Behavioural phenotyping in the mouse: the home cage as test arena

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The identification of gene functions in behavioural regulation requires, novel and improved approaches that allow refinement of behavioural phenotypes (1). Current behavioural phenotyping methods mainly consist of exposing the animals of interest to several short-lasting tests that each addresses certain behavioural aspects (2). A major drawback of these methods is the extensive handling that is likely to interfere with test results. Furthermore, important dynamic and circadian processes are ignored due to the limited time period of testing. Testing animals in their home cage environment allows for continuous observations over consecutive days and the evaluation of novelty and baseline behaviours. Home cage testing also minimizes human intervention (such as handling) and reduces interactions with other environmental factors not related to the behavioural test (such as animal transport). By carefully designing the home cage environment, different behavioural domains can be studied simultaneously, for example, by providing the animals with different stimuli and tasks (light, sound, novel objects, cognition tasks). We developed a modular home cage system combined with videotracking software (Noldus IT, The Netherlands) for continuous recordings of locomotor activity. For validation of the home cage test different well-characterized inbred strains are exposed to both the home cage test and to standard behavioural tests, such as the open field and elevated plus maze. This presentation addresses the first of a series of validation experiments and compares activity levels of the C57BL/6 and DBA/2 strains in the home cage and the open field. Here we show that the determination of locomotor activity levels in different mouse strains highly depends on the behavioural test that is used. In addition, factor analysis of the behavioural structure will be presented and the potential of the home cage test for behavioural phenotyping purposes will be discussed.

1. Gerlai, R. (2002) TINS 25: 506-509
2. Crawley, J.N. (1999) Brain Res. 835: 18-26

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