

## USE OF CARBON DIOXIDE (CO<sub>2</sub>) AS A EUTHANASIA AGENT

### Purpose/Scope

The purpose of this Standard Operating Procedure (SOP) is to outline the IACUC's procedure regarding use of carbon dioxide (CO<sub>2</sub>) as a euthanasia agent.

### Background

The Office of Laboratory Animal Welfare (OLAW) has determined a need to issue Public Health Service Policy on Humane Care and Use of Laboratory Animals (PHS Policy) guidance to Assured institutions clarifying current requirements regarding the use of carbon dioxide (CO<sub>2</sub>) as a euthanasia agent for small laboratory animals (i.e., small rodents). PHS Policy (<http://grants.nih.gov/grants/olaw/references/phspol.htm>) requires Institutional Animal Care and Use Committees (IACUCs) to determine that methods of euthanasia utilized in research proposals are consistent with the Report of the American Veterinary Medical Association Panel on Euthanasia (<http://www.avma.org/resources/euthanasia.pdf>) (AVMA Panel Report), unless a deviation is justified for scientific reasons in writing by the investigator. IACUC approval of such deviations must be project-specific and include critical review of assertions of scientific necessity. IACUCs may not otherwise disregard or issue blanket waivers of applicable AVMA Panel Report recommendations.

### Policy

Methods of euthanasia used in research proposals must be consistent with the latest Report of the American Veterinary Medical Association Panel on Euthanasia (<http://www.avma.org/resources/euthanasia.pdf>). CO<sub>2</sub> remains an acceptable method for euthanasia for all animal species as noted in the AVMA guidelines under the following conditions:

- pre-filling the chamber is recommended only under circumstances in which such use has been shown not to cause distress
- animal death is verified after euthanasia and prior to disposal to prevent unintended recovery
- individuals administering CO<sub>2</sub> euthanasia are trained and qualified
- chambers are not overcrowded
- compressed CO<sub>2</sub> in cylinders is the only source of CO<sub>2</sub> used for euthanasia.

Although CO<sub>2</sub> when properly administered is generally considered an acceptable euthanasia agent for small laboratory rodents, its acceptability is predicated on the following:

- High concentrations of CO<sub>2</sub> may be distressful to some species. Accordingly, pre-filling the chamber is recommended only under circumstances in which such use has been shown not to cause distress. Although conclusive data are not available for all species, IACUCs and veterinary staff should keep abreast of current peer-reviewed scientific literature and apply informed professional judgment to the design of institutional policies for CO<sub>2</sub> delivery systems and procedures, keeping in mind the

imperative to avoid or minimize discomfort, distress, and pain when consistent with sound scientific practices.

- Death must be verified after euthanasia and prior to disposal. Unintended recovery must be obviated by the use of appropriate CO<sub>2</sub> concentrations and exposure times or by other means. OLAW notes that thoracotomy after apparent death from CO<sub>2</sub> is one way to ensure the irreversibility of the procedure.
- Institutions must ensure that all individuals responsible for administering CO<sub>2</sub> euthanasia are appropriately qualified and monitored, and that they adhere to IACUC-approved protocols and institutional policies.
- Chambers must not be overcrowded. In this regard, it is important to consider also that mixing unfamiliar or incompatible animals in the same container may be distressful.
- Compressed CO<sub>2</sub> in cylinders is the only AVMA Panel-recommended source of CO<sub>2</sub> for euthanasia purposes.