Gas Anesthesia

Isoflurane

Isoflurane is an inhalant anesthetic agent that produces rapid induction and recovery from anesthesia. The depth of anesthesia can be easily and rapidly altered. Virtually no metabolism occurs in the body because isoflurane is almost completely eliminated in expired air. Liver microsomal enzymes are minimally affected which results in little interference with drug metabolism or toxicology studies.

Isoflurane is best used with an anesthetic machine fitted with a precision vaporizer to deliver controlled amounts of anesthetic and oxygen. The anesthetic can be delivered to the animal via an induction chamber, facemask or endotracheal intubation.

Less desirable, isoflurane can be delivered on cotton balls or cotton gauze in a closed container. Care should be taken to prevent the animal from coming in direct contact with the anesthetic. This is most commonly done to anesthetize an animal prior to a procedure that will result in euthanasia such as perfusion or intracardiac bleed. After the animal is anesthetized, it can be removed and a nosecone (50 ml conical tube) used to maintain anesthesia. The nosecone is fitted with isoflurane-wetted cotton. This method should be performed under a fume hood or negative pressure scavenging system unless the room air is 100% exhausted to the outside and there are at least 10 air changes per hour.

Vaporizers

The primary standard for vaporizer recalibration and certification is governed by the manufacturer's recommendations. If the manufacturer's recommendations are not available, the equipment must be validated at least every two years. If the equipment has been out of service for more than two years, it must be validated before being put into service. Certification consists of the inspection and approval of all mechanics associated with the vaporizer and anesthesia machine. Calibration includes scientific analysis of the emitted gas and insuring the accuracy of the concentration settings and subsequent correction as needed. Qualified personnel must be experienced in clinical equipment maintenance, service and certification. Vaporizers should have a certificate of the calibration date affixed after each service.

Discoloration (yellowish-brown) in the "Fill" sight glass of a vaporizer may be an indicator for the need for service. Other indicators might include cracked or damaged hoses, sticking valves or knobs, and animals not responding (as anticipated) to the level of anesthesia provided.

Scavenging systems

Waste anesthesia gas must be scavenged. Waste anesthetic gases may adversely affect liver, kidney and the central nervous system of chronically exposed personnel. The scavenging equipment must be maintained in good working order to ensure a safe working environment. Care should be taken to ensure the scavenging system does not compromise anesthetic delivery to the animal or contamination of the procedure area (aseptic conditions must be maintained for survival surgery of

any species). Active scavenging is preferred and can be done by use of dedicated evacuation systems or house vacuum, Placement of the exhaust gas line inside of a fume hood is acceptable.

Passive scavenging may be accomplished using a charcoal filter canister such as F/Air or Enviro-Pure. These canisters are not effective for capture of nitrous oxide (often added to an anesthesia regimen for relaxation). A log indicating the number of hours used should be maintained, often on the side of the canister. F/Air and Enviro-Pure canisters in use may not exceed 12 hours. An alternate methodology of monitoring canister life involves weighing the canister periodically after use and discarding the canister when there is a designated increase in the initial weight (50g for F/Air and 75 grams for the Enviro-Pure). F/Air and Enviro-Pure canisters must be used vertically (do not lay them on their side while in use) and suspended off of the table top. When using any charcoal canisters, it is important to avoid obstructing the canister exit vents on the bottom of the canister.

If so equipped, soda lime/Baralyme CO2 absorbers should be changed as soon as 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 date the absorber was changed should be noted on the machine.

Quality Assurance
The Division of Environmental Safety, Sustainability and Risk (ESSR) performs random checks by request to assure that passive and active scavenger systems maintain safe exposure levels for personnel.

Before using an anesthetic machine, all parts and components must be inspected. Cracked, deteriorated or missing parts must be repaired or replaced. Correct hose connections should be ensured by briefly operating the machine without contact with an animal

Calibration Services
Atlantic Biomedical 410 518-9900
Eagle Eye Anesthesia - 800-760-6976
IGN Medical - 888-256-2723
Vetamac - 800-334-1583
Ronco Technical Services, Inc. - 800-635-2006
NLS Animal Health vaporizer exchange program. *(NLS will send a new vaporizer to be switched out with the old vaporizer)*: 724-944-6209