TEXAS TECH UNIVERSITY

Dissertation Defense

Role of amygdala neurons in the modulation of pain with particular focus on CRF neurons

Presented by:

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ABSTRACT: Pain is a clinically relevant healthcare issue that affects millions of people worldwide. Only limited therapeutic options are available, and they are frequently associated with severe side effects, resulting in a desperate need for new and effective analgesic strategies

The mutual interactions of multiple components such as sensory, cognitive and emotional-affective, form the highly complex and unpleasant experience of pain. The amygdala, a limbic brain region, plays a key role in emotional behaviors and in (negative) aversive-affective aspects of pain and pain modulation. Abnormally increased amygdala output activity correlates with pain states. Therefore, reducing uncontrolled amygdala activity is a desirable strategy to mitigate pain.

The corticotropin releasing factor (CRF) system in the amygdala has been linked to pain behaviors and pain-related amygdala plasticity, but little is known about the role of amygdala CRF neurons in pain. A major type of amygdala output neurons, CRF neurons in the central nucleus of the amygdala (CeA) project to various other brain regions to regulate behaviors. One way to modulate neuronal activity selectively is optogenetics, which is based on the expression of excitatory or inhibitory light sensitive molecules in specific cell types and their activation by light of appropriate wavelengths. Optogenetic modulation of amygdala neurons and mGluR3 throughout the nervous system, and they have been group II mGluRs have been linked to pain m acting group II mGluR activators are not yet kn The results of this research project showed that opt affective pain-like behaviors and spinal noc optogenetic mGluR2 subtype inhibited emotional respo pain model, mGluR2 also inhibited sensory pain behaviors and mGluR3 also anxiety-like behaviors. This work identif CRF neurons as an important target for optogenetic and pharmacological interventions to mitigate pain.

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