The Johnson Laboratory

Measuring Neurotransmitter Release and Uptake in Huntington's disease and Fragile X Syndrome

Our laboratory employs a wide array of techniques to study the chemical mechanisms of neurological disorders. These techniques include fluorescence microscopy, biochemical methods, and electrochemical techniques in which biogenic molecules are monitored on milli-second time scales.

Huntington's disease. Huntington's disease (HD) is a neurodegenerative disorder characterized by uncontrollable muscle movements and mental illness. HD patients typically die 15 to 20 years following symptom onset. To understand the contributions of abnormal neurotransmitter release in the debilitating motor symptoms of HD, electrochemical techniques will be applied to transgenic rodent models of HD. Additionally, microscopy techniques will be applied to study tissue sections in these animal models to yield clues regarding mechanisms of altered signaling.

Fragile X syndrome. Fragile X syndrome (FXS) is a developmental disorder caused by an expansion in the number of CGG repeats on the gene encoding the fragile X mental retardation protein (FMRP). Our laboratory has recently discovered that dopamine release and uptake are impaired in the fmr1 knockout genetic mouse model of FXS. We are conducting microscopy and electrochemical experiments to characterize the nature of these impairments.

Selected References:

Johnson, M. A., Rajan, V., Miller, C. E., and Wightman, R. M. "Dopamine Release is Severely Compromised in the R6/2 Mouse Model of Huntington's Disease," J. Neurochem., 2006, 97, 737-746.

Johnson, M. A., Villanueva, M., Haynes, C. L., Seipel, A. T., Buhler, L. A., and Wightman, R. M. "Catecholamine exocytosis is diminished in the R6/2 mouse model of Huntington's disease," J. Neurosci. (submitted)

Divis, J. L., **Hartnett, B. E.**, and Johnson, M. A. "Evidence of impaired dopamine release and uptake in the *fmr*1 knockout mouse model of fragile X syndrome," (in preparation)