

Common laboratory animals

Laboratory Animals: Introduction and Importance

- **Laboratory** animals are specially bred and maintained animals used in scientific research to study the effects of drugs, chemicals, and biological substances.
- In pharmacological and toxicological screening methods, these animals help scientists understand how a drug behaves in the body (pharmacology) and whether it causes harm (toxicology).

Why Laboratory Animals are Used

- To study drug safety (toxicity) before human use
- To evaluate drug effectiveness (pharmacological action)
- To understand dose-response relationships
- To study mechanisms of action of drugs
- To detect side effects and adverse reactions

Characteristics of Good Laboratory Animals

- Healthy and disease-free
- Genetically defined or controlled
- Easy to handle and maintain
- Reproducible responses to drugs
- Short life cycle (for faster studies)

Controlled Environment (Animal House Conditions)

- **Temperature:** Usually 20–25°C
- **Humidity:** Around 40–70%
- **Light cycle:** 12-hour light and dark cycle
- Proper ventilation
- Clean food and water supply

Ethical Considerations

- Use follows **3Rs Principle**:
 - **Replacement** – use alternatives if possible
 - **Reduction** – use minimum number of animals
 - **Refinement** – minimize pain and distress
- Experiments are regulated by ethical committees (IAEC, CPCSEA, etc.)

Relevance in Pharmacological Screening

- Helps determine whether a drug has the desired therapeutic effect
- Used to compare new drugs with standard drugs
- Helps in identifying organ-specific effects (e.g., liver, kidney, heart)

Relevance in Toxicological Screening

- Detects acute toxicity (short-term harmful effects)
- Detects chronic toxicity (long-term effects)
- Helps in determining safe dose limits
- Identifies carcinogenic, mutagenic, and teratogenic effects

Common Laboratory Animals: Overview

- Different animal species are used depending on the type of experiment.
- Each species has unique biological and physiological characteristics.

Most Commonly Used Animals

1. Mice
2. Rats
3. Rabbits
4. Guinea pigs
5. Dogs
6. Non-human primates (less commonly due to ethical concerns)

Selection of Animal Depends On

- Type of study (toxicity, behavioral, immunological, etc.)
- Similarity to human physiology
- Size and ease of handling
- Cost and availability
- Genetic uniformity

Types of Strains

- **Inbred strains:** Genetically identical (used for reproducibility)
- **Outbred strains:** Genetically diverse (used for general studies)
- **Transgenic animals:** Genetically modified for specific research

Importance in Screening Methods

- Help in preclinical testing
- Provide data for drug approval
- Used in dose-response studies
- Help identify side effects and toxic limits

Mouse: Description, Handling, and Applications

Description



- Small size (20–40 grams)
- Short life span (1–2 years)
- Rapid breeding (gestation ~21 days)
- Available in many strains (e.g., Swiss albino, BALB/c, C57BL/6)

Behavioral Features

- Active and sensitive to environmental changes
- Nocturnal (active at night)
- Social animals

Handling of Mice

- Pick up by the base of the tail
- Support body while handling to reduce stress
- Avoid loud noise and sudden movements
- Use gloves for hygiene and safety

Housing Conditions

- Kept in cages with bedding
- Provide food pellets and water
- Maintain proper temperature and light cycle

Applications in Pharmacological Screening

- Used in toxicity studies (acute and chronic toxicity)
- Screening of CNS drugs (sedatives, stimulants, anticonvulsants)
- Cancer research (tumor models)
- Genetic and molecular studies
- Immunological studies

Advantages

- Easy to handle and maintain
- Low cost
- Large amount of genetic data available

Limitations

- Small size makes some procedures difficult
- Differences from human physiology in some systems

Rat: Description, Handling, and Applications

Description



- Medium-sized rodents (200–300 grams)
- Longer life span than mice (2–3 years)
- **Common strains:** Wistar rat, Sprague-Dawley rat
- Well-developed organ systems, closer to humans than mice in some aspects

Behavioral Features

- Intelligent and easy to train
- Social animals, prefer group housing
- Less aggressive compared to mice

Handling of Rats

- Hold by the base of the tail and support the body
- Can also be held around the thorax (chest region)

- Gentle handling reduces stress and improves experimental accuracy
- Avoid rough handling to prevent biting

Housing Conditions

- Larger cages compared to mice
- Bedding material required (wood shavings, corn cob)
- Controlled light, temperature, and humidity
- Adequate food and water supply

Applications in Pharmacological Screening

- Widely used in toxicity studies (acute, subacute, chronic)
- Cardiovascular studies (blood pressure, heart rate)
- CNS studies (antidepressants, antipsychotics, analgesics)
- Metabolic studies (diabetes, obesity models)
- Reproductive and developmental toxicity studies

Advantages

- Larger size allows easy surgical procedures
- Better for blood sampling and repeated dosing
- More physiological data available

Limitations

- Higher cost than mice
- Require more space and maintenance

Rabbit: Description, Handling, and Applications

Description



- Medium-sized animals (1–3 kg)
- Common species: New Zealand White rabbit



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