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Study reveals how obesity could accelerate aging in the brain

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A new study conducted in mice traces how obesity and a high-fat diet may accelerate aging in the blood vessels that supply blood to the brain. The work is being presented this week at the American Physiology Summit, the flagship annual meeting of the American Physiological Society (APS), in Long Beach, California.

The findings suggest that obesity and a poor diet can cause damage to accumulate in the blood vessels, reducing the supply of oxygen to parts of the brain and ultimately leading to cognitive decline. The study could help scientists find ways to intervene and preserve brain function in people with obesity, which is estimated to affect about 42% of U.S. adults.

"This project highlights the critical roles of vascular components and cellular aging in cognitive deterioration, pinpointing novel potential therapeutic targets for dementia prevention and treatment," said Sharon Negri, Ph.D., the study's first author and a postdoctoral research fellow in the laboratory of Stefano Tarantini, Ph.D., in the Department of Neurosurgery at the University of Oklahoma Health Sciences Center.

Previous research has found strong links between midlife obesity and an increased risk of cognitive decline and dementia later in life. The scientists sought to uncover the mechanisms behind this association, with a particular focus on the role of diet and vascular health.

To do this, the researchers studied the impact of a high-fat diet on blood flow to the brain and memory performance in aged obese mice. By using a special mouse model, they were also able to measure cellular senescence, a process when cells stop dividing and making new cells. Cellular senescence increases with aging and contributes to a variety of aging-associated diseases.

"Obesity may cause the cells in blood vessels in the brain to age faster and reach senescence," Negri said. "If a link between obesity and cellular senescence is established, it could open up new lines of investigation aimed at exploring therapeutic avenues to prevent or slow down the progression of senescence, with the potential to mitigate obesity-related health issues, including cognitive decline."

The results showed that after three months, mice fed a high-fat diet had increased cellular senescence and reduced density of healthy blood vessels in the brain, as well as evidence of impaired learning in a maze test, compared with normal-weight mice fed a standard diet. In addition, the scientists found that removing the senescent cells using Navitoclax, an investigational cancer drug that selectively kills senescent cells, improved features of the brain vasculature.

If further experiments confirm that it is possible to reverse the detrimental effects of senescence, Negri and Tarantini's next plan is to evaluate whether various lifestyle interventions could help to prevent or reduce obesity-induced cognitive impairment.

More information: www.physiology.org/professiona … ysiology-summit-2023

Provided by American Physiological Society

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