Neuroscience MTA Rotation Projects: FALL 2020

Towfique Raj, PhD - https://rajlab.org/

Project: Investigate the cellular phase of Alzheimer's disease using single-cell and spatial transcriptomics. This project is part of larger initiative in the lab to use single cell RNAseq (scRNASeq) and proteomics (CITE-seq and cyTOF) to untangle the cellular response to inflammatory stimuli in Alzheimer's disease. Mostly computational but some wet lab opportunities to generate single cell data from primary microglia of autopsied brain tissues on 10x Chromium.

Schahram Akbarian, MD, PhD - http://labs.neuroscience.mssm.edu/akbarian-lab/

Project: Single molecule chromatin fiber sequencing in the nervous system in the context of psychiatric disease.

Abha Rajbhandari, PhD - https://www.rajbhandarilabsinai.org/

The Rajbhandari lab is investigating the interactions of the brain (key brainstem and forebrain structures), vagus nerve and body (heart and lung) in regulation of fear, stress, metabolic and cardiorespiratory functions utilizing novel tools and techniques in neuroscience including rodent behavior, chemogenetics, optogenetics and telemetry monitoring.

Hirofumi Morishita, MD, PhD - https://labs.icahn.mssm.edu/morishitalab/

Project: Circuit mechanism of prefrontal cognitive control behavior and their maturation using mouse models relevant to neurodevelopmental and psychiatric disorders.

Stephanie Tankou, MD, PhD - https://labs.icahn.mssm.edu/tankoulab/

Project: to elucidate the mechanism by which gut proteases regulate neuroinflammation in a mouse model of Multiple Sclerosis.

Alison Goate, D.Phil - http://labs.neuroscience.mssm.edu/project/goate-lab/

Project (computational): Analysis of transcriptomic and epigenomic data in models of Alzheimer's disease risk

Project (wet-lab): Characterization of iPSC-derived microglial function in the setting of Alzheimer's disease risk/protection.

Daniela Schiller, PhD - http://labs.neuroscience.mssm.edu/project/schiller-lab/

The Schiller Lab for Affective Neuroscience - the rotation project will involve examining the neural mechanisms of emotion and social processes in human participants.

Anne Schaefer, MD, PhD - http://labs.neuroscience.mssm.edu/project/schaefer-lab/

The lab is interested in the role of neuron-microglia interaction in control of complex behaviors with a focus on neurodegenerative and psychiatric diseases.

Projects for rotation:
Microglia as key regulators of neuronal activity and complex behaviors Identification of neuroprotective microglia
Epigenetic mechanisms of neuronal longevity

Xiaosi Gu, PhD - https://labs.icahn.mssm.edu/gulab/

Project: Computational modeling of value-based decision making in social and non-social contexts.

Dolores Hambardzumyan, PhD - https://labs.icahn.mssm.edu/hambardzumyanlab/

Project: To interrogate the mechanism of myeloid cell-derived immunotherapy resistance in brain tumors

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Magdalena Janecka, PhD - https://labs.icahn.mssm.edu/janeckalab/

Project: To investigate association between maternal lab results in pregnancy and birth outcomes (e.g. pre-term birth, Apgar scores, etc).

Zhenyu Yu, PhD - https://labs.icahn.mssm.edu/yuelab/

Project: To investigate the role of autophagy-lysosome pathways in controlling metabolic fitness in glial cells, and when disrupted, how they contribute to Alzheimer's or Parkinson's disease by using genetic animal models.

Charles Mobbs, PhD - http://labs.neuroscience.mssm.edu/project/mobbs-lab/

The Mobbs lab has discovered a class of compounds that show great promise in treating Alzheimer’s disease, stroke, and probably other neurodegenerative diseases, and projects are available to examine mechanisms mediating these effects, as well as develop better compounds with even more protective effects.

The Seaver Autism Center (multiple Investigators) - https://icahn.mssm.edu/research/seaver/research

The Seaver Center, directed by Joseph Buxbaum, has four research arms: 1) a gene discovery group that uses large whole exome and whole genome samples to identify genes for pediatric-onset psychiatric disorders; 2) a functional group that uses stem cells and animal models to understand the role of major effect genes in autism; 3) a epidemiology group that makes use of national registries to understand risk architecture of pediatric-onset psychiatric disorders and collects DNA within this framework; and, 4) a clinical research group that studies both idiopathic autism and autism associated with several genes of major effects. For some autism genes, we have studies at all levels (discovery, functional dissection in vitro and in vivo, and patient-based studies), and all of our studies generate and/or make use of big data, so there are also opportunities for computational studies. See: http://www.seaverautismcenter.org

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Roger Clem, PhD - http://labs.neuroscience.mssm.edu/project/clem-lab/

Rotation projects available to study prefrontal cortex cell populations that mediate encoding of positive and negative experiences.

Timothy Blenkinsop, PhD - https://labs.icahn.mssm.edu/blenkinsoplab/

Project: Studying the role of inflammation on retina regeneration

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Joe Castellano, PhD - https://www.castellanolab.org/

Our lab is primarily focused on characterizing communication between the periphery and the brain in the context of aging and neurodegeneration. **(1)** A key direction in the lab deals with understanding the role of major genetic risk factors for Alzheimer's disease and the extent to which peripheral immune function modulates the activity and function of microglia within susceptible brain regions. **(2)** Another large aim of our lab is to characterize specific proteins in the blood that act on CNS circuits to modulate aging and neurodegenerative phenotypes, including Alzheimer's disease pathologies. We use a variety of tools from cell culture to in vivo behavioral studies, and we are increasingly relying on computational tools to gain deeper insight into these questions. Please contact joseph.castellano@mssm.edu for more details for a rotation. http://labs.neuroscience.mssm.edu/project/castellano-lab/

Nik Robakis, PhD - http://labs.neuroscience.mssm.edu/robakis-lab/

The laboratory for Molecular Biology and Genetics of Neurodegeneration, currently concentrates on cell reprograming and its applications in neurodegenerative disorders. Specifically we directly reprogram fibroblasts isolated from Alzheimer's disease (AD) and control patients to neurons. The goal is to detect neuron-associated molecular differences between neurons derived from AD and control donors. Reprogrammed neurons are also subjected to toxic insults to test for toxicity-associated differences. A second project isolates exosomes from reprogrammed neurons and asks for molecular differences between AD and control exosomes. Transgenic mouse models are also used to study mechanisms involved in increased vulnerability to excitotoxicity and Ischemia of neurons expressing familial AD mutants compared to controls.

Venetia Zachariou, PhD - http://labs.neuroscience.mssm.edu/project/zachariou-lab/

The Zachariou lab focuses on the study of epigenetic and signal transduction mechanisms underlying chronic pain and comorbidities (addition, depression). We use genetically modified mice, behavioral, biochemical and genomic assays to understand the mechanisms underlying the transition from acute to chronic pain and the maintenance of sensory and affective pain symptoms. Rotation projects in the lab

involve the use of RNA Scope, western blot analysis and chromatin immunoprecipitation assays to test if prolonged neuropathic pain states affect the expression of transcription factors that facilitate synaptic reorganization and recovery from sensory hypersensitivity.

Ian Maze, PhD - http://labs.neuroscience.mssm.edu/project/maze-lab/

Project: in vivo explorations of histone monoaminylation dynamics and their contributions to neurodevelopment, neural plasticity and disease"

Deanna L Benson, PhD: http://labs.neuroscience.mssm.edu/project/benson-lab/

Project: to examine composition, development and targeted manipulation of synapse structure

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Zhuhao Wu, PhD: https://labs.icahn.mssm.edu/zhuhaowu-lab/

The Wu lab combines novel imaging approaches with genetics to study neural system structures in the whole organism level. A rotation project is: "Whole brain imaging with single cell resolution for atlasing brain plasticity and behavior capacity"