**Motivating Change in Addiction via Modulation of the Dark Side**

**Abstract**

The constructs of emotion and motivation are intimately linked. Throughout my career, W. Horsley Gantt and Joseph V. Brady laid a rich foundation for understanding the concept of emotion, derived from two prominent traditions of physiology and psychology: classical conditioning and operant conditioning, respectively. This framework guided my fierce interest in motivation in general and the interaction between reward and stress, which began at John Hopkins University with my thesis work under the mentorship of Zoltan Annau, with help from Solomon Synder and Joseph Brady, among many others. Using the study of the neurobiology of addiction as a framework, I argue that drug addiction can be heuristically framed as a cycle of three stages—*binge/intoxication*, *withdrawal/negative affect*, and *preoccupation/anticipation* (“craving”)—that involve domains of incentive salience/pathological habits (mediated by basal ganglia circuits), reward deficits/stress surfeit (mediated by extended amygdala circuits), and executive function deficits (mediated by the frontal cortex), respectively. Movement through the three stages involves a transition from positive reinforcement that is associated with the rewarding effects of drugs of abuse to another major source of reinforcement, specifically negative reinforcement that is driven by negative emotional states (termed the “dark side” of addiction). Repeated overstimulation of the reward systems with drugs of abuse decreases reward function, characterized by a decrease in brain stimulation reward and presumbably reflecting a dysphoria-like state. The construct of negative reinforcement, defined as drug taking that alleviates a negative emotional state that is created by drug abstinence, is particularly relevant as a driving force in both the *withdrawal/negative affect* and *preoccupation/anticipation* stages of the addiction cycle.