

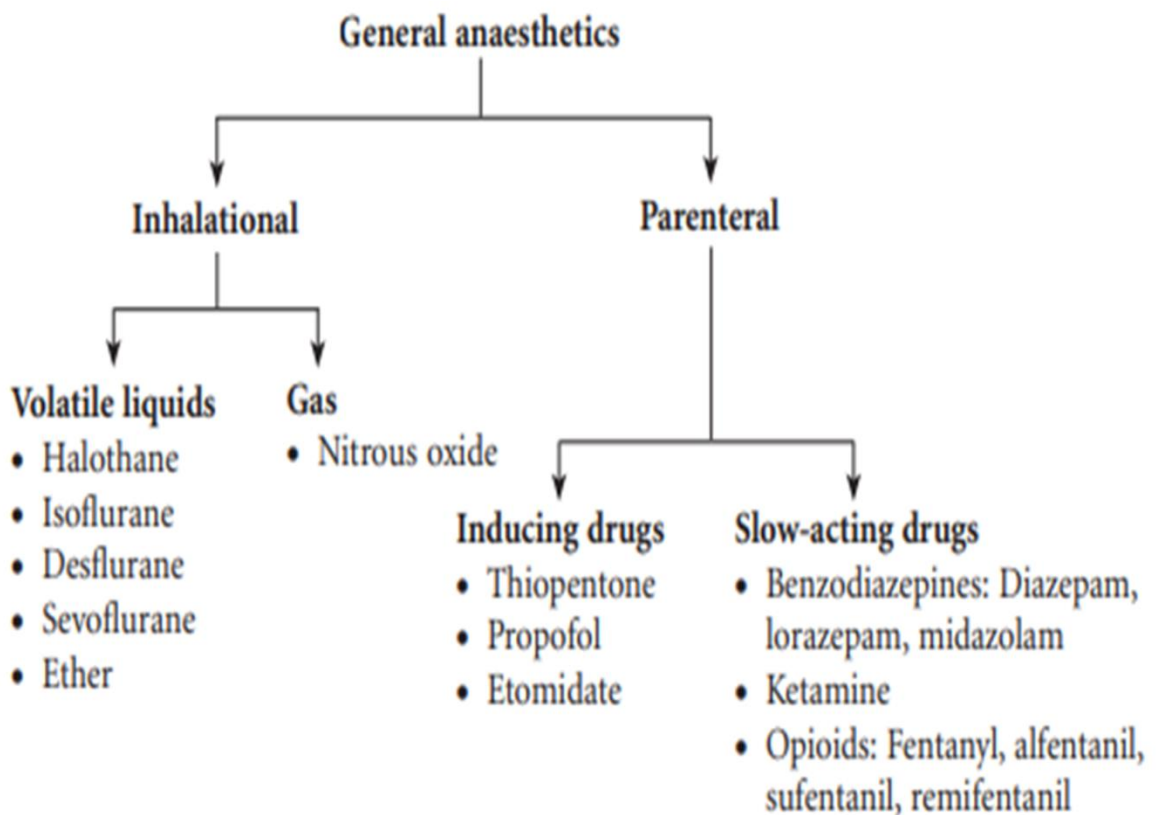
## Anesthetics

- **General anesthetics.**
- **Local anesthetics.**

**General anesthesia:** refers to drug-induced reversible loss of consciousness and all sensations.

### Stages of Anesthesia:

- Stage 1 involves analgesia. The patient is conscious.
- Stage 2 involves excitement, due to blockade of inhibitory pathways in the brain. This can be a dangerous phase due to the vomiting, restlessness, delirium, and other hyperexcitable effects that may occur.
- Stage 3 is the stage at which surgery is usually performed. The patient is unconscious, and his or her skeletal muscles are relaxed.
- Stage 4 involves respiratory and cardiovascular depression, which, if pronounced, can lead to death.



Use of ether is obsolete but is still in use where there are no other facilities available.

Speed of induction and recovery depends on the solubility of the anesthetic agent in blood and fat. Anesthetics with low blood solubility produce rapid induction and recovery (e.g. N<sub>2</sub>O and desflurane). Anesthetics with high solubility in blood produce slow induction and recovery (e.g. ether).

**Halothane** is the prototype. Halothane sensitizes the myocardium to the arrhythmogenic effects of catecholamines. Due to adverse effects (hepatotoxicity) and the availability of other anesthetics with fewer complications, halothane has been replaced in most countries.

**Isoflurane** has respiratory irritant effects, Pungent odour—hence not commonly used for induction. .

**Sevoflurane** is partially metabolized by the liver and may be hepatotoxic. It has rapid onset and recovery (?)

**Desflurane** has the fastest onset of and recovery from anesthesia, this makes it a popular anesthetic for short procedures. Also has respiratory irritant effects so it should not be used for inhalation induction. Higher cost occasionally prohibits its use.

**Nitrous oxide** (laughing gas) is a nonirritating potent sedative that is unable to create a state of general anesthesia. It is frequently used at concentrations of 30% to 50% in combination with oxygen to create moderate sedation, particularly in dentistry.

Nitrous oxide does not depress respiration, and maintains cardiovascular hemodynamics as well as muscular strength.

Nitrous oxide can be combined with other inhalational agents to establish general anesthesia, which lowers the required concentration of the combined volatile agent. This gas admixture further reduces many unwanted side effects of the other volatile agent that impact cardiovascular output and cerebral blood flow.

Nitrous oxide is poorly soluble in blood and other tissues, allowing it to move very rapidly in and out of the body. This can be problematic in closed body compartments because nitrous oxide can increase the volume (exacerbating a pneumothorax) or pressure (sinus or middle ear pressure) because it replaces nitrogen in various air spaces faster than the nitrogen leaves.

Its speed of movement allows nitrous oxide to retard oxygen uptake during recovery, thereby causing “diffusion hypoxia.” This can be overcome by delivering high concentrations of inspired oxygen during recovery.

### **Intravenous Anesthetics:**

IV anesthetics cause rapid induction of anesthesia often occurring in 1 minute or less. It is the most common way to induce anesthesia before maintenance of anesthesia with an inhalation agent.

**Dexmedetomidine**: is an  $\alpha_2$  receptor agonist in certain parts of the brain.

**Etomidate**: is usually only used for patients with cardiovascular dysfunction or patients who are acutely critically ill.

**Methohexital**: is commonly used for electroconvulsive therapy.

**Propofol**: is poorly water soluble, it is supplied as an emulsion containing soybean oil and egg phospholipid, giving it a milk like appearance.

### **Ketamine:**

Ketamine induces a dissociated state in which the patient is unconscious (but may appear to be awake) with profound analgesia. Ketamine stimulates central sympathetic outflow, causing stimulation of the heart with increased blood pressure and CO. It is also a potent bronchodilator. Therefore, it is beneficial in patients with hypovolemic or cardiogenic shock as well as asthmatics. Conversely, it is contraindicated in hypertensive or stroke patients. Ketamine may be used illicitly, since it causes a dreamlike state and hallucinations.

### **Indications for general anesthesia in dentistry**

The indications for GA in dentistry have diminished over the years as techniques of conscious sedation have evolved

- Acute dento-alveolar abscess and severe pulpitis: It may be difficult to achieve adequate local anesthesia in these conditions. Management of these conditions may require general anesthesia.
- Mentally challenged patients: In these patients, conduct of dental procedures safely under local anesthesia could be difficult.
- Children: In small children where attempts to use local anesthesia alone or with conscious sedation has been unsuccessful or the child does not cooperate, dental procedures need to be carried out under general anesthesia.
- Patients allergic to local anesthetics.
- Extensive dental procedures.