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Central hemodynamics and arterial health research insights

Neuroscience Edition

**46 papers and abstracts**  
published between 2019-2023\*

Here are some of the highlights.



**APOE Genotype & AD Biomarker** | July 2021

## **Arterial Stiffening Acts Synergistically with APOE Genotype and AD Biomarker Status to Influence Memory in Older Adults Without Dementia**

A group from the VA San Diego Healthcare System led by Katherine Bangen studied 193 older adult volunteers with normal cognition and mild cognitive impairment. The researchers found risk factors for cerebrovascular disease can increase the risk of developing Alzheimer's disease and are potentially modifiable. Increased arterial stiffness is associated with poorer performance on tests of executive functioning and memory in older adults. The researchers suggest that improving central vascular function may reduce dementia risk. The group advocates for noninvasive measurement of arterial stiffness as it is easier and less expensive to acquire than MRI and can be measured in a clinician's office.



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**Diet, Arterial Stiffness, and Cognitive Performance** | January 2022

## **Diet May Moderate the Relationship Between Arterial Stiffness and Cognitive Performance in Older Adults**

In a study aimed to explore the relationship between diet, arterial stiffness, glucose control, and cognitive performance in older adults at risk of cognitive decline, Sarah Gauci and colleagues reported that arterial stiffness predicted cognitive performance independently, while no relationship was observed between glucose control and cognitive outcomes. The results indicate that diet alone did not predict cognitive performance, but it moderated the relationship between arterial stiffness and cognition.

The study suggests that diet and arterial stiffness may act together to impact cognition and that exploring the interaction between dietary factors and other health factors could help reduce the impact of unhealthy brain aging.



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**7-Year Longitudinal Study on Cognitive Decline** | November 2019

## **Association of Aortic Stiffness with Cognitive Decline: Whitehall II Longitudinal Cohort Study**

A research team led by Marzieh Araghi examine the association between arterial stiffness and cognitive decline over 7 years on 4,300 study participants. The team found that aortic stiffness is linked to an increased risk of cardiovascular disease and cognitive decline, and higher levels of arterial stiffness are associated with faster cognitive decline, suggesting that arterial stiffness severity can be used as an indicator to administer prompt treatments to prevent or delay the onset of cognitive decline or dementia.



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## Effects of Carotid Artery Stiffness on Cerebral Small-Vessel Disease and Cognition

A research team led by Caroline Robert of the National University Health System in Singapore examined the associations between carotid artery stiffness and cerebral small-vessel disease markers, cognition, and dementia subtypes. The results showed that carotid stiffness measures were associated with worse performance in various cognitive functions as well as specific markers of cerebral small-vessel disease and vascular dementia.

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## Associations Between Arterial Stiffening and Brain Structure, Perfusion, and Cognition in the Whitehall II Imaging Sub-study: A Retrospective Cohort Study

A group at the Wellcome Centre for Integrative Neuroimaging led by Sana Suri examined the association between aortic stiffness and brain structure and cognition on 542 participants. The study found that arterial stiffening in mid-to-late life is associated with poor brain white matter integrity and reduced cerebral blood flow, leading to cognitive decline and dementia. The findings suggest that progressive increases in aortic stiffness over a 4-year period can have negative effects on cerebral and cognitive outcomes in later life.

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## Arterial Stiffness and Cardiorespiratory Fitness Are Associated with Cognitive Function in Older Adults

Justin Mason and colleagues reported that, in older adults with high and normal aortic stiffness, those with high stiffness had greater declines in vascular and cognitive function. The study suggests that reducing aortic stiffness and maintaining cardiorespiratory fitness could help slow down age-related cognitive decline. The study also found that executive function, psychomotor speed, visual scanning, and perception are the cognitive domains most affected by arterial stiffness.

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## Vascular and Microstructural Markers of Cognitive Pathology

In a study of 460 participants ( $70 \pm 8$  years), a research group from the Wake Forest University led by Claudia Coffin that arterial stiffness and high blood pressure are associated with cognitive decline and dementia. Higher arterial stiffness is associated with worse cognitive performance, particularly in executive function. The researchers suggest that arterial stiffness may be a potential target for prevention of vascular cognitive impairment and Alzheimer's disease as elevated blood pressure and arterial stiffness are associated with abnormalities in brain microstructure and macrostructure.



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## The Impact of Aging on the Association Between Aortic Stiffness and Cerebral Pulsatility Index

Brandon Fico and colleagues studied the association between aortic stiffness and cerebral artery pulsatility index in young and older adults. The study found that age and aortic stiffness are significant predictors of cerebral artery pulsatility index in healthy adults, emphasizing the need to address aortic stiffness in the aging population to mitigate age-related changes in cerebral hemodynamics. The study further highlights the importance of targeting aortic stiffness to reduce the burden of age-related changes.



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