

Abstract 3070

AUGMENTED REALITY AND MACHINE LEARNING-DRIVEN DIGITAL COGNITIVE ASSESSMENT FOR EARLY DETECTION OF MILD COGNITIVE IMPAIRMENT AND NEURODEGENERATIVE DISEASES

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Aims

Traditional cognitive assessments fall short in scalability and in detecting early signs of Alzheimer's disease (AD). Novel machine-learning (ML)-based digital cognitive assessments use objective tasks to generate biomarkers that could enable earlier, precise, and accessible diagnoses. Investigating these tools offers valuable opportunities to advance early detection in neurodegenerative diseases.

Methods

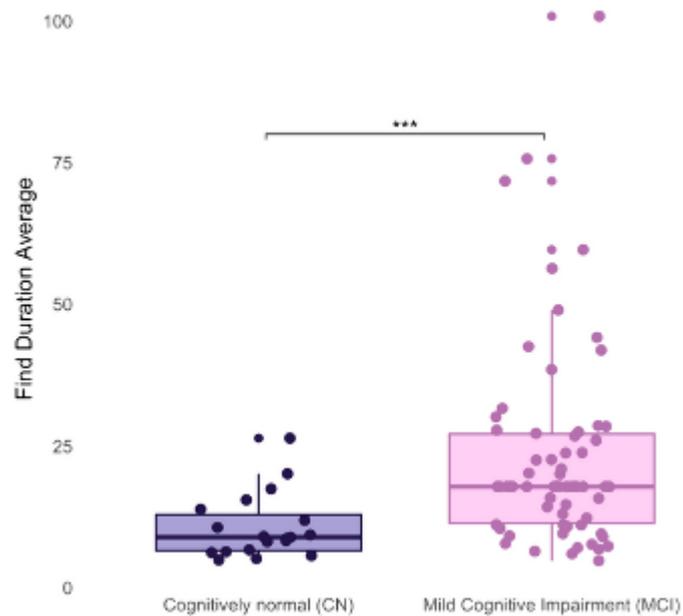
The Altoida NeuroMarker Platform is a tablet-based assessment (iOS) that enables the evaluation of cognitive functional abilities. It involves a 10-minute series of motoric, speech, and augmented reality (AR) tasks, consisting of placing and retrieving virtual objects. It evaluates diverse metrics (accuracy/speed/reaction times/navigation), generating hundreds of digital biomarkers. We tested the Altoida Platform on 70 participants from the SPIN cohort (51.4% female) who received a neurological and neuropsychological evaluation. Amyloid and tau status ($A\beta_{42/40}$ and p-Tau181) were determined in CSF (Fujirebio). We compared AR average object retrieval times (in seconds) (ARAORT-s), across clinical groups and using biomarker-based classification.

Results

Participants were classified as Cognitively Normal (CN;n=19;66.9 (8.7) years;MMSE: 29.1 (1.1) points;Global Deterioration Scale (GDS)=1) or as having Mild Cognitive Impairment (MCI;n=51;73.5 (5.6) years;MMSE:27.4 (1.8);GDS=3). Participants with MCI took longer time to retrieve the objects compared with CN ($p<0.001$). Within the MCI group, Altoida's digital biomarkers differentiated MCI with AD pathology from MCI due to Lewy Body Disease (LBD) ($p<0.05$), Frontotemporal Lobar Degeneration (FTLD) ($p<0.05$), and non-degenerative causes ($p<0.001$), as well as between A+T+ and A-T- participants ($p<0.01$).

Figure 1. ARAORT-s in participants classified as CN and with MCI.

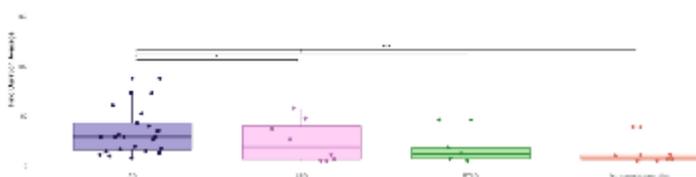
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Figure 2. ARAORT-s in participants classified by underlying neurodegenerative condition.

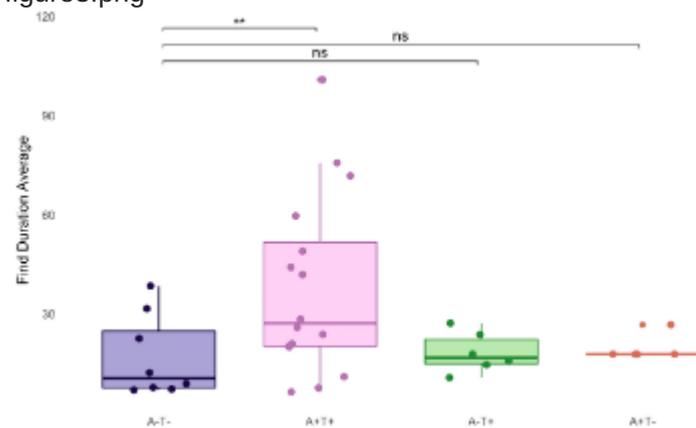
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Figure 3. ARAORT-s in participants with MCI classified by CSF A(T) status (A= $A\beta_{42/40}$; T=p-Tau181)

figure3.png



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Conclusions

Altoida's platform offers a promising solution for the large-scale evaluation of MCI due to different neurodegenerative causes.

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