based on smaller samples of older adults, and they were not nationally representative, according to co-author Howard Hoffman, an epidemiologist at NIDCD. "This is the first study of a nationally representative sample of working age adults, 20 to 69 years old, and we found an association between diabetes and hearing impairment evident as early as ages 30 to 40."

"The link between diabetes and hearing loss has been debated since the 1960s or before, and our results show that a relationship exists even when we account for the major factors known to affect hearing, such as age, race, ethnicity, income level, noise exposure, and the use of certain medications," noted Kathleen Bainbridge, Ph.D., of Social & Scientific Systems, Inc.

Diabetes may lead to hearing loss by damaging the nerves and blood vessels of the inner ear, the researchers suggest. Autopsy studies of diabetes patients have shown evidence of such damage.

Diabetes is a group of diseases marked by high levels of blood glucose resulting from defects in insulin production, insulin action, or both. Afflicting nearly 21 million people in the United States, it is a major cause of heart disease and stroke and the most common cause of blindness, kidney failure, and lower limb amputations in adults. Pre-diabetes, which causes no symptoms, affects about 54 million adults in the United States, many of whom will develop type 2 diabetes in the next 10 years. Pre-diabetes raises the risk of a heart attack or stroke even if diabetes does not develop. People with pre-diabetes can often prevent or delay diabetes if they lose a modest amount of weight by cutting calories and increasing physical activity. People with diabetes also benefit from diet and exercise as well as medications that control blood glucose, blood pressure, and cholesterol. For information about the causes, prevention, and treatment of diabetes, see <http://diabetes.niddk.nih.gov/>.

Most NHANES participants with diabetes had type 2 diabetes, which accounts for up to 95 percent of diabetes cases in the United States. Type 2 diabetes usually appears after age 40, and is more common in overweight, inactive people and in those with a family history of diabetes.

Hearing loss is a common problem caused by aging, disease, heredity, and noise. About 17 percent of American adults — 36 million people — report some degree of hearing loss. There is a strong relationship between age and reported hearing loss: 8 percent of American adults 18 to 44 years old, 19 percent of adults 45 to 64 years old, and 30 percent of adults 65 to 74 years old report trouble with hearing. For information about the causes and treatment of hearing loss, see <http://www.nidcd.nih.gov/health/hearing/>.

The NIDDK conducts and supports research in diabetes and other endocrine and metabolic diseases; digestive diseases, nutrition, and obesity; and kidney, urologic, and hematologic diseases. Spanning the full spectrum of medicine and afflicting people of all ages and ethnic groups, these diseases encompass some of the most common, severe, and disabling conditions affecting Americans. For more information about NIDDK and its programs, see www.niddk.nih.gov.

The NIDCD supports and conducts research and research training on the normal and disordered processes of hearing, balance, smell, taste, voice, speech and language and provides health information, based upon scientific discovery, to the public. For more information about NIDCD programs, see www.nidcd.nih.gov.

The National Institutes of Health (NIH) — *The Nation's Medical Research Agency* — includes 27 Institutes and Centers and is a component of the U.S. Department of Health and Human Services. It is the primary

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