HIGH SENSITIVITY-SPECIFICITY DETECTION OF MCI-AD PATIENTS WITH A NEW IMAGING SYSTEM “NEURONAL ACTIVITY TOPOGRAPHY” BASED ON EEG POWER VARIANCE ANALYSIS

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Introduction: Power fluctuations of scalp potentials are reflecting modulation of neuronal activities and local abnormal neuronal modulations are mapped on a brain surface. With the aid of a pattern matching technique various brain disorders can be discriminated with sometimes higher than 90% of sensitivity-specificity values.

Aims: Development of an inexpensive, high performance imaging system of brain functions to make very early detection of MCI and other brain disorders.

Method: Spontaneous scalp potentials are recorded with 21 electrodes for 5 min in a rest state with closed eyes. The normalized power variance (NPV) of scalp potentials are recorded at every 5 min and NPV is converted into the z-score in reference to normal controls.

Results: Positive and negative z-scores correspond to hyperactive and hypoactive neuronal abnormalities and these abnormalities are displayed on a standard brain. A pattern matching value of a set of z-scores of a patient with that of template z-scores of AD numerically defines Likelihood of AD of that patient. This technique brought about sensitivity and specificity curves crossing each other at 90% level in detecting MCI-AD patients who developed possible or probable AD after 12~18 months.
Conclusion: An internet-assisted new imaging system allows screening of MCI patients in 20-min EEG examination (15 min for preparation and 5 min for recording).