

Biology and Pathology

Central Nervous System

Imaging of Neurochemical Genetics and Behavior in Animal Models with PET and MRI

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Learning Objectives:

- To gain an understanding of how imaging modalities can be used to study neurodevelopment in the nonhuman primate model.
- To gain an understanding of using pre-clinical animal models to study the relationship between behavioral endophenotypes and neurochemical function.
- To gain an understanding of the potential of using imaging genetics to study gene x environment interactions using animal models.

The nonhuman primate serves as an excellent model for studying neurodevelopment and how it relates to psychopathology. As an animal model, they live well in captivity and are very responsive to moderate perturbations such as prenatal stressors. Although they are responsive to these perturbations, they produce viable offspring that are available for longitudinal studies. And importantly, it is possible to have greater control over their rearing environment (as compared to humans), making them the most suitable animal model for studying the development of psychopathology. PET and MRI have demonstrated their utility as powerful tools for studying the development of neurochemical systems in the brain. This lecture will discuss the characterization of PET and MRI methods for studying neurochemical function with applications to disease specific rhesus models related to neurodevelopment.

Relevant Publications:

1. Oler J, Fox A, Shelton S, Christian B, Murali D, Oakes TR, Davidson RJ, Kalin N. Serotonin Transporter Availability in the Amygdala and Bed Nucleus of the Stria Terminalis Predicts Anxious Temperament and Brain Glucose Metabolic Activity. *J Neuroscience* 29(32):9961-9966, 2009. PMID: PMC2756094
2. Christian BT, Wooten DW, Hillmer AT, Tudorascu DL, Converse AK, Moore CF, Ahlers EO, Barnhart TE, Kalin NH, Barr CS, Schneider ML. Serotonin Transporter Genotype Affects Serotonin 5-HT_{1A} Binding in Primates. *Journal of Neuroscience*, 2012. NIHMSID: NIHMS 442926.
3. Converse AK, Moore CF, Moirano JM, Ahlers EO, Larson JA, Engle JW, Barnhart TE, Murali D, Christian BT, DeJesus OT, Holden JE, Nickles RJ, Schneider ML. Prenatal Stress Induces Increased Striatal Dopamine Transporter Binding in Adult Nonhuman Primates," *Biological Psychiatry*, in press, 2013. <http://dx.doi.org/10.1016/j.biopsych.2013.04.023>

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