

Phone-Based Memory Test Predicts In-Clinic Memory, MCI Diagnosis, and Alzheimer's Neuroimaging & Plasma Biomarkers

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Background: Early detection of dementia has become important for interventions that are developed to slow disease progression. Due to technological advancements, healthcare is trending toward using more telehealth screenings due to the convenience it provides patients. In our research, we evaluate the accuracy of a phone-based memory screen at diagnosing mild cognitive impairment.

Methods: 181 participants from the Indiana Alzheimer's Disease Research Center (IADRC) were screened using the Memory and Aging Telephone Screen (MATS) and diagnosed as cognitively normal (CN), subjective cognitive decline (SCD), or mild cognitive impairment (MCI). 177 underwent Rey Auditory Verbal Learning Testing (RAVLT); 103 received A β PET scans ([¹⁸F]florbetapir or [¹⁸F]florbetaben); 91 had plasma tau levels measured; and 140 received MRI scans (Freesurfer v6). ANCOVAs were used to evaluate differences between diagnostic groups covarying for age, sex, and education. ROC analysis and logistic regressions were used to predict MCI and A β positivity. Partial correlations covarying for sex and age (and education for RAVLT) were conducted to evaluate relationships between MATS scores with RAVLT, brain atrophy, pTau level, and amyloid deposition.

Results: MCI patients showed significantly lower MATS scores for immediate ($p < 0.001$) and delayed recall ($p < 0.001$) compared to controls. Scores on the MATS correlated well with clinical based testing (MATS learning vs RAVLT learning: $r^2 = 0.318$, $p < 0.001$). MATS scores showed strong associations for Alzheimer biomarkers: amyloid and tau deposition, hippocampus atrophy, and temporal atrophy. The accuracy of MATS to predict MCI was found to be about 75% with cutoffs of ≤ 16 for learning and ≤ 4 for delayed recall.

Conclusion and Potential Impact: The findings support that the phone memory screen can be used to detect dementia early in disease progression. By establishing cutoffs for this screening tool, physicians can easily and quickly detect signs of early Alzheimer's disease, thus allowing for early intervention to slow disease progression.