

PHARMACIST BOOSTER - 28

PHARMACOLOGY

MOA OF GENERAL ANAESTHETICS



Important for **RRB, AIIMS, ESIC, SEPOY, CISF, GSSSB, DSSSB, SSC, CGHS** etc.



Concept + Revision
कॉन्सेप्ट + रिविजन

हिंदी + English में



GENERAL ANAESTHETICS

- Induction of Anaesthesia
- Maintenance of Anaesthesia
- Reversible
- Minimal Pain & Reflexes
- Controlled Depression of CNS



Vijay Sir

CLICK ON BANNER TO WATCH VIDEO

NITROUS OXIDE & ETHER



N₂O

NITROUS OXIDE

WEAK ANAESTHETIC, GOOD ANALGESIC

O₂

- Commonly used with **oxygen**.



- 70%** N₂O + **30%** O₂ may allow **recall** during anaesthesia.



- Used with O₂ for **dental analgesia**.



Recall possible with **70%** N₂O + **30%** O₂.
Ideal with **O₂** for **dental analgesia**.



ETHER

OLDER INHALATIONAL ANAESTHETIC



- Now **rarely used**; limited to peripheral or **resource-poor** settings.



- Main problems: **unpleasant** and **highly inflammable**.



- Highly inflammable – keep away from **heat** & **sparks**.



Unpleasant odour & **highly inflammable** – use only where **alternatives** are not available.



KEY POINT

N₂O = weak anaesthetic, good analgesic (with **O₂**; **recall possible**). | **Ether** = older, rarely used; restricted use due to **unpleasant** nature & **high flammability**.



HALOTHANE



INHALATIONAL
GENERAL
ANAESTHETIC.



INDUCTION:
2–4%.



MAINTENANCE:
0.5–1%.



GIVEN BY
SPECIAL
VAPORIZER.



CAUSES
BRONCHODILATION
→ USEFUL IN
ASTHMATICS.



HEPATOTOXIC
DRUG.



NOT AN
IV ANAESTHETIC.



BLOOD : GAS
PARTITION
COEFFICIENT = **2.4.**



KEY POINT

BRONCHODILATOR BUT **HEPATOTOXIC.**



ENFLURANE



INHALATIONAL
GENERAL ANAESTHETIC.



FASTER-ACTING
SUBSTITUTE FOR
HALOTHANE.



HALOGENATED
ETHER.



USED BY
INHALATION FOR
ANAESTHESIA.



USED BY
INHALATION FOR
ANAESTHESIA.



SIMILAR ROLE TO
HALOTHANE,
BUT **FASTER.**



KEY IDEA
SAME EFFECT AS
HALOTHANE,
ACHIEVED **FASTER.**



HALOTHANE

- Inhalational general anaesthetic
- Halogenated ether
- Slower onset of action

VS

ENFLURANE

- Inhalational general anaesthetic
- Halogenated ether
- **FASTER ONSET OF ACTION**



FASTER
ACTION



KEY LINE: HALOGENATED ETHER AND FASTER THAN HALOTHANE.

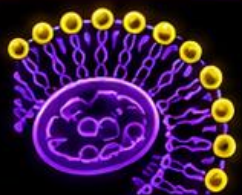


THIOPENTONE



CLASS

Ultrashort-acting
thiobarbiturate.



LIPID SOLUBILITY

Highly
lipid-soluble.



ONSET

Rapid onset
after IV injection.



UNCONSCIOUSNESS

15–20 sec
after IV injection.

2.5% THIOPENTONE SODIUM SOLUTION



Rapid smooth IV induction agent.



DURATION

5–8 min
of action.

ADVANTAGES



Quiet respiration.



Non-irritant.



Non-explosive.



Very rapid and
smooth induction.



KEY POINT

THIOPENTONE = Rapid smooth IV induction agent.





PROPOFOL



IV GENERAL ANAESTHETIC

Administered by intravenous route.



DOSAGE FORM

Available as 1% emulsion.



COMMONLY USED INDUCTION AGENT

Preferred for induction of anaesthesia.



RAPIDLY ACTING

Onset within 30–60 seconds.



DURATION

Short duration of action: 15–45 min.



CAUTION

May cause allergic reaction.



KEY LINE



POPULAR RAPID IV ANAESTHETIC.





ETOMIDATE



TYPE

.....
Induction
anaesthetic.



DURATION

.....
Brief duration
of action.

4–8 min



DOSE

.....
0.2–0.5
mg/kg



KEY USE

.....
Short acting
and useful for
induction.



Short-duration induction agent.



BENZODIAZEPINES



CLASS

Slow-acting
parenteral
anaesthetics.



USES

- Used for **induction**, **maintenance**, and **supplementation**.



INDUCTION



MAINTENANCE



SUPPLEMENTATION



DOSE

Diazepam
0.2–0.3 mg/kg
IV



EFFECTS

- Produces **sedation**
- and **amnesia**.



ONSET

Unconsciousness in
5–10 min.



SEDATION



AMNESIA



DEEP SLEEP



Sedation + amnesia before **unconsciousness**.



BEST PHARMACIST COURSE

RECOMMENDED FOR YOUR PREPARATION



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KETAMINE

1 DISSOCIATIVE ANAESTHESIA



Produces **dissociative anaesthesia**.

Patient is **disconnected** from surroundings while maintaining airway reflexes.

3 AMNESIA



Produces **amnesia**.

Patient does not recall events during the procedure.

2 SEDATION



Causes **sedation**.

Calm, relaxed state with preserved protective reflexes.

4 ANALGESIA



Gives marked **analgesia**.

Effective pain relief, even with minimal cardiovascular effects.



MECHANISM OF ACTION



Blocks **NMDA-type glutamate receptors**.

GLUTAMATE



NMDA RECEPTOR

- Inhibits excitatory neurotransmission
- Produces **dissociation, sedation, amnesia & analgesia**.

CLINICAL USES

- Induction of anaesthesia
- Procedural sedation
- Painful procedures / Trauma



Maintains airway reflexes



Minimal CV effects



Preserves spontaneous respiration



Duration ~15–30 minutes



KEY POINT

Dissociative anaesthetic with strong analgesia.



ANAESTHETIC ADJUVANTS

FENTANYL



Potent **opioid** analgesic.



Highly **lipophilic**.



Short acting:
30–50 min.



Given **IV** at the beginning of **painful surgery**.

REMIFENTANIL



Faster congener of **fentanyl**.



Short and more **predictable** duration.

DEXMEDETOMIDINE



Central **alpha₂** agonist.



Produces **sedation** and **analgesia**.



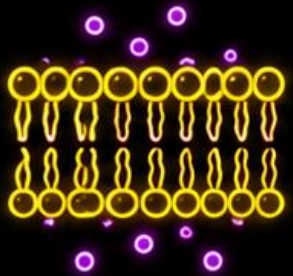
Useful adjuncts for **analgesia** and **sedation**.



FENTANYL



1. Potent
opioid analgesic



2. Highly
lipophilic



3. Short acting:
30–50 min



4. Given **IV**
at the beginning
of painful surgery



Short-acting opioid analgesic used **at start** of painful surgery.



REMIFENTANIL



1. **Faster-acting**
congener of fentanyl



2. **Short duration**



3. **More predictable**
duration of action



Compared to Fentanyl

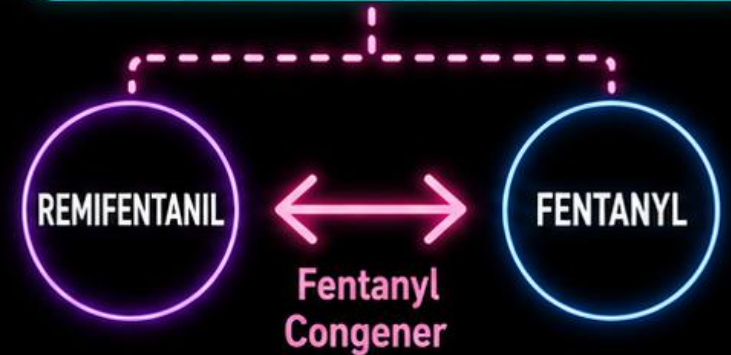


Faster Onset

>



Shorter Duration



Faster fentanyl-like opioid with **short, predictable** action.



DEXMEDETOMIDINE

CNS ACTION



↓ Decreases sympathetic outflow



↓ HR



↓ BP



↓ Sympathetic tone



Stable respiration



α_2
ADRENERGIC
RECEPTOR

1



Central **alpha-2**
adrenergic agonist

2



Produces
sedation

3



Produces
analgesia



Alpha-2 agonist useful for **sedation** and **analgesia**.



ADVANTAGES OF THIOPENTAL SODIUM



1



**Quiet
respiration**

2



**Non-explosive
and non-irritant**

3



**Very rapid and
smooth induction**



Preferred for rapid, smooth IV induction.



HALOTHANE – IMPORTANT POINT



HALOTHANE



**INHALATIONAL
ANAESTHETIC**



EXAM FACT

BLOOD–GAS PARTITION COEFFICIENT = 2.4



REMEMBER: HALOTHANE BLOOD–GAS PARTITION COEFFICIENT IS **2.4**.



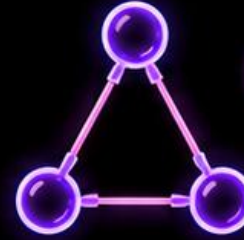
GENERAL ANAESTHESIA — EXAM PUNCH



① **MAC =**
measure of
anaesthetic
potency.



② **Spinal anaesthesia:**
drug injected
into
subarachnoid
space.



③ **Cyclopropane =**
general
anaesthetic.



④ **Concentration effect:**
high N_2O →
rapid uptake.



⑥ **Diffusion hypoxia:**
after stopping N_2O ,
 O_2 falls in alveoli.



⑤ **Second gas effect:**
 N_2O increases
uptake of
another gas.



⑦ **Prevention:**
give 100% O_2
before / after
discontinuation.



KEY TAKEAWAY:

N_2O gives concentration effect, second gas effect, and diffusion hypoxia.



POTENCY



SPINAL



GENERAL
ANAESTHETIC



UPTAKE



MORE UPTAKE



HYPOXIA



PREVENTION



O_2 SUPPORT



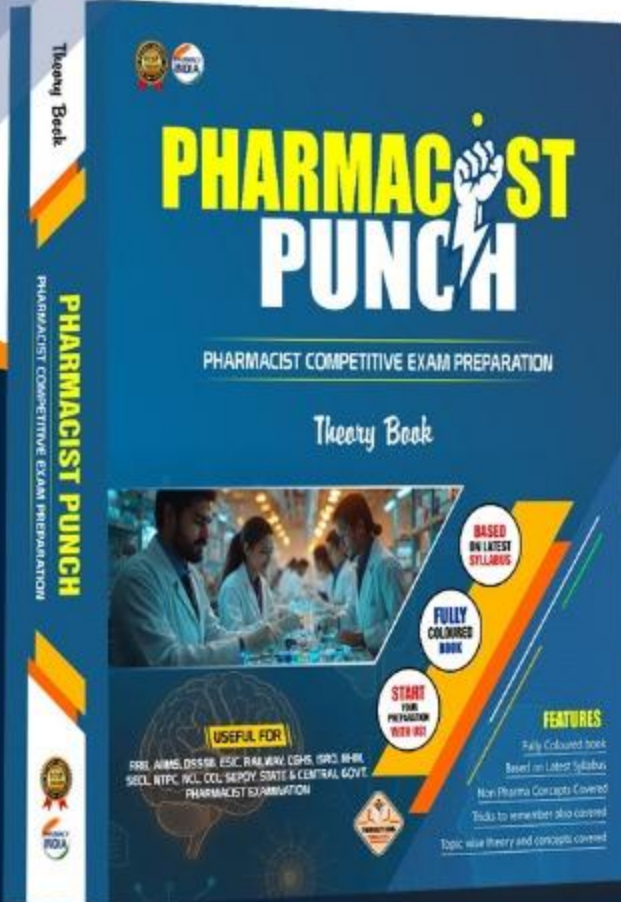
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PUNCH



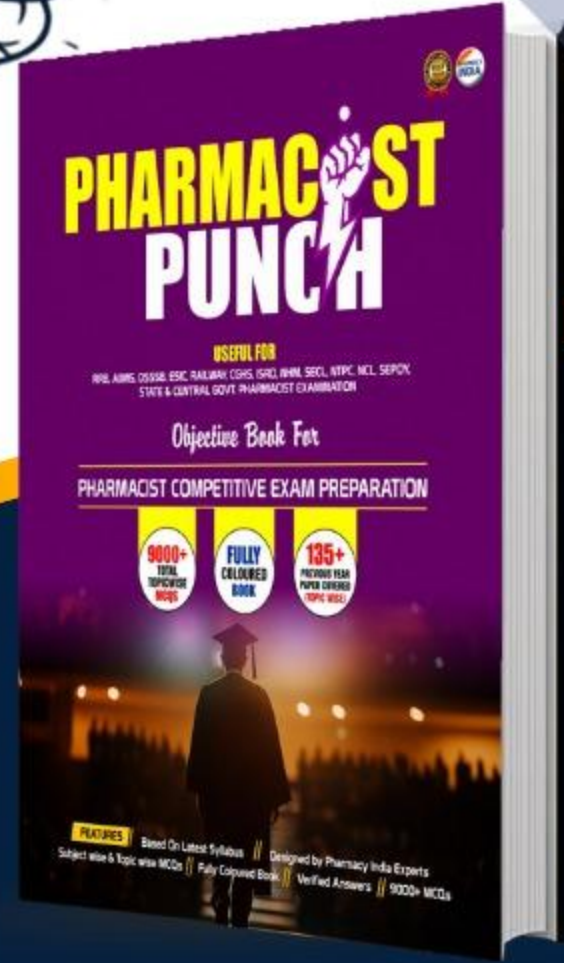
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