

Y maze Y 形迷宫

1. Purpose

1.1 The spontaneous alternation Y maze can be used to assess short-term spatial working memory. Rodents typically tend to explore a new arm of the maze rather than returning to one that was previously visited. Many parts of the brain, including the hippocampus, septum, basal forebrain, and prefrontal cortex, are involved in this task.

2. Safety Requirements

2.1 General laboratory procedures should be followed, which include: no eating, no chewing gum, no drinking, and no applying of cosmetics in the work area. Laboratory coats and gloves must be worn at all times in the work area, unless the protocol specifically describes the appropriate attire for the procedure.

3. Notes

- 3.1 The validity of results obtained from behavioral phenotyping is largely dependent on methods of animal husbandry. It is important that individuals following this procedure are experienced and aware of the animal's welfare, and be familiar with the animal being tested, in order to reduce the anxiety levels of the animal prior to testing.
- 3.2 The majority of mouse behavioral studies are age/sex/strain dependent. It is important to keep these parameters comparable throughout a single experiment.
- 3.3 Environmental factors may contribute to the levels of mouse anxiety. The temperature, humidity, ventilation, noise intensity and light intensity must be maintained at levels appropriate for mice. It is essential that the mice be kept in a uniform environment before and after testing to avoid anomalous results being obtained. In particular, background noise and illumination levels should be measured and documented for each room. Ideally, all mice should be exposed to the same illumination levels in the holding room. For example, in conventional housing, mice housed on the top of the racks may have up to 10 times more Lux than mice on the bottom of racks. No additional experiments which are either noisy or emit odors should be performed during acclimation and testing in the antechamber and the testing room. Ensure that during the test animals are not exposed to any distracting visual signals.
- 3.4 It is recommended that all phenotyping experimentation is conducted at approximately the same time of day because physiological and biochemical parameters change throughout the day. The ideal testing time for all animals is during the first half of the lights-on period (in the morning until early afternoon). If animal groups are tested at different times of the day it is necessary to perform subsequent tests analogous to the initial test in the experimental design.
- 3.5 Light is an important anxiogenic factor that will strongly influence the ambulation in a U-shaped way. Experiments under various illumination intensities and factor-analysis have shown that locomotion under dim light is

a measure of activity rather than of fear (e.g. Trullas & Skolnik 1993). Most pharmacological studies have shown that anxiolytic agents are more likely to have an effect on the area of the activity rather than on the amount of activity itself (Crawley & Paylor 1997; Choleris et al. 2001).

4. Quality Control

4.1 Before each experiment, measure illumination with a Luxmeter and make a record. To obtain evenly distributed light, indirect lighting should be employed. Alternatively, an illumination system for simple and even illumination can be employed. It is most important that light is not significantly darker in the corners (avoid shadows), to prevent bias in the locomotor activity of the animal.

5. Equipment

- 5.1 Illumination system, Luxmeter, EthoVision video tracking system.
- 5.2 Commercially available Y maze apparatus, which constructs with three arms at 120 degrees to each other.
- 5.3 The white acrylic is the dimensions (L)60 x (W)11.5 x (H)10 cm for black color mice. The black acrylic is suitable for white mice.
- 5.4 Video-tracking system. The EthoVision video tracking system is used to analyze data with different zones/parameters.

6. Supplies

- 6.1 Pens
- 6.2 Marker pen
- 6.3 Datasheet
- 6.4 Gloves
- 6.5 Facial mask
- 6.6 Ethanol 70%
- 6.7 Detergent (Windex)
- 6.8 Hand towels
- 6.9 Kimwipes
- 6.10 Color paper
- 6.11 Battery

7. Procedures

Spontaneous alternation of the Y-maze

- 7.1 On the day before testing mice should be individually marked to be easily identified on the test day. One suggestion is to mark their tails.
- 7.2 Transport mice outside the testing room in their home cages. Allow 30 minutes for the mice to acclimation.
- 7.3 Wipe clean the apparatus with detergent (Windex) and 70% ethanol; allow time for it to dry.
- 7.4 Switch on the computer and record mouse by the EthoVision video tracking system for a total of 8 minutes.
- 7.5 Remove a mouse from its home cage, gripping the tail between the thumb and the forefinger and place it into the center of the Y maze as soon as possible.
- 7.6 Following the experimental session, remove the mouse carefully from the Y maze arena, gripping the tail between the thumb and the forefinger, and place



back to its home cage.

7.7 Wipe the Y maze clean with detergent (Windex) and 70% ethanol after each experimental session to avoid olfactory cueing. Allow time for it to dry.

7.8 Set up the appropriate database and arena range in the program so that mouse tracking can be analyzed by EthoVision System software.

7.9 Save data from the experimental sessions onto a disc and analyses.

7.10 The results are presented in 1 excel file and 1 track image file.

