Assessing spontaneous behavior, behavioral timing and learning of mouse strains in the IntelliCage

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The IntelliCage is a fully automated test system permitting assessment of different aspects of mouse behaviour in a social context, including spontaneous behavior, anxiety, learning and memory. The system has a great potential for behavioral phenotyping of genetically modified mouse strains. However, validation is required for reliable testing of those lines. Therefore, we compared three common strains (C57BL/6, DBA/2 and C57BL/6 x DBA/2 F1) in a set of simple test modules: free adaptation, nosepoke adaptation, drinking session adaptation, place preference learning, and place reversal learning. Two replications of the experiment were performed. After testing in IntelliCage, the animals were also tested individually in three commonly used behavioral tests: fear conditioning with extinction sessions, nesting test and burrowing test. The latter two represent the species-specific behaviors and all three have been shown to depend on intact hippocampus in mice. The replications in the IntelliCage produced almost identical results, confirming the reliability of the system. We found significant strain differences in all tests and discuss these in the light of developing new strategies for behavioral phenotyping of mutant mice.