Role of the medial and lateral entorhinal cortex in spatial and non-spatial information processing in rats

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Résumé

Neuroanatomical and electrophysiological data suggest that the medial entorhinal cortex (MEC) is involved in the processing of spatial information, whereas the lateral entorhinal cortex (LEC) is involved in the processing of non-spatial information. However recent studies have suggested that such functional dissociation is not so well-established. In particular, LEC lesion has been found to impair both spatial and non-spatial information processing. Here we hypothesizd that the function of the MEC and the LEC in the processing of spatial and non-spatial information is dependent of the complexity of the information to be processed. Rats with MEC or LEC lesions were submitted to an exploration task in which they were allowed to freely explore a configuration of objects. Their ability to detect a spatial (displacement of object) and a non-spatial (replacement of object) change of the configuration of objects was mesured. We manipulated the environmental complexity by modifying 1) the number of objects and 2) the identity of the objects. Rats were submitted to four different protocols with either 3 and 4 objects, that were either identical or different. The results show that spatial information processing was affected by both MEC and LEC lesions only in the 4-objects condition, independent of whether the objects were identical or different. Non-spatial information processing was not affected by both lesions in all conditions. These results indicate that the role of the MEC and LEC both depends on the complexity of information to be processed. They suggest that these two regions interact for combining spatial and non-spatial information, a fundamental step for the formation of "episodic-like" memory.

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