



# Survival of hippocampally lesioned mice in outdoor pens: equal magnitude of lesion and genotype effects

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## 1 What is the natural function of the hippocampus in mice?

Traditionally, the function of the mammalian hippocampus is interpreted in terms of complex relational processing such as episodic memory and spatial cognition. This view has recently been challenged by naturalistic studies in mice living outdoors, and by hippocampal lesion studies in mice that were tested for a variety of species-specific behaviors not obviously linked to cognition. Both approaches showed that an important function of the hippocampus in mice appears to be the control of species-specific behaviors essential for survival.

Here we demonstrate that hippocampally lesioned mice show an impaired ability for short-term survival in a semi-naturalistic environment without apparent deficits in food site patrolling. While the causes of such impairment remain unknown, we can demonstrate that the genetic background is of importance. One of the standard "healthy" mouse strains in behavioral neuroscience and knockout research (C57BL/6) shows survival times equalling those of mice with mixed genetic background but lacking both hippocampi.

## 2 Testing hippocampally lesioned mice for survival in outdoor pens in western Russia



Outdoor pen



Field laboratory Bubonizi

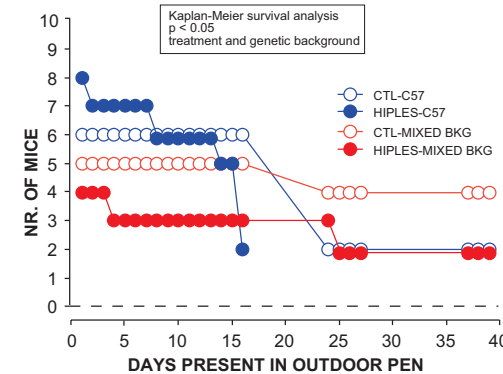
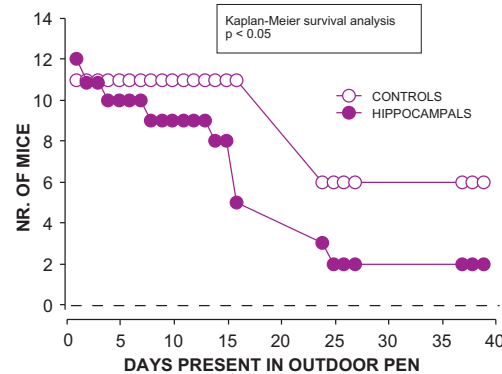
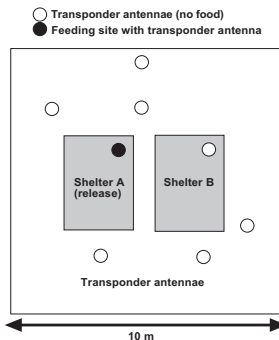


**Mice:**  
 - 6 C57BL/6 controls  
 - 8 C57BL/6 lesions  
 - 5 mixed background controls  
 - 4 mixed background lesions

**Strains & Genetic background:**  
 mixed background: random-bred offspring (generation 21) from diallel cross  
 C57BL/6J x C3H/J x DBA/2J x NZB/J

**Lesions & post-op testing:**  
 - bilateral cytotoxic injections NMDA  
 - entire hippocampus  
 - functional verification by burrowing tests: hippocampals do not burrow

## 3 Monitoring presence of transponder tagged female mice during 39 days in outdoor pen: predicted short survival of hippocampal lesions. C57BL/6 hippocampals disappear, C57BL/6 controls show severe losses



### Conclusions

**Monitoring:**  
 - 8 antenna recording implanted transponders (microchips)  
 - 2 antennae inside shelters, one at feeding site  
 - continuous recording of antennae visits by computer  
 - other data: latencies, location of preferences (not shown)

1. The mouse hippocampus regulates non-cognitive processes and/or behavior essential for short-term survival in a naturalistic environment  
 2. The poor survival of C57BL/6 mice indicates that they (and probably other inbred mouse strains) suffer from hidden functional deficiencies