UNIVERSITY AT BUFFALO

Study delves into ‘hidden’ hearing loss

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Traditional hearing tests often fail to diagnose patients with a common form of inner ear damage that might otherwise be detected by exams that depend on behavioral responses, according to a study led by University at Buffalo researchers.

This type of “hidden” hearing loss presents itself as normal hearing in the clinic, where audiograms – the gold standard for measuring hearing – are typically conducted in a quiet room.

But some forms of hearing loss may go unrecognized due to the complex partnership between the ear and the brain. The central auditory system can compensate for significant damage to the inner ear by turning up its volume control, partially overcoming the deficiency, said Richard J. Salvi, SUNY distinguished professor of communicative disorders and sciences, who directs UB’s Center for Hearing and Deafness and is lead author of the study in Frontiers of Neuroscience.

“You can have tremendous damage to inner hair cells in the ear that transmit information to the brain and still have a normal audiogram,” Salvi said in a statement. “But people with this type of damage have difficulty hearing in certain situations, like hearing speech in a noisy room. Their thresholds appear normal. So they’re sent home.”

About 95 percent of sound input to the brain comes from the ear’s inner hair cells. Damage reduces the signal, but the brain can turn up the volume control to better hear a distant station, the researchers said. “These inner hair cells are like spark plugs in an 8-cylinder engine,” Salvi said. “A car won’t run well if you remove half of those spark plugs, but people can still present with normal hearing thresholds if they’ve lost half or even three-quarters of their inner hair cells.”

For people with inner hair cell loss, sound is less faithfully converted into neural activity in the cochlea. But the weakened activity is amplified as it travels along the central auditory pathway to a structure known as the inferior colliculus and onward into the brain.

As people get older, it is a common complaint to have difficulty hearing in noisy environments. “That’s why the way we’re measuring hearing in the clinic may not be adequate for subtle forms of hearing loss,” said co-author Benjamin D. Auerbach, a postdoctoral fellow at UB’s Center for Hearing and Deafness.