

# Blood Collection Procedures for Rats and Mice

## 1) Lateral Saphenous Vein Sampling (hindlimb)<sup>1</sup>

- \* Can be used in rats and mice, guinea pigs, hamsters, and gerbils by piercing the saphenous vein with a 20 gauge needle and collecting blood in a capillary tube or pipette.
- \* Obtainable blood volumes: small to medium.
- \* Repeated/serial sampling is possible.
- \* Variable sample quality.
- \* The procedure is usually done on an awake, well restrained animal. Commercial restraining devices are available for rodents, but many homemade devices work just as well. If using a closed tube, remember to open holes near the nose for ventilation. Towels can be used to restrain larger rodents.
- \* Site must be clipped and sterile petroleum jelly applied over the vein prior to puncture to assist the blood to bead rather than spread over the skin.
- \* The vein should be visualized and punctured by a jab of a needle held perpendicular to the vein.
- \* Site clots/scabs can be gently pulled to provide small daily samples.
- \* This is demonstrated on the web at:  
<<[http://www.uib.no/vivariet/mou\\_blood/Blood\\_coll\\_mice\\_.html](http://www.uib.no/vivariet/mou_blood/Blood_coll_mice_.html)

## 2) Mandibular (Facial vein/artery)<sup>2</sup> Sampling:

- \* Limited to adult mice.
  - \* Obtainable blood volumes: medium to large.
  - \* Repeated sampling is possible by alternating sides of the face.
  - \* Sample may be a mixture of venous and arterial blood.
  - \* Requires less hands-on training than tail or retro-orbital sampling to rapidly withdraw a reasonable quantity of blood.
  - \* Perform on awake animals to achieve proper restraint which in turn results in proper site alignment and venous compression for good blood flow.
  - \* Can be performed rapidly with a minimum amount of equipment.
- Sample volume can be partially controlled with the size of the needle used to puncture the site.
- Excessive bleeding can be avoided by using a 19-gauge or smaller size needle
- Bleeding stops when mouse is released.

## 3) Lateral Tail Vein or Ventral Dorsal Artery Sampling or Tail Nick:

- \* Can be used in rats by cannulation of the blood vessel and mice by nicking the vessel superficially perpendicular to the tail. Only use the tail artery if larger volumes are

needed to avoid the need for prolonged hemostasis.

- \* Obtainable blood volumes: vein: small artery: large
- \* Sample collection produces a sample of variable quality that may be contaminated with tissue and skin.
- \* Sample quality decreases (more hemolysis) with prolonged bleeding times and "milking" of the tail.
- \* Effective restraint is required on awake animals.
- \* Using a tourniquet or warming the tail with warm compresses will increase obtainable blood volume.
- \* Snipping off the distal portion of the tail for the purposes of collecting blood is NOT recommended.

#### 4) Cardiocentesis (cardiac puncture):

Approximately 60% of total blood volume can be obtained as a terminal procedure through percutaneous cardiocentesis in anesthetized rodents. The two approaches to the heart are from the lateral left side and midline under the sternum aiming the needle toward the heart. Animal must be anesthetized.

#### 5) Retro-orbital Sinus/Plexus Sampling:

The Animal Studies Committee does not recommend the method of retro-orbital puncture for the collection of blood in rodents for serial sampling. With serial sampling, the procedure has been associated with histopathological changes in orbital tissues of rats that included hemorrhage and inflammation of the retro-orbital periosteum, eye muscles and Harderian gland.<sup>3</sup>

- \* Can be used in both rats and mice (though not usually the method of choice in the rat) by penetrating the retro-orbital plexus/sinus with a glass capillary tube or Pasteur pipette. The presence of a plexus rather than a sinus in the rat can lead to greater orbital tissue damage than in the mouse.
- \* This is recognized to be a humane procedure that produces minimal, transient distress in the hands of a skilled technician. If unskilled, the procedure has a greater potential to result in complications than other blood collection procedures.
- \* A large number of mice can be bled rapidly with this procedure.
- \* A medium to large volume of blood can be collected.
- \* Not amenable to frequent repeated sampling from the same orbit.
- \* Limit collection to one eye only.
- \* If conducted in conscious mice, a topical ophthalmic anesthetic solution should be used prior to the procedure, but it is preferable to use general injectable or gas anesthesia such as Isoflurane when possible. Due to pain and distress issues, retro-orbital sampling in the rat should always be conducted under general anesthesia.
- \* Expect a good sample quality, but take into account the potential contamination with ophthalmic anesthetic solution.

\* In all rodents, care must be taken to ensure adequate hemostasis following the procedure by applying gentle pressure to the eye for one minute.

\* Sterile capillary tubes are always recommended to avoid periorbital infection and potential long term damage to the eye. The edges of the capillary tubes should be smooth to decrease the likelihood of eye damage.

## References

1. Hem, A., Smith, A. J. and P. Solberg, Saphenous vein puncture for blood sampling of the mouse, rat, hamster, gerbil, , ferret and mink. *Laboratory Animals* (1998) 32: 364-368. Full text available online at: <http://www.lal.org.uk/pdf.htm>
2. Van Herck H., Baumans V., Van der Craats N. R., et al. Histological changes in the orbital region of rats after orbital puncture. *Laboratory Animals* (1991b) 26: 53-58.