Title
Roles of prefrontal cortex and mediodorsal thalamus in recognition memory

Text
Damage to the mediodorsal thalamus (MD), has been linked to amnesiac syndromes in humans and in
rats (Mitchell and Dalrymple-Alford 2005). The MD is strongly anatomically connected with the
prefrontal cortex (mPFC) a region previously shown to play a selective role in recognition memory in
rats (Barker et. al. 2007).

The aim of the current study was to investigate 1. the relative contributions of mPFC and MD to
recognition memory; 2. the inter-dependence of MD and mPFC in recognition memory using a
disconnection analysis.

In experiment 1, male DA rats were divided into 3 groups: bilateral excitotoxic lesions in MD, mPFC
lesions and surgical sham controls. In experiment 2, male DA rats were divided into two groups, one
group received unilateral excitotoxic lesions in both the MD and mPFC in contralateral hemispheres
while the other group received unilateral MD and mPFC lesions in the same hemisphere. Recognition
memory in all groups was tested using a battery of object recognition tasks based on the
spontaneous object preference task (Ennaceur et. al. 1988). These tasks tested object recognition,
object location memory, temporal order memory, object-in-place and object-in-context associative
memory.

In experiment 1 bilateral lesions in the MD and mPFC had no effect on standard object recognition
memory or object location memory. In contrast both MD and mPFC lesions significantly impaired
object-in-place associative memory, temporal order and object-in-context memory.

In experiment 2 unilateral lesions in the MD and mPFC had no effect on object recognition memory
irrespective of whether the lesions were in the contralateral or ipsilateral hemispheres. However
animals with MD and mPFC lesions in contralateral hemispheres were significantly impaired in the
object-in-place, and object-in-context memory tasks.

This data demonstrated that the connections between MD and mPFC are functionally necessary for
recognition memory tasks, dependent on associative memory processes.

Theme
F - Cognition and behaviour
Animal cognition and behaviour - Cognitive learning and memory systems