

Automated dissection of permanent effects of hippocampal or prefrontal lesions on performance at spatial, working memory and circadian timing tasks of C57BL/6 mice in IntelliCage

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To evaluate permanent effects of hippocampal and prefrontal cortex lesion, lesioned C57BL mice were exposed to a series of tasks in IntelliCages. Testing started at 51 to 172 days after bilateral lesions and lasted for 154 and 218 days in two batches of mice, respectively. Spontaneous behavioral patterns clearly separated the three groups, hippocampals showing erratic hyperactivity and impaired circadian synchronization. Hippocampal lesions led to deficits in spatial passive avoidance, as well as in reference and working memory tasks. Impairment was minimal in rewarded preference/reversal schemes, but prominent if circadian timing was required or if errors were punished. No impairments of prefrontally lesioned subjects were discernible. These results corroborate the view that hippocampal dysfunction spares simple spatial learning tasks but impairs the ability to cope with conflicting task-inherent spatial, temporal or emotional cues. The results show that automated testing and data analysis of socially kept mice is a powerful, efficient and animal-friendly tool for dissecting behavioral profiles of hippocampal dysfunction.