Neuroimaging of reward deficiency syndrome: Chronic stress and behavioral addiction findings

Based on extensive investigations of rodent and primate models, the mesoaccumbens dopamine pathway, extending from the ventral tegmentum of the midbrain to the forebrain regions such as nucleus accumbens, is a crucial component of the brain reward and reinforcement system that purportedly mediates pleasure, contentment, and motivation. The common element of the rewarding effects of addictive chemicals relates to increases in dopamine levels in the nucleus accumbens, which is a critical event underlying the subjective pleasure or “high” (reward) that is sought by drug users. In contrast, repeated artificial dopamine enhancement in the neurophysiologic reward system by euphorogenic drugs leads to a dysfunctional hypodopaminergic state rendering it less responsive to natural reinforcers i.e., reward deficiency syndrome. Both chronic stress exposure in the form of post-traumatic stress disorder (PTSD) and the behavioral addiction, classified among “Substance-Related and Addictive Disorders” in the Diagnostic and Statistical Manual of Mental Disorders, 5th edition, namely gambling disorder (GD) are also characterized by decreased sensitivity to natural reinforcers. The purpose of this talk is to present functional magnetic resonance imaging and behavioral data, collected by our lab, demonstrating reward deficiency-type neuroadaptations in patients diagnosed with either PTSD or with GD. The author will highlight three lines of research evidence from the wheel of fortune gambling task, from visual processing of rewarding and stressful images selected from the International Affective Picture System and from the Skinner box-like computer key pressing procedure validated for measuring motivational function in humans. Testable hypotheses and further research to unravel the primary versus secondary nature of the observed deficits will be highlighted along with role of the reward-enhancing behavioral and pharmacotherapeutic interventions within the addictive- and stressor-related disorders’ treatment armamentarium.

Biography

Igor Elman, MD, is an Associate Professor of Psychiatry at Harvard Medical School. He was trained at the National Institute of Mental Health and is a Diplomate of the American Board of Psychiatry with a subspecialty certification in Addiction Psychiatry. Presently, he heads a clinical research lab, focused on the role of reward and motivational systems in pathophysiology of severe neuropsychiatric disorders, including addictions, schizophrenia and post-traumatic stress disorder. He is a recipient of NIDA K23 and R01 Awards. He serves as Editor-in-Chief of the Journal of Psychology Research and Behavioral Management.