



POLICY

TITLE:	Blood Collection
Policy Number:	2014-004
Responsible Department:	Institutional Animal Care and Use Committee
Policy Contact:	IACUCOffice@westernu.edu
Approval Date:	6/11/14
Reviewed Date:	4/12/17; 1/29/2020
Revised Date:	4/12/17 (deleted silver nitrate, added styptic powder; added facial vein and tail tipping for blood collection); 1/29/2020 (Refined conditions for blood draws from retro-orbital sinus)

Purpose of Policy: To ensure that the collection of blood from laboratory animals is performed in a manner that does not compromise the overall well-being of laboratory animals and is compatible with the research objectives.

Policy Information: Blood collection must be done in a manner that minimizes pain and distress to the animal. All procedures used for blood collection must be approved by the Institutional Animal Care and Use Committee (IACUC) and any person performing the procedure must be properly trained in the technique used. The Attending Veterinarian can provide guidance and training on blood collection procedures. The guidelines below are for normal, healthy animals so be aware that aged animals or animals that are stressed, have undergone an experimental procedure or suffer from a disease state or some other pathology might not tolerate the volumes or frequencies of blood collection described below.

The maximal permissible volume of blood that can be collected from a survival animal is equivalent to 1.25% (1.25 ml/100 g) of the animal's body weight at the time of collection. The frequency of blood collection will depend on the volume collected each time. If the maximal permissible volume is collected in one draw, this volume may be collected only once every 2 weeks. Multiple smaller volumes may be collected provided that the total volume collected in a 2 week period does not exceed 1.25% of the animal's current body weight. Collection of blood above the recommended volumes can lead to physiologic stress, anemia, hypovolemic shock and death. When determining the amount of blood that can be safely collected, the phlebotomist must know the approximate circulating blood volume of the particular species. The circulating blood volume (CBV) is species-specific and is generally be estimated as 5.5-7% (55-70 ml/kg) of total body weight. This can be used to determine the total blood volume (TBV) of an animal. However, in sick, pregnant, obese and geriatric animals the percent of total blood volume may be as much as 15% lower as compared to a healthy animal. Withdrawal of larger volumes or more frequent collections will require rigorous scientific justification and may require monitoring the animal for anemia.

The following rules apply to the collection of blood from laboratory animals:

- Amputating digits for blood collection is not permitted as it is not consistent with the humane treatment of laboratory animals.
- Survival blood collections do not require general anesthesia as long as a peripheral blood vessel is used.
- Cardiac puncture may only be done under anesthesia as part of a non-survival procedure.
- Blood collection from the retro-orbital sinus requires anesthesia. Afterwards, an antibiotic ophthalmic ointment must be applied to both eyes to prevent desiccation and infection unless a short-term anesthetic such as isoflurane is used. In this case, the antibiotic ointment need only be applied to the affected eye. Serial sampling over several minutes or hours is not permitted as it can lead to hemorrhage, inflammation and infection. In addition, there must be a minimum of two weeks between blood collections from the retro-orbital sinus and alternate eyes must be used at each draw.
- Animals must not be returned to their home cages until complete hemostasis, as evidenced by a lack of bleeding either externally or under the skin (e.g., bruising or hematoma formation) has been achieved either by using gentle digital pressure on all sites or styptic powder on all sites except the retro-orbital sinus/plexus. Styptic powder must not be used on open wounds greater than 2mm in size. Animals with evidence of hematomas or significant bruising following phlebotomy must be brought to the attention of the Attending Veterinarian (AV) and may receive analgesia at the AV's discretion.
- Terminal phlebotomy must be performed under general anesthesia and death must be verified at the completion of the collection.
- Methods of collection other than those listed below or deviations from any of the above rules require scientific justification and IACUC approval.

Recommended Blood Collection Sites in laboratory Animals

- **Mouse:** tail vein or artery, tail tipping, lateral saphenous vein, facial vein, retro-orbital sinus, cardiac
- **Rat:** tail vein or artery, saphenous vein, retro-orbital plexus, lateral saphenous vein, cardiac
- **Guinea pig:** ear vein, saphenous vein, anterior vena cava (under general anesthesia), cardiac
- **Hamster:** ear vein, saphenous vein, anterior vena cava (under general anesthesia), cardiac

Information on other species may be found at <http://www.nc3rs.org.uk/our-resources/blood-sampling>.