

Local and General anesthesia

General anesthesia: is the loss of sensation throughout the entire body, accompanied by loss of consciousness. General anesthesia is necessary for major surgical procedures. General anesthetics can be divided into two groups:

- (1) inhalation anesthetics.
- (2) intravenous anesthetics.

Stages of General Anesthesia:

1. **Stage 1 (Loss of pain):** The patient loses general sensation but may be awake. This stage proceeds until the patient loses consciousness.
2. **Stage 2 (Excitement and hyperactivity):** The patient may be delirious and try to resist treatment. Heart rate and breathing may become irregular, and blood pressure can increase. IV agents are administered here to calm the patient.
3. **Stage 3 (Surgical anesthesia):** Skeletal muscles become relaxed, and delirium stabilizes. Cardiovascular and breathing activities stabilize. Eye movements slow, and the patient becomes still. **Surgery is performed during this stage.**
4. **Stage 4 (Paralysis of the medulla region in the brain)** (responsible for controlling respiratory and cardiovascular activity): If breathing or the heart stops, **death could result.** This stage is usually avoided during general anesthesia.

Methods of inducing general anesthesia

1. Intravenous method.
2. Inhalational method.

Classification of general anesthetic drugs: -

1) Inhalation anesthesia

A. Volatile liquid:

1. **Sevoflurane:** Non-irritant to airways, commonly used for pediatric and adult.
2. **Desflurane:** Very rapid action and recovery, but pungent and not recommended for induction.

3. Isoflurane:**4. desflurane****5. Halothane****B) Gas:****1. nitrous oxide.****Mechanism of action:**

At clinically effective concentrations, general anesthetics increase the sensitivity of the γ -aminobutyric acid (GABA) receptors to the inhibitory neurotransmitter GABA. This increases chloride ion influx and hyperpolarization of neurons.

USES:

- 1. Nitrous oxide** is a non-irritating, potent analgesic but a weak general anesthetic.
- 2. Nitrous oxide** alone cannot produce surgical anesthesia, but it is commonly combined with other more potent agents.
- 3. Nitrous oxide** does not depress respiration and does not produce muscle relaxation.
- 4. Halothane** is a potent anesthetic but a relatively weak analgesic. Thus, it is usually co-administered with nitrous oxide, opioids, or local anesthetics. Halothane relaxes both skeletal and uterine muscles and can be used in obstetrics when uterine relaxation is indicated.

2) I.V Anesthesia**A. Barbiturate and barbiturate Like agents****1. propofol****B. Benzodiazepines**

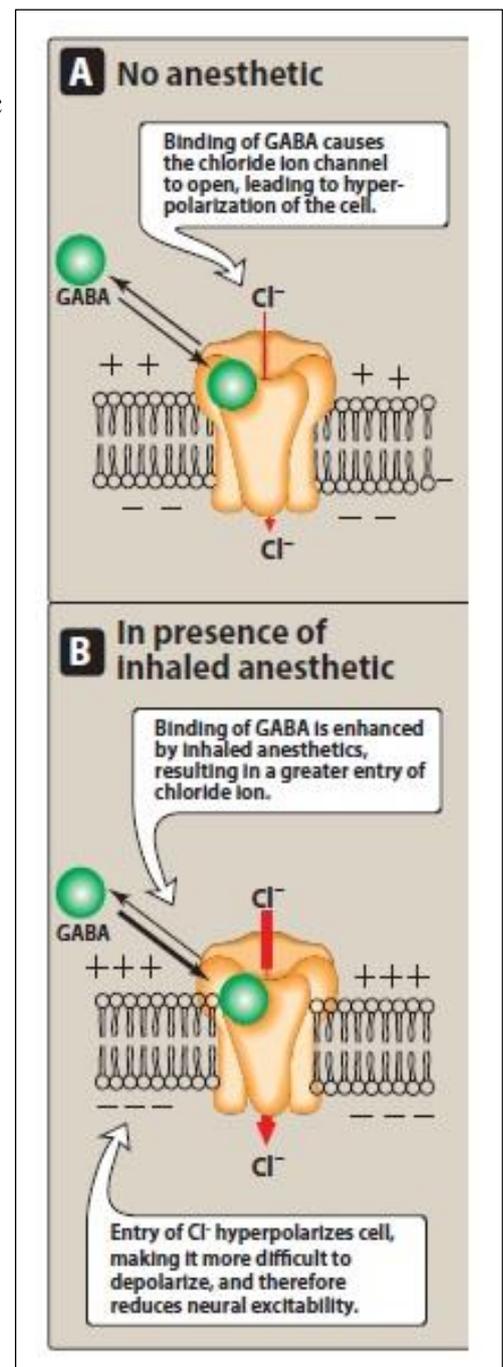
-lorazepam

-midazolam

-diazepam (Valium)

C. Opioids alfentanil

-fentanyl



D. Others

-ketamine

USES:

2. **Propofol** is an IV sedative/hypnotic used for the induction of anesthesia.
3. **Ketamine**, a short-acting, non-barbiturate anesthetic, induces a **dissociated state** in which the patient is unconscious (but may appear to be awake) and does not feel pain. This dissociative anesthesia provides **sedation, amnesia, and immobility**.
4. **Barbiturates Thiopental** is an **ultra-short-acting** barbiturate. It is a potent anesthetic but a weak analgesic. Barbiturates require supplementary analgesic administration during anesthesia.

Adverse effects of Barbiturates:

- Drowsiness, disorientation, respiratory depression.
- Peripherally: hypotension due to myocardial depression and depression of VMC.

Non-Anesthetic Drugs (as Adjuncts to Surgery):

A number of drugs are used either to complement the effects of general anesthetics or to treat anticipated side effects of the anesthesia.

1. Preoperative Drugs (Sedation & Anxiety Reduction)

Relieve anxiety, provide sedation, and induce amnesia.

2. Intraoperative & General Adjuncts

- **Anticholinergics** (e.g., **Atropine**): Dry secretions (reduce saliva/bronchial mucus) and suppress bradycardia caused by anesthetics.
- **Muscle Relaxants**: Used to facilitate intubation and improve surgical access.
- **Antiemetics**: Prevent post-anesthetic nausea and vomiting.

3. Postoperative & Specialized Adjuncts

- **NSAIDs & Clonidine**: Improve post-operative analgesia.
- **Gabapentin**: Used for dynamic pain and to reduce opioid side effects.