The use of integrated behavioral station in chronic behavioral studies

Boris Sakic
McMaster University, Hamilton, Canada, sakic@mcmaster.ca

Human and animal neurodegenerative diseases are often accompanied by constellations of neurologic and behavioral deficits. In a murine model of neuropsychiatric lupus we observe age-dependent deficits in food/water intake, spontaneous locomotor activity, motivated behavior, emotional reactivity, and learning/memory performance. Anecdotal observations include seizures and self-injurious behavior [1]. However, given relatively short observations in behavioral tasks, no information could be systematically collected with respect to resting, sleep, food/water intake, or epileptic episodes. These important measures can be confounding factors when assessing performance in activity-demanding tasks, such as open-field, plus-maze, water maze, and forced swim tests [2]. This incompleteness in assessing behavioral profile of lupus-prone mice led to a necessity for a continuous, home-based monitoring of singly-housed mice during prolonged progress of systemic autoimmune disease. A custom-made integrated behavioral station (INBEST) was designed to meet this demand by concurrent, 24/7 measurements of multiple behavioral outputs in enriched home environment (see *Figure 1*). Dependent variables include measurements of food/water intake, responsiveness to palatable stimulation [3, 4], spontaneous ambulatory activity, climbing, voluntary running, anxiety-related behaviors, social interactions, sleep, and vocalization. Attached visual and auditory stimuli can be also used for conditioning and learning paradigms. The advantage of INBEST in comparison to standard behavioral testing is elimination of confounding effects induced by transportation stress and continuous, automated collection of measures reflective of nocturnal activity, exploration, anxiety-related and depressive-like behaviors. Third-party components and infrared MPEG4 technology integrated with EthoVision XT R2 and Observer XT are expected to yield wealth of information which will better account for onset, kinetics, and severity of behavioral changes, as well as important relationships among various behavioral deficits. The usage of INBEST can be expanded to other models of chronic CNS disorders, as well as to developmental, neuroethological, and chronic pharmacological studies.

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References

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Figure 1. *Integrated Behavioral Station (InBeSt)*