Department of Molecular and Cellular Biology
Graduate Seminar MCB*6500
Friday, June 7, 2019 in SSC 1511 @ 12 noon

presented by:

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"Elucidating the neural correlates underlying the therapeutic effects of deep brain stimulation in Parkinson’s disease"

Despite the success of deep brain stimulation (DBS) as a treatment for Parkinson’s disease (PD) symptoms, the lack of accessibility to DBS for the majority of PD patients is a significant concern. Thus, there is a need for the development of novel, effective, and accessible therapies based on the DBS mechanism of action. Understanding the systems effects of DBS with greater neuroanatomical and cellular resolution is key to identifying small molecules, or biologics, that can mimic these effects. We hypothesize that this type of resolution can be achieved by utilizing system-wide adeno-associated virus-mediated Tet-Tagging to selectively “tag” the connectome activated by subthalamic DBS followed by neuroanatomical and functional analysis of tagged networks. Therefore, using the 6-OHDA rat model system of PD the present proposal aims to 1) Tag the neural circuitry activated by DBS and confirm the therapeutic relevance of the connectome via re-activation of the circuit (in the absence of DBS) with functional connectivity assessments, 2) Visualize the connectome in 3D using iDISCO. The results of this study will provide insight into the functional and neuroanatomical mechanisms of DBS as well as elucidating the affected neural circuitry. In a follow-up study we aim to determine the effects of DBS on gene expression in the connectome using single cell transcriptomics. Together, these results will help establish the DBS mechanism of action thereby providing insights towards the development of novel pharmaceuticals for treating the symptoms of PD.