

Alzheimer's and vascular changes in the neck

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Studies on Alzheimer's disease and other forms of dementia have long focused on what's happening inside the brain. Now an international research team studying Alzheimer's and mild cognitive impairment is reporting potentially significant findings on a vascular abnormality outside the brain.

The finding has potential implications for a better understanding of Alzheimer's and other neurological disorders associated with aging.

The pilot study was published in the *Journal of Alzheimer's Disease* Nov. 8 online ahead of print by researchers from the University at Buffalo, the University of Bradford in the United Kingdom and National Yang-Ming University School of Medicine in Taiwan. The authors caution that the study is small and that the results must be validated in larger, future studies.

They studied a hemodynamic abnormality in the internal jugular veins called jugular venous reflux or JVR. It occurs when the pressure gradient reverses the direction of blood flow in the veins, causing blood to leak backwards into the brain.

JVR occurs in certain physiological situations, if the internal jugular vein valves do not open and close properly, which occurs more frequently in the elderly. This reverse flow is also believed to impair cerebral venous drainage.

The brain's white matter is made of myelin and axons that enable

communication between nerve cells.

"We were especially interested to find an association between JVR and white matter changes in the brains of patients with Alzheimer's disease and those with mild [cognitive impairment](#)," says Robert Zivadinov, MD, PhD, FAAN, professor of neurology at the UB School of Medicine and Biomedical Sciences and senior author.

"Age-related white matter changes have long been associated with dementia and faster cognitive decline," he says. "To the best of our knowledge, our study is the first to show that JVR is associated with a higher frequency of white matter changes, which occur in patients with mild cognitive impairment and Alzheimer's disease."

Ching-Ping Chung, the first author on the study and assistant professor of neurology at National Yang-Ming University, adds: "We are the first to observe that JVR may be associated with formation of these lesions in the brain, given the fact that Alzheimer's patients have more white matter lesions than healthy people.

"If this observation is validated in larger studies," she continues, "it could be significant for the development of new diagnostic tools and treatments for pathological white matter lesions developed in Alzheimer's disease and other forms of dementia."

White matter changes have been found to have a direct relationship to the buildup of [amyloid plaque](#) long seen as central to the development of Alzheimer's disease.

"The accumulation of amyloid plaque may result from the inability of cerebrospinal fluid to be properly cleared from the brain," says Clive Beggs, second author on the study and professor of medical engineering at the University of Bradford. In addition, he says, the study found that

JVR appeared to be associated with dirty-appearing white matter, which is thought to represent early stage lesion formation.

"To the best of our knowledge, this is one of the first studies to explore the impact of dirty-appearing white matter in the elderly," Beggs continues. He adds that the significance of dirty-appearing [white matter](#) in the elderly needs more study.

The research involved 12 patients with Alzheimer's disease, 24 with [mild cognitive impairment](#) and 17 age-matched elderly controls. Participants underwent Doppler ultrasound exams and magnetic resonance imaging scans.

The impact of hemodynamic changes in veins from the brain to the neck has been the focus of numerous studies by Zivadinov and colleagues at UB and institutions worldwide.

"Given the major finding of our group in 2011 that both healthy controls and people with a variety of neurological diseases present with structural and hemodynamic changes of the extracranial venous system, we thought it was important to study how they might be involved in the development of Alzheimer's disease and other important neurodegenerative conditions," he explains.

Zivadinov notes that the frequency of JVR increases with aging and its accumulated effects on cerebral circulation may take many years to develop. Patients are likely to be asymptomatic for a long time, which would explain why the condition is seen in both healthy people and those with neurological diseases, he adds.

Provided by University at Buffalo

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