

## Optogenetic examination of effects of stress on the orbitofrontal-amygdala synaptic transmission

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The orbitofrontal cortex (OFC) has important roles for processing of negative emotion and has recently been highlighted as a critical region in stress-related psychiatric disorders such as depression. However, mechanisms how stress affect OFC circuit and induce psychiatric symptoms were less understood. OFC sends dense projection to the amygdala, which is one of the key nodes for generation of negative emotion. Taken together, there is a possibility that stress affects the information processing in the OFC-amygdala pathway, and it underlies stress-induced emotional alteration. To address this possibility, we isolated the synaptic transmission from OFC to the basolateral nucleus of the amygdala (BLA) using optogenetic and whole-cell patch-clamp methods in mice, and examined the effect of repeated stress on the OFC-BLA synapse. Interestingly, repeated tail-shock stress induced postsynaptic plasticity as shown by increase of AMPA/NMDA currents ratio and inward rectification in OFC-BLA synapse. Furthermore, Optogenetic activation and chemogenetic inactivation of the OFC-BLA transmission during the tail-suspension test increased and decreased stress-related behavior in mice, respectively. Our findings suggested that synaptic changes in the OFC-BLA pathway were one of the neural bases in stress-induced behavioral alterations.