APPLICATION OF A NEW TEST PROTOCOL TO STUDY THE EFFECT OF ACUTE AND CHRONIC PAIN ON SOCIAL BEHAVIOUR IN MICE

Shannon Tansley, BSc, MSc Candidate
McGill University, Integrated Program in Neuroscience – Psychology
Student/Trainee

INTRODUCTION / AIM

A common shortcoming of social neuroscience studies using rodent models is that the behavioural dependent measures are often under-sampled. Procedures are needed to assess the volitional behaviour in rodents in a neutral, novel environment coupled with the data sampling over extended periods of time. We have developed and automated the Tube Co-occupancy Test (TCOT) to meet these needs. The testing environment used in the TCOT is a brightly lit, rectangular box containing a small, open ended opaque tube. Using this test protocol, we have found that in the simplest dyadic social context, same sex pairings spend different proportions of time sharing the tube, occupying the tube one at a time, or avoiding the tube. Sibling dyads displayed significantly more co-occupancy of the tube than did stranger dyads. Our lab is now interested in the social neuroscience of pain in laboratory animals as it has not been studied systematically. Using the newly validated TCOT, we propose to study how mouse strains with different levels of sociability respond to acute and chronic pain conditions. Three mice strains are to be studied; the outbred CD-1, the inbred C57BL/6, known to be highly social, and the inbred BTBR, previously shown to demonstrate deficits in social behaviour. Preliminary data suggest that the C57BL/6 strain, commonly used in basic research, differ from outbred CD-1 mice with respect to its behavioural response to pain. These findings and the continuation of this study will advance our understanding of the effect of pain on social behaviour in varying strains of laboratory mice.

METHODS

Procedures are needed that assess volitional behaviour in rodents in a neutral, novel environment coupled with data sampling over extended periods of time. We developed and automated the Tube Co-occupancy Test (TCOT) to meet these needs. The testing environment used in the TCOT is a brightly lit, 12 x 26 x 16 cm rectangular box (called the ‘arena’) containing a 7.5 x 3 cm diameter, open, opaque tube. Using this test protocol we found that single mice introduced into the arena spend nearly 70% of their time inside the opaque tube – measured over a 3-hour sampling period. In the simplest, dyadic (a pair of mice), social context, a test mouse is placed in the arena with either a sibling (‘sibling dyad’) or stranger (‘stranger dyad’). It must decide if it will cohabit the tube with its arena partner.

RESULTS

In preliminary studies we found that same-sex dyads spent different proportions of the observation time sharing the tube, occupying the tube one at a time or with avoiding the tube. Sibling dyads displayed significantly more co-occupancy of the tube than did stranger dyads.
Preliminary data suggest that the inbred mouse (C57BL/6), commonly used in basic research, appears to differ from the outbred CD-1 mouse with respect to its behavioural response to pain. Our data suggest that outbred mice strains may be a better model for social assays that evaluate the role of pain, compared to inbred mice strains.

**DISCUSSION / CONCLUSIONS**

The results of this research are expected to advance our understanding of the effect of pain on the social behaviour of the mouse and, further, to clarify how differences in the behavioural traits of different mouse strains interact with treatment effects.