

LAB_084 Use of IntelliCage for Mice

I. OBJECTIVE

To ensure the safe housing of live mice in a home-cage monitoring system (IntelliCage) for continuous recording of long term cognitive and behavioural assays in a social environment.

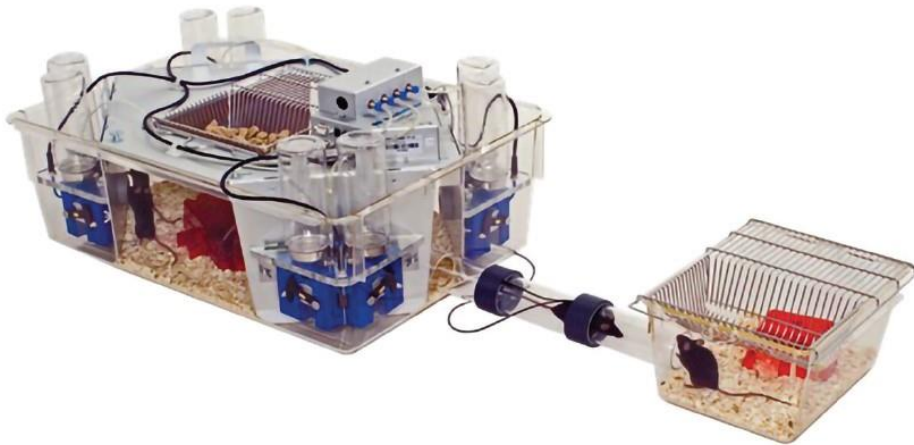


Figure 1: IntelliCage layout with optional animal gate and cage.

II. COMMENTS / RECOMMENDATIONS

- Relative to animal ethics applications, when using this SOP, the following must be described in the individual ethics application: any variation to this SOP (e.g. dietary changes/restrictions or altered light cycles), any specific procedures (e.g. injections or treatments), maximum duration of home-cage monitoring (i.e. the duration within the IntelliCage).
- This procedure has been written with specific reference to the Integrated Physiology Facility (IPF). The IPF IntelliCage includes both software and hardware (TSE IntelliCage) components and may only be used by an IPF approved experienced operator.
Warning: failure or improper setup of any one component may lead to malfunction and damage to the system.
- Equipment and procedures may vary somewhat in other animal facilities – these variations must be described in the individual animal ethics application, if using this SOP.
- Users should further read and understand the associated Risk Assessments prior to operation: 3657 UQBR Handling and restraint of laboratory animals; 3940 Handling rats and mice (available on the [UQSafe](#) website).
- Equipment/software failures and animal escapes need to be reported to the IPF manager immediately.
- This procedure involves mouse handling and appropriate care should be taken, refer to [LAB_006 Handling and Restraint in Mice and Neonates](#).
- Wild type and genetically modified animals must be transported to equipment as per OGTR guidelines and [LAB_003 Transportation of Laboratory Rodents](#).
- The IPF is a shared space with unknown commensal microbial status. Once transported to a shared space it is often not possible, for biosecurity reasons, to return rodents to their original animal facility. Arrangements

Conditions:

- Investigators named in an animal ethics application, relative to this SOP, must be competent to implement the SOP
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for transportation and ongoing care of experimental animals must be made with relevant animal facility managers when planning projects that aim to use a shared facility.

III. EQUIPMENT

- PPE

Minimum PPE in the IPF includes gloves, gown, eye protection, face mask and closed in shoes. Additional PPE may be required based on additional risk e.g., working with infectious animals (P2 fitted mask and viral gown).

- Anaesthetic machine and vaporiser calibrated for isoflurane use, induction box, rodent anaesthetic circuit and scavenger system (Refer to, [LAB_060 Rodent anaesthesia – isoflurane](#))
- Heat lamp
- Heating pad
- Eye lubricant (e.g. Viscotears®, GenTeal®)
- Topical anaesthesia (Emla® 5% cream: 25 mg/g lidocaine, 25 mg/g prilocaine)
- Radiofrequency identification (RFID) transponders/microchip and injector (Figure 2)

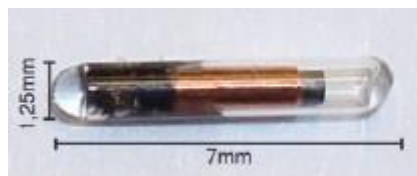


Figure 2: Radiofrequency identification (RFID) transponder/microchip

- IntelliCage automated home-cage monitoring system:
 - 39 cm x 58 cm x 21 cm cage containing Purachip bedding
 - Houses (x4 per cage)
 - Mice are fed *ad libitum*
 - Operant (conditioning) corners, each with 2 x water bottles

Each corner can accommodate one mouse at a time with two nose poke holes (left and right) that provide access to water.

- Microprocessor
- Ring antenna (for detection of radio-frequency identification transponders implanted in individual animals – see “Animal Preparation” below)

Up to 16 mice can be group housed in one IntelliCage for the duration of an experiment.

- Animal gate/weighing tube (optional)
- Social box/animal cage (optional)
- Disinfectant (1-2% Virkon), Ethanol (70%)
- Clinical waste bin

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Figure 3: IntelliCage chamber (left) and operant corner (right).

IV. PREPARATION

1. Check AEC approvals to ensure that the correct procedure, personnel and facility are approved to undertake the planned work.

Deviations can occur between approved procedures listed versus what is planned with the animal, check that they match and that the relevant personnel are approved. For example, if dietary modification is intended to occur this must be specified in the AEC application.

2. Check booking dates and details with the animal facility manager.

3. All animal arrivals/departures and euthanasia's must be recorded on the Mosaic movement sheet available in the animal facility.

4. Animals should weigh >15 gm (typically 2 months or older).

Aged animals or animals with severe motor impairment should be carefully monitored to ensure that they are able to access the corners and the feeder. Feed may be placed on the floor if needed.

5. It is better to begin co-housing male mice from a young age prior to using in the IntelliCage if littermates cannot be used.

6. Mice are maintained with bedding that is changed every week depending on the task schedule (i.e., avoid changing bedding during spatial learning tasks especially during the initial 1–2 days).

7. IntelliCage Plus software (TSE Systems) collects data and controls the experiments.

8. Experimental modules/tasks can be sequentially performed according to the scientific questions.

9. Visits, nose pokes, and licks are recorded and assigned to individual mice through the RFID antenna at each operant corner entrance.

10. Expired RFID transponders will frequently transmit incorrect signals that result in incorrect data. *Check all RFID tag expiration dates prior to use.*

11. IntelliCage's can be placed in a suitable mouse holding room or environment-controlled chamber.

V. PROCEDURE

Animal preparation:

Implant sterilised radiofrequency identification (RFID) transponders subcutaneously (dorsocervical region) into each mouse while under isoflurane anaesthesia 1 week prior to IntelliCage housing:

1. Place induction box on top of heating pad.

2. Weigh the mouse.

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3. Induce anaesthesia, as per [LAB_060 Rodent Anaesthesia – Isoflurane](#)

- a) Turn on oxygen flow (0.5L/min to 1 L/min) and place mouse in the induction chamber.
- b) Introduce 4% isoflurane by turning on the vaporiser to induce anaesthesia and monitor breathing pattern.
- c) Once adequately anaesthetised, place animal onto the preheated surface in the prone position (Figure 4). Maintain anaesthesia (~1.5-2% isoflurane) via use of a nose cone and apply a small amount of corneal lubricant onto each eye.
- d) Before proceeding ensure the animal has reached a deep plane of anaesthesia.
 - Muscle tone must be loose/weak
 - Skin pinch reflex must be absent, i.e. superficial pain is absent
 - Toe pinch reflex must be absent, i.e. deep pain is absent

4. Clean and wet the injection site with 70% ethanol to minimize the introduction of hair into the subcutaneous space. *If clipping the fur or using hair removal cream to make the site more visible is to be performed, please specify in the original ethics request.*

5. Pinch and lift the loose skin at the back of the neck and shoulders creating a tent. Insert the injecting needle through the skin parallel to the spine, bevel facing up. Eject the microchip subcutaneously (Figure 4).



Figure 4: RFID tag and injector.

6. Pinch the microchip through the skin to keep it in the inter-scapular space.

7. Withdraw the needle slowly. Apply a small amount of pressure with clean gauze to provide haemostasis.

Topical anaesthesia can be administered (Emla® 5% cream: 25 mg/g lidocaine, 25 mg/g prilocaine).

8. Recover the mouse from anaesthesia, as per [LAB_060 Rodent Anaesthesia – Isoflurane](#)

- a) Turn off the vaporiser and place the animal in a heated cage. Monitor until conscious and freely moving, then return to home cage. *In the event your mouse does not recover or seems unwell refer to LAB_022 UQBR Veterinary Care Program. Report any Unexpected Adverse Events to the AEC.*
- a) Ensure vaporiser and oxygen supply have been turned off.
- b) Monitor the mouse and check the implanted transponder with a transponder reader daily for at least 1 week. *The position of the implanted transponders is critical for correct animal identification.*

Moving mice into the IntelliCage:

1. Check with facility staff that the experimental design has been programmed, tested and the status of the system is operational.

2. Fill food and water hoppers and ensure proper function and correct position in the cage and corner chambers.

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3. Ensure the sliding doors in the corner chambers open and close correctly.

Continue to check the condition of the doors daily throughout the experiment.

3. Prior to introducing animals into the IntelliCage check animal identifications and ensure the presence of an RFID transponder in each mouse using the transponder reader.

Remove any mice for which a transponder is not detected.

4. House mice (up to 16) with enough Purachip bedding to cover the floor of the IntelliCage.

If IntelliCage is to be placed in an environmental control chamber ensure the correct light cycle, temperature and humidity parameters are programmed and operating:

- *Light cycle: 6 am lights on/6 pm lights off*
- *Chamber temperature: 25°C*
- *Chamber humidity: 50%*

5. Use software to control the experiment.

6. Animals must be monitored daily to ensure water hoppers remain in working order.

Software can be used to monitor drinking, weight (if applicable) and activity.

7. Check mice are freely moving and appear healthy and alert.

8. Monitor water consumption. Check food is accessible through the grate at the base of the hopper and refill if necessary. Check for the presence of faeces in the bedding.

Weight loss of >10% requires investigation and intervention.

9. If a mouse does not visit or drink during a 12-hour period the software will display an alert "12345 (Animal ID) did not make any visits during the last 720 minutes".

In this instance check the animal is active. Check the transponder is working and is still detectable in the animal. Check the doors can open. If the animal does not drink in a 24-hour period, consider removing it from the experiment.

10. Use any project specific score sheets, as approved for the individual model.

If you find an unwell mouse refer to LAB_022 UQBR Veterinary Care Program. Report any Unexpected Adverse Events to the AEC.

11. Record in the room diary that you have checked your mice and make note of any complications identified.

12. On completion of your experiment ensure all animals have been removed from the IntelliCage and record any movements on the Mosaic movement sheet.

13. Export all relevant data.

Version #	Reviewing AEC (note: all other relevant AECs ratify the approval)	AEC Review Date	Approval To Date
1	MBS	19/01/2024	19/01/2027

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