

Sex differences in spatial learning of C57BL/6J mice in the IntelliCage: The impact of appetitive and aversive stimuli

Roos L (1), Matos S (1), Amrein I (1), Wolfer DP (1,2)

(1) Institute of Anatomy, University of Zurich, Switzerland

(2) Institute for Human Movement Sciences and Sport, ETH Zurich, Switzerland

The IntelliCage system was used to investigate behaviour and spatial learning of C57BL/6J mice of both sexes using a dual motivation approach. The system allows automated testing of cognitive abilities in a social homecage environment, minimizing experimenter intervention. To avoid using water deprivation as a learning driver, we developed protocols where spatial learning is motivated by the mice's preference for sweetened over plain water. Our previous study showed that male mice are at a disadvantage compared to female mice in mastering difficult, appetitively motivated learning tasks, probably due to sex differences in value-based decision making. When using a dual motivation protocol with sweet-tasting saccharin as an appetitive stimulus and bitter-tasting quinine as an aversive stimulus, female mice showed improved task engagement and performance. The present study investigated whether quinine sufficiently motivates male mice to equalize the learning differences between the sexes. We found that quinine improved learning motivation in both sexes, but male mice were still less motivated to learn for a sweet reward than females. Overall, female mice demonstrated better learning performance and sustained motivation. To better understand the sex differences observed, immunohistochemical investigations of key regions in the brain's reward system are planned.