

The role of the limbic-ventral striatal circuitry in responding to stimuli with conflicting meanings

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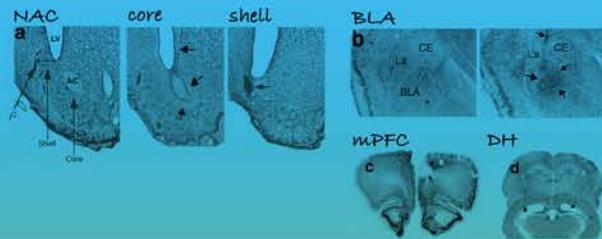
introduction

The nucleus accumbens (NAC) has been implicated in integrating limbic and cortical inputs for response selection in ambiguous situations. In the latent inhibition (LI) procedure CS-alone presentations are followed by CS-US pairings so that the CS subsequently signals conflicting associations. LI is manifested by the interference of the CS-alone association with the acquisition of behavioral control by the CS-US association. We investigated the roles of several brain structures (NAC shell and core, dorsal hippocampus [DH], basolateral amygdala [BLA], and medial prefrontal cortex [mPFC]) in LI, as well as in the disruption of this phenomenon via two behavioral manipulations.

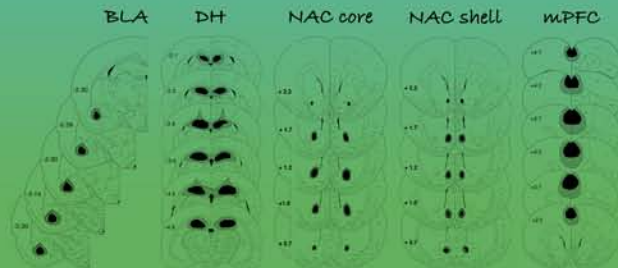
method

Rats with sham or excitotoxic lesions to each of these structures were trained in two aversively motivated tasks following either pre-exposure or no-exposure to the CS. In one task (conditioned emotional response), the number of conditioning trials was manipulated to produce or abolish LI (low or high number of trials, respectively). In the second task (active avoidance), the context was manipulated to produce or abolish LI (same or different context in preexposure and conditioning, respectively).

photomicrographs of representative lesions



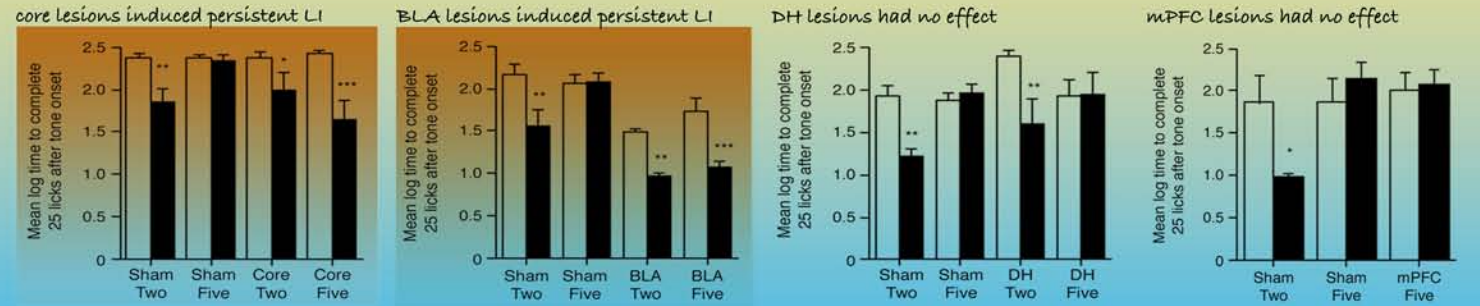
reconstructions of the maximal and minimal regions of damage



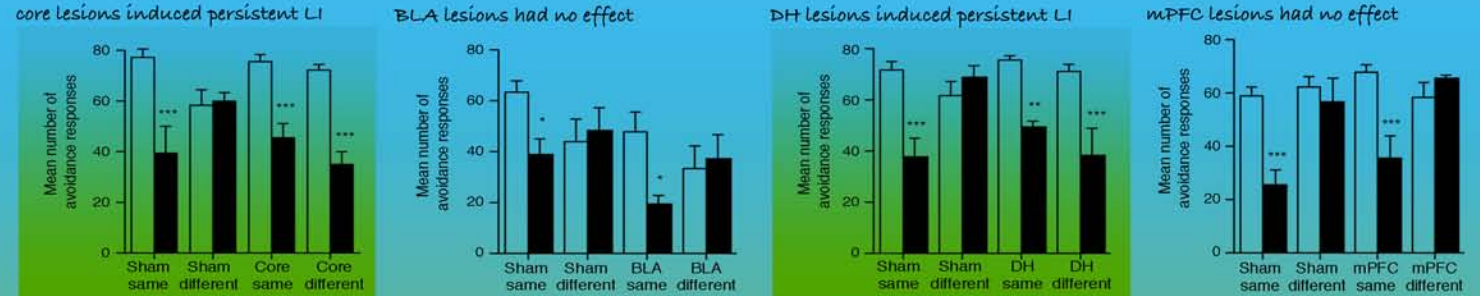
results

We found that NAC shell lesions abolished LI, while mPFC lesions had no effect on behavior in the tasks. Lesions to the BLA reversed the disruption of LI produced by additional training trials in the conditioned emotional response task, but not the disruption of LI produced by changing the context in the avoidance task. Lesions to the DH had effects opposite from those of BLA, whereas NAC core lesions reversed LI disruption produced by both manipulations.

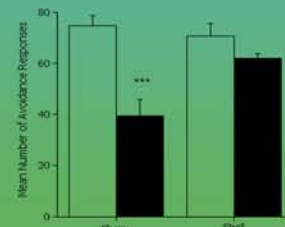
lesion effects on latent inhibition with low (two) or high (five) number of conditioning trials



lesion effects on latent inhibition with same or different context in preexposure and conditioning

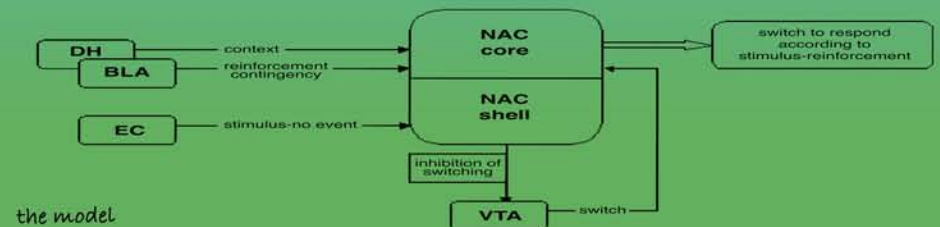


shell lesions disrupted LI



conclusions

These data suggest that NAC core and shell, DH and BLA, act in concert to determine response selection to stimuli signaling conflicting predictions. In particular, we propose a model in which the NAC shell relays information regarding stimulus irrelevance, while the BLA and the DH relay reinforcement and contextual information, respectively. This information is integrated in the NAC core, where a response to the stimuli is made or inhibited.



the model