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EEG in Psychiatry: Driving reactions to intermittent photic stimulation improve the method's sensitivity and information value

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The functional test of intermittent photic stimulation (IPS) induces in the EEG photic driving - a rhythmic response (PDR) time-locked to the stimulus and its harmonics. The IPS can reveal a fuller set of the individual's potential bioelectrical oscillators of different frequencies including latent ones not present or weak in the resting state and enhanced by resonancelike driving reactions. The frequency and amplitude characteristics of PDRs, together with their topography and coherence, can provide additional information regarding the structure and spatial organization of neurophysiological processes as compared to the spontaneous EEG. In the search for latent EEG signs of the brain development alterations in functional neuropsychiatric disorders, the PDR characteristics of the children and adolescents with partial epilepsy (n=95), autism (n=16) and ADHD (n=30), aged 5 to 18 years, were compared to those of the normally developing subjects (n=120) of the same age. Eleven stimulation runs were presented at fixed frequencies of 3-24 Hz for 20-30 s each. The reduced topographic generalization of PDRs over non-visual cortical areas and the lower level of the driving coherence showed a reducing effect of the antiepileptic drug therapy and a possible delay in brain maturation in partial epilepsy. The latter was also reflected in the increased driving amplitudes at the lower IPS frequencies. In high-functioning autistic patients, the IPS at the fast alpha and beta frequencies revealed a reduction in the right hemisphere activation and in the interhemispheric connectivity together with potential hyperconnectivity in the left hemisphere. In the ADHD patients, some alterations in the PDR topography were also revealed. The results obtained were not observed in the resting spontaneous EEG. This shows that the PDR application improves the sensitivity and information value of EEG and looks very promising for neurophysiological studies and diagnostics of different psychiatric disorders which are not usually evident under traditional examination.

Biography

Vladimir V Lazarev is a Full Professor of Psychophysiology and Clinical Neurophysiology and Director of Laboratory of Neurobiology and Clinical Neurophysiology at the National Institute of Women, Children and Adolescents Health Fernandes Figueira / Oswaldo Cruz Foundation (Ministry of Health), Rio de Janeiro, Brazil (since 2002). He is a doctor of Biological sciences in Neurophysiology (National Mental Health Research Center of the Russian Academy of Medical Sciences / Moscow State University, 1991) Ph.D. in Psychophysiology (Institute of Psychology of the USSR Academy of Sciences, Moscow, 1977).

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