

SOP #: 701.02Title: **SOP -** Collection of Blood Samples

Approvals:

Attending Veterinarian

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Date:

03/01/20191. Purpose

1.1 The intent of this procedure is to describe the recommended methods, volume and frequency of blood collection from commonly used laboratory animal species.

2. Responsibility

2.1 Principal Investigators,

2.2 Laboratory technicians.

3. Definitions

3.1 Homeostasis: The ability or tendency of an organism or cell to maintain internal equilibrium by adjusting its physiological processes.

3.2 Cholinergic: capable of liberating acetylcholine, especially in the parasympathetic nervous system.

3.3 Hematoma: A localized swelling filled with blood resulting from a break in a blood vessel.

4. Guidelines

## 4.1 Materials needed for blood collection

4.1.1 Clippers, betadine swabs and alcohol prep pads

4.1.2 Appropriate needle and syringe (refer to the SOP for the test that the blood is being drawn for).

- 4.1.3 Appropriate materials needed for the test that the blood is being drawn for (refer to the SOP for that test).

#### 4.2 Animal Preparation:

- 4.2.1 Using the clippers, shave the chosen blood draw site
- 4.2.2 If the blood is being drawn with a small gauge needle (25G or smaller) the shaved area is cleaned with alcohol wipes.
- 4.2.3 If the blood is being drawn with a larger gauge needle (23G or larger) the shaved area is first cleaned with a Betadine swab followed with the alcohol wipe.

#### 4.3 Collecting the Blood Sample: Summary of the advantages and disadvantages of the various methods of blood sampling

<b>ROUTE/ VEIN</b>	<b>General Anesthesia</b>	<b>Tissue damage</b>	<b>Repeat bleeds</b>	<b>Volume</b>	<b>Species</b>
<b>Marginal ear</b>	<b>no</b>	<b>low</b>	<b>yes</b>	<b>++</b>	<b>rabbit</b>
<b>Cephalic</b>	<b>no</b>	<b>low</b>	<b>yes</b>	<b>++</b>	<b>rabbit</b>
<b>Saphenous/lateral tarsal</b>	<b>no</b>	<b>low</b>	<b>yes</b>	<b>++</b>	<b>mouse/rat/rabbit</b>
<b>Lateral tail</b>	<b>no</b>	<b>low</b>	<b>yes</b>	<b>+</b>	<b>mouse/rat</b>
<b>Facial vein/artery (Mandibular)</b>	<b>no</b>	<b>low</b>	<b>yes</b>	<b>+++</b>	<b>Mouse</b>
<b>Anterior Vena Cava</b>	<b>No (small) Yes</b>	<b>Low/moderate</b>	<b>no</b>	<b>+++</b>	<b>Pig</b>

#### 4.4 Recommendations on Blood Withdrawal and Recovery Periods

- 4.4.1 Volume collected must be reduced if the animal is weak, ill, old, fat or anemic.
- 4.4.2 Removal of 10% of the circulating blood volume will initiate homeostatic cholinergic mechanisms. If 15-20% of the volume is removed, cardiac output and blood pressure will be reduced. Removal of 30-40% of the volume can induce hemorrhagic shock and 40% loss can cause 50% mortality in rats.
- 4.4.3 Smaller volumes removed at too frequent intervals will cause anemia. It is recommended to replace collected blood volume by 2 times the volume of blood

collected with isotonic fluids (i.e., fluids with same tonicity as blood, such as 0.9% saline, 5% dextrose or Lactate Ringer solution)

- 4.4.4 Do not puncture a site presenting inflammation or a hematoma and limit the number of punctures to four punctures per day with no more than two punctures per site. Whenever possible, use a catheter for multiple sampling.

This table shows the blood volume (ml/kg) for various laboratory animals used at FIU:

Species	Blood Volume (ml/kg)	
	Recommended mean*	Range of means
Mouse	72	63-80
Rat	64	58-70
Rabbit	67	67
Pig	72	65-80

\*The recommended mean corresponds to the midpoint of the range of means

- 4.4.5 These tables show the maximum volume of blood which can be collected at once or over a 24-hour period and the corresponding recovery time during which the animal should not be collected again (based on the percentage of total blood volume collected). For instance, for a mouse, the sum of blood volumes collected over 24 hours cannot exceed 0.4 mL and the animal cannot be collected again before 4 weeks.

Maximum Volumes and Recovery Period			
Single Sampling	Recovery period in weeks	Multiple Sampling (24 hours)	Recovery period in weeks
7.5 %	1	7.5 %	1
10%	2	10%	2
15%	3	15%	4

Species	Total Blood Volume (mL)	7.5% (mL)	10% (mL)	15% (mL)	20% (mL)
Mouse (25 g)	1.8	0.1	0.2	0.3	0.4
Rat (250 g)	16	1.2	1.6	2.4	3.2
Rabbit (5 kg)	335	25	33	50	67
Pig (20 kg)	1440	108	144	216	288

5. References

5.1 Diehl, K.-H. et al., "A Good Practice Guide to the Administration of Substances and Removal of Blood, Including Routes and Volumes" J. Applied. Toxicology., 21, 15–23 (2001)

6. Revisions

6.1 Rev 01 (March 2019) – added pigs to the sop.