# Lateral Tail Vein Injection in Mice and Rats (Preferred Technique For Vascular Access in Mice)

**IACUC Standard Procedure**
**Effective Date: November 2023**

UCSF Office of Research
Institutional Animal Care and Use Program

## Description of procedure:

The most accessible vessels for intravenous administration in rodents are veins that run the length of both lateral aspects of the tail. Contact the IACUC office for one-on-one training sessions.

**Supplies:**

- Sterile 27-30 gauge needles for mice
- Sterile 25-27 gauge needles for rats
- 500uL to 1ml syringe for mice is recommended
- 1ml or 3ml syringes for rats
- Heating device
- Gauze sponges
- Isoflurane Anesthesia System (recommended)

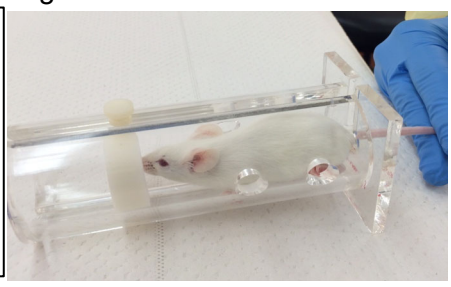
Note: It is highly recommended that new users of this technique anesthetize the animals while conducting this procedure until proficiency is obtained.

**Procedure Steps:**

1. Weigh each animal before injection. Up to 1% of the animal's body weight but no more than 0.2ml in volume can be administered per injection.
2. Record body weights and agent volumes to be administered for each animal.
3. Prior to injection, warm animal for 5-10 minutes to dilate the veins. Animal may be warmed by placing the animal in a commercially available warming box, brass restrainer (Figure 1) or by using a warm water circulating pad placed under the cage. These are the safest and most effective ways to warm rodents. If an overhead heat lamp is used, extra care must be taken to prevent overheating the animal.
4. When anesthesia is administered, position the animal on its side on a rodent safe heat source to maintain thermoregulation during anesthesia. Apply eye lubricant if anesthesia takes more than 5 min.
5. Conscious animals need to be restrained using a commercially available restraint device of appropriate size (Figure 2). A prewarmed brass restrainer* provides heat for vasodilation, reducing the need for prewarming mice in a cage. The duration of the restraint should be kept to a minimum, and the equipment washed frequently to prevent pheromone-induced stress or cross contamination. Rodents sometimes spin in the restrainer; be sure to confirm orientation and location of the lateral tail vein before performing injections.

Figure 1.

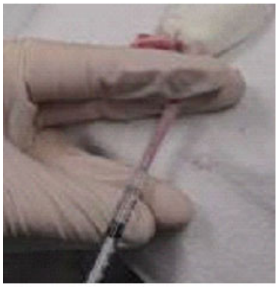
Figure 2.



6. With the dominant hand, hold the syringe near the plunger so that the remaining fingers can easily push the agent into the vessel without disrupting the needle in the vein.
7. Syringes should be prepped with no air bubbles. One syringe and needle are recommended per animal. Needles should be sharp and replaced after two attempts. Insert the needle (small gauge, 27-30 for mice and 25-27 for rats), bevel up, into the vein towards the direction of the head. Keep the needle and syringe parallel to the tail. Aspiration is not advised as it may cause the vein to collapse, but a flash of blood in the hub of the needle may be seen when first placed. Proper placement may not be verifiable until injection occurs, but when placed correctly the needle should advance smoothly into the vein. Slowly inject. No resistance should be felt when depressing the plunger. If there is resistance and/or a blister or white area appears above the needle on the tail, the needle should be removed and re-inserted above the first site.

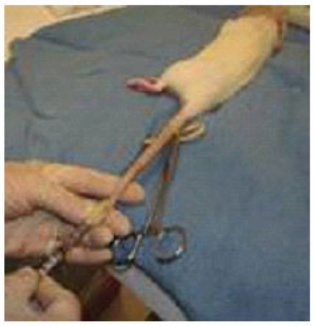
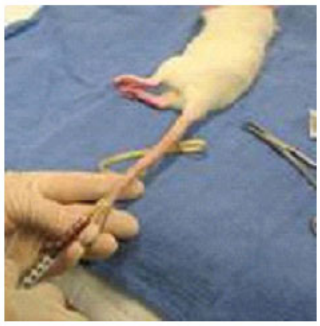
***Additional instructional detail:***

*Mouse:*



*Grasp the tail at mid-length or at the distal (further down the tail) end. The index and middle fingers of the non-dominant hand are placed around the tail above where the needle will be inserted (digital pressure will act as a tourniquet). The lower part of the tail is held between the thumb and ring finger below the injection site. Put slight tension on the tail by applying pressure with both sets of fingers. Needle should enter the vein at a shallow depth, keeping syringe and needle parallel to tail. Release pressure to the proximal fingers before administering the agent into the vein. Note: With mice, elevating the animal about 4-6 inches off the table may be helpful with keeping the needle and syringe parallel to the vein.*

*Rat:*

*A tourniquet is used to constrict the vein to allow visualization and access to the vein for injection mid-length or at the distal (further down the tail) end. A tourniquet is made with a rubber band wrapped around the top of the tail and held together firmly with a hemostat. The tourniquet is released before the agent is administered into the vein.*

*Note: With brown or black mice and rats, an additional light source may be necessary to aid in visualizing the tail veins. Rats have scales making the vein difficult to see, especially in older adults. The scales are removed by gently cleaning the tail with a saline or*

*chlorhexidine solution making the veins more apparent- wipe in the direction of the scales to avoid irritation to the tail.*

8. Remove the needle and apply gentle compression until bleeding has stopped.
9. If the animal was anesthetized, monitor the animal during the recovery process.
10. Return animals to their cage and observe to make sure that bleeding has not resumed.

**Agents:**
This procedure is recommended to be performed under anesthesia. All agents administered to animals should be listed in the "Agents" section of the IACUC protocol.

**Adverse Effects:**
Adverse effects should be listed in the “Adverse Effects” section of the IACUC protocol. Examples of potential adverse effects include: Peri-vascular irritation, blood loss.

**References:**

Hooke Laboratories; injection angle image.

Braintree Scientific; Brass Restrainer image

Dielh KH, Morton R, Morton D, *et al* (2001). “A Good Practice Guide to the Administration of Substances and Removal of Blood, Including Routes and Volumes.” Journal of Applied Toxicology. 21: 15–23.

Turner PV, Brabb T, Pekow C, Vasbinder MA (2011). Administration of substances in laboratory animals: routes of administration and factors to consider. Journal of the American Association for Laboratory Animal Science. 50 (5): 600-613.

Turner PV, Pekow C, Vasbinder MA, Brabb T (2011). Administration of substances in laboratory animals: equipment considerations, vehicle selection, and solute preparation. Journal of the American Association for Laboratory Animal Science. 50 (5): 614-627.