The Hilda and Preston Davis Foundation Awards Program
for Eating Disorders Research: Senior Postdoctoral Fellows
2019Award Recipients

Postdoctoral Fellow
Beth Israel Deaconess Medical Ce
Mentor: Mark Andermann, Ph.D.

Neural circuits mediating hunger-dep
nervosa

Restrictive-type anorexia nervosa (AN) causes anguish in patients and families, and can often be fatal. Treatments remain inadequate, in part because we lack a good understanding of the underlying neural circuits and their pathology. The basal amygdala (BA) and insular cortex (InsCtx) are consistently implicated in AN by lesion and neuroimaging studies. For example, AN patients show enhanced InsCtx responses to aversive cues, and blunted responses to food cues. Our lab recently discovered an important pathway from AgRP neurons to InsCtx via paraventricular thalamus (PVT) and BA – two areas involved in assessing hunger-dependent salience of learned cues. PVT neurons projecting to BA (PVTBA) have been implicated in cued fear retrieval. I will directly test the hypotheses that hypothalamic hunger-promoting AgRP neurons suppress cued fear retrieval via inhibition of PVTBA projection neurons. Thus, the state of food restriction may shift from being net-negative to net-positive under conditions of heightened anxiety, as in many patients that subsequently develop AN. To investigate whether these circuits contribute to the etiology of AN, I will use two photon calcium imaging to track PVTBA axons of behaving mice. I will test whether PVTBA responses to aversive cues increase following satiation or inhibition of AgRPPVT axons, and whether these responses are suppressed by activation of AgRPPVT axons in sated mice (Aim 1). I will then develop a novel mouse model of AN in which mice in a stressful context can voluntarily increase or decrease activity of AgRPPVT axons in a simple virtual reality environment. In this way, I will test the hypothesis that healthy mice avoid stimulation of AgRPPVT axons, while anxious, food-restricted mice learn to take specific actions that lead to increased activity in AgRPPVT axons. Together, these experiments provide novel approaches to understanding the neural circuits underlying learned behaviors that promote sustained food restriction in AN.