

Researchers offer insight into cognitive changes in multiple sclerosis

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(Medical Xpress)—Researchers at Trinity College Dublin in collaboration with colleagues in the Department of Neurology at St Vincent's University Hospital and University College Dublin have recently reported new insights into cognitive changes in multiple sclerosis, using newly developed signal processing methods. The findings have been recently published in the international journal PlosOne.

The multidisciplinary research involved neurologists, [biomedical engineers](#) and neuropsychologists. Their focus was on cognitive impairment which affects nearly 65% of [multiple sclerosis](#) (MS) patients and can occur in the absence of [physical disability](#). Dysfunctions in speed of information processing, attention, memory and executive functions are most typically observed in MS patients, which have an adverse impact on daily life. It is important to recognise cognitive impairment as early as possible and to monitor its course frequently. However, neuropsychological tests to assess cognitive function can only be carried infrequently and do not provide an objective measure of cognitive impairment.

The research team was led by Professor Richard Reilly, Professor of Neural Engineering at Trinity College, and Professor Niall Tubridy, Department of Neurology at St Vincent's University Hospital. They addressed cognitive impairment assessment by developing new mathematical methods to extract information from MS subjects' scalp with [electroencephalography](#) (EEG) data that allows objective measurement of cognitive function at frequent intervals and more

importantly offers new insights into the origins of this cognitive impairment in MS.

The team acquired EEG data using 128-scalp electrodes from 95 subjects ([MS patients](#) and controls subjects) while they completed a series of visual and auditory stimulus experiments. They then employed their newly developed mathematical methods to process the spatiotemporal EEG data developing a measure of cognitive function.

Professor Reilly commented that "objective, reliable EEG methods such as these developed in this study may have the potential to aid the detection and monitoring of [cognitive impairment](#) in MS, and therefore to complement clinical neuropsychological assessment."

Professor Tubridy added that "the relationship between pathological changes in the brain white and grey matter, neurophysiological and neuropsychological cognitive function is imprecisely defined in MS. This study provides new information on the impact of the cognitive impairments on the condition and will help us look for new interventions to improve the quality of life of our patients".

Professor Reilly added that "future studies will explore the neural information using new advanced data analysis methods such as approaches to model the distributed nature of EEG by incorporating activations and structural information from individual subjects' MRI image data". In addition, he said that "longitudinal studies of EEG scalp and deeper brain electrical activity spanning over several years are required to fully determine if EEG data has clinical utility in predicting the changes in cognitive function in MS".

More information: Kiiski H, Reilly RB, Lonergan R, Kelly S, O'Brien MC, et al. (2012) Only Low Frequency Event-Related EEG Activity Is Compromised in Multiple Sclerosis: Insights from an Independent

Component Clustering Analysis. *PLoS ONE* 7(9): e45536.
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