

IACUC POLICIES, PROCEDURES and GUIDELINES

CALIBRATION AND CERTIFICATION OF GAS ANESTHETIC EQUIPMENT

Purpose:

This document establishes guidelines for the calibration and certification of gas anesthesia equipment at the University of Kentucky. Anesthetic vaporizers and gas anesthesia units are designed to deliver an accurate level of anesthetic vapor in a controlled and safe manner to animals to induce and reliably maintain anesthesia. The proper operation of these units is essential to minimize potential pain and suffering, to ensure the maintenance of reliable and safe anesthesia, and to minimize the potential of human health risks due to inadvertent exposure to anesthetic vapors.

Responsibilities:

All personnel using anesthetic equipment are responsible for maintaining the equipment in proper operating condition. The Attending Veterinarian of the University of Kentucky has overall responsibility for providing guidance to investigators and animal care personnel regarding anesthesia and analgesia.^{1,2} The Director, Environmental Health and Safety has overall responsibility for ensuring the provision of a safe workplace and compliance with the regulatory requirements of the Occupational Safety and Health Administration (OSHA).^{3,4,5} Finally, the Institutional Animal Care and Use Committee (IACUC) has an overall responsibility to minimize potential pain and distress and to ensure the provision of a safe workplace when animals are used.

General Guidelines:

a. Anesthetic Machine and Vaporizer Service

Before the use of an anesthetic machine, all parts and components must be inspected. Cracked, deteriorated or missing parts must be repaired or replaced. Anesthetic vaporizers and anesthesia units used in animal research must be periodically verified and calibrated to ensure proper operation. The primary standard for frequency of calibration shall be the manufacturer's written specifications. If manufacturer's recommendations are not available, the equipment must be validated at least annually for units delivering halothane and at least every two years for other units. If the equipment has been out of service for more than one year, it must be validated before putting it back in service.

Discoloration (yellowish-brown) in the "Fill" sight glass of a vaporizer may be an indicator for the need for service by an authorized service center. Other indicators might include cracked or damaged hoses, sticking valves

or knobs, animals not responding (as anticipated) to the level of anesthesia provided. Heavily used units may require more frequent calibration and service.

Certification and calibration must be done by qualified personnel or an authorized service center. Anesthetic machines and vaporizers must have documentation of the date of inspection with the initials of the technician performing the service.

The Division of Laboratory Animal Resources (DLAR) maintains a number of anesthetic units in experimental surgery and for use of investigators on a fee for use basis. These units are considered heavily used and are subject to annual on-site calibration and certification by qualified service center personnel.

The IACUC office, as a component of the semiannual facilities inspection and program evaluation, maintains a list of investigators with research animal anesthetic units located within their laboratory. Investigators are responsible for ensuring that the units are inspected, calibrated, and certified by qualified service center personnel either according to the manufacturer's written recommendations or annually for halothane units and biennially for other units. It is the responsibility of the IACUC, as a component of the semiannual facilities inspection to verify that all anesthetic units are properly calibrated and certified.

The IACUC office and DLAR shall attempt to notify all investigators of the date of the on-site certification of DLAR units so that they may elect to have their units similarly calibrated and certified at that time (the cost for certification and calibration is reduced but still the responsibility of the investigator). Investigators may independently contact an authorized service vendor to provide certification/calibration/repair services if desired or necessary for logistical reasons.

b. Waste Gas Scavenging Systems

An effective mechanism for waste gas scavenging is essential to reduce exposure from potentially harmful waste gases. Environmental Health and Safety performs random checks to assure that passive and active scavenger systems maintain safe exposure levels for personnel. Concerns regarding the effectiveness of anesthetic waste scavenging systems should be directed to Environmental Health and Safety who can assess the levels of waste anesthetic gas exposure and potential risk to personnel using the systems.

Active scavenging can be done by use of dedicated evacuation systems exhausted directly outside the building to the atmosphere and this is the preferred method of removing excess anesthetic gases.

Charcoal canisters such as F/Air[®] or Enviro-Pure[®] canisters may be used to absorb halogenated gases. When using charcoal canisters it is important to avoid obstructing the canister exit vents on the bottom of the canister and to orient the canister vertically for proper operation. A log indicating both the hours used and the initial starting weight of the canister must be kept on the canister or on a record sheet affixed to or near the anesthesia unit. The total hours of use and net weight gain should not exceed the manufacturer's recommendations (12 hours/50 grams for the F/Air[®] canister and 12 hours/75 grams for the Enviro-Pure[®] canister). The use of a monitor in the scavenging system (Pure-Guard[™]) eliminates the need to weigh the canisters and provides additional safeguards.

Soda lime/Baralyme CO₂ absorbers should be changed after 8 hours of use and sooner if a purple color is seen. The pH change of becoming saturated with CO₂ activates a change in the ethylene violet dye indicator contained in the absorbers. After time these indicators can change back to white-grey. The soda lime/baralyme in the absorber should be changed as soon as a color change is observed. Record the date changed on the absorber and on the record sheet affixed to the anesthesia machine.

Fume hood: Open drop anesthesia techniques must be conducted in a fume hood that has been tested and certified by Environmental Health and Safety.

References:

1. Guide for the Care and Use of Laboratory Animals, Institute of Laboratory Animal Resources, National Academy Press, Washington, D.C., 1996.
2. Animal Welfare Regulations, Code of Federal Regulations, Title 9 - Animals and Animal Products, Chapter 1 – Animal and Plant Health Inspection Service, Subchapter A – Animal Welfare
3. Occupational Health and Safety in the Care and Use of Research Animals, Institute of Laboratory Animal Resources, National Academy Press, Washington, D.C., 1997.
4. Hazard Communication Standards, Code of Federal Regulations, Title 29, Part 1910.1200 - Occupational Safety and Health Standards, Subpart Z - Toxic and Hazardous Substances.
5. Occupational Exposure to Hazardous Chemicals in Laboratories, Title 29, Part 1910.1450 - Occupational Safety and Health Standards, Subpart Z - Toxic and Hazardous Substances.
6. Criteria for a recommended standard occupational exposure to waste anesthetic gases and vapors; DHEW Pub. No. (NIOSH) 77-140, March 1977. www.cdc.gov/niosh/77-140.html

Approved and Adopted by the
Institutional Animal Care and Use Committee
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