Al-Mustaqbal University College/ Department of Pharmacy

Pharmacology lab 2/ 4th stage

Laboratory Animals

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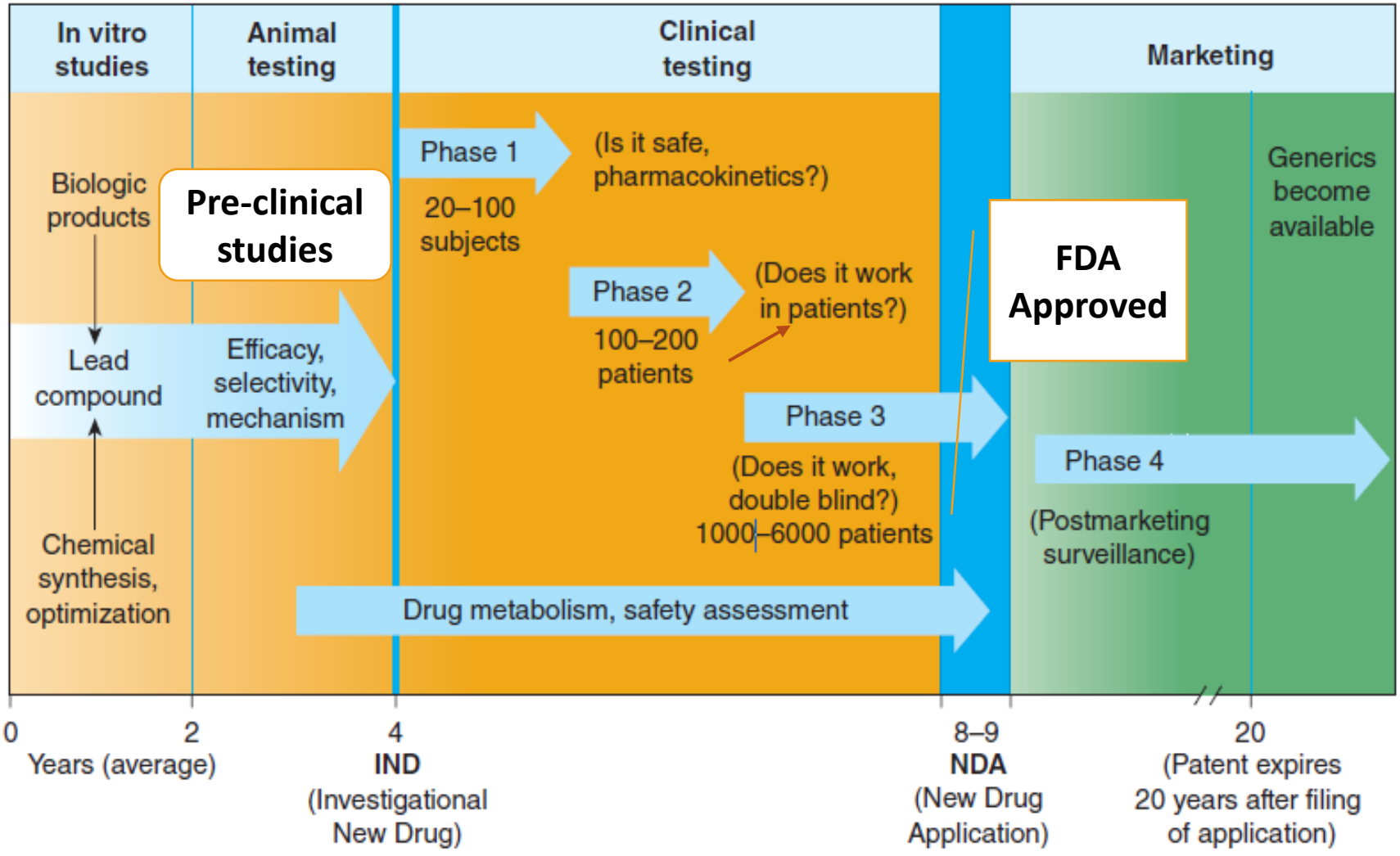
Development process of drug



Preclinical Studies

- The studies which are conducted to define pharmacological and toxicological effects .
- This studies done with a specific approach to development and testing that required to bring a drug to market.
- Some of the requirements may be different for drugs used in life-threatening diseases

Types of Preclinical Testing

1. Short Term Animal Studies (Acute):

- ❖ **Determine pharmacological action and toxicity.**

2. Long Term Animal Studies (Chronic):

- ❖ **Look for potential side effects that may result from long term use such as carcinogenicity (ability to cause cancer).**
- ❖ **Look for reproductive effects.**

3. Cell line study

- ❖ **cell line model systems may be particularly useful to predict anticancer drug response and to help further our understanding of mechanisms of drug action.**

Animals Sharing DNA sequences

- Humans share (98.8%) of their DNA with chimpanzees

- Mice share nearly (90%).

Sharing DNA sequences

- This is important because mice have been used in laboratories as experimental animals for research into human disease processes for years.

- Also, Rats have since been used to answer a wide range of basic science questions related to common human diseases in the fields of physiology, immunology, pharmacology, toxicology, nutrition, behavior and learning.

Sharing DNA sequences

		
Pig 98%	Chimps % 98.8	Zebra fish 73%
		
Cat 90%	Mouse % 85	Dog 84%

Handling and restraint

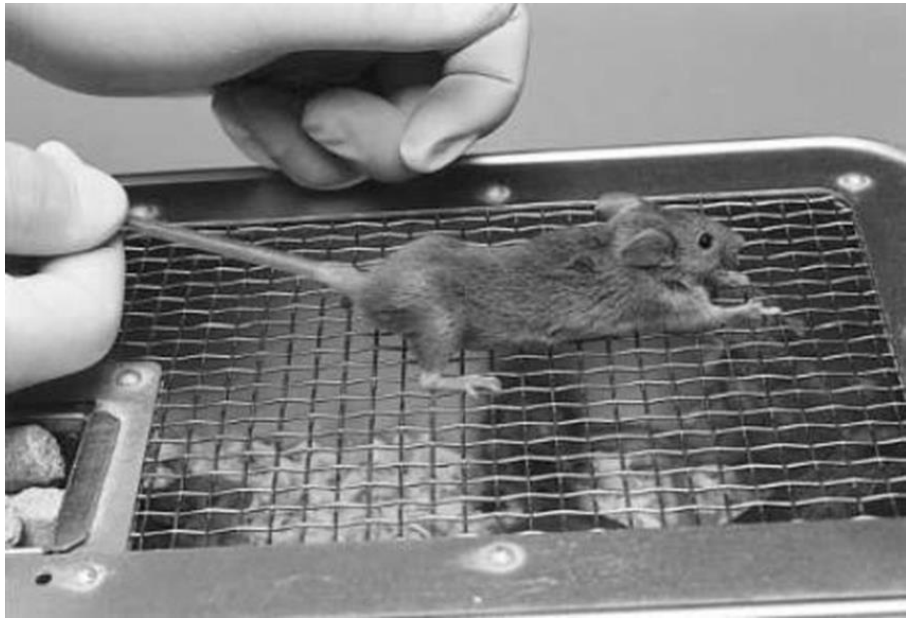
- **Good handling and restraint** is the most important technique for correct administration.
- **Proper restraining** leads to successful administration and varies with the routes of administration.

Handling and restraint

- There are two styles of manual restraint, one uses **both hands** and the other is **single handed.**

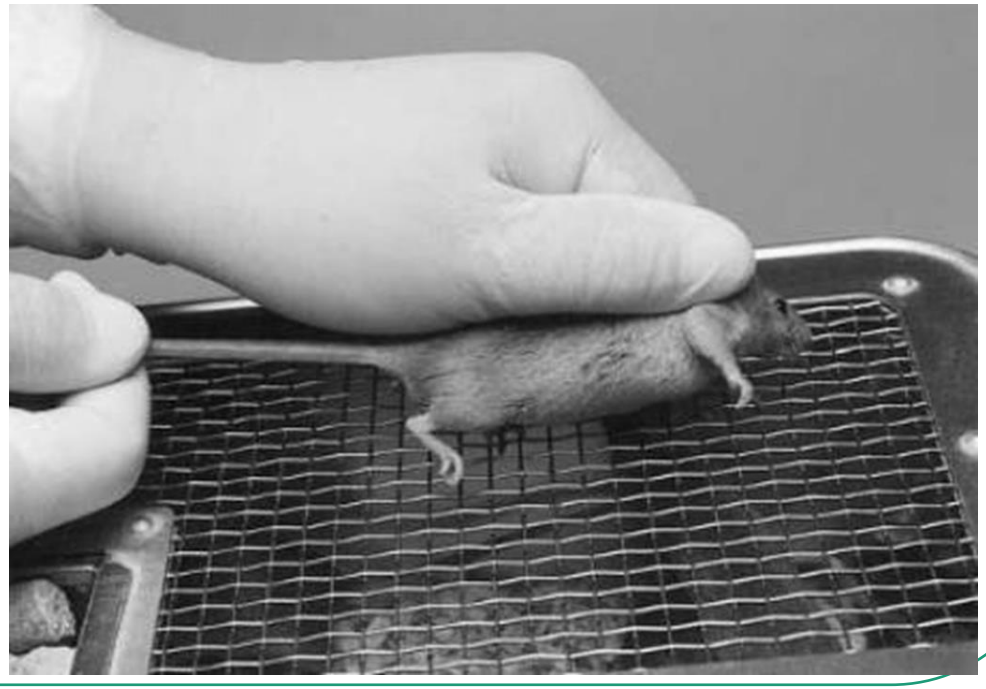
Double handed manual restraint

The mouse is lifted by the base of the tail and placed on the cage lid or other solid surface with one hand and then its tail is pulled gently back



Double handed manual restraint

It is quickly and firmly picked up by the scruff of the neck behind the ears with the thumb and index finger of the other hand.

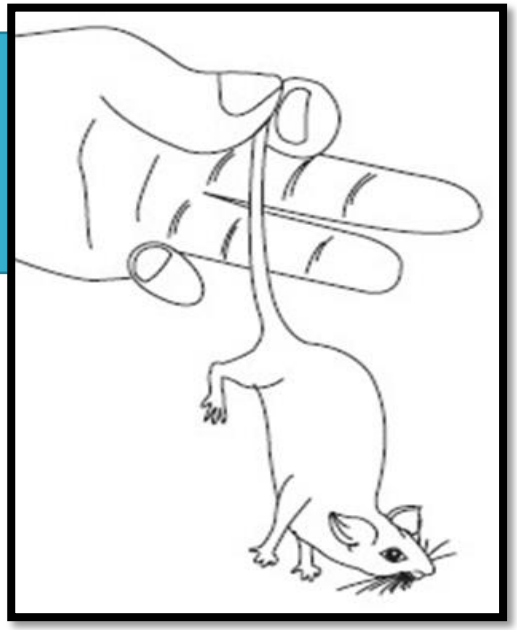


Double handed manual restraint

The tail is transferred from the first hand to between the palm and little or ring finger of the other hand, then fixed

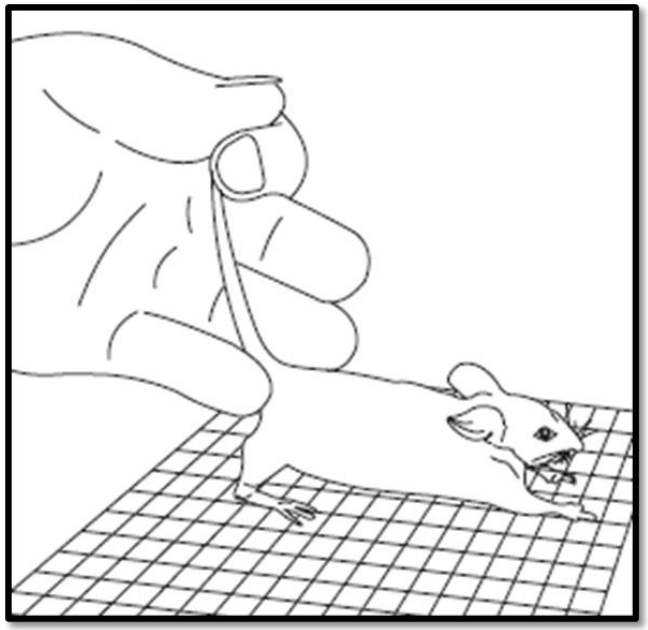
The mouse is restrained
(مقيدة بشكل تام)

Single handed restraint



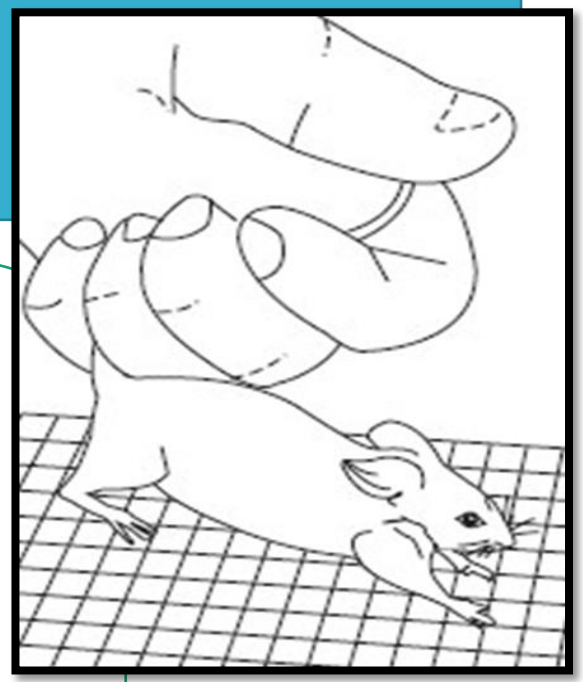
1- The tail is picked up using thumb and fore finger of the chosen hand.

2- Then the mouse is placed on the cage lid or other solid surface.

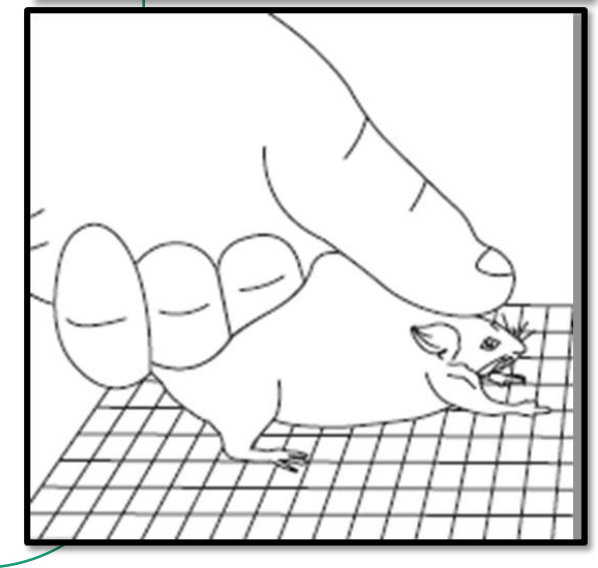


Single handed restraint

3-The tail is immediately grasped by the palm and middle finger, ring finger and/or little finger, and the thumb and forefinger released



4- The fold of skin from the scruff of neck down the back is immediately gripped using the thumb and forefinger

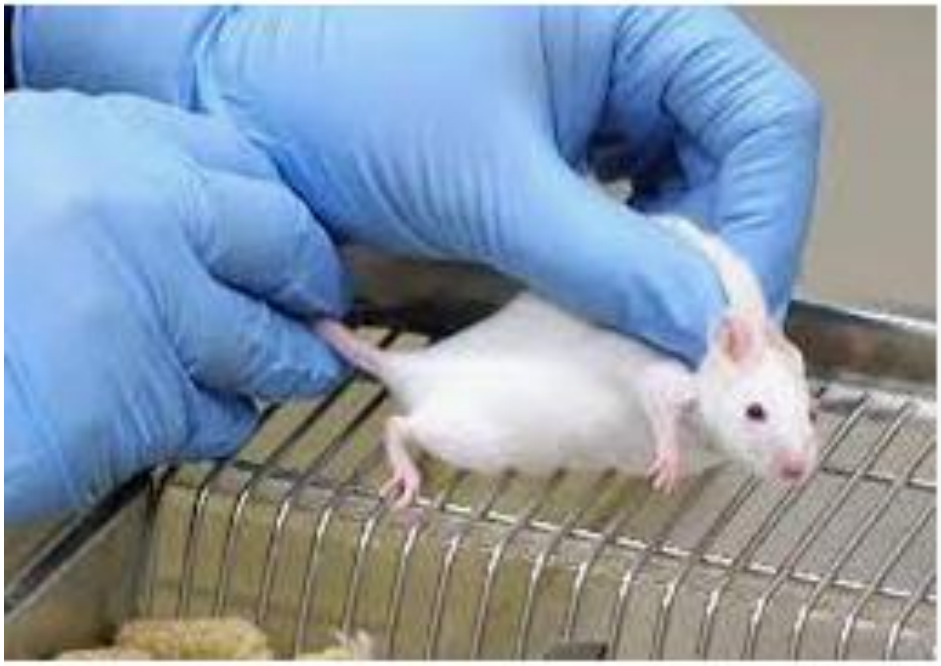


Single handed restraint

5-To prevent kicking by the hind legs, the tail is fixed using the palm and forefinger and then the left hind leg is held firmly between the ring and little finger

(where the mouse is restrained by the left hand).

Double handed restraint



Administration site

- **Several possibilities for the administration of substances to mice.**
- **The most common routes are oral , subcutaneous, intra-peritoneal or intravenous injection.**

- **The intramuscular administration is not recommended, as the muscle of the mouse is too small.**

Administration site

1. Concentration of substances

- **The concentration can vary over a fairly wide range without greatly influencing the end result of the experiment.**
- **Lower concentrations are clearly desirable.**

2. PH of the injected solution

- **For most routes of administration, providing the solutions are not highly buffered, a pH range of 4.5–8.0 is satisfactory.**

Administration site

3. Volume and frequency of administration

- **The injection volume is limited by any toxicity of the substance and by the size of the mouse. It should be kept as small as possible.**

Needles and syringes

- **Usually, 26–27-G, 1/2- to 5/8-in. (12.5–15.6- mm) needles are satisfactory**

Syringe

- **(a) 26 G 1/2 in. needle**
- **(b) 1/2 in. intradermal needle(tip is 27 G, base is 22 G)**

Needle.

Enteral administration

- It is possible to give quite large amounts of non-sterile substances or solution and that a pH as low as 3.

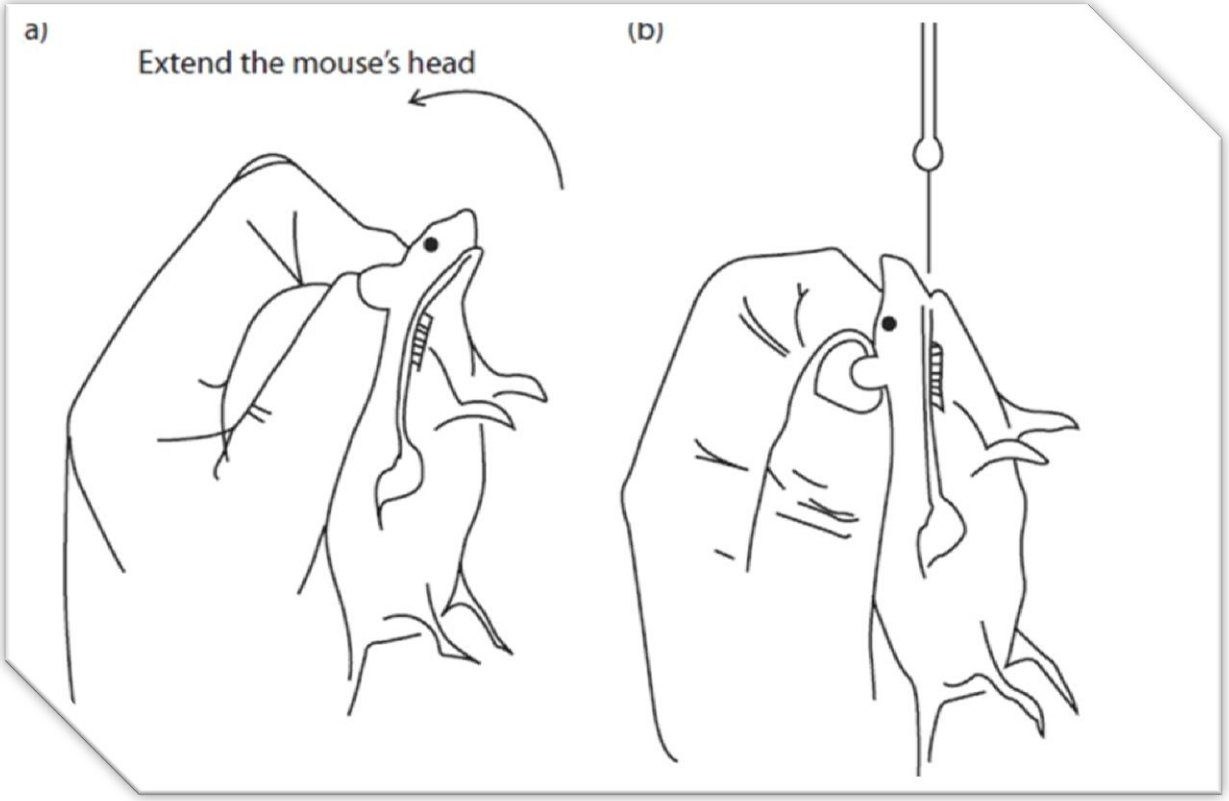
- On the other hand, alkaline solutions are very poorly tolerated by mouth.

Oral administration

The simplest method for administration is to give the substance with food or drinking water.

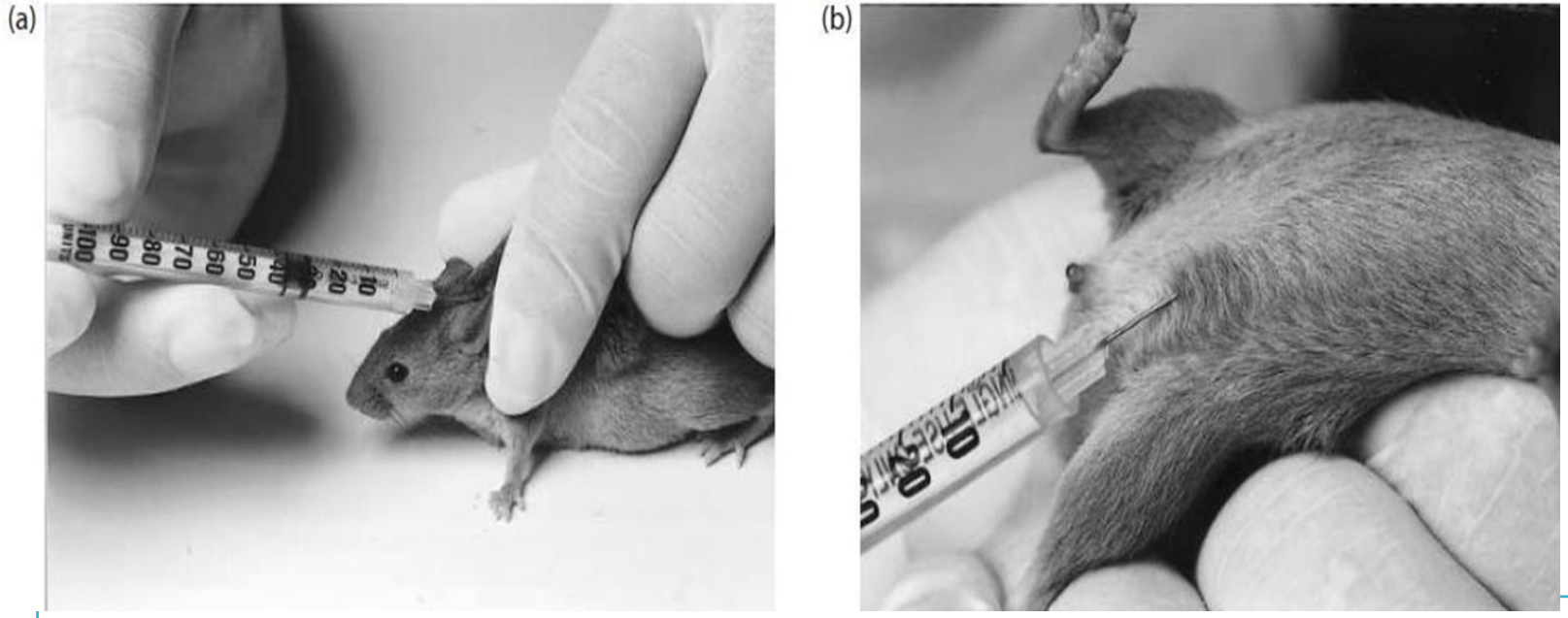
Intra-gastric administration

Direct administration by oral gavage to adult mice A 22 G - ball tip needle is used to prevent damaging the esophagus and from passing through the glottal opening into the trachea.



Subcutaneous administration (s.c.)

Subcutaneous administrations are easy. As they are rarely painful.



(a) S.c injection at the base of a fold of loose skin (area at the neck) using an Insulin syringe: 27 G 1/2 in

(b) S.c injection at the lower left quadrant using an Insulin syringe

Intra-peritoneal administration (IP)

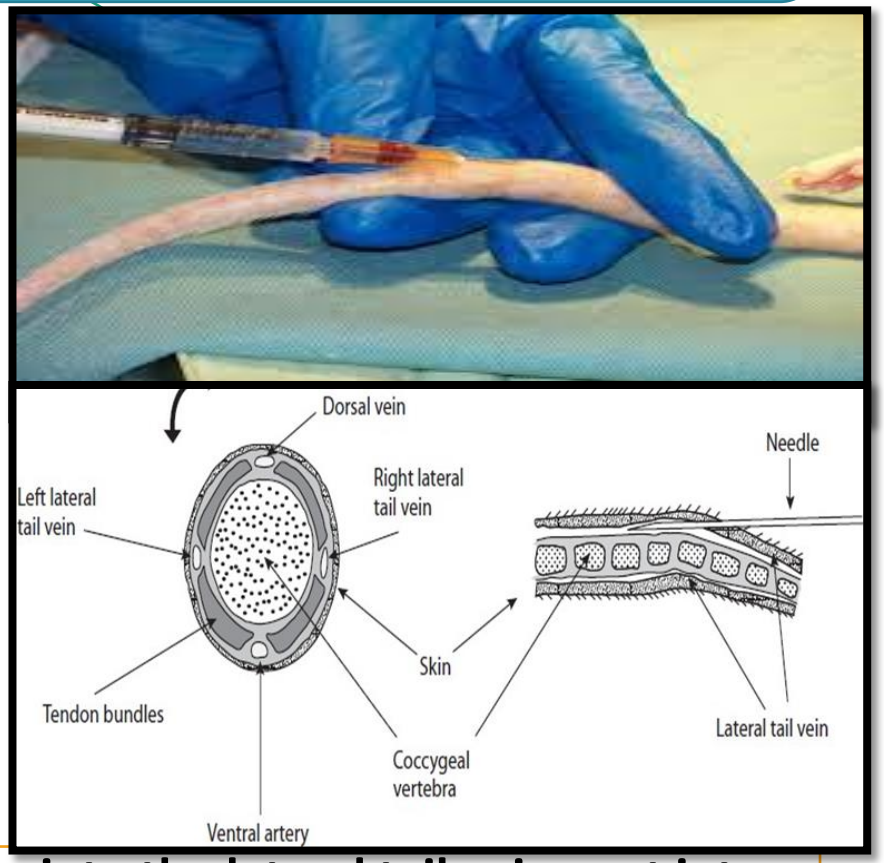
This is the most common route being technically simple and easy. It allows quite long periods of absorption from the repository site

Intraperitoneal injection to lower left quadrant using an Insulin syringe: 27 G 1/2 in., 1.0 ml.

Intravenous injection I.V

Advantages over other routes.

(Solutions at a high concentration, high or low pH or irritating can be administered.



Administrations are usually made into the lateral tail veins <u>not into the dorsal tail vein.</u>


Thank You
For Your
Attention