

The EuroLaD-EEG consortium: towards a global EEG platform for dementia, for seeking to reduce the regional impact of dementia

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Background: The value of Electroencephalography (EEG) to unveil pathophysiological signatures in neurodegenerative diseases that cause dementia has been recently highlighted. To grant EEG tools the necessary validity, reliability, and scalability to support the diagnosis of dementia globally, efforts will need to integrate knowledge developed by EEG labs across diverse countries and develop protocols that can be swiftly implemented by such labs to harmonize research and clinical practices. These are the aims of EuroLaD-EEG, a consortium that brings together five Latin American (LAC) and five European countries to develop a harmonised EEG database (Aim 1) that can help improve dementia phenotyping and diagnosis (Aim 2).

Methods: EuroLaD-EEG has developed a global EEG database that comprises 1234 EEG recordings from groups of healthy adults (n=1223), patients with mild cognitive impairment (n=199), and with familial and sporadic variants of neurodegenerative diseases (e.g., AD and FTD) (n=501). We have recently published the harmonization pipeline that will allow EuroLaD-EEG meet its Aim 1 (Prado et al., 2022, *Int J Psychophysiol*, 172, 24–38). We have now developed a multi-feature multimodal approach that combines demographic, neuropsychological, fMRI and EEG data as inputs for a gradient boosting machine-learning classifier. Multicentric data including those from underrepresented samples will enter such a classification algorithm towards our Aim 2.

Results: Preliminary results with a subsample from LAC (n=282) revealed high classification (AUC > 0.90 for all the classes) and robustness towards heterogeneity, sociodemographic variability, and missing data. We are now planning to combine data from European and LAC to explore sources of phenotypic variability linked to socio-demographic and cultural factors.

Conclusion: By broadening our understanding of dementia phenotypes, risk factors, and affordable diagnostic approaches, and adding new evidence on variability across developed and developing countries, the EEG will contribute unique evidence that will help enhance both dementia phenotyping and diagnostic strategies.