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Researchers from Klinikum Bayreuth GmbH Report Findings in Multiple Sclerosis (Frontal Brain Activity and Cognitive Processing Speed In Multiple Sclerosis: an Exploration of Eeg Neurofeedback Training)

Date: July 5, 2019
From: Health & Medicine Week
Publisher: NewsRX LLC
Document Type: Article
Length: 604 words

Full Text:

2019 JUL 5 (NewsRx) -- By a News Reporter-Staff News Editor at Health & Medicine Week -- Current study results on Autoimmune Diseases and Conditions - Multiple Sclerosis have been published. According to news reporting originating from Bayreuth, Germany, by NewsRx correspondents, research stated, "Cognitive deficits including impaired information processing speed as assessed by the Symbol Digit Modalities Test (SDMT) are common in multiple sclerosis (MS). Oscillatory markers of processing speed may be extracted from magnetoencephalographic (MEG) and electroencephalographic (EEG) resting-state recordings."

Financial supporters for this research include Sanofi-Genzyme GmbH, Germany, Klinikum Bayreuth GmbH, Germany.

Our news editors obtained a quote from the research from Klinikum Bayreuth GmbH, "In this context, an increased proportion of frontal slow-wave (theta, 4-8 Hz) to fast-wave (beta, 13-30 Hz) EEG activity was indicative of impaired SDMT performance. Such an increased theta/beta ratio may reflect oscillatory slowing associated with deficits in attention control. Therapeutic approaches that consider atypical oscillatory activity in MS remain sparse. In a cross-sectional design, we examined the relation between SDMT performance, the EEG theta/beta ratio and its components. We also explored longitudinally, whether EEG neurofeedback could be used to induce a putatively adaptive alteration in these EEG parameters, toward a pattern indicative of improved processing speed. N = 58 MS patients (RRMS/SPMS/PPMS N: 18/35/3, 2 cases excluded) participated in a neuropsychological examination and a resting-state EEG recording. Subsequently, N = 10 patients received neurofeedback training for two weeks in a hospitalized setting. The purpose was to reduce the frontal theta/beta ratio through operant conditioning. In the cross-sectional examination, patients with slow SDMT speed displayed an increased theta/beta ratio, relative to those with normal speed. This involved increased frontal theta power, whereas beta power was equal across groups. The theta/beta ratio remained stable during neurofeedback across sessions of the two-week training period. In an exploratory secondary analysis, within sessions a reduction in the theta/beta ratio during active training blocks relative pre/post session resting-states was observed, driven by reduced theta power. These findings provide support for utilizing frontal EEG theta activity as an inverse marker of processing speed in MS. Across sessions, there was no support for successful operant conditioning of the theta/ beta ratio during the two-week training period."

According to the news editors, the research concluded: "The observed state-specific shift within sessions, involving a transient reduction in theta activity, nevertheless may provide a rationale for a further investigation of neurofeedback as a treatment approach in MS."

For more information on this research see: Frontal Brain Activity and Cognitive Processing Speed In Multiple Sclerosis: an Exploration of Eeg Neurofeedback Training. *NeuroImage Clinical*, 2019;22():. *NeuroImage Clinical* can be contacted at: Elsevier Sci Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, Oxon, England.

The news editors report that additional information may be obtained by contacting P.M. Keune, Klinikum Bayreuth GmbH, Dept. of Neurology, Hohe Warte 8, D-95445 Bayreuth, Germany. Additional authors for this research include S. Hansen, T. Sander, S. Jaruszowicz, J. Keune, E. Weber, P. Oschmann, C. Kehm and M. Schonenberg.

Keywords for this news article include: Bayreuth, Germany, Europe, Autoimmune Diseases and Conditions, Autoimmune Diseases and Conditions of the Nervous System, Business, CNS Demyelinating Autoimmune Disease, Demyelinating Diseases and Conditions, Health and Medicine, Immune System Diseases and Conditions, Multiple Sclerosis, Neuroimmunology, Neurology, Klinikum Bayreuth GmbH.

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The citation for this news report is: NewsRx. Researchers from Klinikum Bayreuth GmbH Report Findings in Multiple Sclerosis (Frontal Brain Activity and Cognitive Processing Speed In Multiple Sclerosis: an Exploration of Eeg Neurofeedback Training). *Health & Medicine Week*. July 5, 2019; p 5617.

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Source Citation (MLA 8th Edition)

"Researchers from Klinikum Bayreuth GmbH Report Findings in Multiple Sclerosis (Frontal Brain Activity and Cognitive Processing Speed In Multiple Sclerosis: an Exploration of Eeg Neurofeedback Training)." *Health & Medicine Week*, 5 July 2019, p. 5617.

Gale Health and Wellness, link.gale.com/apps/doc/A591567777/HWRC?u=mlln_b_bpublic&sid=bookmark-HWRC&xid=850f389d. Accessed 1 July 2021.

Gale Document Number: GALE|A591567777