FEAR-POTENTIATED STARTLE AS A MODEL SYSTEM FOR ANALYZING LEARNING AND MEMORY

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Research during this funding period has focused on the role of a particular brain area, the amygdala, in fear conditioning, using increased acoustic startle amplitude in the presence of a stimulus previously paired with shock as a measure of fear in rats. We have found that a) electrical stimulation of the amygdala increases startle; b) mechanical or chemical lesions of the amygdala prevent either footshock or stimuli paired with footshock from elevating startle; c) there is a direct anatomical connection between the central nucleus of the amygdala and a specific point along the acoustic startle pathway; d) lesions at several levels of this connection between the amygdala and the startle circuit block both conditioned and unconditioned fear; e) local infusion of specific receptor antagonists (N-methyl-D-aspartate receptors) into the amygdala prevent the development of fear conditioning and f) presentation of a conditioned fear stimulus activates early expression genes (c-fos) in the amygdala. The data strongly implicate the amygdala as a critical brain structure for both the acquisition and expression of conditioned and unconditioned fear. Drugs that reduce anxiety in humans may act by interacting with specific receptors in the amygdala.
Final Technical Report

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AFOSR-87-0336

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Publications:


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