

A novel digital cognitive biomarker for mild cognitive impairment and Alzheimer's disease

Gerardo Fernández¹, Marcela Schumacher², David Orozco³, Gustavo Sgrilli², Gustavo Echeverria², Ramiro Linares², Mario A. Parra⁴

¹ Instituto de Investigaciones en Ingeniería Eléctrica "Alfredo Desages", Bahía Blanca, Argentina

² Axis Neurociencias, Bahía Blanca, Argentina

³ Clínica Privada Bahiense, Bahía Blanca, Argentina

⁴ University of Strathclyde, Glasgow, United Kingdom

Background

Recent evidence suggests that oculomotor behaviours linked to cognitive performance can be a biomarker of Alzheimer's disease (AD). Short-Term Memory Binding (STMB) declines in patients with AD dementia and in those at risk of dementia. STMB relies on brain regions relevant to visual processing which are known to support oculomotor behaviours. Viewmind is proposed as a novel "cognitive digital biomarker" with the potential of revealing phenotypic features of AD in the pre-dementia stage of the pathology. Viewmind applies artificial intelligence to analyse eye movements and pupil responses during the performance of STMBT.

Method

STMBT assesses the ability to temporarily hold bicoloured objects whose colours had to be remembered either as individual features (baseline) or integrated within unified representations (binding). Viewmind's technology powered by Artificial Intelligence improved STMBT for identifying MCI patients and their potential conversion to AD.

Result

The 3 years Longitudinal Study involved 42 healthy older adults and 61 patients with Mild Cognitive Impairment (MCI). Viewmind retrospectively classified 91% of the MCI patients who later converted to AD as AD patients. From those MCI patients that Viewmind predicted as no AD, none later converted to AD but they progressed to Fronto-temporal or Parkinson's Disease.

Conclusion

Taken together, the results above suggest that Viewmind can (1) unveil novel features of AD dementia unknown to date, and (2) provide a more sensitive tool which can detect and trace aspects of such phenotype in people at risk, thus helping to ascertain the presence of the prodromal stages of the disease.

MILD COGNITIVE IMPAIRMENT (MCI) TO ALZHEIMER'S

