Environmental Chamber Housing Policy
IACUP Policy
Effective Date: September 6, 2019

UCSF Office of Research
Institutional Animal
Care and Use Program

I. Purpose

This policy establishes UCSF IACUC standards to ensure the highest level of animal welfare and compliance for research animals in various environmental and research chambers. Chambers require IACUC approval in the protocol. The environmental limits provided in this policy are to avoid significant physiologic changes and health and welfare impacts.

II. Regulatory or Accreditation Authority

a. *Guide for the Care and Use of Laboratory Animals, Eighth Edition*, November, 2013, p. 42 – Environment, Housing, and Management.

III. Scope

This policy applies to rodents and birds in chambers both in and outside of centralized LARC care space. For example, this can include warm, cold, hypoxic, hyperoxic, circadian rhythm, metabolic, and behavioral chambers. Animals may be in the chamber in their home cage, or placed directly in the chamber.

IV. Policy

Investigators should consult LARC and IACUC prior to placing orders for chambers or beginning construction of lab-made chambers. Placing animals in chambers requires IACUC approval of an animal use protocol, with a complete description of the chamber, Standard Operating Procedures for cleaning and maintenance, and a clear consideration of possible adverse events that may occur in the chamber. IACUC will determine the need for environmental monitoring and the need for 24-hour investigator notification.

If animals are in chambers overnight or longer than 24 hours, requirements outlined in Laboratory Housing and Care of Animals by Researchers IACUC Policy are concurrently applicable, consideration applies to Section C. Approved Animal Housing/Researcher Care Standard of Care. Chambers should be within LARC vivaria and LARC-maintained if reasonable based on operational requirements.

General Standards

All chamber types will be assessed for animal welfare, with particular scrutiny pertaining to environmental parameters that can cause lethal conditions. Chamber operators must demonstrate that any system failure will result in a non-lethal condition for contained animals and that alarm(s) function properly. This evaluation will include an assessment of the time between a system failure, dangerous conditions, and effective operator response. Emergency procedures must be in place to preserve animal health and

welfare if a chamber fails. Not every chamber requires monitoring of all of the various parameters. For those listed below, limits shall be within the minimums and maximums shown unless different values are specifically and scientifically justified and approved by the IACUC:

1. Oxygen -The minimum oxygen level is 7%. The maximum oxygen level is 100% for no more than 48 hours.
2. Carbon dioxide -The maximum carbon dioxide level is 10,000 ppm or 1%.
3. Temperature -The temperature minimum is 5 ^{C}C (41 ^{O}F). The maximum is 34 ^{O}C (93.2 ^{O}F).
4. Ammonia -The ammonia level in the microenvironment of a cage should not exceed 300 ppm.
5. Air exchange rate -The air exchange rate in the chamber should be greater than 10 air changes per hour (ACH).

A. Alarm system

A 24hr remote alarm system should be implemented for reasonably likely conditions that would be lethal to the animals. This alarm system should have the capacity to notify emergency contacts if potentially lethal conditions or controller failure is detected.

B. Maintenance

Manufacturer's maintenance and calibration recommendations must be followed. This includes maintenance, calibration, and cleaning instructions for the chamber enclosure and all accompanying equipment (including controllers/ sensors/ alarms). Laboratory designed or constructed equipment must have equivalent instructions.

C. Record keeping

Chambers that have once or twice-daily monitoring by lab personnel and/or LARC should have those commitments clearly posted in the room, along with criteria for actions such as PI notification, removing the animals from the chamber, or reverting to ambient environmental conditions.

Chambers that have once or twice-daily monitoring by lab personnel and/or LARC must have a sheet in the room for recording those observations and readings. Records of adherence to maintenance and calibration must be readily available for LARC and IACUC staff and kept for 3 years. Long-term commitments (e.g., annual professional servicing every September) must be posted in the room.

References

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2. Gordon, C. (2012). Thermal Physiology of Laboratory Mice: Defining Thermoneutrality. *Journal of Thermal Biology* 37, 654-685.
3. *Guide for the Care and Use of Laboratory Animals (Eight Edition)*, Institute of Laboratory Animal Resources, National Academy Press, Washington, D.C., 2011.
4. Hankenson, F., et al. (2018). Effects of Rodent Thermoregulation on Animal Models in the Research Environment, *Comparative Medicine* 68 (6), 425-438.

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6. Jensen, F., et al. (1991) Epileptogenic effect of hypoxia in the immature rodent brain. *Ann Neurol* 29 (6), 629-37.
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9. Reeb, C., et al. (1997) Impact of Room Ventilation Rates on Mouse Cage Ventilation and Microenvironment. *Contemp Top Lab Anim Sci* 36 (1), 74-79.
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