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THEORY OF GLUCOSE-DEPENDENT ALCOHOL RELATED FUNCTIONAL SYSTEM OF ERROR PROCESSING

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We have recently showed that episodic moderate intake (1-2 times/month) of alcohol in insignificant doses at 23ml of pure ethanol after a week's interval leads to increase in error commission under intensive mental activities using complex and standard psychophysiological tasks. We also noted an error commission response effect of moderate alcohol use on blood glucose concentration. The theory of glucose dependent alcohol-related functional system of error processing explains the results of our latest findings. It incorporates the Holroyd et al model (Holroyd et al. Trends in Neurosci 2003; 26 (8): 402 -404) and the fishbone model of brain glucose metabolism, in which leptin is the main regulator. The major postulates of this theory are based on the following: neuronal functions depend on the blood-brain glucose proportionality value. Lowering the blood glucose level (e.g. inadequate energy reserve) leads to loss of nervous impulses, subsequently leading to decrease neuronal functions. Under these conditions, the response-monitoring system in the basal ganglia is activated. The error processing capacity under these conditions depends on the activities of the mesencephalic dopamine system and anterior cingulate cortex, as well as the blood-brain glucose level. The major concepts of the functional system of error processing unravel basic knowledge about the effects of drugs etc on the functions of the nervous system.