Harmonization of neuropsychological data in the multicenter Italian study NeuroArtP3 - artificial intelligence of clinical neurological data for predictive, preventive and personalized medicine

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Introduction: The NeuroArtP3 (NET-2018-12366666) is a multicenter project co-funded by the Italian Ministry of Health, involving clinical and computational centers operating in the field of neurology, including neurodegenerative, neuroinflammatory and oncological diseases. The core objectives of the project are i) to harmonize the collection of data across the participating centers, ii) to structure standardized disease-specific datasets and iii) to advance knowledge on modelling diseases trajectories through machine learning analysis. In this study we have explored the feasibility of harmonising collection of neuropsychological data in Alzheimer's, Parkinson's and Multiple Sclerosis patients.
Methods: several focus-groups per pathology have been organized by the consortium to harmonize the data collection, the inclusion criteria of the retrospective and prospective cohorts and the outcomes. Among the clinical and instrumental variables, a large part of the data is represented by the neuropsychological evaluations (i.e. the Alzheimer dataset included 15 neuropsychological tests).
Results: up to now, each center has completed the retrospective collection, reaching a sample size of almost 100 patients per pathology. Regarding the neuropsychological tests collection, despite the huge efforts during the data collection planning, many differences have arisen. In fact, heterogeneity was observed in the cognitive functions examined by the participating centers, as well as the tests used and the information reported in the data source documentation, that will need to be addressed during the machine learning analysis phase.
Discussion: machine learning methods are increasingly used to develop predictive models from large datasets. Sharing comparable data is key to promote quality and reliability results of solid research based on considerable amount of data. However, the heterogeneous nature of clinical data still represents a challenge. In particular, for neuropsychological data, there is a need to standardize the use and interpretation of the tests currently adopted in the clinical practice.