

LAB_055 Hypoxia Chamber Use with Laboratory Mice and Rats (Expiry: March 2026)

I. OBJECTIVE

To describe the standard technique for exposing laboratory mice and rats to acute or chronic hypoxic conditions for scientific purposes.

II. COMMENTS / RECOMMENDATIONS

- Current literature indicates survivability and tolerance of 10%-12% oxygen exposure in adult and pregnant rodents (C57BL/6J, CD1, FVB mice and SD rats), in both acute and chronic settings. 12% oxygen sees changes in many organs and tissues including overall body weight, temperature and behaviour. Of note, rodents of different strain, age and body weight display varied tolerance and adaptability to hypoxic conditions, and response can be dependent upon rate of exposure.
- Hypoxia exposure has the potential to cause pain, distress and death. For this reason, it is imperative that monitoring frequency and methods are appropriate for the model and that clear intervention points and humane endpoints have been established (usually by way of a score sheet).
- Relative to animal ethics applications, when using this SOP, the following must be described in the individual ethics application: duration and frequency of animal exposure (to the chamber), proposed fractional gas concentrations (and duration of this exposure), expected impacts to animal wellbeing from this exposure, methods and frequency of animal monitoring, proposed intervention points and humane endpoints, any variation to the standard procedures described in this SOP.
- This procedure has been written with specific reference to the Integrated Physiology Facility (IPF), the hypoxia chamber and ProOx 110 may only be used at this facility by IPF approved experienced operators. 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 failures and animal escapes need to be reported to the animal facility manager immediately.
- All incidents/injuries should be reported to the animal facility manager and via [UQSafe](#) online.
- This procedure involves mouse handling and appropriate care should be taken, refer to [LAB_006 Handling and restraint in mice and neonates](#), and [LAB_039 Handling and Restraint in Rats and Neonates](#).
- Wild type and genetically modified animals must be transported to equipment as per OGTR guidelines and [LAB_003 Transportation of Laboratory Rodents](#).
- This procedure requires an understanding of gas handling procedures. It is recommended that all users undertake the Compressed Gases Safety online training module via the UQ Staff [Health and Safety Training and Induction](#) website.
- 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 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

Conditions:

- Investigators named in an animal ethics application, relative to this SOP, must be competent to implement the SOP
- Any variation to this SOP must be described in the relevant animal ethics application
- If this SOP has not been reviewed and approved by a UQ AEC within the last three years it is no longer valid and cannot be used in animal ethics applications until reapproved (see "AEC Reviewed/Approved" date in this document's header).

Minimum PPE is 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).

- Hypoxia chamber and ProOx 110 (Figure 1)
- IVC Tecniplast cages and open top wire lids (Figure 1)

Three IVC cages with up to four mice in each can be housed in the hypoxia chamber for the duration of each experiment.

- Purachip bedding, Envirodry nesting material
- Mouse pellets
- Disinfectant (1-2% Virkon), Ethanol (70%)
- Clinical waste

IV. PREPARATION

- The low level of oxygen (<21%) in hypoxic chambers is maintained by automated addition of nitrogen gas. If tanks are allowed to become empty oxygen levels would normalize compromising the quality of your experiment and results.
- Based on previous experiments, to maintain a constant 10%-12% oxygen level, nitrogen tanks need to be replaced every 48 – 72 hrs.
- Oxygen levels are measured and adjusted by the ProOx 110 controller.
- All operations are executed by the ProOx 110 controller.
- A gas regulator (2500 PSI input, 0-60 PSI output) set at a maximum of 25 PSI is required to ensure no damage occurs to the ProOx 110.
- Prior to use ensure the ProOx 110 and chamber have been calibrated by the IPF manager.

V. PROCEDURE

1. Ensure chamber is on and correct oxygen level is programmed using the ProOx 110 (as per animal ethics approval).
2. Check animal identifications.
3. House mice (up to 4 mice per IVC cage) with normal food, water, bedding and nesting in open top cages.
4. Place occupied cages (up to 3) in the chamber and close the door (Figure 1).

Please note that opening the chamber will cause oxygen to normalize to room levels. Please make sure that you close the chamber door properly once you finish animal placement (or cage changes). Please also monitor the oxygen level to ensure it is decreasing back to the set point. If the oxygen level does not go back to the set point within 30 minutes, please contact the animal facility manager.

5. Monitor the mice at least daily – this assessment should include consideration of general appearance, activity & responsiveness, respiratory function, as well as food and water consumption. Ensure monitoring records are maintained.

The frequency of monitoring required will vary greatly dependent on potential for impact to animal wellbeing e.g. rapid changes in oxygen concentration or oxygen concentrations <10% require frequent monitoring.

6. Monitor the ProOx 110 reading and gas bottle level at least twice daily.

Replace gas cylinder if needed.

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

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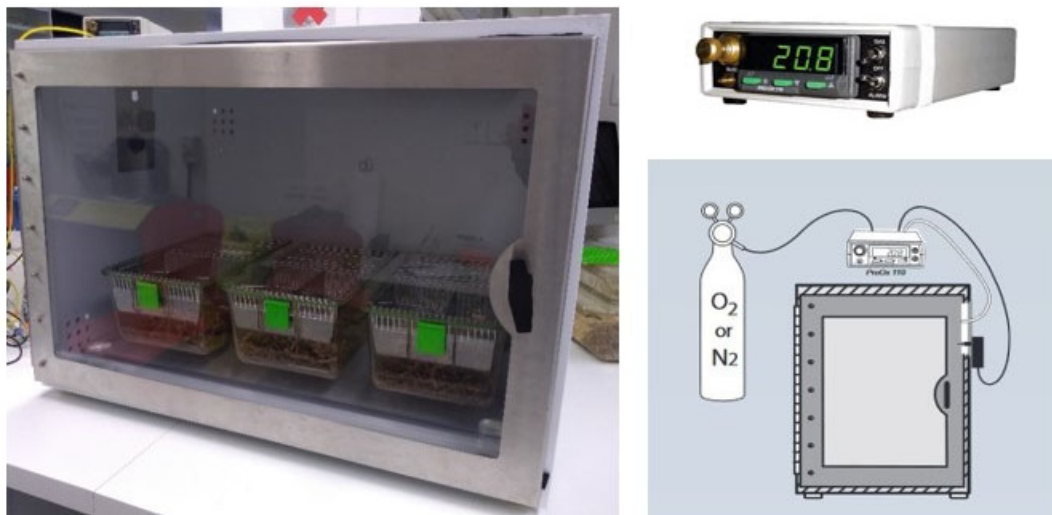


Figure 1. Hypoxia chamber, ProOx 110 oxygen sensor and setup.

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