

Rodent Blood Collection Guidelines

The maximum volume of blood that one can take from a rodent at any one time varies with the desired frequency of sampling. In general, the more blood that is taken, the longer one must wait before the rodent can be sampled again. **The maximum that can be collected as a non-terminal blood collection without replacement fluids is 10% of the total circulating blood volume of a healthy animal. If 10% is taken, one must wait 2 weeks before taking more blood unless otherwise approved by the Purdue Animal Care and Use Committee. If 7.5% of the circulating blood volume is collected, one must wait one week before taking more blood. If 1% of the circulating blood volume is collected, one must wait 24 hours before taking more blood.** On average, the total circulating blood volume is equal to 5.5 - 7% of the animal's body weight. If larger amounts are needed, then up to 15% of the total circulating blood volume may be withdrawn if replacement fluids are given at the time of blood withdrawal. Removal of 15% of total blood volume must be justified in the animal protocol and approved by the PACUC. (See table below).

Background

The limitations for blood collection preserve the health status of the animal and maintain the validity of experimental results based on blood samples. The guidelines provided are for healthy, normal adult animals. Animals that are young, aged, stressed, have undergone experimental manipulations, or are suffering from cardiac or respiratory disease may not be able to tolerate this amount of blood loss.

Rodent Guidelines

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

Body weight (g)	*CBV(ml) Circulating Blood Volume	1% CBV (ml) every 24 hrs†	7.5% CBV (ml) every 7 days†	10% CBV (ml) every 2 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

References:

NIH Guidelines for Survival Bleeding of Mice and Rats

Approved by PACUC September 2016

*Circulating blood volume

†maximum sample volume for that sampling frequency

Common Blood Collection Sites in Mice and Rats

For training on any of the techniques below please contact the Purdue Training Coordinator at 765-494-9163 or 765-494-2521.

Submandibular veins or Facial vein blood collection in mice

Blood collection from the submandibular facial vein is a safe and fast technique in mice. It requires momentary hand restraint and approximately 200ul of blood can easily be obtained from a healthy adult mouse. Repeated sampling is possible by alternating sides of the face. With this method, you must be careful to NOT take too much blood! Training is necessary before this procedure is performed. http://www.medipoint.com/html/directions_for_use1.html

Lateral Tail Vein or Ventral Tail Artery Sampling

This method can be used in both rats and mice. Blood samples can easily be obtained by superficially nicking the vessel perpendicular to the tail. Sample collection is easily performed in both species, but produces a sample of variable quality that may be contaminated with tissue and skin products. Repeat collections are possible. Materials needed include a sterile hypodermic needle, blood collection tubes and gauze. Good hemostasis is required, especially if the artery is used!

Lateral Saphenous Vein Sampling

This method can easily be used in both mice and rats. Remove the hair, apply a small amount of petroleum jelly, apply tourniquet to occlude the vessel and “pump” the foot to aid in visualization of the vessel, puncture the vessel perpendicular to the leg and collect blood into your collection tube. Once blood is collected, remove the tourniquet and apply pressure to the vessel with gauze at the puncture site. This is a great site for serial sampling by alternating legs and if samples are only hours apart, the scab can usually be removed to start the blood flow again.

Jugular Vein Sampling (limited to rats)

This technique is suitable for obtaining medium to large volumes of blood. With experience, this method allows for a high quality blood sample. This method can be conducted without anesthesia; however, use of anesthesia greatly facilitates the procedure. This method does not easily lend itself to serial sampling. Care must be taken to avoid formation of a hematoma. Always apply pressure to puncture site for a minimum of 30 seconds!

Retro-orbital Sinus/Plexus sampling

References:

NIH Guidelines for Survival Bleeding of Mice and Rats

Approved by PACUC September 2016

Used in anesthetized mice and rats. Method involves penetrating the retro-orbital sinus in mice or plexus in rats with a capillary tube or Pasteur pipette. This method can yield medium to large blood samples, but may result in eye trauma. Multiple samples can be obtained by alternating eyes.

Cardiocentesis

Blood collection by cardiac puncture can yield a large sample amount, is a terminal procedure and should be performed only after ensuring that the animal is under deep anesthesia. Fluid replacement is not necessary for this terminal procedure.

References:

NIH Guidelines for Survival Bleeding of Mice and Rats

Approved by PACUC September 2016