

Cerebrovascular pattern improved by ozone autohemotherapy: an entropy-based study on multiple sclerosis patients

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Abstract

Ozone major autohemotherapy is effective in reducing the symptoms of multiple sclerosis (MS) patients, but its effects on brain are still not clear. In this work, we have monitored the changes in the cerebrovascular pattern of MS patients and normal subjects during major ozone autohemotherapy by using near-infrared spectroscopy (NIRS) as functional and vascular technique. NIRS signals are analyzed using a combination of time, time–frequency analysis and nonlinear analysis of intrinsic mode function signals obtained from empirical mode decomposition technique. Our results show that there is an improvement in the cerebrovascular pattern of all subjects indicated by increasing the entropy of the NIRS signals. Hence, we can conclude that the ozone therapy increases the brain metabolism and helps to recover from the lower activity levels which is predominant in MS patients.

Keywords

Ozone autohemotherapy
Near-infrared spectroscopy
MANOVA
Multiple sclerosis
Time-frequency Entropy
Empirical mode decomposition
Cerebrovascular pattern

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