Abstract:
Molecular and functional neuroimaging studies have revealed deficits in dopaminergic circuits and in top-down control mechanisms associated with stimulant abuse. Our laboratory has used a combination of imaging modalities, including PET, activation and resting-state fMRI and structural MRI, to explore the links between dopaminergic signaling and behavioral functions that can influence the course of addiction and recovery. We have shown that striatal D2-type receptor signaling is linked to behavioral and neural measures of self-control and risky decision-making in the laboratory, that stimulant users exhibit enhanced intrinsic activity of the mesocorticolimbic system in the resting state, and a negative association of mesocorticolimbic resting-state connectivity with responsivity of dorsolateral prefrontal cortex to risk during decision-making. Moreover, we have provided evidence that midbrain D2-type receptors influence the neurotoxic effects of methamphetamine, as indicated by negative associations between D2-type receptor availability and structural deficits in striatum and cortex. These studies show the utility of multi-modal neuroimaging in extending knowledge of how psychostimulants produce profound effects on adaptive behavior.