Researchers develop combined data model to better evaluate for mild cognitive impairment

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A new study has shown that by combining imaging and neuropsychological testing, one can more accurately assess the cognitive status of individuals.

Cognitive decline is one of the most concerning behavioral symptoms associated with Alzheimer's disease (AD). The ability to efficiently distinguish individuals with mild cognitive impairment (MCI) from individuals who have normal cognition (NC) is crucial for early detection of AD.

In the past, different tests have been used to evaluate MCI. The Mini-Mental State Examination (MMSE) is a commonly used screening tool for dementia. Additionally, the Wechsler Memory Scale Logical memory (LM) test is a neuropsychological test that assesses verbal memory and is considered sensitive for AD. Neuroimaging, such as magnetic resonance imaging (MRI) provide biologic evidence that cognitive decline is neurodegenerative.

Researchers from Boston University School of Medicine (BUSM) used the National Alzheimer's Coordinating Center database to select data from 386 subjects who were clinically diagnosed with either NC or MCI. Subjects had previously completed the MMSE, the LM test and an MRI. They then developed a machine learning framework that allowed for the combination of models generated from individual MRI scans along with models developed on MMSE and LM test results to predict clinical diagnosis of cognitive status. "Our findings indicate that this framework can better predict MCI as it has the capability to combine needed information from multimodal data resource," explained corresponding author Vijaya B. Kolachalama, Ph.D., assistant professor of medicine at BUSM.

According to Kolachalama and Rhoda Au, Ph.D., professor of anatomy and neurobiology at BUSM and director of neuropsychology at the Framingham Heart Study, this study is a proof of principle that multimodal fusion of models developed using MRI scans, and other traditional test data is feasible and can better predict cognitive impairment. The fusion model was superior to the individual models alone and achieved an overall accuracy of over 90 percent.

These findings appear online in *Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring*.

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