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Cardiovascular health affects hearing, speech according to research

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Professor Raymond Hull, communication sciences and disorders.

Ray Hull, professor of communication sciences and disorders in audiology/neurosciences at Wichita State University, has concluded research analyzing 84 years of work from scientists worldwide into the

connection between cardiovascular health and the ability to hear and understand what others are saying.

Hull's work connected the dots from 70 scientific studies to confirm a direct link.

"The auditory function impacted by cardiovascular health is problematic because our entire central nervous system needs an oxygen-rich nutrient supply," Hull said. "If it doesn't get it due to cardiovascular health problems, then it can be affected."

Hull's findings may seem surprising, but he says that the connection is a very logical one because both the inner ear – the aspect of the ear that transduces sound into an electrochemical signal – and the brain depend on healthy blood flow.

Hull has been presenting his research at conferences and medical journals, and is frequently quoted by the American Heart Association on the topic of heart disease. He has been conducting research at Wichita State since 1993.

Cardiovascular disease – including coronary blockage (blockage of the heart and vascular system), coronary infarction (heart attacks), congenital heart problems, vascular hypertension (high blood pressure) and other related conditions – can inhibit the blood and nutrient supply to the inner ear, which receives and analyzes sound. The affected auditory system includes both the brain stem and auditory portions of the brain that interpret what we hear so that it can be analyzed and understood.

Hull said there are many possible causes of hearing loss, and cardiovascular disease appears to exaggerate the impact of those causes and thus the degree of hearing decline. This compounded effect not only

increases the difficulty a person experiences in comprehension, but also their ability to process what they hear with speed and accuracy.

Some of the studies analyzed by Hull revealed a link between cardiovascular health and cognitive function, which includes higher brain tasks such as speed and accuracy of decision making, and the uses of language to express oneself clearly. The problem is one that typically affects older adults, whose most common causes of disability are cardiovascular disease, hearing loss and falls.

"One of the most frustrating aspects of this problem for them is the inability to process what they hear," Hull said. "Even when the hearing mechanism is working, what they hear just doesn't make sense. That's when people start to complain, 'He just talks too fast,' or 'It's time to change the PA system at church' – they have difficulty understanding what other people are saying."

Fortunately, he said, a number of studies show that improvements in oxygen exchange and cardiovascular health can likewise result in improvements in the ability to hear and understand speech.

One of the findings Hull said was most intriguing came from a study published by Colcome and Kramer (2003) in *Psychological Science*, which suggested that "…cardiovascular improvements might even turn back the clock, biologically speaking, and lead to patterns of auditory processing and cognitive activation that are more similar to the patterns of younger adults. These improvements could likewise result in an increase in speed and accuracy of speech understanding in adulthood, including those functions in older adults."

Provided by Wichita State University