Universität Basel

Research Project

Improved prediction and montoring of CNS disorders with advanced neurophysiological and genetic assessment

Third-party funded project

Project title Improved prediction and montoring of CNS disorders with advanced neurophysiological and genetic assessment
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Objective: To establish a numerical model for better characterization and prediction of the course of the two most prevalent chronic neurological disorders with high impact on quality of life in young and elderly human beings, respectively: Multiple Sclerosis (MS) and Alzheimer's disease (AD). The numerical model will contain clinical, neuropsychological, genetic, imaging and neurophysiological data. Background: Although diagnosis of MS has greatly improved over the last decade, reliable prediction of the disease course (prognosis) is still not satisfying. In AD and other dementia types diagnosis is more difficult early in the disorder and depends in part on the course of symptoms. In both disease groups, clinical examination is still the main tool to assess the course of disease and the grade of impairment. Neurophysiological measurements like electroencephalography (EEG) at rest and during visual and sensory stimulation (evoked potentials, EP) represent parameters of impulse propagation in the central nervous system. These measures are likely to be abnormal early in the course of MS and AD. Therefore, they may add important information on the prognosis in MS and AD, and on the differential diagnosis of dementias. Recent technical developments allow the recording of EEG and EP with high resolution (256 channels) resulting in precise identification and localization of pathological changes. Genetic testing is likely to further improve the prediction of the disease course. Methods: In the MS subproject one hundred patients and fifty age-matched healthy controls will be examined three times at yearly intervals. Clinical and neuropsychological examination will be complemented by high-resolution EEG and EP, genetic testing and brain imaging by magnetic resonance tomography. In the AD subproject, forty patients with dementia will be compared to forty age matched healthy controls in regard to their cognitive performance, genetic profile and results of high resolution EEG and EP. All results of the different tests will be analyzed with a statistical model, which summarizes all data of an individual to a score to predict the clinical course in MS and AD. Significance: Reliable markers of disease progression and prognosis would allow to conduct clinical trials with a smaller number of patients or in less time, thus reaching clinically meaningful results more efficiently. This is especially important in MS and AD, where innovative treatment options are entering the phase of clinical testing in coming years. Moreover, improved prediction of the course of MS and AD may be useful even in individual patients for counselling and treatment decisions.

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