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The influence of lacunes on cognitive function

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WHAT IS SMALL-VESSEL DISEASE? Small-vessel disease (SVD) occurs when small yet vital arteries in the brain narrow. This process may block blood flow to certain parts of the brain, especially in the "white matter." The white matter of the brain is made up of the connections—or wiring—between brain areas. Similar SVD can affect the "gray matter," where the brain cells or neurons live. MRI scans of the brain in patients with SVD often show both white matter lesions (WML) and lacunar infarcts. WML are patchy areas in the brain where the white matter shows signs of being affected by SVD. Lacunar infarcts are areas where the blood flow to small parts of the brain has been blocked, resulting in a tiny stroke called a "lacune" or lacunar infarct.

WHY WAS THE STUDY CONDUCTED? Previous studies have shown that WML affect brain function, but the role of lacunes has been less clear. It is possible that they are so small that they are not important. In their article (*Neurology*® 2011;76:1872–1878), Jokinen et al. ask: "What is the true medical significance of lacunes?" and "Why do they matter to you and me?" They examined how lacunes affect brain function and reviewed available literature on this topic. Their objective was to find a more definite answer.

HOW DID THEY DO THE STUDY? The researchers studied 387 older adults who were all independently functioning, with no dementia, and who all had some evidence of SVD on their MRI scans. As mentioned before, the researchers looked for 2 different types of lesions, WML and lacunar infarcts, both of which may be present in MRI scans of patients with SVD. All adults had baseline MRI and cognitive testing done at the start of the study. The cognitive testing included measures of speed and motor control and "executive skills." Executive skills are high-level abilities such as decision-making, planning, abstract thinking, and adapting to changing situations. All patients' memory was also tested. All testing was repeated after 3 years. The researchers controlled for factors other than the lacunes that might affect thinking ability. These factors included age, sex, education, baseline cognition, and the baseline level of SVD. The goal was to relate changes in brain MRI findings to changes in cognition over the 3-year period. They wanted to see what features were most closely related.

WHAT DID THE RESEARCHERS FIND? Out of the 387 subjects, 72 developed one or more new lacunes over the 3-year time period. The most important result from the study was that lacunes were found to be related to a decline in speed and motor control, as well as a decline in executive skills. Those small lacunes did cause a change in function. However, new lacunes were not related to changes in memory function. In addition, the locations of lacunes did not seem to play a large role in determining their effect. The best predictor of cognitive function at the 3-year follow-up was actually the WML volume calculated in a subject's first scan, not the number of lacunes. Still, they showed that the effect of lacunes was important.

WHY WAS THE STUDY IMPORTANT? Lacunes can happen in a moment's time, but they may have long-lasting effects on cognition. It has been shown that WML cause cognitive decline; however, the contribution of lacunes to cognitive decline was unclear. Some past studies suggested that lacunes cause cognitive problems, while other research showed that they do not.

Although this study showed that their effects are relatively small, lacunes found on MRIs do lead to measurable cognitive decline. Although WMLs and larger strokes may have greater effects on the brain, lacunes should not be ignored, because they can significantly affect cognitive functions. Patients with SVD should do as much as they can to prevent lacunes by controlling or preventing the risk factors for a stroke, especially high blood pressure and diabetes.

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