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Title: Neurobiological mechanisms conferring a resilient or vulnerable phenotype in response to stress in an animal model of PTSD
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Background: Post-traumatic stress disorder (PTSD) is an incapacitating, chronic syndrome reflecting a disorder of cognitive, emotional, and physiological processing of and/or recovery from exposure to a potentially traumatic experience (PTE). Understanding mechanisms that contribute to the generation of individual differences in vulnerability to stress-related psychopathology is of critical importance.

Research Hypothesis: Our general hypothesis is that stress-induced impairment in behavioral responses (modeling the avoidant and hyperarousal PTSD symptom clusters) is mediated by alterations in the interplay between the mPFC, the amygdala, and the hippocampus and/or in the expression of brain plasticity genes.

Aims: To determine which brain regions modulate stress-related responses:

Methods: We used a lesion approach targeting the BLA, CeA or hippocampus. Animals were exposed to PSS for 15 min and seven days later were evaluated in behavioral tests.

Results: The prevalence of extreme behavioral responses among the PSS-exposed animals with hippocampus damage was significantly lower than for exposed-vehicle treatment (0% vs. 30% of the total population - respectively), and did not differ significantly from the unexposed control animals, in which there were no EBR individuals.

Discussion: Inactivation of the hippocampus and exposure to a psychogenic stressor effectively reduced PTSD-like behavioral disruption and trauma cue response 8 days later. In contrast, inactivation of the amygdaloid nucleus and exposure to a psychogenic stressor effectively increased PTSD-like behavioral disruption and trauma cue response 8 days later. In addition, hippocampal lesions enhance corticosterone stress response and prolong corticosterone release following PSS exposure. In contrast with the hippocampus, the amygdala appears to activate the HPA axis.

Conclusions: Results of the present work add to the evidence that hippocampus and amygdala have a modulating influence upon the pituitary-adrenal axis, and suggest separate roles for these 2 components of the limbic system.

Key words: Posttraumatic Stress Disorder, Animal Model, Cutoff Behavioral Criteria, HPA-axis, Corticosterone
Publications associated with the project:


