Plasma biomarkers and psycho-behavioral profile for characterization of psychiatric vs neurodegenerative diseases: insights from the NEMINAPSY cohort

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BACKGROUND. The accurate differential diagnosis between psychiatric and neurodegenerative diseases represents a major issue in psychiatry and neurology[1]. To this respect, the implementation of easily accessible biomarkers[2] such as blood biomarkers has recently shown great potential[3]. In 2022, the joint competences of the sections of Psychiatry and Neurology of Perugia University Hospital converged in the NEMINAPSY (Neuroinflammatory bioMarkers in Neurodegenerative And PSYchiatric disorders) study aimed at: (i) identifying and characterizing biological profiles of neurodegenerative and psychiatric disorders; (ii) estimating prognostic and diagnostic role of each biomarker with respect to clinical-neuropsychological testing. Herein, we present preliminary findings from this study in a subset of patients.

MATERIALS AND METHODS. 50 patients from the NEMINAPSY cohort were considered for the analysis (23 with Alzheimer's Disease, 4 with Fronto-Temporal Dementia, 6 with Lewy Body Dementia, 5 with Bipolar Disorder and 14 with Major Depressive Disorder). For all of them, pTau217, GFAP and NfL levels were measured in plasma and all of them underwent a thorough psycho-behavioral assessment including Montgomery-Åsberg Depression Scale (MADRS) and Hamilton Anxiety Rating Scale (HAM-A). Univariate and multivariate regression models were tested to determine the power of each marker (both biological and clinical) alone and of each possible combination of any number of them to differentiate between neurodegenerative vs psychiatric patients and between each diagnostic group; pairwise cut-offs were generated for all parameters via ROC analysis.

RESULTS. The combination of all plasma biomarkers and neuropsychological scores reached an AUC of 0.98 in discriminating between psychiatric vs. neurodegenerative diseases. Models including less than all covariates reached lower AUCs, yet some models achieved AUCs >0.90. When considering biomarkers alone, plasma pTau217, NfL and GFAP reached AUC>0.85 in discriminating psychiatric vs. neurodegenerative patients. Plasma pTau217 exhibited excellent accuracy (AUC>0.95) in discriminating AD from all other subgroups, while plasma NfL was particularly accurate in differentiating FTD from psychiatric disorders (AUC>0.95).

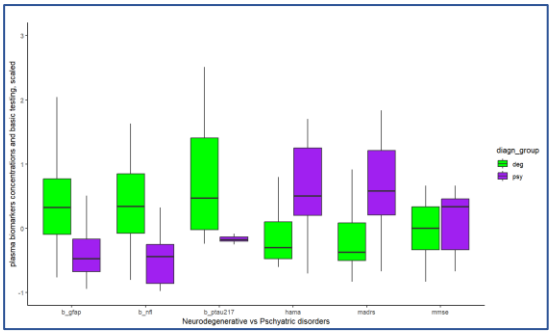

Fig. 1. Plasma biomarkers and basic testing in psychiatric and neurodegenerative disorders

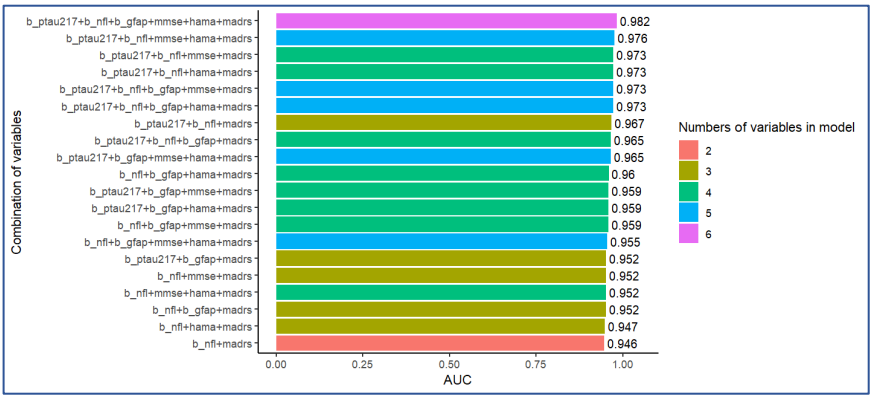

Fig. 2. Performance of combined logistic regression models

DISCUSSION. Preliminary findings from NEMINAPSY study show that combining all clinical and biological features yielded the best performance in regression models, thereby supporting the need of a comprehensive and accurate clinical and molecular profiling of psychiatric patients.

1.Ducharme S et al. Brain. 2020;143(6):1632-1650.
2.Gaetani L et al. Expert Rev Mol Diagn. 2023;23(12):1195-1207.
3.Gaetani L et al. J Neurol Neurosurg Psychiatry. 2019;90(8):870-881.