

Objectives : Addictive disorders have been defined as a chronic intermittent brain disease which occurs frequently in the general population and in treatment settings. In early stages of the disorder, *motivational brain processes* change: memories of pleasant effects of the substance become more salient and responsiveness of reward-motivational circuitry (nucleus accumbens, ventral striatum, amygdala, hippocampus) is strengthened. In later stages of the disorder (addiction), drug taking shifts from motivational driven *impulsive behavior* to *compulsive behavior* expressed neurobiologically by increased activity of the dorsal striatum and diminished activity of the dorsolateral prefrontal cortex (DLPFC, Goldstein & Volkow, 2002). Thus, frontostriatal networks, important for self-regulation, impulsive and compulsive actions, are crucially involved in substance dependence. Addictive behaviour not involving substance use, such as pathological gambling (PG), has been associated with functional abnormalities in frontostriatal brain areas as well. Neuroimaging studies in substance dependence have found higher brain reactivity to substance related cues in motivation related brain circuitry such as the OFC, nucleus accumbens (NAc), insula, and cingulate cortex.

Compulsivity in substance dependence is exemplified by diminished cognitive flexibility, which has been reported in numerous neurocognitive studies in substance dependencies. In contrast, only a few studies have probed the neural underpinnings of compulsivity or cognitive flexibility in substance dependence. Results from an ongoing study of our lab show diminished switching in alcohol dependence, accompanied by less activity in cingulate cortex, parahippocampal gyrus, areas associated with task monitoring, and handling changes in task demands. This presentation will give an overview of recent cognitive and neuroimaging studies on impulsivity and compulsivity in substance dependence and pathological gambling, and the way these functions influence the course of addictive disorders.