Higher motor impulsivity in DBA/2 than C57BL/6 mice revealed by a novel simple reaction time task in IntelliCage

Vannoni E (1), Voikar V (1), Wolfer DP (1,2,3)

(1) Institute of Anatomy, University of Zurich, Switzerland
(2) Institute for Human Movement Sciences, ETH Zurich, Switzerland
(3) Zurich Center for Integrative Human Physiology, University of Zurich, Switzerland

In previous research, C57BL/6 and DBA/2 mice have been found to differ in motor impulsivity in the serial reaction time tasks. These tasks are very time-comsuming requiring extensive training and multiple test sessions. However, motor impulsivity can also be assessed in a faster and easier way by using simple reaction time task. Our aim was therefore to develop such task using the automated device IntelliCage, which measures behavior of mice living in social groups and under undisturbed condition. We used 24 mice housed in mixed groups in two IntelliCages (6 C57BL/6 and 6 DBA/2 per cage). The task consists in the following: after the start of a corner visit, mice initiated the trial by making a nosepoke in one of the two sides available. Then, after a random delay (1-3 sec) during which mice had to wait and inibit any response, a light stimulus appeared above the side where the first nosepoke occurred and mice where able to collect their reward (water) upon a second nosepoke made on the illuminated side. The time available to respond was limited to 5 seconds as well as the access to the reward. Premature responses (pre-stimulus nosepokes) prevented the light to turn on, therefore ending the trial. We measured the percentage of visits with a premature response, the number of premature responses, and the latency to correct response. All variables decreased with time in both strains indicating that the animals learned the task. However the percentage of visits with a premature response was significanlty higher in DBA/2 than in C57BL/6 mice and was dependent on the applied delay. DBA/2 mice also performed more premature responses than C57BL/6 but only at the beginning of the task. Strain differences were also revealed in the latency to correct response with DBA/2 being slower than C57BL/6 mice. Overall, our results are consistent with previous findings obtained with the serial reaction time tasks and suggest that the IntelliCage may be used to assess motor impulsivity in a more efficient and automated way.