ALZHEIMER'S DEMENTIA EARLY DIAGNOSIS, CHARACTERIZATION, PROGNOSIS AND TREATMENT DECISION VIA A SOFTWARE-AS-MEDICAL DEVICE WITH AN ARTIFICIAL INTELLIGENT AGENT

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INTRODUCTION

- **TRACE4AD** (DeepTrace Technologies s.r.l, Italy) is a machine learning-based software-as-medical device able to predict the conversion to Alzheimer's disease (AD) dementia of subjects at risk within 24-months exploiting automatic processing of T1-weighted MPRAGE brain MRI study and neuropsychological tests [1].
- TRACE4AD **provides a report** with the predicted **individual risk** of conversion to AD dementia, specific cognitive deficits, and suggestions **supporting neurologists** in diagnosis and characterization, prognosis, and decision-making.

AIM

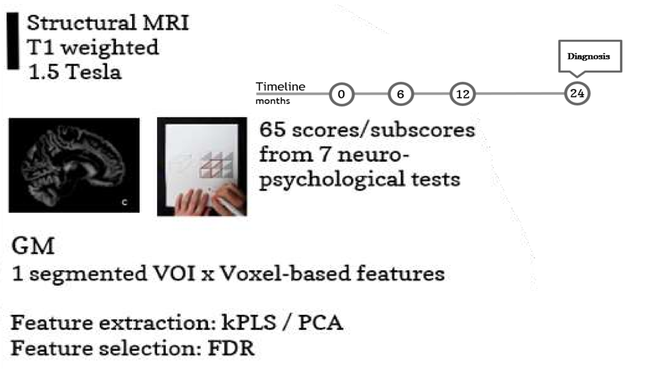
To test **TRACE4AD in the clinical setting** in its ability, at baseline, to:

a) predict amnestic Mild Cognitive Impairment (MCI) conversion to AD dementia **within 24-months**;

b) characterize **cognitive** deficits;

c) support neurologists' decision-making.

METHODS

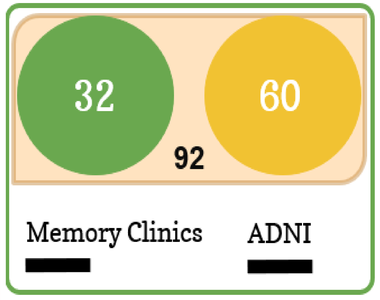


REFERENCE STANDARD

- the neurologist-s **clinical diagnosis** at 24-months
- the **neuropsychological assessment** at the baseline
- the **agreement** with the neuro exam and intervention decision time and type defined by neurologists at the baseline.

TRACE4AD extracted the **gray matter map** from MPRAGE and used it (combined with **cognitive measures**) to make inferences.

PARTICIPANTS



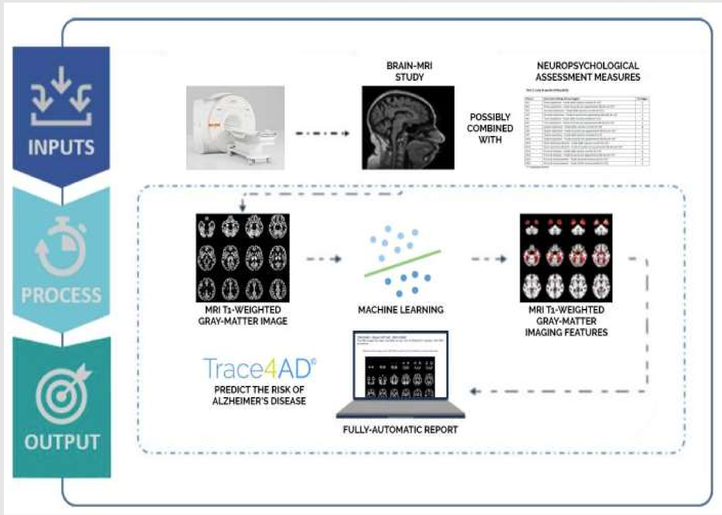
Patients were recruited from 2 Italian centers

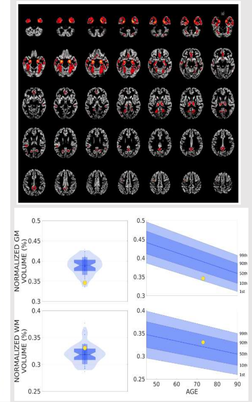
Demographic's:
Mean age 73.12±7.6
46% female

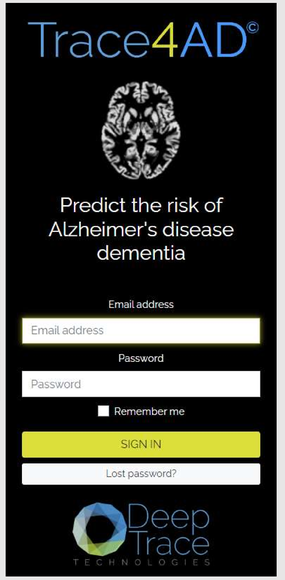
RESULTS

TRACE4AD accurately predicted conversion/non-conversion to AD dementia in
- 93.3% of patients based on the MRI study alone
- 96.6% based on MRI and cognitive measures.

- Cognitive deficits characterized by TRACE4AD were found in agreement with the neuropsychologist's assessment for all patients except 1 who presented with major depression







- TRACE4AD supported prompt **neurologists' decision in 88.2% patients at baseline**: 6 patients with cognitive complaints, defined with normal cognition by the tool, had no interventions; 9 patients with subtle cognitive deficits, recommended for treatment by the tool, had a tailored intervention.

- Disagreement between the neurologist's prediction and the tool at baseline was in only 2 patients, defined with no risk and high risk of dementia conversion, respectively. A follow-up visit was scheduled for those patients.

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References

[1] Battista, P., et al., 2020). Artificial intelligence and neuropsychological measures: The case of Alzheimer's disease. Neuroscience & Biobehavioral Reviews, 114, 211-228.