

**UNIVERSITY OF CALIFORNIA SAN DIEGO  
INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE**

**Guidelines for Blood Collection**

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.

**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.

*Some Guidelines for specific species begin on the next page*

## Guidelines for Blood Collection in Mice

To improve vasodilation effects in rodents, it is helpful to warm the entire patient. This can be accomplished in 10-15 min 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 ACP 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 ACP veterinary technician at [vetservices@acp.ucsd.edu](mailto:vetservices@acp.ucsd.edu).

Total blood volume = 6% of lean body weight.

Maximum blood collection = 10% of total blood volume every two (2) weeks.

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

Collection Site	Advantages	Disadvantages
<b>Lateral tail vein</b>	<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>
<b>Orbital Sinus or Plexus</b>	<ul style="list-style-type: none"> <li>Large volumes of blood can be collected</li> </ul>	<ul style="list-style-type: none"> <li>Anesthesia is required</li> </ul>
<a href="#"><u>Lateral Saphenous Vein</u></a>	<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 required.</li> </ul>
<b>Submandibular Lancet</b>	<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 required.</li> </ul>
<ul style="list-style-type: none"> <li>Please see the following site for a <a href="#"><u>demonstration</u></a> in lateral saphenous blood collection from mice.</li> </ul>		
<ul style="list-style-type: none"> <li><b>Cardiac Puncture</b></li> </ul>	<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>

## Guidelines for Blood Collection in 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 occurrence 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
<b>Marginal Ear Vein</b>	<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>
<b>Central Ear Artery</b>	<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>
<b>Lateral Saphenous Vein</b>	<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>
<b>Cephalic Vein</b>	<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>
<b>Jugular Vein</b>	<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>
<b>Anterior Vena Cava</b>	<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>
<b>Cardiac Puncture</b>	<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</li> </ul>

## Guidelines for Blood Collection in Rats

To improve vasodilation effects in rodents, it is helpful to warm the entire patient. This can be accomplished in 10-15 min 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 ACP 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 ACP veterinary technician at [vetservices@acp.ucsd.edu](mailto:vetservices@acp.ucsd.edu).

Total blood volume = 6% of lean body weight.

Maximum blood collection = 10% of total blood volume every 2 weeks.

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

Collection Site	Advantages	Disadvantages
<b>Lateral tail vein</b>	<ul style="list-style-type: none"> <li>• Vein is easily accessed</li> <li>• Anesthesia not required</li> <li>• Yields moderate quantities</li> </ul>	<ul style="list-style-type: none"> <li>• Specialized equipment is needed</li> <li>• Animal must be securely restrained</li> </ul>
<b>Ventral Tail Artery</b>	<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>
<b>Orbital Sinus or Plexus</b>	<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>
<b>Lateral Saphenous Vein</b>	<ul style="list-style-type: none"> <li>• Large quantities of blood can be collected</li> <li>• Anesthesia not required</li> <li>• Excellent technique for serial sampling</li> </ul>	<ul style="list-style-type: none"> <li>• Requires training</li> </ul>
<b>Anterior Vena Cava</b>	<ul style="list-style-type: none"> <li>• Large quantities can be collected</li> </ul>	<ul style="list-style-type: none"> <li>• Requires anesthesia</li> <li>• Requires specialized training</li> </ul>
<b>Cardiac Puncture</b>	<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</li> </ul>