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Brain Signature for Emotional Burnout

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Burnout syndrome is one of the forms of chronic occupation stress. There is no single view on the nature and structure of emotional burnout. Boyko's psychological construct of Emotional Burnout (EB) defines Syndrome as a mechanism of psychological defense in the form of complete or partial excluding of emotions in response to traumatic influences and includes three key stages: Anxiety Tension, Resistance, and Exhaustion. The neurophysiological mechanisms of emotional burnout remain insufficiently studied. Establishing burnout-specific changes in brain activity is necessary to understand the phenomenon of burnout and distinguish it from other emotional mental disorders. Defining the EEG markers of burnout was our aim. 752 volunteers, first-fifth year students from the Taras Shevchenko National University of Kyiv aged 18 to 26 years participated in this study. EEG was recorded during the resting state (3 min, closed eyes condition) monopolarly using EEG 23-channel system Neurocom. To establish EEG correlates of emotional burnout during rest state we used special software written in Python 3.6 to implement Power Spectral Density calculation, the interhemispheric and intrahemispheric average coherence and Detrended Fluctuation Analysis (DFA). We analyzed separate artifact-free EEG segments in all frequency bands from 0.2 to 45 Hz. Psychological testing was performed before the registration of EEG. To determine the formation of emotional burnout Boyko's "Syndrome of emotional burnout"Inventory was used. The Exhaustion phase of emotional burnout was formed in 79 participants, and it was under development in 213 participants. In background EEG activity during the development of the Exhaustion phase of emotional burnout variations in EEG spatial synchronization were observed in low- and high-frequency EEG components and includes the formation of two separate networks of functional connections: interhemispheric prefrontal, anterior frontal, and frontal links (alpha and gamma low bands) and parietal-occipital links (alpha and gamma high bands). DFA describes the long-term temporal correlations in the cortex, which are involved in different aspects of brain functioning. We detected a high resting state DFA scaling exponent values (up to 0.90-0,95) under exhaustion development in the alpha 1 (left temporal, parietal area), alpha 2 (right frontal area), alpha3 (posterior regions). Obtained values of DFA exponent and average coherence suggest the exhaustion formation is accompanied by the changes in visual and verbal processing, emotional processes (discretion and analysis).
Keywords—Emotional burnout, Exhaustion, Detrended Fluctuation Analysis, Power Spectral Density, Functional connectivity

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