

Procedure Type: Blood Collection

Procedure Title: Blood Collection in Conscious Rats Species: Rat,
Domestic

Pain/Distress Category: C

Procedure Description: (select all that apply)

	Site	Procedural Description
<input type="checkbox"/>	Tail vein or artery	<p>General blood withdrawal guidelines: Rats have an average circulating blood volume of 64 ml/kg (0.064 ml/g x 200 g rat = 12.8 ml circulating blood volume for a 200 g rat). 7.5% of the circulating blood volume can be safely removed with a recovery period of 7 days. If blood must be drawn more frequently, it may be divided into several draws, but the total amount withdrawn should not exceed 7.5% of the circulating blood volume per week.</p> <p><u>Procedural Steps:</u></p> <p>Syringe Method -</p> <ol style="list-style-type: none">1. Restrain rat in rodent restraint apparatus.2. Warm tail to dilate vessels (heat lamp, warm water, or warm compress).3. Moisten venipuncture site with alcohol.4. Using a 23g or smaller needle on a 1 cc syringe, line up the needle, bevel facing up, with the vessel, and gently insert into lumen of vessel.5. Gently pull back on the plunger and let blood slowly fill the syringe.6. Remove needle and apply pressure to site with gauze pad until bleeding stops. <p>Tail Nick Method –</p> <ol style="list-style-type: none">1. Restrain rat in rodent restraint apparatus.2. Warm tail to dilate vessels (heat lamp, warm water, or warm compress)3. Moisten venipuncture site with alcohol.4. Puncture the vessel with a 21 g needle.5. Collect sample into a pipette via capillary action or allow blood to drop into a microcentrifuge or blood collection tube.6. Apply gentle pressure to puncture site with a gauze pad until bleeding stops. <p>Potential Adverse Events: Excessive bleeding, hematoma formation, tissue trauma, or infection.</p>
<input type="checkbox"/>	Jugular	<p>General blood withdrawal guidelines: Rats have an average circulating blood volume of 64 ml/kg (0.064 ml/g x 200 g rat = 12.8 ml circulating blood volume for a 200 g rat). 7.5% of the circulating blood volume can be safely removed with a recovery period of 7 days. If blood must be drawn more frequently, it may be divided into several draws, but the total amount withdrawn should not exceed 7.5% of the circulating blood volume per week.</p> <p>Note: This technique requires two people <u>and</u> requires a high degree of competence! Care must be taken not to impede breathing.</p>

	Jugular (cont.)	<p>Procedural Steps:</p> <ol style="list-style-type: none"> 1. Scruff the rat by firmly grasping the loose skin over the neck/shoulder region with your thumb and index finger; gently turn your hand so that the rat is lying comfortably in the palm of your hand; use your free hand to hold the front legs back with your thumb, and gently extend the head back between the index and middle finger, with your index finger resting on the rat's chin. 2. A second person clips the ventral aspect of the neck and moistens the venipuncture site with alcohol. 3. The restrainer applies light pressure to the vein with their thumb, just proximal to the venipuncture site, to make the vessel easier to visualize. 4. Using a 21 g, 1" needle on a 1-3 cc syringe, the syringe is inserted into the jugular vein at a 30 degree angle, with the syringe directed towards the hind end of the rat. 5. Gently pull back on the plunger and let blood slowly fill the syringe. 6. Remove needle and apply pressure to site with gauze pad until bleeding stops. <p>Potential Adverse Events: Excessive bleeding, difficulty breathing, hematoma formation, tissue trauma, or infection.</p>
☐	Lateral saphenous	<p>General blood withdrawal guidelines: Rats have an average circulating blood volume of 64 ml/kg (0.064 ml/g x 200 g rat = 12.8 ml circulating blood volume for a 200 g rat). 7.5% of the circulating blood volume can be safely removed with a recovery period of 7 days. If blood must be drawn more frequently, it may be divided into several draws, but the total amount withdrawn should not exceed 7.5% of the circulating blood volume per week.</p> <p>Note: This technique generally requires two people.</p> <p>Procedural Steps:</p> <ol style="list-style-type: none"> 1. Restrain rat by either placing in a commercially available Decapicone® bag or placing your hand firmly over the back and rib cage and restraining the head with your thumb and forefinger immediately behind the mandibles; turn the rat on its side, and with your other hand, extend the uppermost hind leg, applying gentle pressure above the knee joint so that the lateral saphenous vessel is visible. 2. Moisten the venipuncture site with alcohol, followed by sterile ophthalmic ointment, and part the hair to visualize vessel. 3. Puncture vessel with 25-27g needle in a swift, lancing motion; blood will flow from site. 4. Collect sample into a pipette via capillary action or allow blood to drop into a microcentrifuge or blood collection tube. 5. Release pressure on leg and apply gentle pressure to venipuncture site with a gauze pad until bleeding stops. 6. Removal of the scab will enable serial sampling. <p>Potential Adverse Events: Excessive bleeding, hematoma formation, tissue trauma, or infection.</p>

Procedure Endpoints:

Hemostasis will be verified before returning any animal to their home cage. Blood collection amounts and frequency will not exceed stated guidelines.

Early Euthanasia Criteria:

Rats will be examined immediately following blood collection and weekly thereafter, for general appearance and activity level, as well as potential adverse events based on blood collection method (see above). If moribund, or if any other abnormal signs are noted, the rat will be euthanized immediately.

Literature Search for Alternatives:

Key Words	Search Site	Years Covered
Saphenous, tail vein, jugular, blood collection, rat, alternatives, refinement	PubMed, SCOPUS	1991-[insert current year here]