03_Concorso Pubblico, per titoli ed esami, per la copertura a tempo determinato, della durata di cinque anni per n. 1 posto di RICERCATORE SANITARIO, cat. D, livello D super da assegnare alla UOC NEUROLOGIA 5 - NEUROPATOLOGIA

PROVA 1

1. Spieghi, il candidato, gli aspetti neuropsicologici/comportamentali nelle malattie da prioni

2. In un database relazionale di dati su pazienti cosa si intende per RECORD e per CHIAVE PRIMARIA?

3. Legga e traduca il testo allegato tratto dalla letteratura scientifica

Prova Estratta

ELISA PELLENCIN
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12.11.2021

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Classification of Patients with Alzheimer's Disease and Dementia with Lewy Bodies using Resting EEG Selected Features at Sensor and Source Levels: A proof-of-concept study

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Affiliations expand

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Abstract

Background: Early differentiation between Alzheimer's disease (AD) and Dementia with Lewy Bodies (DLB) is important for accurate prognosis, as DLB patients typically show faster disease progression. Cortical neural networks, necessary for human cognitive function, may be disrupted differently in DLB and AD patients, allowing diagnostic differentiation between AD and DLB.

Objective: This proof-of-concept study assessed whether the application of machine learning techniques to data derived from resting-state electroencephalographic (rsEEG) rhythms (discriminant sensor power, 19 electrodes) and source connectivity (between five cortical regions of interest) allowed differentiation between DLB and AD.

Methods: Clinical, demographic, and rsEEG datasets from DLB patients (N=30), AD patients (N=30), and control seniors (NOld, N=30), matched for age, sex, and education, were taken from our international database. Individual (delta, theta, alpha) and fixed (beta) rsEEG frequency bands were included. The rsEEG features for the classification task were computed at both sensor and source levels. The source level was based on eLORETA freeware toolboxes for estimating cortical source activity and linear lagged connectivity. Fluctuations of rsEEG recordings (band-pass waveform envelopes of each EEG rhythm) were also computed at both sensor and source levels. After blind feature reduction, rsEEG features served as input to support vector machine (SVM) classifiers. Discrimination of individuals from the three groups was measured with standard performance metrics (accuracy, sensitivity, and specificity).

Results: The trained SVM two-class classifiers showed classification accuracies of 97.6% for NOld vs. AD, 99.7% for NOld vs. DLB, and 97.8% for AD vs. DLB. Three-class classifiers (AD vs. DLB vs. NOld) showed classification accuracy of 94.79%.

Conclusion: These promising preliminary results should encourage future prospective and longitudinal cross-validation studies using higher resolution EEG techniques and harmonized clinical procedures to enable the clinical application of these machine learning techniques.

Keywords: Alzheimer's Disease; EEG Source Connectivity; Feature Selection; LORETA; Lewy Body Dementia; Machine Learning.

Prova estratta.

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12.11.2024

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PROVA 2

1. Illustri, il candidato, il profilo cognitivo/comportamentale associato alle diverse sindromi ipercinetiche

2. In relazione al programma Microsoft Access, cosa si intende per DATABASE RELAZIONALE?

3. Legga e traduca il testo allegato tratto dalla letteratura scientifica

Prova non eseguita.

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doi: 10.1186/s13195-021-00914-4.

Intracortical diffusion tensor imaging signature of microstructural changes in frontotemporal lobar degeneration

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Free PMC article

Abstract

Background: Frontotemporal lobar degeneration (FTLD) is a neuropathological construct with multiple clinical presentations, including the behavioural variant of frontotemporal dementia (bvFTD), primary progressive aphasia-both non-fluent variant (nfvPPA) and semantic variant (svPPA)-progressive supranuclear palsy (PSP) and corticobasal syndrome (CBS), characterised by the deposition of abnormal tau protein in the brain. A major challenge for treating FTLD is early diagnosis and accurate discrimination among different syndromes. The main goal here was to investigate the cortical architecture of FTLD syndromes using cortical diffusion tensor imaging (DTI) analysis and to test its power to discriminate between different clinical presentations.

Methods: A total of 271 individuals were included in the study: 87 healthy subjects (HS), 31 semantic variant primary progressive aphasia (svPPA), 37 behavioural variant (bvFTD), 30 non-fluent/agrammatic variant primary progressive aphasia (nfvPPA), 47 PSP Richardson's syndrome (PSP-RS) and 39 CBS cases. 3T MRI T1-weighted images and DTI scans were analysed to extract three cortical DTI derived measures (AngleR, PerpPD and ParlPD) and mean diffusivity (MD), as well as standard volumetric measurements. Whole brain and regional data were extracted. Linear discriminant analysis was used to assess the group discrimination capability of volumetric and DTI measures to differentiate the FTLD syndromes. In addition, in order to further investigate differential diagnosis in CBS and PSP-RS, a subgroup of subjects with autopsy confirmation in the training cohort was used to select features which were then tested in the test cohort. Three different challenges were explored: a binary classification (controls vs all patients), a multiclass classification (HS vs bvFTD vs svPPA vs nfvPPA vs CBS vs PSP-RS) and an additional binary classification to differentiate CBS and PSP-RS using features selected in an autopsy confirmed subcohort.

Results: Linear discriminant analysis revealed that PerpPD was the best feature to distinguish between controls and all patients (ACC 86%). PerpPD regional values were able to classify correctly the different FTLD syndromes with an accuracy of 85.6%. The PerpPD and volumetric values selected to differentiate CBS and PSP-RS patients showed a classification accuracy of 85.2%.

Conclusions: (I) PerpPD achieved the highest classification power for differentiating healthy controls and FTLD syndromes and FTLD syndromes among themselves. (II) PerpPD regional values could provide an additional marker to differentiate FTD, PSP-RS and CBS.

Keywords: CBS; Cortex; Cortical diffusivity; Diffusion tensor imaging; FTD; FTLD; Intracortical; Microstructural; Minicolumn; PSP.

Prova non extratte.

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PROVA 3

1. Spieghi, il candidato, gli aspetti neuropsicologici/comportamentali nei diversi tipi di demenza rapidamente evolutiva

2. In un database relazionale di dati su pazienti quale CHIAVE PRIMARIA sceglierebbe?

3. Legga e traduca il testo allegato tratto dalla letteratura scientifica

Prova non estratta.

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Case Reports

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Primary progressive aphasias associated with C9orf72 expansions: Another side of the story

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Collaborators, Affiliations expand

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Abstract

C9orf72 repeat expansions are rarely associated with primary progressive aphasias (PPA). In-depth characterization of the linguistic deficits, and the underlying patterns of grey-matter atrophy in PPA associated with the C9orf72 expansions (PPA-C9orf72) are currently lacking. In this study, we comprehensively analyzed a unique series of 16 patients affected by PPA-C9orf72. Eleven patients were issued from two independent French and Finnish cohorts, and five were identified by means of literature review. Voxel-based morphometry (VBM) studies were performed on three of them. This study depicts the spectrum of C9orf72-related aphasic phenotypes, and illustrates their linguistic presentation. The non-fluent/agrammatic variant was the most frequent phenotype in our series (9/16 patients, 56%), with apraxia of speech being the main defining feature. Left frontal lobe atrophy was present in these subjects, peaking in inferior frontal gyrus. Three patients (19%) showed the semantic variant, with progression of atrophy in temporo-polar regions, later involving orbitofrontal cortex. Anterior temporal lobe dysfunction was also particularly relevant in two patients (12.5%) with mixed forms of PPA. Lastly, two patients (12.5%) had unclassifiable PPA with predominating word-finding difficulties. No PPA-C9orf72 patients in our series fulfilled the criteria of the logopenic variant. Importantly, this study underlines the role of C9orf72 mutation in the disruption of the most anterior parts of the language network, including prefrontal and temporo-polar areas. It provides guidelines for C9orf72 testing in PPA patients, with important clinical impact as gene-specific therapies are upcoming.

Keywords: C9orf72; Frontotemporal dementia; Frontotemporal lobar degeneration; Primary progressive aphasia; Progranulin (GRN).

Prova non estratta.

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