

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

Postdoctoral Fellow  
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Neural circuits mediating hunger and  
anorexia nervosa

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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 the independent 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 behavior. I will test whether PVTBA responses to aversive cues increase following satiation or inhibition of AgRP PVT axons, and whether these responses are suppressed by activation of AgRP PVT 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 AgRP PVT axons in a simple virtual reality environment. In this way, I will test the hypothesis that healthy mice avoid stimulation of AgRP PVT axons, while anxious mice learn to take specific actions that lead to increased activity in AgRP PVT axons. Together, these experiments provide novel approaches to understanding the neural circuits underlying learned behaviors that promote sustained food restriction in AN.

