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Barnes Maze

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We use this protocol and it's working

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Abstract

This protocol provides a detailed, step-by-step guide for conducting the Barnes maze test, a well-established behavioral assay for assessing spatial learning and memory in mice and rats. The maze utilizes a rodent's innate aversion to open, brightly lit spaces and their drive to seek a hidden, dark escape box. The procedure covers pre-experimental habituation, multi-day acquisition training trials to evaluate learning, and a final probe trial to assess long-term spatial memory retention. This method is a robust, dry-land alternative to the Morris water maze, minimizing stress associated with water immersion.

Setup

1 Have a clear open space in the middle of your behaviour room to work with.

2 Tear napkin pieces into small squares to prepare for escape box covering

3 Organize images (cross, triangle and circle) on the walls adjacent to maze apparatus. Ensure they are all at the same x and y plane.

4 Be sure to secure maze to ensure it does not shift during experiment

5 Obtain a cup that is wrapped in napkin or paper to allow for a dark enclosure for mice.

6 *Allow for one hour period for mice in the testing room before each phase of the test each day.
*Cover home cages with trash bags or a blanket to keep it dark, leaving the front of the cage exposed to light.

7

HABITUATION PHASE, Day 1 (no time limit, use home cage bedding):

8 Check positioning of escape box on barnes maze apparatus and place home cage bedding inside.

9 Place. Mouse in center of maze covered by dark cup.

10 10 seconds after placement, allow mouse to freely roam the maze for an undefined amount of time until they find and independently enter the escape box.

11 If mice do not find the escape box, gently guide mouse into the box and allow to sit in there for approx 2 min

12 Upon entry, cover the escape box hole with a napkin for at least 15 seconds.

13 When removing, carefully and quietly remove the escape box with mouse from the apparatus and place the box in the cage to allow mouse to re-enter home cage.

14 Continue the above steps for each of your trials. Clean apparatus and box with 2% chlorohexadine disinfectant.

ACQUISITION PHASE, Days 2-6 (5 days)

15 After each trial in this phase: include clean, fresh bedding in the escape box to encourage entry into the tunnel, without them having to rely on a scent.

16 For each trial, there will be one, 5-minute session: place mouse in center of apparatus covered by dark cup.

17 If mouse does not find nor enter the escape box after 5 minutes, gently guide it towards the direction of the tunnel where they should enter on their own.

18 Upon entry, cover the escape box hole with a napkin for at least 15 seconds.

19 Carefully remove escape box from maze apparatus and gently place in the home cage of the mouse to allow it to re-enter cage.

20 Continue the above steps for each of your trials. Clean apparatus and box with 2% chlorohexadine disinfectant.

PROBE TRIAL, Day 9 (1 day, after two rest/off days)

21 Ensure maze is in position so that the holes are in the same position as during the training/acquisition days.

22 Remove escape hole from apparatus for the duration of the trials.

23 For each trial, there will be one, 90second session: Place mouse in center of apparatus and allow to roam for duration of session.

24 Return mouse to home cage.

25 Continue the above steps for each of your trials. Clean apparatus and box with 2% chlorohexadine disinfectant.