
VISUAL EXPERIMENT

Forced swim test in mice: A common animal model of depression

Muhammad Aslam

Department of Basic Medical Sciences, Faculty of Pharmacy, Ziauddin University, Karachi 75600, Pakistan.

Correspondence: Pharmacologist1@yahoo.com; Cell: +92-3452220192

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ABSTRACT

The Forced Swim Test (FST) is a rodent behavioral paradigm utilized for assessment of potential antidepressant-like medications. In this model the mice are put in a plexiglas tank. The tank is loaded with water and the behavior of the mice to escape the tank is scored. The behavioral parameter scored in this test is called immobility, resembling a behavioral state of misery, as seen in human depression.

INTRODUCTION

The Forced Swim Test (FST) is a rodent behavioral paradigm utilized for assessment of potential antidepressant-like medications. In this model the mice are put in a Plexiglas tank. The tank is loaded with water and the behavior of the mice to escape the tank is scored. The mice try to come out of the water and this behavior is known as "mobility". However, after some time the struggling movements of the mice die down and the mice may surrender and become totally motionless which is known as "immobility". The length of immobility time is scored during the testing period and decrease in the length of time of immobility during this test is termed as antidepressant activity (Liao et al., 2013; Aslam and Sultana, 2015). Fruitful usage of the forced swim test obliges adherence to certain procedural points of interest and minimization of outlandish anxiety to the mice. In this experiment, we are going to give visual details of this important depressive model.

MATERIALS AND EQUIPMENT

Swimming tank

The equipment used in this test was manufactured using Plexiglas. The dimensions of the cylindrical tank were (diameter 20 cm, height 30 cm). The tank was filled with tap water up to 15 cm height. The temperature of the water was adjusted at $25 \pm 1^\circ\text{C}$.

Thermometer

The temperature was adjusted using a glass mercury thermometer.

Stop watch

Stop watch was used to record the mobility time.

Camera to make video clips

Smartphone, iPhone 6, was used to make the video clips.

Tissue rolls:

Every mouse was made dry with tissue roll before returning it to its home cage.

VIDEO CLIPS

Pre-experiment	34 sec
Experiment	7 min 12 sec

METHOD

1. Set the camera in the right position
2. Fill the tank to the level of 15 cm Adjust the water temperature to $25 \pm 1^\circ\text{C}$ using hot water and/or ice to adjust the temperature
3. Check the temperature, using a thermometer, before starting the test
4. Bring the mice in laboratory and leave them there for 60 min for acclimation
5. Gently and slowly pick the mouse by the tail and transfer it into the swimming tank
6. Start the timer already set at 6 min (360 sec)
7. Stop recording at the end of 6 min
8. Remove the mouse from swimming tank. Dry it with tissue before transferring it to its home cage
9. Note down the mobility time for last 4 min (240 sec) of the aggregate 6 min (360 sec) test period During initial 2 min of aggregate 6 min test period the mouse become exceptionally dynamic, overwhelmingly swim in circles, and attempt to climb the divider or jump to the base
10. Calculate immobility time by subtracting mobility time from the total time

$$\text{Immobility} = 240 \text{ seconds} - \text{Mobility}$$

DISCUSSION

Forced Swimming Test (FST) is one of the most commonly utilized models for assessing potential antidepressant compounds. This model is often used in rodents to evaluate antidepressant-like activity by assessing the decrease in immobility time (Rodrigues et al., 2002; Suzuki et al., 2001). The behavioral parameter scored in this test is called immobility, resembling a behavioral state of misery, as seen in human depression (Steru et al., 1985). In the forced swimming test, mice are constrained to swim in a restricted space from which they can't escape, and are activated to a particular behavior of immobility. This behavior demonstrates a state of despair which can be decreased by antidepressant medications used to treat human depression (Borsini and Meli, 1988; Steru et al., 1985).

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