Functional diversity of inhibitory amygdala microcircuits

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Neural circuits undergo experience-dependent plasticity to form long-lasting memories. Excitatory projection neurons are considered to be the primary neuronal substrate for memory acquisition and storage. Inhibitory interneurons control the activity of projection neurons in a in a spatially and temporally precise manner, yet their contribution to memory acquisition, storage and expression remains poorly understood. Here, we employ a miniature microscope imaging approach to monitor the activity of large amygdala interneuron populations in freely moving mice during aversive learning and extinction at the single cell level. We find that amygdala interneurons display mixed-selectivity and show complex plastic responses at both the ensemble and single neuron level across the acquisition, expression and extinction of aversive memories. Overall, our work identifies complex neuronal plasticity within amygdala interneuron ensembles that goes beyond a passive processing function, suggesting a critical role of inhibitory microcircuit elements for memory selectivity and stability.