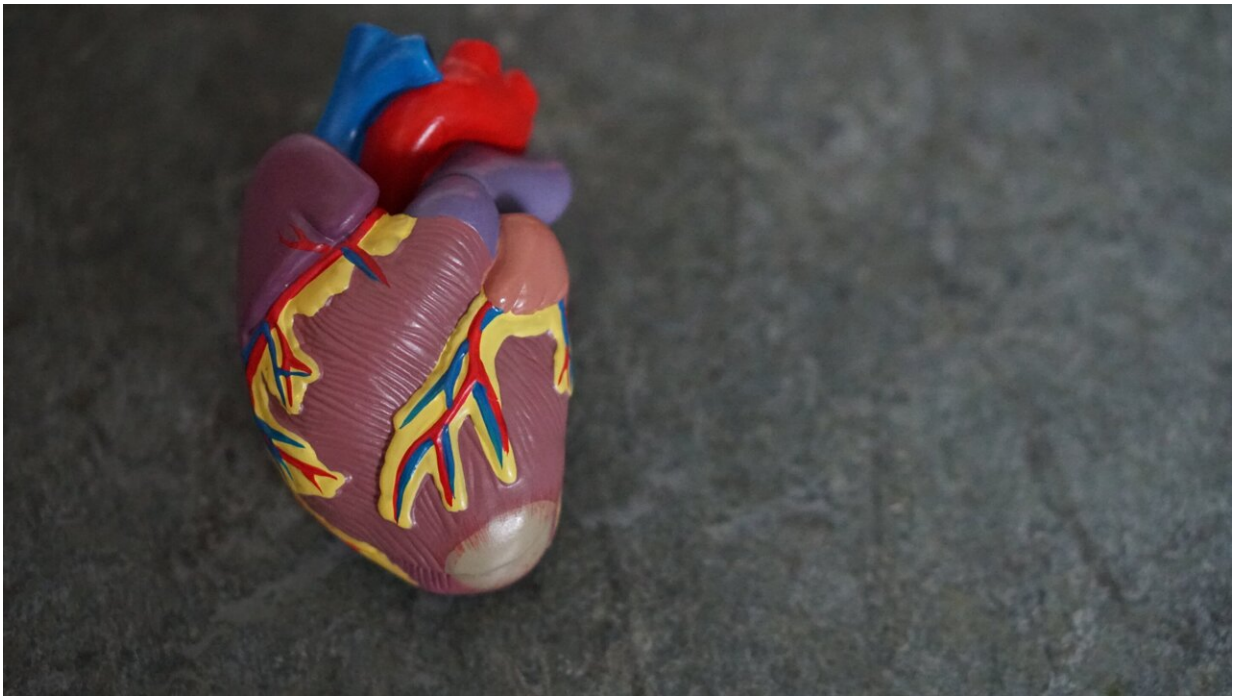
Medical Xpress

Heart disease causes early brain dysfunction and can triple key Alzheimer's protein

January 13 2022



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Heart disease can directly cause brain dysfunction early on which could lead to dementia and can triple the amount of an Alzheimer's protein in the brain, say scientists.

The new research, published in *eLife*, has found that heart disease causes a breakdown of a key brain function which links brain activity and blood

flow, meaning the brain gets less blood for the same amount of activity.

This is happening in heart disease patients before the build up of fat in the brain's blood vessels (atherosclerosis) and is a prelude to dementia. Until now it has been unclear how some forms of vascular dementia can happen years before atherosclerosis in the brain.

The researchers also discovered that the combination of heart disease and a genetic predisposition for Alzheimer's Disease trebles the amount of beta-amyloid, a protein that builds up and triggers Alzheimer's, and increases the levels of an inflammatory gene (IL1) in the brain.

Dr. Osman Shabir, lead author of the study from the University of Sheffield's Neuroscience and Healthy Lifespan Institutes, says that "Alzheimer's Disease is the most common form of dementia worldwide and heart disease is a major risk factor for both Alzheimer's and dementia. The new findings are key to furthering our understanding of the links between heart disease and dementia."

"We've discovered that heart disease in midlife causes the breakdown of neurovascular coupling, an important mechanism in our brains which controls the amount of blood supplied to our neurons. This breakdown means the brain doesn't get enough oxygen when needed and in time this can lead to dementia."

The team have since been awarded a three year grant by the British Heart Foundation to look at the use of an arthritis drug which targets IL1 to see if it could reverse or reduce the brain dysfunction seen to be caused by heart disease.

The team also found that brain injuries can also worsen brain blood flow regulation, supporting observations that patients' symptoms often worsen after injuries or falls.

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More information: Osman Shabir et al, Assessment of neurovascular coupling and cortical spreading depression in mixed mouse models of atherosclerosis and Alzheimer's disease, *eLife* (2022). DOI: 10.7554/eLife.68242

Provided by University of Sheffield

Citation: Heart disease causes early brain dysfunction and can triple key Alzheimer's protein (2022, January 13) retrieved 24 April 2024 from https://medicalxpress.com/news/2022-01-heart-disease-early-brain-dysfunction.html

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