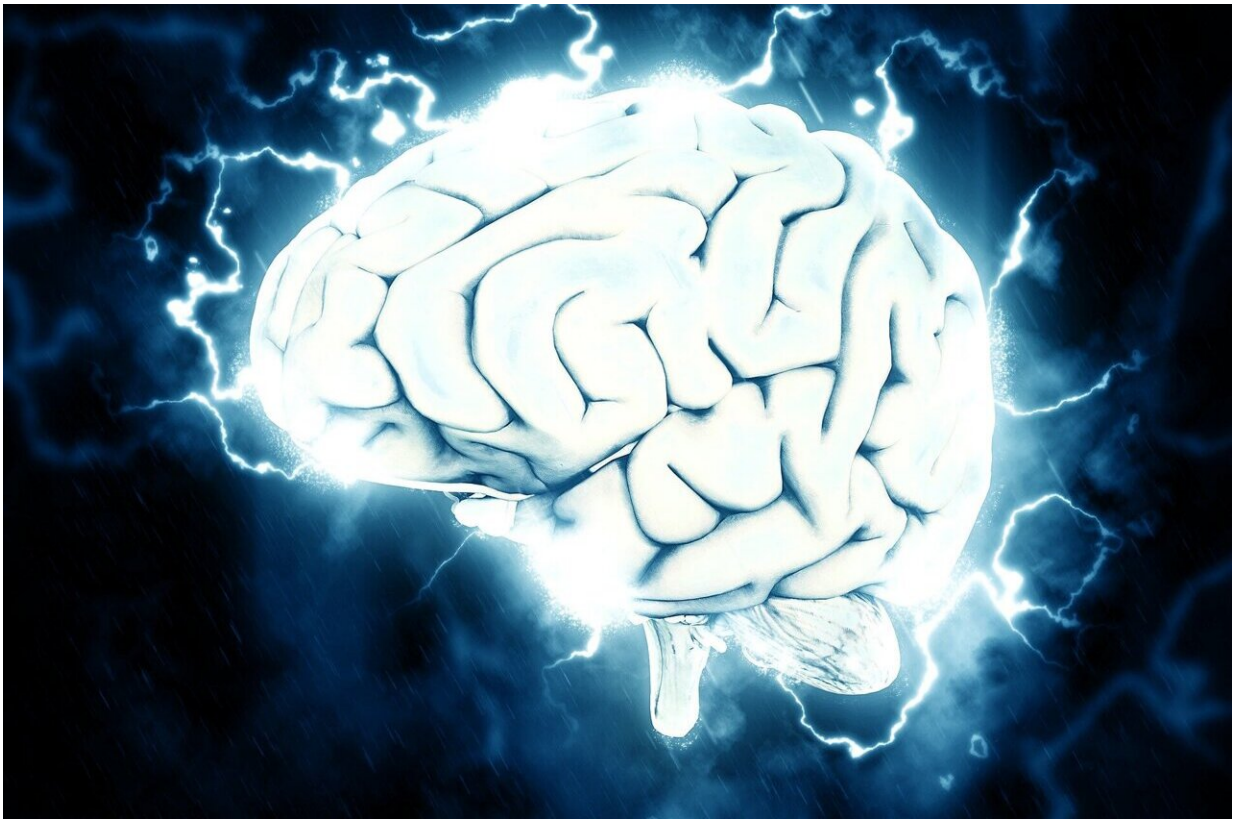


High blood pressure's impact on white matter could be key to dementia prevention

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A study from the Center for Healthy Brain Aging (CHeBA) provides compelling evidence for clinical practice to direct efforts toward preventing white matter damage in individuals with hypertension in

order to protect against cognitive decline and dementia.

High blood pressure has a negative effect on many aspects of health and is also known to affect both the gray and [white matter](#) in the brain during the aging process. Gray matter is where the [brain cells](#) exist, whereas white matter constitutes the network of nerve fibers that provides the communication connection between different areas of gray matter.

The study, led by Dr. Jing Du and Associate Professor Wei Wen and [published](#) March 11 in *Hypertension*, found that compared with gray matter, white matter is more vulnerable to raised blood pressure.

"Because gray matter has a greater amount of small blood vessels, and therefore a greater supply of blood compared to white matter, we wanted to see if white matter is more susceptible to damage from reduced [blood flow](#) caused by [high blood pressure](#)," says Du.

Brain age is an emerging neuroimaging derived measure using deep learning techniques that has gained significant attention in recent years.

According to Associate Professor Wen, who is Leader of the Neuroimaging Group at CHeBA, brain age is calculated from MRI scans and is considered a powerful index for estimating the underlying biological health of brain tissues.

"We applied advanced technology known as the 3D-CNN deep learning model to measure the gray matter and white matter brain ages separately," says Du.

The researchers looked at brain scans from nearly 40,000 people with varying levels of blood pressure, ranging from normal to high. They found that as blood pressure increased, both gray and white matter showed signs of aging, with white matter appearing to age faster.

The findings suggest that memory and thinking problems are more likely to occur as a result of high blood pressure's impact on white matter, rather than gray matter.

The researchers also investigated how different aspects of blood pressure affect brain aging. They found that systolic blood pressure had a linear relationship with both gray and white matter aging—meaning as blood pressure increases, so does brain aging. On the other hand, diastolic blood pressure had a U-shaped relationship, suggesting an optimal range for maintaining brain health.

The study suggests that white matter in the brain is particularly vulnerable to high blood pressure. To preserve brain health, it is crucial to keep blood pressure within an optimal range.

"Managing blood pressure effectively could help protect against [cognitive decline](#) and future efforts should focus on monitoring and managing white matter health in people with high blood pressure," says Du.

More information: Jing Du et al, Association of Blood Pressure With Brain Ages: A Cohort Study of Gray and White Matter Aging Discrepancy in Mid-to-Older Adults From UK Biobank, *Hypertension* (2024). [DOI: 10.1161/HYPERTENSIONAHA.123.22176](https://doi.org/10.1161/HYPERTENSIONAHA.123.22176)

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