

## Euthanasia

Proper euthanasia technique includes a follow-up exam to confirm death or the absence of a heartbeat. Monitoring respiration is not considered sufficient since with some euthanasia techniques heartbeat may be maintained after visible respiration has ceased.

The need to minimize fear and apprehension must be considered in determining the method of euthanasia. Distress vocalizations, fearful behavior, and release of certain odors or pheromones by a frightened animal may cause anxiety and apprehension in other animals. Therefore, whenever possible, animals should not be exposed to euthanasia of others.

The euthanasia methods listed in the table below are consistent with the American Veterinary Medical Association (AVMA) Panel of Euthanasia, 2007.

<b>Method of Euthanasia</b>	<b>Comments</b>
Carbon dioxide	Acceptable method
Phentobarbital overdose (> 130 mg/kg IV, IP)	Acceptable method
Inhalant Anesthetic overdose	Acceptable method
Exsanguinations of an anesthetized animal	Acceptable method
Decapitation of an anesthetized animal	Acceptable method
Cervical dislocation of anesthetized animal	Acceptable method
Decapitation in awake animal	Acceptable only with scientific justification in writing on the IACUC protocol and subsequent IACUC approval
Cervical dislocation of an awake animal	Acceptable only with scientific justification in writing on the IACUC protocol and subsequent IACUC approval

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

The euthanasia chamber should not be prefilled with CO<sub>2</sub> since high concentrations (>70%) can cause nasal irritation, discomfort, and excitability. Rather, the animals should first be placed into the chamber, followed by the addition of CO<sub>2</sub> at a low flow rate (i.e. a rate sufficient to displace approximately 20% of the chamber volume per minute) to complete the process. In general the low flow rate can be assessed if a very low hissing sound is heard as the chamber is filled with CO<sub>2</sub>. Rapid gas flows should be avoided since excessive noises can develop and induce excitement and distress the animals. In addition, exposure to high CO<sub>2</sub> concentrations is painful as the CO<sub>2</sub> mixes with the moisture in the nasal passages to form carbonic acid. Gas flow should be maintained for at least 2 minutes after apparent clinical death (i.e. at least one minute after the animal has quit breathing). Unintended recovery must be obviated by the use of appropriate CO<sub>2</sub> concentrations and exposure times, and followed by a physical method such as cervical dislocation (in <200 g rats), bilateral toracotomy, exsanguinations, or decapitation.

According to the 2007 Report of the AVMA Panel on Euthanasia, 'Compressed CO<sub>2</sub> gas in cylinders is the only recommended source of carbon dioxide because the inflow to the chamber can be regulated precisely. CO<sub>2</sub> generated by other methods such as from dry ice, fire extinguishers, or chemical means is unacceptable'. Only one species at a time should be placed into a chamber, and the chamber must not be overcrowded. When placed into the chamber, all animals must have floor space. Euthanasia should always be done in cohorts (live animals should not be placed in chamber with dead animals). Chambers should be kept clean to minimize odors that might distress animals prior to euthanasia. Animals must not be euthanized in animal housing rooms, except under special circumstances such as during quarantine for infectious disease agents.