



## Standard Operating Procedure: Injections in Dogs and Cats

These SOPs were developed by the Office of the University Veterinarian and reviewed by Virginia Tech IACUC to provide a reference and guidance to investigators during protocol preparation and IACUC reviewers during protocol review. They can be used as referenced descriptions for procedures on IACUC protocols. However, it is the sole responsibility of the Principal Investigator to ensure that the referenced SOPs adequately cover and accurately represent procedures to be undertaken in any research project. Any modification to procedure as described in the SOP must be outlined in each IACUC protocol application (e.g. if the Principal Investigator plans to use a needle size that is not referenced in the SOP, simply state that alteration in the IACUC protocol itself).

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## I. Procedure Summary & Goal

- a. Many therapeutic and diagnostic agents used in veterinary medicine must be injected parenterally in animals (fluids, biologics, medications, test agents).
- b. Injections can be made via intradermal (ID), subcutaneous (SC), intramuscular (IM), or intravenous (IV) routes. Intravenous injections will be described in a separate SOP; Venipuncture.
- c. In order to facilitate a safe and effective administration of various therapeutic and diagnostic agents, understanding the technique and anatomic location of different injection sites is very important.

## II. Personal Protective Equipment & Hygiene

- a. Hands should be washed thoroughly or sanitized before and after injections.
- b. Personal protective equipment appropriate to the setting should be used.

## III. Supply List

- a. Sterile hypodermic needle, 20-25 gauge,  $\frac{5}{8}$  to 1½ inch length
- b. Syringe(s), 1-30ml
- c. +/- clippers (electric or battery operated)
- d. #40 Clipper blade
- e. Drug or substance to be injected
- f. Alcohol swab or alcohol moistened cotton ball

## IV. Detailed Procedure

- a. Position
  - i. For all injections, be sure to restrain the animal in the most appropriate position to insure the animal and the handler's comfort and safety as well as the best access to the chosen injection site.
  - ii. In some instances, a muzzle should be placed for added safety.
- b. Intradermal Injection
  - i. Location: usually lateral cervical region and the lateral aspects of the thorax.
  - ii. Clip haired skin at site of injection to facilitate visualization.
  - iii. Direct the needle at 35-45o angle with the bevel facing up.
  - iv. Advance the needle just under the epidermis
  - v. Inject the contents of the syringe.
    1. Resistance should be discerned when injecting and a 'bleb' should be visible at the injection site.
      - a. If there is very little to no resistance felt, and no "bleb" forms, the needle is most likely in the subcutaneous tissue (too deep).
- c. Subcutaneous Injections
  - i. Location: most often dorsal cervical region, dorsal interscapular area and lateral surfaces of the thorax.

- ii. Pull up, or tent an area of skin over the chosen injection site.
    - 1. The axis of the tent can be horizontal or vertical over the injection site.
  - iii. Direct the needle toward the base of the tented skin and advance it parallel to the long axis of the skin tent.
    - 1. This will prevent the needle from going through both sides of the tent.
  - iv. Advance the needle, draw back on the syringe to look for blood, and inject the contents of the syringe.
- d. Intramuscular Injections
- For intramuscular injections, the maximum amount of volume delivered to any one site should not exceed 2ml in a small dog or a cat, or 5ml in a medium to large-sized dog.
- i. Quadriceps IM injections
    - 1. Location: The quadriceps muscle group is located cranial to the greater trochanter of femur, ventral to the wing of the ilium and proximal to the straight patellar ligament of the stifle.
    - 2. The cranial border of femur marks the most caudal aspect of the quadriceps muscle group.
    - 3. Direct the needle perpendicular to, or slightly cranial within the proximal  $\frac{1}{2}$  to  $\frac{1}{3}$  of the muscle.
      - a. The needle may also be directed perpendicular to the long axis of the femur.
    - 4. Advance the needle, aspirate gently for blood, and inject the contents of the syringe.
  - ii. Triceps IM Injections
    - 1. Location: The triceps muscle is located caudal to point of shoulder, ventral to the scapula, continuing distally to the elbow.
    - 2. Direct the needle perpendicular, or slightly caudal to the muscle within the proximal/upper half.
    - 3. Advance the needle, aspirate gently for blood, and inject the contents of the syringe.
  - iii. Lumbar IM Injections
    - 1. Location: The epaxial muscles are located dorsal to the line of transverse processes of the vertebrae and lateral to the dorsal spinous processes.
      - a. Though this muscle group extends from the iliac crest to the skull, the appropriate location for injection is at the level of the 3rd to 5th lumbar vertebrae.
    - 2. Direct the needle perpendicular and either slightly cranial or caudal into the muscle group.
    - 3. Draw back on the syringe to look for blood, and inject the contents of the syringe.
  - iv. Hamstring IM Injections
    - 1. Location: The hamstring muscle group (semimembranosus, semitendinosus, middle gluteal) forms the caudal thigh muscle group.
      - a. Demarcated proximally by the greater trochanter of femur, caudally by the ischial tuberosity, and distally by the caudal aspect of the femur to the stifle joint.
    - 2. Using the non-dominant hand, grasp the muscle with the thumb held at the caudal-most aspect of the femur.

3. Direct the needle perpendicular to, or caudally within, the upper/proximal  $\frac{1}{2}$  to  $\frac{1}{3}$  of the muscle group.
  4. Advance the needle, draw back on the syringe to check for blood, and inject the contents of the syringe.
- v. Intravenous Injections
1. See Venipuncture Guidelines

## V. Potential Complications

- a. Subcutaneous injections can result in the needle going through both sides of the skin tent, allowing medications not to be injected properly, or if resistance is felt during injections medications may be going into the dermis.
- b. Subcutaneous injections can be injected in vasculature if verification of injection is not made by aspirating before injection.
- c. Intramuscular injections can result in temporary or permanent nerve damage and muscle irritation.
- d. Vaccine reactions including local inflammation, hives, facial swelling, vomiting, respiratory distress hair loss, sneezing, lethargy.
  - i. Fever and limping
  - ii. Vaccine site associated sarcomas
  - iii. Anaphylaxis
- e. Avoidance Measures:
  - i. SQ Injections; Be sure injection is SQ - proper technique, use only small gauge needle and small amount of sterile saline (0.25), use sterile needle and solution for injection
  - ii. IM Injections; Use small and appropriate volume (<0.5 ml), use proper technique and understand the location of nerves and use of small needle size, use sterile needle and solution for injection

## VI. Variations

- a. Vaccines
  - i. Dogs
    1. DA2PP should be administered SC in the left forelimb
    2. Rabies should be administered SC in the right hind limb
  - ii. Cats
    1. FVRCP should be administered SC in the right forelimb distal to the elbow
    2. Rabies should be administered SC in the right hind limb distal to the stifle
    3. Vaccines should be given to cats SC on the lateral aspect of the limbs distal to the elbow or stifle joints in order to facilitate the management of vaccine-associated sarcomas. (AAFP, 2013)
- b. For intravenous injections, please see the Venipuncture SOP.
- c. Recommended vaccination sites and route of administration in dogs and cats

- i. See Canine and Feline Vaccination SOP

## **VII. Links to Multimedia Aids and References**

- a. <http://www.vetmed.wsu.edu/resources/Techniques/intramuscular.aspx>
- b. <http://www.youtube.com/watch?v=tQaBe-nzkUU>
- c. 2013 AAFP Feline Vaccination Advisory Report. J Feline Med Surg, 15:785-808.  
<http://www.http://jfm.sagepub.com/content/15/9/785.full.pdf+html>
- d. <https://www.aahanet.org/PublicDocuments/CanineVaccineGuidelines.pdf>