

Rat Handling Training (2021)

Laboratory Animal Facility, HKUST (CWB)

Note: This material serves as part of the training program for animal users of Laboratory Animal Facility, HKUST (CWB). The rest of the training program includes

- General Animal Use Training
- LAF User Manual
- Hands-on training and orientation in the facility, and
- Biosafety course (provided by HSEO)

General Information About Rats

	RAT
Life Span	2.5-3.5 years
Adult Weight	M 300-500g F 250-300g
Birth Weight	5-6g
Heart Rate	330-480 bpm
Resp Rate	85 bpm
Body Temp	35.9. – 37.5C
Gestational period	21-23 days
Weaning age	21-23 days

Blood Drawing in Laboratory Animals

- **Training and experience of the individual in the blood drawing are of critical importance.**
- The method of blood collection to be used, the intervals between blood collection procedures, and the volume of blood to be removed, should be listed in the approved protocol specific to each stud
- Recommended volumes for blood collection are intended to preserve the health status of the animal and maintain the validity of experimental results. The guidelines provided are for healthy, normal adult animals.

Blood Drawing Volume and Frequency

Max Blood Draw (Total Blood Volume)	Recovery Time
15%	3 weeks
10%	2 weeks
7.5%	1 week
0.75%	Daily
Max Blood Draw (Body Weight)	Recovery Time
1%	3 weeks
0.75%	2 weeks
0.5%	1 week
0.05%	Daily

- TBV is 6% of body weight (60ml/kg)
- Max amount of blood safely drawn at a single survival blood draw is 15% of TBV
- i.e. **200g rat**, TBV = 200 x 6% = 12ml
- 15% max blood draw = 12ml x 15% = **1.8ml** = amount of blood that can be safely drawn at a single time every **3 weeks**

Types of Restraint : Two Types

PHYSICAL



CHEMICAL



Physical Restraint

- Provide a place for rat to hide to calm it during short transfers
- For a firm restraint, grasps whole body with the index and middle fingers along sides of the head, thumb and remaining fingers under the axilla, then use other hand to support lower body and hold the tail
- **DO NOT** apply too much pressure to the head/chest to avoid struggling of the rat
- **DO NOT** hold tail distal to the base - degloving injury
- **DO NOT** grasp rats at the nape of the neck (unlike mice), as rats will object strongly this way



Chemical Restraint

- Recommended if the injectable will cause great distress or discomfort to the animal
- Either by isoflurane or injectable drugs (ketamine/xylazine, acepromazine, etc)



Injection Techniques

- **Sub-cutaneous (SQ)**
- **Intraperitoneal (IP)** - inadvertent injection of some material into the gut, abdominal fat and subcutaneous tissues is a relatively frequent occurrence
- Material that is irritant or with a high or low pH can cause pain both during and following injection.
- As with all injection sites, using a new needle for each animal, and injecting fluid that is at body temperature will reduce any discomfort caused by the procedure.
- **Intravenous (Tail Vein) injections**

Subcutaneous (SQ)

- Tent skin into a triangular shape
- Back of neck – excess skin – BEST (mice and rats)
- Back of hind quarters
- Needle entry angle should be parallel (or slightly downwards) to the muscle layer
- After entering skin, aspirate to confirm entry into dead space (should see air drawn back only) before injecting substance. If difficulty drawing back (in muscle) or drawing back blood (in capillary/vein), take entire needle out and reposition



Subcutaneous (SQ) – continued

- Viscosity
- The smaller the needle size the better for the animal (27-25gauge) for thin substance
- Tumour cells – 25 gauge to avoid lysis of cells
- Max volume for SQ should be 2-3cc

Intraperitoneal (IP) in Rat

- Lower right quadrant of abdomen
- Avoid hitting liver, bladder, caecum
- 1-3 cc syringe
- 25-27g needles
- Max volume 0.01ml/g



IV in Lateral Tail Vein in Rat

- two lateral tail veins and a tail artery located on the tail (Figures 1 and 2).
- 1cc syringe
- 27-30g needle
- Restraint tube
- Heating source
- Max volume 0.5ml
- Warming the rat (or tail only) causes vasodilation and provides better vein visibility – use heating chamber, heating pad or a heating lamp, or dipping tail in warm water.
- Wipe tail with antiseptic solution

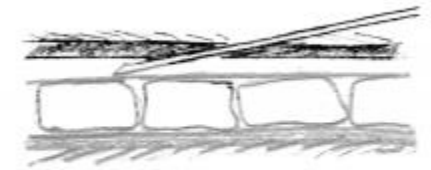
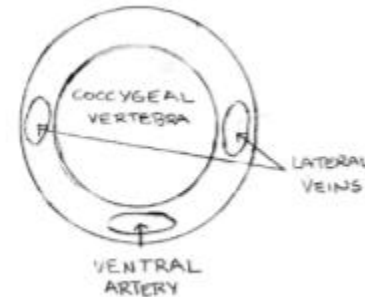


Figure 2. Transection Schematic of Tail Showing Needle Placement

