Testing Object Related Memory in Head Fixed Model

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The ability to remember locations of food or objects is crucial to survival, but its underlying neuronal mechanism has not yet been clear. Recognizing object requires formation and retrieval of related memory. Novel object recognition task is a common method to study this kind of memory on rodent models. Scientists exploit rodents' internal preference of novel objects over familiar ones to test whether subjects form proper memory or not. Rodents without memory deficits would spend more time interacting with novel objects. Lesion studies combined with such behavioral task have revealed important brain regions involved in forming/maintaining the memory. Nevertheless, to study how neurons of these brain regions achieve memory function requires measurements of their activities and/or connectivity in large scales using in vivo two-photon imaging or intracellular recordings. Such measurements, however, depend upon animals' heads to be fixed to harvest high-quality data. There is a need, thus, to develop behavioral tasks to test object memory in head-fixed animals. Here we suggest a solution to solve this problem. By implanting a metal strip on mice skulls, we restrict their head movement. During the behavior tests, subjects explore new and familiar objects in an arena lifted by air platform. With this, we aim to test a variety of of object recognition paradigms in head-fixed mice models hoping to combine the new behavioral tasks with hoping to combine the new behavioral tasks with in vivo recordings for further investigation of neuronal mechanism underlying object related memory.

Keywords: Novel object recognition, Head-fixed animal

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