QUANTITATIVE & SYSTEMS BIOLOGY SEMINAR: Integrative Modeling of Human Brain Development and Neurodevelopment Disorders

Bennet Novitch

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Date:
11/19/2021

Time:
2:30 PM-3:45 PM

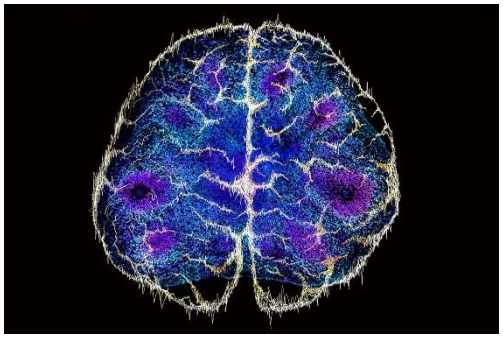
Location:
COB2 140

About The Speaker:

Dr. Novitch earned his Ph.D. from Harvard University and completed postdoctoral training in Developmental Neuroscience at Columbia University before joining the faculty of the University of Michigan and then UCLA. He is currently a Professor and the Ethel Scheibel Chair in Neuroscience in the Department of Neurobiology at the UCLA David Geffen School of Medicine, and a member of the leadership teams of the Broad Center for Regenerative Medicine and Stem Cell Research and the Intellectual and Developmental Disabilities Research Center.

Dr. Novitch's research seeks to determine the molecular pathways that direct the differentiation of neural stem cells, and assembly of neural circuits. Using a variety of approaches including organoid technologies, he and his team are investigating the underlying causes of neurodevelopmental and neurological disorders.

Abstract:



The remarkable information processing capacity of the human brain is thought to derive from its enormous mass, cellular density, and structural complexity. Defects in brain growth and organization result in a host of neurodevelopmental disorders, neuropsychiatric diseases, and intellectual disabilities.

A key step towards understanding the normal and abnormal functions of the brain thus lies in defining the mechanisms that control brain growth and neural circuit activities. Experimentally studying human brain development is inherently challenging. However, recent studies have demonstrated that some aspects of brain growth can be modeled through the directed differentiation of human pluripotent stem cells into 3-dimensional structures commonly referred to as organoids. While significant progress has been made, many challenges remain including consistency and reproducibility in organoid production and formal demonstrations of the extent to which brain organoids accurately recapitulate human development and disease in vivo. In my presentation, I will describe our work developing reliable organoid platforms, illustrate the similarities the developing human brain in vivo, and discuss our ongoing efforts to model neurodevelopmental disorders such as microcephaly, autism spectrum disorders, and epilepsy.

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