



# Prefrontal Cortex Role in Stress Processing and Regulation

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## Opinion

Regulation and processing of the stress are the important roles of the prefrontal cortex. During exposing to stress, various regions of the prefrontal cortex will be activated like lateral and ventromedial prefrontal cortex and medial orbitofrontal cortex. Amygdala responds to the stress as a natural mechanism but long-term stimulation of the amygdala leads to its dysfunction and consequently prefrontal cortex dysfunction. Due to the inverse relationship between prefrontal cortex and amygdala, increasing in the activity of the prefrontal cortex leads to reduced activity of the amygdala. Hypothalamic-pituitary-adrenal axis would be modulated by the ventromedial prefrontal cortex in stress. During negative emotions regulation, the amygdalar activity and cortisol response would be decreased and the ventromedial prefrontal cortex activity would be increased. The role of ventromedial prefrontal cortex and amygdala connection is important for fear extinction after exposing to the stress. There would be a close relationship between amygdala and prefrontal cortex and sustained the overactivity of the amygdala would influence the regulatory function of the prefrontal region in an adverse direction.

During stress exposure, the prefrontal functions would be impaired either. Also, early life traumatic stress would cause various abnormalities in different brain regions like dorsomedial prefrontal cortex and decreased in density of the serotonin 1A receptor and cause the risks for stress-related pathologies to be increased. In stress-induced prefrontal cortex dysfunction, the hyperdopaminergic mechanisms would play a role because in animal studies, advanced treatment with haloperidol could recover the prefrontal cortex cognitive function after stress exposure. Human studies show that chronic psychosocial stress can impair the regulatory control of the prefrontal cortex. During stress, striatum and amygdala would dominate the behaviour with habitual and maladaptive patterns and in these situations the regulatory function of the prefrontal cortex would be weakened. Under chronic stress, the lim-

bic-striatal circuit stimulation in a continuous manner, would cause the impairment in the regulatory function of the prefrontal cortex. This will cause the disinhibition in the activity of the striatum and amygdala which leads to more severe emotional distress.

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