



## *Institutional Animal Care and Use Committee Guidelines and Policies*

*Approved December 21, 2005; Updated 4-19-06*

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### **GUIDELINES FOR EUTHANASIA OF LABORATORY ANIMALS**

The objective of euthanasia of laboratory animals is to provide a swift and painless death to the animal while ensuring the safety of laboratory personnel. Some general considerations for euthanasia include the ability to induce quick loss of consciousness and death without inducing pain or distress, reliability and irreversibility of the method, safety of personnel and compatibility with desired experimental outcomes. General modes of euthanizing agents act via different mechanisms (hypoxia, central nervous system depression, physical disruption of brain activity) and, dependent on the animal species, some may be more acceptable methods. For a detailed and thorough description of different methods, doses and species acceptability, refer to the 2000 Report of the AVMA Panel on Euthanasia (JAVMA 218:669-696, 2001): <http://www.avma.org/resources/euthanasia.pdf>

Below is a table summarizing the acceptable and conditionally acceptable methods of euthanasia for species currently within the BRF.

	<u><b>Acceptable</b></u>	<u><b>Conditionally acceptable</b></u>
<b>Rodents</b>	barbiturates <sup>1</sup> , carbon dioxide, inhalational anesthetics, KCl in conjunction with general anesthetic	decapitation <sup>2</sup> cervical dislocation
<b>Rabbits</b>	barbiturates <sup>1</sup> , carbon dioxide, inhalational anesthetics, KCl in conjunction with general anesthetic	decapitation <sup>2</sup> cervical dislocation
<b>Swine</b>	barbiturates <sup>1</sup> , carbon dioxide, KCl in conjunction with general anesthetic	inhalational anesthetics
<b>Amphibians</b>	tricaine methane sulfonate (TMS), benzocaine hydrochloride, double pithing	decapitation, pithing

<sup>1</sup>sodium pentobarbital should be used at dosages 4-5 times higher than the anesthetic dose for euthanasia.

<sup>2</sup>To use decapitation on non-anesthetized animals, personnel must be properly trained in this technique; the need to use this method must be scientifically justified; guillotines and scissors must be sharp and maintained on a regular basis. See additional comments at the end of this document.



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### **Inhalant Agents:**

**NOTE: Scavenging of these agents is required:**

- Halothane, enflurane, isoflurane, sevoflurane, methoxyflurane and desflurane with or without nitrous oxide are acceptable for animals < 7 kg.
- Nitrous oxide should not be used alone.

### **Carbon dioxide\***

Acceptable for most species. Compressed carbon dioxide gas is supplied in cylinders. Flow rate should be 20% of chamber volume/minute and the chamber should not be pre-filled. **Dry ice is not allowed** as a CO<sub>2</sub> source because of a lack of flow rate control. **A secondary, physical method of ensuring death is required** (for example, cervical dislocation, decapitation, opening the thoracic cavity).

*\*See Guideline on Use of Carbon Dioxide for Euthanasia of Small Laboratory Animals for additional information.*

### **Noninhalant Pharmaceutical Agents:**

#### **Barbiturates**

*Pentobarbital* – 200 mg/kg iv is sufficient for euthanasia of most lab animal species. Intraperitoneal injection may be used in situations where this approach would cause less stress than iv injection.

*Sodium secobarbital* - 88 mg/kg iv may also be used for euthanasia of most species. Intraperitoneal injection may be used in situations where this approach would cause less stress than iv injection.

**Potassium chloride** – 1-2 mmol/kg iv or intracardiac delivery. This method is NOT acceptable in *unanesthetized* animals. When used after general anesthesia is obtained, this agent is acceptable for most species.

**NOTE: An secondary, physical method of assuring death is always recommended. For example, decapitation, cervical dislocation or opening the thorax should be considered. This is to ensure that no animal assumed dead will “revive” in a freezer or other disposal location. A secondary method is absolutely required in the case of carbon dioxide use.**



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### **Physical methods:**

**Cervical dislocation** – This is a humane technique for mice, for rats (<200g) and rabbits (<1 kg) *when performed by trained personnel.*

**Decapitation** – Used for rodents and small rabbits in research settings. Technique should be performed by trained personnel on anesthetized animals. Use of plastic cones may be useful in minimizing restraint stress to the animals. If this method is used without pre-anesthesia, proper training must be documented and scientific justification provided. Guillotines should be appropriate for the species and scheduled maintenance and inspections of the equipment is needed.

Neonatal rodents less than 7 days of age may be decapitated with sharp scissors without prior anesthesia. *See Guideline on Euthanasia of Neonatal Animals for additional information.*

**Exsanguination** – NOT accepted as the sole means of euthanasia. It should be used only when animals are previously rendered unconscious with a general anesthetic.

Acceptable methods recommended by the AVMA and cited above do not require scientific justification in the IACUC Animal Use Protocol. Conditionally acceptable methods are not the preferred methods and do require justification in the IACUC Animal Use Protocol. Any methods not listed above are unacceptable and the use of any unacceptable method is strongly discouraged. However, there may be unusual circumstances requiring the use of these methods; strong scientific justification should be provided in the IACUC Animal Use Protocol and a veterinary consult should be included.

### **GENERAL CONSIDERATIONS:**

Whenever possible, animals should not be exposed to euthanasia of others, especially of their own species. Many species, including rodents, react adversely to the smell of blood and animals should never be decapitated in the presence of other animals. Ideally, the person performing decapitation should change gloves and clean the guillotine of blood between animals. Distress vocalizations, fearful behavior, and release of certain odors or pheromones by a frightened animal can cause anxiety, apprehension and stress in other animals which can be avoided. In addition to ensuring a more humane death, good euthanasia practices will reduce the possibility of adverse physiologic changes in other animals (such as a release of hormones and alterations in brain chemistry) which could affect research results.