



# Dartmouth College

## Institutional Animal Care and Use Committee

### IACUC Guidelines

**Title:** Guidelines for Blood Collection

**Guideline**

Too much blood collected at any one time may cause hypovolemic shock, physiological stress and even death. If smaller volumes are collected too frequently, anemia may result.

As a general rule, 20% of the total blood volume can be collected at one time every 2-4 weeks, or 1% at more frequent intervals of 24 hours or more. The total blood volume can be calculated as approximately 6% of body weight. The estimated volume at exsanguination is approximately half of the total blood volume.

**Mice**

To improve vasodilation effects in rodents, it is helpful to warm the entire patient. This can be accomplished in 10-15 minutes at 40°C with a special commercially available warming chamber. Care should be taken to prevent overheating.

The choice of anesthetics is an important consideration when collecting blood from rodents due to physiologic effects of the anesthetic. Consult with the ARC veterinarian. If you are not experienced in blood collection techniques, training is required.

- Total blood volume = 6% of lean body weight.
- Maximum blood collection = 10% of total blood volume every two (2) weeks.

**Example**

- 30gm mouse = 0.03 kg x 0.06 = 1.8 ml x 0.10 = 0.18 ml

Collection Site	Advantages	Disadvantages
Lateral tail vein	<ul style="list-style-type: none"> <li>▪ Anesthesia not required</li> <li>▪ Vein is easily accessed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Must be securely restrained</li> <li>▪ Yields only small quantities</li> <li>▪ Some specialized equipment needed</li> </ul>
Orbital Sinus or Plexus	<ul style="list-style-type: none"> <li>▪ Large volume of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anesthesia is required</li> <li>▪ Requires training</li> <li>▪ Potential eye or conjunctiva damage</li> </ul>
Lateral Saphenous Vein	<ul style="list-style-type: none"> <li>▪ Anesthesia not required</li> <li>▪ Excellent technique for serial blood sampling</li> <li>▪ Moderate volume of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Requires some specialized training</li> <li>▪ Some specialized equipment needed.</li> </ul>
Submandibular	<ul style="list-style-type: none"> <li>▪ Anesthesia not required</li> <li>▪ Vein is easily accessed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Requires some specialized training—ARC can provide training</li> <li>▪ Goldenrod lancets needed</li> </ul>

Cardiac Puncture	<ul style="list-style-type: none"> <li>▪ Maximum volume of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Requires deep anesthesia</li> <li>▪ Non-survival procedure only</li> </ul>
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### Rabbits

- Total blood volume = 6% of lean body weight
- Maximum blood collection = 20% of total blood volume every 2 -4 weeks

### Examples

- 4 lb rabbit = 1.80 kg x 0.06 = 108 ml x 0.20 = 21.6 ml
- 6 lb rabbit = 2.72 kg x 0.06 = 163 ml x 0.20 = 32.6 ml
- 8 lb rabbit = 3.60 kg x 0.06 = 216 ml x 0.20 = 43.2 ml
- 10 lb rabbit = 4.50 kg x 0.06 = 270 ml x 0.20 = 54.0 ml

Rabbits may follow the above bleeding schedule as long as packed cell volume (PCV) and total plasma proteins (TPP) are monitored. The occurrences of anemia, hypoproteinemia, or unthriftiness require appropriate supplementation and a rest from further bleeds. The duration of this rest will be determined by the attending veterinarian. Animals should be weighed weekly if on the above bleeding schedule and their weights recorded appropriately.

Collection Site	Advantages	Disadvantages
Marginal Ear Vein.	<ul style="list-style-type: none"> <li>▪ Anesthesia not required</li> <li>▪ Vein is easily accessed</li> <li>▪ Yields small - moderate quantities of blood</li> </ul>	<ul style="list-style-type: none"> <li>▪ Must be securely restrained</li> <li>▪ Some specialized equipment is needed</li> <li>▪ Topical anesthetic is recommended</li> </ul>
Central Ear Artery	<ul style="list-style-type: none"> <li>▪ Large quantities of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Topical anesthesia is strongly recommended (due to the possibility of arterial spasm)</li> <li>▪ Training recommended</li> </ul>
Lateral Saphenous Vein	<ul style="list-style-type: none"> <li>▪ Anesthesia not required</li> <li>▪ Collection of small quantities of blood</li> </ul>	<ul style="list-style-type: none"> <li>▪ Training recommended</li> <li>▪ Some specialized equipment needed</li> </ul>
Cephalic Vein	<ul style="list-style-type: none"> <li>▪ Anesthesia not required</li> <li>▪ Collection of small quantities of blood</li> </ul>	<ul style="list-style-type: none"> <li>▪ Training recommended</li> <li>▪ Some specialized equipment needed</li> </ul>
Jugular Vein	<ul style="list-style-type: none"> <li>▪ Large quantities of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anesthesia is recommended</li> <li>▪ Requires specialized training</li> </ul>
Anterior Vena Cava	<ul style="list-style-type: none"> <li>▪ Maximum quantity of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Requires anesthesia</li> <li>▪ Requires skill</li> <li>▪ Risk of cardiac tamponade</li> </ul>
Cardiac Puncture	<ul style="list-style-type: none"> <li>▪ Maximum quantity of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Requires deep anesthesia</li> <li>▪ Non survival procedure only</li> </ul>

### Rats

To improve vasodilation effects in rodents, it is helpful to warm the entire patient. This can be accomplished in 10-15 mm at 40°C with a special commercially available warming chamber. Care should be taken to prevent overheating.

The choice of anesthetics is an important consideration when collecting blood from rodents due to physiologic effects of the anesthetic. Consult with an ARC veterinarian. If you are not experienced in blood collection techniques, training is recommended. If you have questions or comments about any of the above techniques, contact an ARC veterinary staff at [Animal.Resources.Center@Dartmouth.edu](mailto:Animal.Resources.Center@Dartmouth.edu).

- Total blood volume = 6% of lean body weight.
- Maximum blood collection = 10% of total blood volume every 2 weeks.

**Example**

- 250gm rat= 0.25 kg x 0.06 = 15 ml x 0.10 = 1.5 ml

Collection Site	Advantages	Disadvantages
Lateral tail vein	<ul style="list-style-type: none"> <li>▪ Anesthesia not required</li> <li>▪ Vein is easily accessed</li> <li>▪ Yields moderate quantities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Must be securely restrained</li> <li>▪ Some specialized equipment needed</li> <li>▪ Can use Goldenrod lancet</li> </ul>
Ventral Tail Artery	<ul style="list-style-type: none"> <li>▪ Large quantities of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anesthesia is required</li> <li>▪ Requires training</li> </ul>
Orbital Sinus or Plexus	<ul style="list-style-type: none"> <li>▪ Large volume of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anesthesia is required</li> <li>▪ Requires training</li> </ul>
Lateral Saphenous Vein	<ul style="list-style-type: none"> <li>▪ Anesthesia not required</li> <li>▪ Excellent technique for serial blood sampling</li> <li>▪ Large quantities of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Requires some specialized training</li> <li>▪ Some specialized equipment needed.</li> </ul>
Anterior Vena Cava	<ul style="list-style-type: none"> <li>▪ Large quantities of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anesthesia is required</li> <li>▪ Requires specialized training</li> </ul>
Cardiac Puncture	<ul style="list-style-type: none"> <li>▪ Maximum volume of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Requires deep anesthesia.</li> <li>▪ Non-survival procedure only</li> </ul>

**Terminal Blood Withdrawal**

Terminal bleeds are only allowed on animals under general anesthesia, and the animal's death must be verified at the end of the bleed. An alternative euthanasia method is recommended after the blood withdrawal.

A general rule: An animal's blood volume is 10 percent of its body weight, and only about half of that can be recovered when the animal is bled out. Therefore, as a terminal bleed, 5-6 percent of an animal's body weight is a reasonable amount of blood (ml) that may be collected at exsanguination.