MedicalXpress

Vascular brain injury greater risk factor than amyloid plaques in cognitive aging

February 11 2013

Vascular brain injury from conditions such as high blood pressure and stroke are greater risk factors for cognitive impairment among non-demented older people than is the deposition of the amyloid plaques in the brain that long have been implicated in conditions such as Alzheimer's disease, a study by researchers at the Alzheimer's Disease Research Center at UC Davis has found.

Published online early today in *JAMA Neurology* (formerly *Archives of Neurology*), the study found that vascular brain injury had by far the greatest influence across a range of cognitive domains, including higher-level thinking and the forgetfulness of mild cognitive decline.

The researchers also sought to determine whether there was a correlation between vascular brain injury and the deposition of beta amyloid (Aβ) plaques, thought to be an early and important marker of Alzheimer's disease, said Bruce Reed, associate director of the UC Davis Alzheimer's Disease Research Center in Martinez, Calif. They also sought to decipher what effect each has on memory and executive functioning.

"We looked at two questions," said Reed, professor in the Department of Neurology at UC Davis. "The first question was whether those two pathologies correlate to each other, and the simple answer is 'no.' Earlier research, conducted in animals, has suggested that having a stroke causes more beta amyloid deposition in the brain. If that were the case, people who had more vascular brain injury should have higher levels of beta amyloid. We found no evidence to support that."

"The second," Reed continued, "was whether higher levels of cerebrovascular disease or amyloid plaques have a greater impact on cognitive function in older, non-demented adults. Half of the study participants had abnormal levels of beta amyloid and half vascular brain injury, or infarcts. It was really very clear that the amyloid had very little effect, but the vascular brain injury had distinctly negative effects."

"The more vascular brain injury the participants had, the worse their memory and the worse their executive function – their ability to organize and problem solve," Reed said.

The research was conducted in 61 male and female study participants who ranged in age from 65 to 90 years old, with an average age of 78. Thirty of the participants were clinically "normal," 24 were cognitively impaired and seven were diagnosed with dementia, based on cognitive testing. The participants had been recruited from Northern California between 2007 to 2012.

The study participants underwent magnetic resonance imaging (MRI) — to measure vascular brain injury — and positron emission tomography (PET) scans to measure beta amyloid deposition: markers of the two most common pathologies that affect the aging brain. Vascular brain injury appears as brain infarcts and "white matter hyperintensities" in MRI scans, areas of the brain that appear bright white.

The study found that both memory and executive function correlated negatively with brain infarcts, especially infarcts in cortical and sub-cortical gray matter. Although infarcts were common in this group, the infarcts varied greatly in size and location, and many had been clinically silent. The level of amyloid in the brain did not correlate with either changes in memory or executive function, and there was no evidence that amyloid interacted with infarcts to impair thinking.

Reed said the study is important because there's an enormous amount of interest in detecting Alzheimer's disease at its earliest point, before an individual exhibits clinical symptoms. It's possible to conduct a brain scan and detect beta amyloid in the brain, and that is a very new development, he said.

"The use of this diagnostic tool will become reasonably widely available within the next couple of years, so doctors will be able to detect whether an older person has abnormal levels of beta amyloid in the brain. So it's very important to understand the meaning of a finding of beta amyloid deposition," Reed said.

"What this study says is that doctors should think about this in a little more complicated way. They should not forget about cerebrovascular disease, which is also very common in this age group and could also cause cognitive problems. Even if a person has amyloid plaques, those plaques may not be the cause of their mild cognitive symptoms."

Provided by UC Davis