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Improved dementia diagnosis possible, new study shows

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(Medical Xpress)—Nearly 36 million people worldwide are estimated to currently have dementia. That number is expected to almost double every 20 years. Researchers are diligently working to find better, more accurate methods for earlier diagnosis.

According to recently published research from the University of Georgia's Franklin College of Arts and Sciences department of psychology, scientists may be one step closer to a better biomarker for earlier detection of mild cognitive impairment, the leading predictor of dementia and Alzheimer's disease in older adults.

Psychology professor and Bio-Imaging Research Center director Stephen Miller, along with former graduate student Carlos Faraco, used fMRI brain scans-scans that give researchers not only a visual picture of the structure of the brain but also information about blood flow within the brain-to test the working memory of adults with normal healthy adult brains against those showing signs of mild cognitive impairment. The research was recently published in the journal *Neuropsychologia*.

While researchers have looked at stored memory in terms of mild cognitive impairment and dementia research, working memory is a relatively new area of research in the fMRI research realm.

Initial results from the study show hyperactivity in the lateral temporal lobes, the area of the brain associated with working memory. Hyperactivity here means that the brain is exerting more energy to

complete a task, which may be a biomarker for developing dementia.

"Broadly, we're interested in finding more ways to identify people at risk for developing dementia," said Miller. "So, one of the ways that's been developed over the last few years is identifying a group of individuals who seem to be at higher risk for developing dementia based on early, relatively subtle signs of cognitive difficulties."

Individuals with mild cognitive impairment generally have mild memory problems, forgetfulness and may have difficulty with spatial recognition and information recall, as well as learning new pieces of information; however, they are still functionally fine and living independently.

"After about five years about half of these individuals with MCI convert to dementia, mostly to Alzheimer's dementia," said Miller. "But half of them don't. So, everybody is looking for more sensitive markers of that."

Researchers have been using fMRI brain scans for some time now to look at parts of the brain that are associated with stored memory, mainly the medial temporal lobes and the hippocampus. However, Miller's team decided to look at the part of the brain that is associated with working memory-the lateral temporal lobes.

Our brains use working memory when we hold a piece of information, manipulate it and hold it in our memory until it's time to be used, all within a relatively short amount of time. Remembering and dialing a telephone number after someone calls it out orally, despite a small distraction like the doorbell ringing, is an example of working memory in use.

To test working memory, Miller and his research partners tested both older adults with MCI and older adults with normal functioning brains using a series of complex working memory tasks. They tasked

participants with using working memory in two tasks-clicking on the correct color dot and remembering a sequence of letters-with one working memory task interrupting the next. At the end of the tasks, participants then had to recall information from those tasks.

Researchers then used scans to examine brain activity when participants were completing working memory tasks and at the end when participants were recalling information.

The findings, he said, are particularly interesting and could lead to better biomarkers for dementia, as other studies using fMRI scans testing stored memory are more difficult to read due to their placement next to sinus air passages that often makes imagery blurry.

While Miller admits that other researchers need to replicate this research and further test the hypothesis, the initial results from this study suggest that fMRI scans of the temporal lobes could give doctors earlier diagnostic tools someday.

"This adds to the literature another somewhat novel marker of likely differences between MCI individuals and normal individuals than hasn't been described in the literature very much, if at all," he said. "If it shows to be consistent, so that MCIs are consistently hyperactive in these lateralized temporal areas, in combination with what we already know about medial temporal lobe areas, that will hone in on being able to effectively identify those who have MCI versus those that don't."

More information: Read the complete journal article at www.sciencedirect.com/science/ … ii/S0028393213002601

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