Stress. 2009 Sep;12(5):445-50. doi: 10.1080/10253890802510302.

Medial prefrontal cortical activation modulates the impact of controllable and uncontrollable stressor exposure on a social exploration test of anxiety in the rat.

Christianson JP, Thompson BM, Watkins LR, Maier SF.

Source

Department of Psychology and Center for Neuroscience, University of Colorado, Boulder, CO 80309, USA. john.christianson@colorado.edu

Abstract

The presence of behavioral control over a stressor can blunt many of the effects of the stressor. We have recently reported that uncontrollable stress (inescapable electric tailshock, IS) reduces later social exploration of a juvenile whereas controllable stress (escapable shock, ES) does not. Activation of the ventral medial prefrontal cortex (vmPFC) is crucial to blunting the effects of IS on later escape behavior (learned helplessness). The goal of the current study was to test the role of the vmPFC in modulating the effects of stressor controllability on anxiety in the social exploration test. Thus, adult male rats were implanted with cannula guides for drug microinjection into the vmPFC. In Experiment 1, temporary inactivation of the vmPFC with the GABA(A) agonist muscimol before exposure to ES prevented the protective effects of stress control, leading to reduced social exploration. In Experiment 2, excitation of the vmPFC prior to IS with the GABA-activated Cl((-)) channel antagonist picrotoxin mimicked the stress resistance produced by control and prevented IS-induced reduction in social exploration. These results are consistent with prior work and identify the vmPFC as a critical component of the neural circuitry mediating the effects of stressor control on later behaviors. The relationship between the vmPFC, dorsal raphé nucleus, and other structures mediating stress-induced anxiety are discussed.

PMID:
19051125
[PubMed - indexed for MEDLINE]
PMCID:
PMC2787917
Free PMC Article