

University of Cincinnati
Animal Care and Use Program

Physical Euthanasia Guidelines

The American Veterinary Medical Association (AVMA) sets best practice standards for how animals are euthanized in the United States and in some circumstances internationally in the “AVMA Guidelines for Euthanasia”¹. The AVMA considers performing physical methods of euthanasia (e.g. cervical dislocation, decapitation) without prior administration of anesthesia conditionally acceptable and humane when no other appropriate alternatives exist. Additionally, personnel should be trained on anesthetized or dead animals to demonstrate proficiency.

Conditional Approval for Euthanasia without Anesthesia

You may only perform physical methods of euthanasia without anesthesia if:

- 1) The Principal Investigator (PI) lists this procedure (and related justification as part of experimental design for scientific reasons) on their *approved* IACUC protocol and,
- 2) The researcher(s) performing physical methods of euthanasia without anesthesia receive appropriate training as described in the ACUP training policy, *prior* to performing the technique.

To verify if physical methods of euthanasia without anesthesia are approved on your IACUC protocol:

- 1) Login to the [Research Administration Portal \(RAP\) website](#).
- 2) Click on the IACUC protocol you want to review.
- 3) Select the **Experiments** tab, then search (Ctrl + F) the page for “%without anesthesia”.
- 4) Results will display the physical method of euthanasia that is approved by UC’s IACUC without anesthesia.

Example below:

History	Experiments	Animal Counts	Documents	Reviews	Contacts	Snapshots	Training	Amendments	...												
<table border="1"> <thead> <tr> <th>Name</th> <th>Species</th> <th>USDA Total Pain Category</th> <th>Common Procedures</th> </tr> </thead> <tbody> <tr> <td>Mouse Euthanasia</td> <td>Mouse</td> <td>no 120 B: 0, C: 0, D: 120, E: 0</td> <td> <ul style="list-style-type: none"> • Euthanasia - Cervical Dislocation Without Anesthesia - Mouse (Standard - Euthanasia) • Euthanasia-Physical-Decapitation Without Anesthesia-Mouse (Standard - Euthanasia) </td> </tr> <tr> <td>Rat Euthanasia</td> <td>Rat</td> <td>no 120 B: 0, C: 0, D: 120, E: 0</td> <td> <ul style="list-style-type: none"> • Euthanasia-Physical-Decapitation Without Anesthesia-Rat (Standard - Euthanasia) </td> </tr> </tbody> </table>										Name	Species	USDA Total Pain Category	Common Procedures	Mouse Euthanasia	Mouse	no 120 B: 0, C: 0, D: 120, E: 0	<ul style="list-style-type: none"> • Euthanasia - Cervical Dislocation Without Anesthesia - Mouse (Standard - Euthanasia) • Euthanasia-Physical-Decapitation Without Anesthesia-Mouse (Standard - Euthanasia) 	Rat Euthanasia	Rat	no 120 B: 0, C: 0, D: 120, E: 0	<ul style="list-style-type: none"> • Euthanasia-Physical-Decapitation Without Anesthesia-Rat (Standard - Euthanasia)
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Required Training for Euthanasia without Anesthesia

All researchers performing physical methods of euthanasia without anesthesia must receive appropriate training **prior** to performing the technique. The PI is responsible for assuring all staff members whose duties include a physical method of euthanasia without anesthesia receive training and are competent to perform these procedures. Training may be provided by LAMS Veterinary Staff or an approved lab endorsed trainer:

- 1) **LAMS Veterinary Staff:** To schedule a training appointment contact animaltraining@uc.edu
- 2) **Endorsed Trainer:** All endorsed trainers are required to undergo training or audit by LAMS prior to being certified as endorsed trainers for their respective labs.
 - a. Trainers who have received endorsement and are conducting training sessions for their lab members are required to submit documentation of the training to animaltraining@uc.edu.

- b. Recertification for endorses trainers will be conducted every three years via an in-person audit by LAMS or authorized auditor.

Physical Methods of Euthanasia without Anesthesia

The two most common methods of physical euthanasia without anesthesia are **cervical dislocation** and **decapitation** (sometimes referred to as “live decap”). LAMS Veterinary Staff recommends that inexperienced researchers carefully observe experienced researchers and practice on either anesthetized or dead animal carcasses before attempting the method on an unanesthetized animal. When initially performing the procedure on an unanesthetized animal, it should be performed under the direct supervision of experienced personnel.

Physical Method	Cervical Dislocation	Decapitation
How it Works	Hypoxia due to disruption of vital centers	Hypoxia due to disruption of vital centers
Mode of Action	Direct depression of the brain	Direct depression of the brain
Rapidity	Moderately rapid	Rapid
Ease of Performance	Requires training and skill	Requires training and skill
Personnel Safety	Safe	Guillotine poses potential injury hazard
Species Suitability	<ul style="list-style-type: none"> • Adult mice (all sizes and weights) • Rats weighing $\leq 200\text{g}$ (~ 7 weeks old) 	<ul style="list-style-type: none"> • Mouse/rat neonates: use a scalpel, single edge razor blade, or sharp scissors • Mouse/rat adults: use a guillotine
Efficacy/Comments	Irreversible; violent muscle contractions may occur post-mortem	Irreversible; violent muscle contractions may occur post-mortem

Due to the anatomy and tissue integrity of neonates, attempts at cervical dislocation often result in blunt decapitation. Therefore, neonates should be euthanized without anesthesia using decapitation via scalpel, single edge razor blade, or sharp scissors.

Performing the Cervical Dislocation Procedure

- 1) Restrain the rodent in a sternal upright position on a firm flat surface, grasping the base of the rodent’s tail with your dominant hand.
- 2) Using your non-dominant hand, place a sturdy metal tool (e.g. thick edge of cage card holder, closed pair of scissors or hemostats) against the back of the rodent’s neck at the base of the skull.
- 3) In a quick and deliberate motion, simultaneously push down and forward with the metal tool against the rodent’s head while pulling straight backward with your dominant hand holding the base of the rodent’s tail, using sufficient force to cause dislocation. The rodent should immediately be rendered unresponsive.
- 4) Verify dislocation effectiveness by feeling for a distinct separation of the cervical spinal vertebrae with your gloved fingertips. The spinal cord will usually sever between the occipital condyles at the base of skull and the first cervical vertebra, leaving a palpable separation or notch at this site. Occasionally, dislocation may occur between thoracic vertebrae, but this will also be palpable.

- 5) Visually confirm that respiratory arrest has occurred and verify for the absence of heartbeat by palpating the thorax.

Performing the Decapitation Procedure

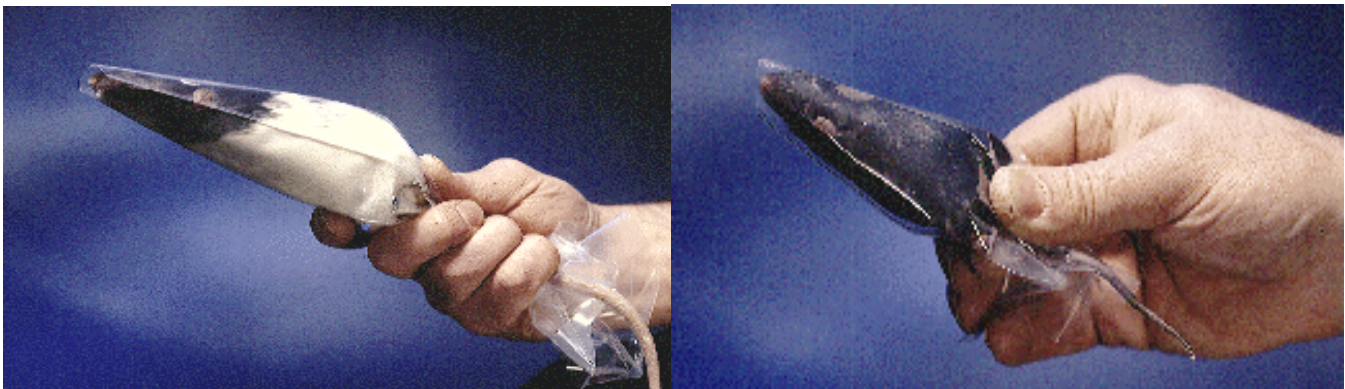
An important aspect of successful decapitation is ensuring the animal is in a calm, cognizant demeanor to reduce distress when handling. Reducing distress in animals is largely dependent on the researcher exhibiting calm and confident behavior and selecting a quiet environment to perform the procedure.

Creating a Reduced Stress Environment for Decapitation

- 1) Select and maintain a quiet stress-free environment where the procedure will be performed.
- 2) Eliminate any excessive noise (e.g. unnecessary talking above a whisper, laughing, loud/startling sounds).
- 3) If more than one animal is to be euthanized via decapitation:
 - a. Place housing cages containing live animals as far away as possible from the decapitation procedure area, or even in another room or space outside the room. Minimize the amount of time live animals are in the same area as those being decapitated.

Performing Decapitation

- 1) Open the guillotine blades to the ready position, creating a cavity between the blades to position the animal's neck. Remove one rodent at a time from the home cage to be carried directly to the guillotine.
- 2) Safely restrain the animal and secure the animal's forelimbs against its torso to prevent the animal's limbs from getting caught in the guillotine during decapitation. If you experience problems holding and positioning the animal, consider using plastic decapitation sleeves.



Pictured above: a rat (left) and mouse (right) securely restrained in a plastic decapitation sleeve.

- 3) Position the animal's neck at the proper position within the blade cavity. **Double check to ensure that the animal's limbs and personnel fingers are not in the direct path of the blades.**
- 4) Push down on the handle that closes the guillotine blades with sufficient force and speed to make a fast and thorough cut through the animal, ending in the stop position.

Guillotine Maintenance

Guillotines should be thoroughly cleaned after use with detergent and water, then receive a final rinse with 70% ethanol (or other alcohol-based disinfectant). Dry the guillotine in an inverted, upside-down position with the blades open to facilitate drying. Apply a lubricating oil to the articulating surfaces after air drying. If you transport the guillotine between approved areas (e.g. from a satellite lab space to a LAMS animal procedure room), thoroughly disinfect the entire guillotine after it has been successfully transported to each location.

Guillotine blades must be kept sharp at all times. The frequency of blade sharpening will depend on the frequency of use, number of animals, and the species undergoing decapitation. Either a trained lab member or sharpening service may sharpen the blades. You must keep a dedicated instrument record (e.g. notebook, log sheet) for each guillotine that documents the date and nature of service (e.g. sharpening and articulation joint service repairs). This documentation must be available for review by the IACUC during semi-annual inspections or upon request. An extra set of blades or a secondary guillotine are recommended if your primary guillotine is heavily used; it also doubles as a backup if you need to perform this procedure when your primary guillotine is being serviced.

Guillotine Safety

- 1) Always ensure fingers and hands are clear of the blade path.
- 2) Only trained personnel should operate, perform maintenance on, disassemble, and clean guillotines.
- 3) Dull or old blades should be discarded in an approved sharps container.

References

1. AVMA Guidelines for the Euthanasia of Animals: 2020 Edition.
<https://www.avma.org/sites/default/files/2020-01/2020-Euthanasia-Final-1-17-20.pdf>