Institutional Animal Care & Use Program - UTEP	
Title: Blood Collection: Maximum Volumes and Fluid Replacement	
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In Effect ☒ **Rescinded** ☐	**Date Rescinded**:

A. RESPONSIBILITIES

It is the responsibility of all personnel conducting research involving the use of animals at The University of Texas at El Paso (UTEP) to abide by this policy in order to ensure appropriate animal welfare. It is the responsibility of the Institutional Animal Care and Use Committee (IACUC) to review for approval, properly justified requests for an exception to this policy.

B. BACKGROUND

This Policy describes industry standards for blood collection in laboratory animals. If an investigator wishes to deviate from this policy, all changes must be outlined and justified in the protocol application (approval of the protocol indicates approval of the deviation from the policy for that protocol only).

Blood collection must be performed in such a manner that the animal's health is not compromised. Collection of excessive blood volume can lead to severe decreases in blood pressure, shock, and death. Hemostasis must be ensured.

C. POLICY

The purpose of this policy is to outline requirements for faculty animal research investigators who designate animal-related procedures to a Co-I and naïve animal PI(s) with no animal use experience wishing to become active animal researchers.

D. GENERAL INFORMATION

1. Single blood draw

a. up to10% of the animal's total blood volume can be taken once evey two weeks (Table 1 – Best Practice) **2.** Multiple blood draws

b. up to 15% of the animal's total blood volume can be taken through multiple samplings over a 2-week period.

c. If 20% blood volume is collected over a 2-week period through multiple

samplings, double fluid replacement must be administered (see #4 below).

3. Exsanguination

a. The animal must be anesthetized or euthanized prior to terminal blood collection.

4. Fluid replacement

a. When blood is withdrawn above the maximum amount (10% blood volume), fluid replacement must be implemented.

b. Two times the blood volume removed should be replaced with appropriate isotonic fluids (.9% saline or lactated ringers or similar). For example, if 0.27mL of blood is collected from a 25g mouse (representing 15% of blood volume), then 0.5mL fluids must be administered.

c. Subcutaneous and intraperitoneal (IP) routes of administration of the fluids are generally used. In emergency situations where blood volume needs to be rapidly increase, fluids can be given intravenously

5. Blood volume calculations

a. Total blood volume (mL) = animal's weight (g) X 0.06

b. 10% maximum allowable sample = total blood volume (mL) = X 0.10

6. Hypovolemic shock

a. Single blood collection samples above 15% of total blood volume are not recommended due to potential for hypovolemic shock

b. Clinical signs include: fast, thready pulse; pale mucous membranes; cold skin and extremities restlessness; hyperventilation; subnormal body temperature

E. APPENDIX

Table 1. Blood collection percentage and associated recovery periods. These are minimum recovery periods and the actual recovery time should be assessed based on the individual animal's condition.

Single Sample Collection		**Multiple Sample Collection**	
% circulatory blood volume removed	Approximate recovery period	% Circulatory blood volume removed	Approximate recovery period
7.5%	1 Week	7.5%	1 Week
10%	2 Weeks	10%	2 Weeks

15%	4 Weeks	20%	4 Weeks

Table 2. Total blood and sample volumes for species with specific body weight (i.e. volume estimates are based on the example body weight)

Species	Total Blood Volume	Example Animal Weight	Total Blood Volume	7.5%	10% (max single sample)	15%	20%
Mouse	72 mL/kg	25 g	1.8 ml	0.14 mL	0.18 mL	0.27 mL	0.36 mL
Rat	64 mL/kg	250 g	16 ml	1.2 mL	1.6 mL	2.4 mL	3.2 mL

*For mature, healthy animals with an adequate plane of nutrition.

Table 3. Sites for blood collection

Species	Site of Colleciton
Mouse/Rat	Cardiac (terminal only), retro-orbital sinus* (anesthetized only), tail vein, saphenous vein, facial vein, distal tail transection (1-3mm, anesthesia required)

If retro-orbital collection is necessary, the following guidelines apply:

- General anesthesia is required
- Application of a topical ophthalmic anesthetic during/after collection should be considered to provide post-procedural analgesia.
- Only one eye may be sampled at any time
    - If repeated sampling within 8 hours is necessary, the retro-orbital sinus may be re-sampled by disrupting the blood clot without repeated damage to the sinus, provided the 24-hour maximum blood collection limits are not exceeded. Please consult with veterinary staff for demonstration and training of proper technique to reduce risk of trauma.

- Alternate between left and right eyes per session
- No more than 1 collection performed per 7 days; therefore 14 days between collections in the same eye
- A maximum of 3 procedures may be performed per eye (up to 6 collections total)

F. REFERENCES

- BVA/FRAME/RSPCCA/UFAW Joint Working Group on Refinement. 1993.Removal of blood from laboratory mammals and birds (first report). Laboratory Animals; 27:1-22.
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- Martin, Brent J. The Laboratory Cat. The Laboratory Animal Pocket Reference Series. CRC Press. 1998.
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