

Shahrukh Asif<sup>a</sup> Hafsa Abbas<sup>b</sup> Mubashar Rehman<sup>c</sup>

## Methods to Intra-Peritoneal and Subcutaneous Administration on Experimental Animals

### Abstract

*Parenteral site of administration of drug provides several advantages. In subcutaneous administration of the drug mainly move to the capillaries from the site of action. However, in case of the intraperitoneal administration the peritoneal cavity of is the target. Different experimental animal requires certain criteria to deliver the dose of the drugs. All the parameter is vital to perform experiment on animals. We have search different search engine PubMed, Tadoreline, Goggle Scholar etc. Methods along with the precautionary measure and safety issue are discussed. Also, various steps area defined for administration of drugs in experimental work. The main purpose of this review is to gather the work realter to intra peritoneal and sub cutaneous administration of the drugs.*

**Key Words:** Liquid Drug, Experimental Animal, Subcutaneous, Intraperitoneal

### Introduction

Subcutaneous defines as situated or applied under the skin. To deliver the drug through subcutaneous, the needle is to be inserted under the fatty tissue of the skin. The drug then move into the capillaries (vessel) along the administered area. In the case of Subcutaneous the rate of absorption is lower than the intramuscular or intraperitoneal injection. When people that area unit dying area unit unable to require oral medication, injectable medication is employed. once indefinite quantity medication is needed, a health-care skilled travels to the dying person's

home, which can delay symptom relief. (*Marlis polan et al 2020*) SC route is preferred when drug needs to avoid first pass effect and requires sustain release.

### Requirements

- Gloves
- Alcohol swabs
- Cotton ball
- Syringe
- Drug
- Experimental animal (rat, rabbit, mice)

**Table 1.** Criteria of Maximum Volume to be Administrated and the size Of Needle

Animals	Needle gauge	Volume of Dose
Mice(25gm)	25-27g	<3ml
Rat(200gm)	25g	<10ml
Rabbit(2-5kg)	23 to 27g	<50ml

### Procedure

- The primary step, prepare the syringe by putting the needle of counseled gauge on the syringe.
- Use the grading and then line up the level with respect to the numbers on the syringe.

<sup>a</sup>Undergraduate Students (Final year), Department of Pharmacy, Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan.

<sup>b</sup>Undergraduate Students (Final year), Department of Pharmacy, Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan.

<sup>c</sup>Assistant Professor, Department of Pharmacy, Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan. Email: [mrehman@gau.edu.pk](mailto:mrehman@gau.edu.pk)

- Take the amount of solution to be administered to the animal into the syringe.

**For Mice**

In order to administer the drug to the mice, first restrain the animal with your non – dominant hand making sure access to an area with loose skin as shown in figure.1.

**For Rat**

In case of the rate, we must use a facecloth or some kind of small towel for the purpose of restraining the rat then tent the loose skin using the non-dominant hand as shown in figure.1.

**For Rabbit**

Grasp a flap of skin of rabbit, Through the skin into the, insert the needle of the syringe as shown in figure1.

- Hold the syringe in dominant hand at the base of this tent, then put the needle over the skin with the level of the needles facing upwards.
- Increase the negative pressure by pulling back on the plunger before injecting. Proceed with the injection If there is negative pressure unless the solution has been fully administered depress the plunger.
- Remove and check out once more with a brand-new needle, syringe, and answer as long as blood is drawn back to the hub of the needles.
- Then take away the needle and place directly into sharp instrumentality while not recapping.
- Observe the animal behaviors by putting the animal into the cage



**Figure 1:** Subcutaneous Administration in rat Mouse and Rabbit

**Precautions**

- Needle entry ought to be fast with the bevel facing towards the skin and also the medication administered slowly. Needle withdrawal ought to even be fast.
- Needle ought to be inserted at ninety degrees.
- Using the jet-injector to produce anaesthesia before IV catheterization within the dysfunction is effective, fast, and doesn't need sharps disposal and handling precautions (*David J Peter, John P Scott, Henry C Watkins, and Heidi E Frasure 2002*).
- Lager needle is required in case of more viscous liquids which also cause a lot of difficulty.

- Cold administration of the substance may cause the discomfort to the animal, so we should warm it up.

**Introduction to Intra- Peritoneal Injection**

Intraperitoneal injection consists of an injection of a substance into the peritoneum (body cavity). It is usually inferred upon animals as compared to humans. When giant amounts of blood replacements area unit needed, or there's low force per unit area or alternative issues than it's typically prevented by employing a appropriate vessel for injection.

**Table 2.** Maximum Volume of Administration and Recommended Needle size

Species	Needle	Gauge Volume	Explanation
Mouse	25-27g	<10ml/kg	The maximum volume is 0.25ml for example, for a 25gram mouse,
Rat	23-25g	<10ml/kg	For example, for a 250gram rat, the maximum volume is 2.5ml

## Materials Required

- Syringes (size should be appropriate according to injection volume).
- Needles (according to the animal appropriate size).
- In order to inject sterile substance (recommended dose is to keep in sterile multi-dose vials).
- 70% isopropyl alcohol (the top of multi-dose vial used for disinfecting).
- Heat Gauze source used for warming that needs to be injected (maximum heat limit should not exceed 37 degree Celsius).

## Procedure

1. Use 70% alcohol and gauze for disinfecting top of multi-dose vial.
2. The amount of solution to be administered is drawn into the syringes and needles-heat the solution before administration.
3. Take out the animal from the cage gently and restrain appropriately in the head-down position.
4. Identify anatomical landmarks for injecting it in the appropriate area of the abdomen. Usually, the lower right quadrant of the abdomen of animal and the injection site. It helps in preventing damage to the urinary bladder, cecum, and other abdominal organs.

## Note

The side injected between right and left should vary if it is to be injected daily for multiple days. The approval from the animal care protocol is compulsory.

1. In the lower quadrant of the abdomen insert the needle in both mice and rats towards the head at a 30-40° angle to horizontal. Insert the needle to the depth as the abdominal cavity consists of an entire bevel (In fat animals, almost the entire length of the needle length is usually inserted but in smaller mice, only about ½ the needle length is usually inserted).
2. To ensure negative pressure prior to injecting, pull back on the plunger. If there is negative

## FOR Rats

The 2-person technique (preferred and recommended):

- Scissor or "V" hold is employed.
- With your index and middle fingers, grasp the rat's head. It is not advisable to push on the trachea.

pressure, then the injection is proceeded. The plunger is depressed until the solution has been fully administered.

3. The needle should not be allowed to move around inside the abdomen.
4. A new needle and syringe are used for each animal. Pull the needle and place the needle directly without recapping into a sharp's container.
5. Place the animal into the cage. The complications are than observed.

## Complications

### Bleeding at the injection site

Apply stress until the bleeding ends. Clean with water.

### Peritonitis

The substance is injected than it can cause inflammation or infection of the peritoneal cavity if the gut is punctured or a non-sterile.

### Laceration

may result in huge complications of abdominal organs and internal bleeding or infection

## Injection

can cause infections into the gastrointestinal tract or bladder.

## Position of Animal for IP Injection and Restraint

### for Mice

Tilt the head of the mouse slightly toward the ground, the head should be lower than its hind end as shown in figure.2. The abdominal viscera shift cranially, in this way. Hence, accidental puncture of abdominal organs at the site of injection can be lowere

- Kindly wrap the remainder of your fingers around the animal's thoracic cavity without crushing it. Straighten the index and middle fingers to stretch the head and further restrain the rodent.
- With the other hand, hold the back feet and tail.
- To relieve joint tension, a finger is inserted between the legs.

- A finger is positioned between the legs to relieve joint tension.
- With your hand, gently stretch the rat so that the head is lower than the body, as shown in the figure.

The injection is given by someone else.



**Figure 2:** The 2-Person Technique

### Person Technique

- Using a facecloth or a small towel to clean your face. Cover the rat headfirst in the towel to prevent it from jumping around - but not too firmly
- Gently rotate the rat and towels in a dorsal recumbency position, which is normally at the back of the animal, as shown in the figure. 4.
- Using your nondominant arm, place the rat's head along your arm and in the crook of your elbow.
- Gently restrain the rat against your body with your arm/elbow.
- With your nondominant side, restrain the feet and tail.



**Figure 3:** 1-Person technique

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