Role of Serotonin in the Central Nucleus of the Amygdala and Lateral Septum

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Serotonin, a monoamine neurotransmitter believed to be implicated in depression, is secreted at various sites throughout the brain, including the terminal ends of neurons in the amygdala and lateral septum. This secretion is regulated by an auto-receptor, 5HT-2A, functioning through a negative feedback mechanism in the dorsal raphe nucleus, located near the midline of the brain. Although biogenic amines act in a generally inhibitory manner toward postsynaptic neurons, serotonin has not been shown to definitively act in this way; the possibility of excitatory behavior in postsynaptic neurons exists.

In the current study, stereotaxic brain surgery in a rat model will be used to infuse 1 μL of a 5HT-2A agonist, 8-OH-DPAT, or antagonist, Way 100635, into the dorsal raphe nucleus. As serotonin levels increase or decrease, electrical activity in the central nucleus of the amygdala and lateral septum will be observed using single-cell recording via an electrode implanted into the desired brain structure. 8-OH-DPAT is expected to decrease levels of serotonin, whereas Way 100635 is expected to increase its production. The rate of firing in the amygdala and lateral septum – whether it increases or decreases upon treatment with each drug – will be used to determine if serotonin is acting as an excitatory or inhibitory neurotransmitter at each structure, further elucidating its role in this circuit.