

HEARING LOSS and Diabetes

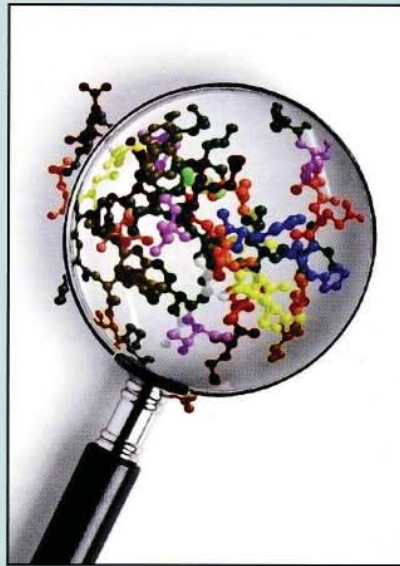
Coincidence or Connection?

In the last five years one of the most widely publicized health stories has been the exponential rise in the incidence of diabetes. There are ~21 million children and adults in the United States (7% of the population), who have diabetes – a startling number. Even more alarming, the number of diagnosed adults has increased an astonishing 61 percent since 1991 and is projected to more than double by 2050! The prevalence among older Americans is as high as 20 percent, affecting seven million people over the age of 65.

Diabetes is now the sixth leading cause of death in the U.S. Potentially fatal complications include stroke, heart disease, kidney failure and blindness. But it may not be generally known that hearing loss is also a possible complication. In fact, a recent study, funded by the National Institutes of Health (NIH), reports that the incidence of hearing loss in adults with diabetes is about twice as common as that found in people who do not have the disease. Is this statistic more than a coincidence? That's a puzzling question and it's become the source of new research, especially among molecular scientists.

What Do Diabetes and Hearing Loss Have in Common?

Possible connections between hearing loss and diabetes have been speculated about since the 1800's, but it's the advent of molecular science that is helping explore the connections the two diseases may have – and how the hearing health of diabetics can be better monitored. Although the details regarding the mechanisms remain elusive, scientists are working hard to decipher the likely molecular players in this connection. They're speculating that since the vasculature system (i.e., blood vessels) and nerves play



important roles in auditory function, any disease capable of damaging cells through these pathways has the potential to adversely affect hearing.

Since we know that diabetes-related damage takes place in human eyes and kidneys, we might suspect that these changes would also take place in the inner ear, an area rich in blood vessels. Nerve cell damage related to diabetes may affect structures farther along the hearing pathway as well. For example, we know that electrical signals from the cochlea may travel more slowly along the auditory nerve in diabetic versus non-diabetic patients. Alterations in the brain cells in some diabetics also may result in slower processing of complex sounds such as speech.

Making the Connection: Translating Research Into Practice

This exciting research is showing us the effects cellular changes have throughout the vasculature and nerves of those with diabetes. Even though all types of diabetes are not the same

(type-1 diabetics produce no insulin, while type-2 produce some but not in sufficient amounts or can't make proper use of what is produced), in both types an excessive amount of glucose in the bloodstream, termed hyperglycemia, creates a dangerous environment for cells throughout the body. Both these conditions are fertile ground for additional complications that may begin long before clinical symptoms are detected. Additional support for these results is that molecular research is now revealing differences at the cellular level between diabetic and non-diabetic patients, even when hearing loss is not detectable.

Translated into practical terms, these results suggest that the hearing of diabetic patients is affected before clinical symptoms can be detected. Experts now recommend that specific tests for hearing loss be included as part of a diabetic's routine care. In terms of scientific research, routine tests may also present an opportunity to learn even more about how diabetes affects individuals with pre-existing hearing loss. Establishing a connection between hearing loss and diabetes also could result in a change in the standard of care for diabetics. Physicians would be more inclined to add monitoring of hearing abilities to their preventive care protocol and to refer all patients with a hearing loss, diabetics or not, to a hearing health professional for treatment so that they can manage and make the most of their hearing abilities. Undoubtedly this is a win-win connection between science and hearing health. ❖