UNIVERSITY OF NORTH CAROLINA
CHARLOTTE

Animal Care and Use Program

SOP: Rodent Blood Collection

Objective:	To establish guidelines for survival bleeding of mice and rats
Author:	Attending Veterinarian, Laboratory Animal Resources
Date:	February 22, 2021

Guidelines for Survival Bleeding of Mice and Rats

These guidelines have been developed to assist investigators in their choice and application of survival rodent bleeding techniques. The guidelines are based on peer-reviewed publications as well as on data and experience accumulated at, and shared by, the NIH. The Investigator and veterinary staff should decide which method of blood withdrawal to use.

As with any procedure, training is critically important. The comfort and level of skill of an investigator with a procedure, as well as the sample volume and frequency of sampling should be considered when choosing a method. It is the responsibility of both the investigator and IACUC to ensure use of techniques and procedures which result in the least pain and distress to the animal, while adequately addressing the needs of the experimental design.

Exceptions to these guidelines, e.g., increase in blood volume to be collected or retro-orbital bleeding without use of anesthesia as outlined below, should be scientifically justified in the Protocol and approved by the IACUC.

Training and experience in the chosen procedure are of paramount importance. Training opportunities and resources, including access to experienced investigators and veterinarians, must be made available to new personnel. The procedures utilized must be reviewed and approved by the IACUC prior to their implementation.

Factors to consider in choosing the blood withdrawal technique for the protocol:

- The species to be bled.
- The size of the animal to be bled and the estimated total blood volume.
- The type of the sample required (e.g. serum, whole cells, etc.).
- The quality of the sample required (sterility, tissue fluid contamination, etc.)
- The quantity of blood required.
- The frequency of sampling.
- The health status of the animal being bled.
- The training and experience of the individual collecting the blood.
- The effect of restraint or anesthesia on the blood parameter measured.

The acceptable quantity and frequency of blood sampling is dependent on the circulating blood volume of the animal and the red blood cell (RBC) turnover rate‡. The approximate circulating blood volume of rodents is 55 to 70 ml/kg of body weight. Of the circulating blood volume, approximately 10% of the total volume can be safely removed every 2 to 4 weeks, 7.5% every 7 days, and 1% every 24 hours.

‡RBC life span of the mouse: 38-47 days. RBC life span of the rat: 42-65 days.

Volumes greater than recommended should be justified in the protocol and appropriate fluid and/or cellular replacement provided. Blood sample ranges, based on body weight, are provided in **Table 1.**

Table 1: Approximate Blood Sample Volumes for a Range of Body Weights

Body weight (g)	***CBV (ml)**	**1% CBV (ml)** *every 24 hrs†*	**7.5% CBV (ml)** *every 7 days†*	**10% CBV (ml)** *every 2 – 4 wks†*
20	1.10 - 1.40	.011 - .014	.082 - .105	.11 - .14
25	1.37 - 1.75	.014 - .018	.10 - .13	.14 - .18
30	1.65 - 2.10	.017 - .021	.12 - .16	.17 - .21
35	1.93 - 2.45	.019 - .025	.14 - .18	.19 - .25
40	2.20 - 2.80	.022 - .028	.16 - .21	.22 - .28
125	6.88 - 8.75	.069 - .088	.52 - .66	.69 - .88
150	8.25 - 10.50	.082 - .105	.62 - .79	.82 - 1.0
200	11.00 - 14.00	.11 - .14	.82 – 1.05	1.1 - 1.4
250	13.75 - 17.50	.14 - .18	1.0 – 1.3	1.4 - 1.8
300	16.50 - 21.00	.17 - .21	1.2 – 1.6	1.7 - 2.1
350	19.25 - 24.50	.19 - .25	1.4 – 1.8	1.9 - 2.5

* Circulating blood volume † Maximum sample volume for that sampling frequency

Questions regarding rodent blood collection techniques should be directed to the Attending Veterinarian, or the Director, Laboratory Animal Resources.

References

NIH Animal Research Advisory Committee (ARAC), "Guidelines for Blood Collection in Mice and Rats" (https://oacu.oir.nih.gov/sites/default/files/uploads/arac-guidelines/b2_blood_collection_in_mice_and_rats.pdf)

Revision History

Approved February 22, 2021
Administrative changes September 17, 2022