

Research Interest:

- Neuropeptide Regulation and Function in Nigrostriatal and mesolimbic pathways

Our current research is focused on clarifying the cellular and molecular mechanisms by which some neuropeptides mediate long-term adaptations to offset the damaging impact resulting from chronic exposure to psychostimulant drugs such as cocaine and amphetamines. Clarification of these mechanisms is of central importance in understanding how the central nervous system adapts and recovers during adult life. Because cocaine and amphetamines increase the concentration of extracellular dopamine at synapses of the central nervous system, the research in my laboratory centers around the neurotransmitter dopamine and its effects on neuropeptides that in turn feedback and modulate the cascade of reactions restoring homeostasis and neuroadaptability in the neostriatum of the rodent brain. We study the mechanism by which neuropeptides restore homeostasis in the neostriatum after exposure to psychostimulants at behavioral, neurochemical, and molecular levels. In addition, histological methods are used to study the damaging effects of the psychostimulant methamphetamine and to demonstrate that some neuropeptides protect neurons from the damaging impact of this commonly abused drug. We utilize both Sprague-Dawley rats and mice as model systems, the latter species affords the construction of gene knockouts and transgenes in order to validate hypotheses. The strongest point of our research is that we apply various techniques to elucidate one central question, namely, the involvement of neuropeptides during exposure and recovery from addictive drugs.