

## WVU IACUC POLICY: Forced Swim Test

### Background

The classical Porsolt forced swim test (FST) was developed as a rodent test to screen candidate antidepressant drugs. It is based on the assumption that when animals discover that they cannot escape from the apparatus that they will stop struggling and limit their swimming to what is required to keep their heads above water. In the FST, the animal is placed in a cylindrical container of water (although other water containers can be used) from which it cannot escape. Most animals will attempt to escape by actively swimming. When the animal stops swimming and floats on the surface of the water it is considered to have “given up”. An animal that gives up relatively quickly is thought to be displaying characteristics similar to human depression. The validity of this test stems from the finding that physical or psychological stress (which can induce depression in humans) administered prior to the test causes animals to give up sooner, and treatment with an antidepressant drug will increase the time an animal spends in swimming escape attempts. This procedure can be used in one of two ways. First, it can be used to assess the incidence of depression-like behavior induced by another cause (e.g., a drug, gene modification, or environmental condition), or it can be used repeatedly to induce a depressive-like state. **When the purpose of this test is to induce depression, any animal that participates in a forced swim test *must* be categorized as a pain category E. If the FST is used to assess depressive-like behaviors and administered only one or two times, animals do not have to be characterized as category E unless additional characteristics would justify category E classification. Other uses of water baths for memory testing or exercise are not covered by this policy.**

### Important Considerations

1. Species used
  - a. Rats and mice
  - b. Impaired swimming ability due to musculoskeletal or other abnormalities will affect performance in this test.
2. Water depth and temperature
  - a. The water ***must*** be deep enough so the animal cannot touch the bottom with its tail or feet. A depth of 30 cm is commonly recommended, although less depth may be adequate for mice.
  - b. Water temperature ***must*** be between 24°C and 30°C.
  - c. Animals need to be wiped off and placed in a dry, warm environment after removal from the water. Absorbent towel(s) may be placed in the holding cage to collect water dripping off the animal and a heating source directed over or underneath the cage may provide warmth. Towel-drying or blow-drying animals may be stressful in animals that are not handled much, and rough handling can cause injury.
3. Water changes
  - a. Urine and fecal material will accumulate in the water and contribute to bacterial contamination and growth. The container needs to be emptied and disinfected after each day's tests. Deviations from this need to be approved by the IACUC.
  - b. Fecal material should be removed after each animal with a small mesh net.

#### 4. Test procedures

- a. A wide range of test session durations have been reported (4 – 20 minutes)<sup>1</sup>.
- b. Animals **must** be observed continuously during the swim test. Any animal that sinks below the surface **must** be removed from the water immediately<sup>2</sup>. The number of testing sessions per day needs to be stated in the investigator's animal use protocol and approved by the IACUC.
- c. If the test is performed for 20 minutes or more, twice in the lifetime of an animal, this procedure **must** be considered Category E.

#### **Alternative Tests**

Tail-suspension test and others<sup>1,2,3</sup>.

#### **References**

1. Crawley JN. What's Wrong With My Mouse? Behavioral Phenotyping of Transgenic and Knockout Mice, 2<sup>nd</sup> ed. Hoboken (NJ): Wiley; 2007.
2. *Guidelines for the Care and Use of Mammals in Neuroscience and Behavioral Research*. Washington, DC: The National Academies Press; 2003. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK43327/>
3. Castagne V, Moser P, Porsolt RD. Behavioral Assessment of Antidepressant Activity in Rodents. In: Buccafusco JJ, editor. *Methods of Behavior Analysis in Neuroscience*. 2nd edition. Boca Raton (FL): CRC Press, 2009. Chapter 6. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK5222/>