Abstract

Becoming a mother is a developmental milestone in many mammalian species, leading to life-long transformations in female physiology. The postpartum period is characterized by profound changes in key physiological processes which are necessary to maintain lactation and infant care. This is paralleled by heightened neural and behavioral responses to novel sensory cues from the offspring. However, we know surprisingly little about the neural circuit elements in the female brain supporting the emergence and maintenance of such sex- and reproductive state-specific processes. The goal of this project is to gain mechanistic understanding about how the female reproductive cycle affects astrocytic control of the postpartum brain and dissect the functional consequences for endocrine, neural, and behavior responses in mice. We investigated (1) how reproductive state affect astrocytic gating of synaptic inputs relaying sensory cues from the infant to the hypothalamus, and (2) how reproductive state-dependent changes in astrocytes during the postpartum period regulate endocrine responses of oxytocin neurons and behaviors towards infants. We studied this on a synaptic, circuit, and behavior level combining multiple state-of-the-art approaches, including in vivo fiber photometry in freely moving animals, circuit dissection using optogenetics, viral tools, and behavior tracking.