Transponder-based in-cage learning and activity monitoring system for 8-16 mice per cage: INTELLICAGE and TRAFFICAGE for high throughput screening

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Behavioral assessment of mice is a sensitive tool for discovering early effects of neurodegeneration, targeted gene deletions or chronic exposure to toxic agents of drugs. On the other hand, it is time consuming and the results are often biased by behavioral peculiarities of mice, such as unstable performance, limited cognitive abilities, handling artifacts and inappropriate choice of test paradigms. Based on more than 20 years of studying mouse behavior in the laboratory, and five years of studying cognitive abilities in naturalistic settings, we have developed a transponder-based technology that allows the learning behavior and circadian activity of group-caged mice to be monitored over weeks and months.

INTELLICAGE houses 8-16 mice (preferably both experimental subjects and controls). Male mice must have been raised together, or they may require insertable separators. One cage contains four test chambers, accessible to only one mouse at a time. Each chamber contains a two-choice bottle system with computer-controlled delivery of liquids. Animal identities are checked by reading numbers from subcutaneously implanted commercial transponders, such as TROVAN. Within a chamber, mice can be tested for operant visual discrimination learning, conditioned taste aversion and various forms of conditioning schedules. Punishment can also be delivered. Mice can be tested for patrolling different locations (working memory), temporal patrolling schedules and spatial avoidance learning. Activity of mice and devices from up to 8 cages is controlled by a microcomputer. Off-line data analysis and downloading new program modules is done via the Internet from an application server in Zurich; the experimenter simply collects the daily results from a web site.

TRAFFICAGE is a downscaled version of INTELLICAGE that records only the circadian activity of transponder-tagged mice. Due to the complexity of brain systems regulating circadian activity, many cerebral alteration are likely to be detected. The system runs as a stand-alone system controlled by a local computer, but for more thorough analysis data can also be sent to an application server. Fur further information, visit http://www.newbehavior.com.