

The sensory insular cortex mediates the stress-buffering effects of safety signals but not behavioral control.

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Source

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Abstract

Safety signals are learned cues that predict stress-free periods whereas behavioral control is the ability to modify a stressor by behavioral actions. Both serve to attenuate the effects of stressors such as uncontrollable shocks. Internal and external cues produced by a controlling behavior are followed by a stressor-free interval, and so it is possible that safety learning is fundamental to the effect of control. If this is the case then behavioral control and safety should recruit the same neural machinery. Interestingly, safety signals that prevented a behavioral outcome of stressor exposure that is also blocked by control (reduced social exploration) failed to inhibit activity in the dorsal raphe nucleus or use the ventromedial prefrontal cortex, the mechanisms by which behavioral control operates. However, bilateral lesions to a region of posterior insular cortex, termed the "sensory insula," prevented the effect of safety but not of behavioral control, providing a double-dissociation. These results indicate that stressor-modulators can recruit distinct neural circuitry and imply a critical role of the sensory insula in safety learning.

PMID:

19074043

[PubMed - indexed for MEDLINE]

PMCID:

PMC2667691 [Free PMC Article](#)