



Common Laboratory Techniques- Anesthetics and Euthanasia used for animal studies

Anesthetics

1. Isoflurane

- Description: Isoflurane is a widely used inhalation anesthetic for inducing and maintaining anesthesia in small laboratory animals like rats and mice.
- Usage:
 - Induction: Animals are placed in an induction chamber where isoflurane is delivered through a vaporizer mixed with oxygen.
 - Maintenance: After induction, the animal is transferred to a nose cone or mask to maintain anesthesia during the procedure.
- Advantages: Isoflurane provides rapid induction and recovery, allowing precise control over anesthesia depth. It is less irritating to the respiratory tract compared to other inhalants.
- Considerations: Continuous monitoring of the animal's vital signs is necessary to ensure proper anesthesia depth and avoid complications.

2. Ketamine

- Description: Ketamine is a dissociative anesthetic often used in combination with other agents like xylazine for anesthesia in small animals.
- Usage:
 - Administration: Ketamine is typically administered via intraperitoneal (IP) or intramuscular (IM) injection.
 - Combination: When combined with xylazine, it provides both anesthesia and muscle relaxation.
- Advantages: Effective for short to medium duration procedures and provides good analgesia.
- Considerations: Monitoring for respiratory depression and cardiovascular effects is essential. Recovery can be prolonged, and additional analgesia may be required.

3. Xylazine

- Description: Xylazine is an alpha-2 adrenergic agonist used as a sedative and muscle relaxant, often in combination with ketamine.



- Usage:

- Administration: Given via IP or IM injection, usually in combination with ketamine.
- Advantages: Provides good muscle relaxation and sedation, enhancing the effects of ketamine.
- Considerations: Can cause bradycardia and hypotension; monitoring is essential.

Euthanasia

1. CO₂ Inhalation

- Description: Carbon dioxide (CO₂) inhalation is a widely used method for euthanizing small laboratory animals such as rats and mice.
- Procedure:
 - Chamber: Animals are placed in a chamber where CO₂ is gradually introduced.
 - Flow Rate: The flow rate should displace 10-30% of the chamber volume per minute to ensure a humane and painless process.
- Advantages: CO₂ is effective, readily available, and inexpensive. It is suitable for euthanizing multiple animals simultaneously.
- Considerations: Proper flow rate and gradual introduction are crucial to minimize distress. Animals should be monitored to ensure death before removal from the chamber.

2. Pentobarbital Injection

- Description: Pentobarbital is a barbiturate used for euthanasia by inducing deep anesthesia followed by respiratory and cardiac arrest.
- Procedure:
 - Administration: Administered via IP or intravenous (IV) injection.
 - Dosage: The dosage varies depending on the species and size of the animal, typically 100-150 mg/kg.
- Advantages: Provides a rapid and humane death with minimal distress.
- Considerations: Requires proper handling and disposal of the drug. Personnel must be trained in IV injection techniques to ensure effective administration.

3. Cervical Dislocation



- Description: Cervical dislocation is a physical method used for euthanizing small rodents, primarily when chemical methods are not suitable.
- Procedure:
 - Technique: The animal is held firmly, and a quick, forceful pull is applied to the head to dislocate the cervical vertebrae.
- Advantages: Does not require chemical agents and provides immediate death.
- Considerations: Should only be performed by trained personnel to ensure it is done swiftly and humanely. It is not suitable for larger animals or those with strong neck muscles.