Morishita Lab of Perceptual & Cognitive Development

The primary goal of the Morishita Lab at the Icahn School of Medicine at Mount Sinai is to identify the cortical circuit mechanisms to establish perception and cognition relevant to neuropsychiatric disorders. The laboratory uses an integrated approach to combine molecular, imagining, anatomical, electrophysiological and behavior methodologies by using mouse models.

Our unique strategy is to use visual system, a premier model of critical period for cortical plasticity, to discover novel circuit mechanisms, and then apply these mechanisms as tools to dissect more complicated critical periods for cognitive behaviors such as attention and social cognition. We practice a “circuit first approach” by capitalizing on technologies to establish a causal contribution of circuit activity to behavior by implementing an intersectional viral strategy to combinatorially monitor and manipulate neural activity within specific circuits of mice during naturalistic freely moving behavior. Our approach circumvents the difficulties in interpretations associated with the lesion or pharmacological studies.

We are fortunate to collaborate with multiple laboratories within the Icahn School of Medicine to incorporate advanced techniques. These techniques include but not limited to longitudinal in vivo imaging using two photon microscopy (with Ellis-Davies Lab), patch-clamp recordings (with Clem Lab) fiber photometry imaging (with Russo Lab), Miniscope imaging (with Cai Lab), Shuman Lab), in vivo electrophysiology from behaving rodent (with Shapiro Lab). Our hope is by applying these circuit-specific approaches in behaving mice will make it possible to identify a circuit mechanism of cognitive behavior.