

General Anesthesia



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General anesthesia



It is complete unconsciousness produced by a process of controlled, reversible intoxication of C.N.S. in which there is muscle relaxation and diminished to external stimuli.

Route of Administration



1. By inhalation.
2. By injection of nonvolatile or nongaseous anesthetics.

☞ Intravenous (most common).

☞ Sometimes may be given by intra peritoneal, intramuscular or other routes.

By combination of injectable and inhalation with or without pre-anesthetic.

Inhalation Anesthesia device





Halothane Vaporizer



Flowmeter

O₂ N₂O



Air bag



Facial mask



corrugated tube



Smooth tube



canister



N2O bottle
(Blue color)



O2 bottle (black color)



Endotracheal tube



Pressure gage

Pharmacokinetics



General anesthesia is produced by the action of an anesthetic on the brain and spinal cord. Although demonstrated that significant quantities of some inhalation anesthetics are metabolized within the body, for practical purposes they are primarily exhaled. Small amounts are eliminated in feces and urine or diffused through the skin and mucous membranes.

Injectable agents depend on redistribution within the body, biotransformation, principally in the liver, and excretion via the kidneys.

Anesthetics are commonly administered by intravenous injection and occasionally by intramuscular, intrathoracic, intraperitoneal, subcutaneous, and even oral or rectal routes.

Stages of General Anesthesia



For descriptive purposes, the levels of CNS depression induced by anesthetics have been divided into four stages depending on neuromuscular signs exhibited by patients . It should be emphasized that no clear division exists between stages.

Stage I



This is termed the stage of voluntary movement and is defined as lasting from initial administration to loss of consciousness.

Nervous animals are bound to resist restraint. Excited, apprehensive animals may struggle violently and voluntarily hold their breath for short periods.

Epinephrine release causes a strong, rapid heartbeat and pupillary dilation. Salivation is frequent in some species, as are urination and defecation. With the approach of stage II, animals become progressively ataxic, lose their ability to stand, and assume lateral recumbency. Initially, they can turn or lift the head without support.

Stage II



This is called the stage of delirium or involuntary movement. As the CNS becomes depressed, patients lose all voluntary control. This feature marks the change from stage I. By definition, this stage lasts from loss of consciousness to the onset of a regular pattern of breathing.

Patients react to external stimuli by violent reflex struggling, breath holding, tachypnea, and hyperventilation. Continued catecholamine release causes a fast, strong heartbeat, cardiac arrhythmias may occur, and the pupils may be widely dilated. Eyelash and palpebral reflexes are prominent. During this stage, animals may whine, cry, bellow, or neigh, depending on the species concerned. In some species, especially ruminants and cats, salivation may be excessive; in dogs, cats, and goats, vomiting may be evoked.

Stage III



This is the stage of surgical anesthesia and characterized by unconsciousness with progressive depression of the reflexes.

Muscular relaxation develops, and ventilation becomes slow and regular. This stage divided into planes : light, medium, and deep.

- ❧ **Light anesthesia** persists until eyeball movement ceases.
- ❧ **Medium anesthesia** is characterized by progressive intercostal paralysis, and deep anesthesia by diaphragmatic respiration. A medium depth of unconsciousness or anesthesia has traditionally been considered a light plane of surgical anesthesia (stage III, plane 2) characterized by stable respiration and pulse rate, abolished laryngeal reflexes, a sluggish palpebral reflex, a strong corneal reflex, and adequate muscle relaxation and analgesia for most surgical procedures.



∞ **Deep surgical anesthesia** (stage III, plane 3) is characterized by decreased intercostal muscle function and tidal volume, increased respiratory rate, profound muscle relaxation, diaphragmatic breathing, a weak corneal reflex, and a centered and dilated pupil.

If CNS depression is allowed to increase further, patients will progress to stage IV.

Stage IV.



In this stage, the CNS is extremely depressed, and respirations cease. The heart continues to beat only for a short time. the pupils are widely dilated. The anal and bladder sphincters relax. Death quickly intervenes unless immediate resuscitative steps are taken.

Length of procedure



1. Short procedures lasting less than 15 minutes

Any general anesthetic procedure, surgical or otherwise, that lasts less than 15 minutes. Preanesthetic medications are usually given IM or SC but may be given IV if the patient is amenable to this. Most of the injectable anesthetic agents (thiopental, propofol, ketamine-benzodiazepine, etomidate, Telazol, alphaxalone).

Intermediate procedures lasting 15–60 minutes



Compared to short duration procedures, the main difference here is that additional drugs need to be administered after induction to extend the maintenance phase of anesthesia. In most cases, this is most often accomplished by transferring the patient to an inhalant anesthetic such as isoflurane or sevoflurane. Alternatively, maintenance with an injectable drug such as propofol administered as a CRI is also possible. IV catheterization and endotracheal intubation should be performed in all of these patients.

Long procedures lasting more than 60 minutes

Any general anesthetic procedure, surgical or otherwise, that lasts greater than 1 hour.

For most patients requiring long-duration anesthesia, inhalant agents such as isoflurane and sevoflurane are the drugs of choice for maintenance as they will still result in rapid and predictable recoveries. IV catheterization, endotracheal intubation, and IV fluid therapy are standard requirements, and other supportive interventions may be indicated for certain patients and/or clinical situations.

Common preanesthetic medications in dogs



| Drug | IM, SC dose in mg/kg | IV dose in mg/kg |
|-----------------|----------------------|------------------|
| Midazolam | 0.1-0.3 | 0.1-0.2 |
| Acepromazine | 0.02-0.1 | 0.01-0.05 |
| Dexmedetomidine | 0.001-0.005 | 0.001-0.005 |
| Butorphanol | 0.2-0.4 | 0.2-0.4 |
| Atropine | 0.04 | 0.02 |

Anesthetic induction and coinduction agents in cats



| Anesthetic/coinduction drug | IV dose in mg/kg |
|-----------------------------|------------------|
| Propofol | 4-10 |
| Thiopental | 5-15 |
| Midazolam/ketamine | 0.1-0.3/3-10 |

Dosage Calculation



**Dose * Weight /
Concentration**

Dose of some anesthetic and per-medication drugs



| Drugs/ Animals | Xyalzine mg/Kg | Acepromizine mg/Kg | Diazepam mg/Kg | detomidine mg/Kg | Propfol mg/Kg | Ketamine HCL mg/Kg |
|-------------------|-------------------|-----------------------|-------------------|---------------------|------------------|--------------------------|
| Dogs | 1-2 | 0.02-0.1 | 4-5 | 0.01-0.02 | 5-6 | 5-15 |
| Cat | 1-2 | 0.1-0.2 | 4-5 | 0.01-0.02 | 4-10 | 15 |
| Horse | 2 | 0.2 | 0.02-0.08 | 0.02 – 0.04 | 2-4 | 2 |
| Cattle | 0.05-0.2 | 0.2 | 0.5-1 | 0.03-0.06 | 4-5 | 2 |



☞ Note:

1- Concentration was found on vial as mg or percentage
(1% = 10 mg , 100% = 1000mg)

2- Signs of stages and planes of anesthesia in details :

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Thanks