Dartmouth College
Animal Care and Use Program
Institutional Animal Care and Use Committee

IACUC Policies and Procedures

Title: Euthanasia of Rodents Using Carbon Dioxide

Purpose: The Public Health Service policy states the methods of euthanasia must be consistent with the methods listed in the AVMA Panel on Euthanasia. Dartmouth College and Medical School fully support and comply with this Panel. The purpose of this policy is to provide an overview of the use of Carbon Dioxide as a method of Euthanasia for Dartmouth Investigators. It is not meant to replace the Full Text of the report.

Euthanasia techniques should result in rapid loss of consciousness followed by cardiac or respiratory arrest and the ultimate loss of brain function. In addition, the technique should minimize distress and anxiety experienced by the animal prior to loss of consciousness. For death to be painless and distress-free, loss of consciousness should precede loss of motor activity (muscle movement). Loss of motor activity, however, cannot be equated with loss of consciousness and absence of distress. Signs of effective CO2 anesthesia are those associated with deep surgical anesthesia, such as loss of withdrawal and palpable reflexes.

This adoption of this policy will affect all Animal Subject Review Forms (ASRF) approved after April 1, 2004. All information in this policy has been paraphrased from the 2000 AVMA Panel guidelines.

Policy: Animals placed together in chambers should be of the same species, and, if needed, should be restrained so that they will not hurt themselves or others. Chambers should not be overloaded and need to be kept clean to minimize odors that might distress animals subsequently euthanized.

Compressed CO2 gas in cylinders, or through an in-house distribution center, is the only allowed source of carbon dioxide. The euthanasia chamber should be clear to allow visualization of the animal. Initially, only "room air" should be in the chamber. With (an) animal(s) in the chamber, an optimal flow rate should displace at least 20% of the chamber volume per minute. Incomplete filling of a chamber may permit animals to climb or raise their heads above the higher concentrations and avoid exposure since CO2 is heavier than air. Gas flow should be maintained for at least 1 minute after apparent clinical death. It is important to verify that an animal is dead before removing it from the chamber and prior to disposal. Death should be verified by the absence of a palpable heartbeat. If an animal is not dead, CO2 narcosis must be followed with another method of euthanasia, such as cervical dislocation or thoracotomy.

Neonatal rodents (P7 or younger) have a great capacity for holding their breath and anaerobic metabolism. Therefore, induction of anesthesia and time to loss of consciousness when using inhalants may be greatly prolonged. Other techniques such as decapitation may be more appropriate for this age.

All personnel responsible for administering CO2 euthanasia must be appropriately qualified and adhere to IACUC approved protocols and institutional policies. Training in the use of the equipment and appropriate methods of euthanasia is available from the ARC.