## BENZODIAZEPINES

*Alprazolam* XANAX
*Chlordiazepoxide* LIBRIUM
*Clonazepam* KLONOPIN
*Clorazepate* TRANXENE
*Diazepam* VALIUM, DIASTAT
*Estazolam*
*Flurazepam* DALMANE
*Lorazepam* ATIVAN
*Midazolam* VERSED
*Oxazepam*
*Quazepam* DORAL
*Temazepam* RESTORIL
*Triazolam* HALCION

## BENZODIAZEPINE ANTAGONIST

*Flumazenil* ROMAZICON

## OTHER ANXIOLYTIC DRUGS

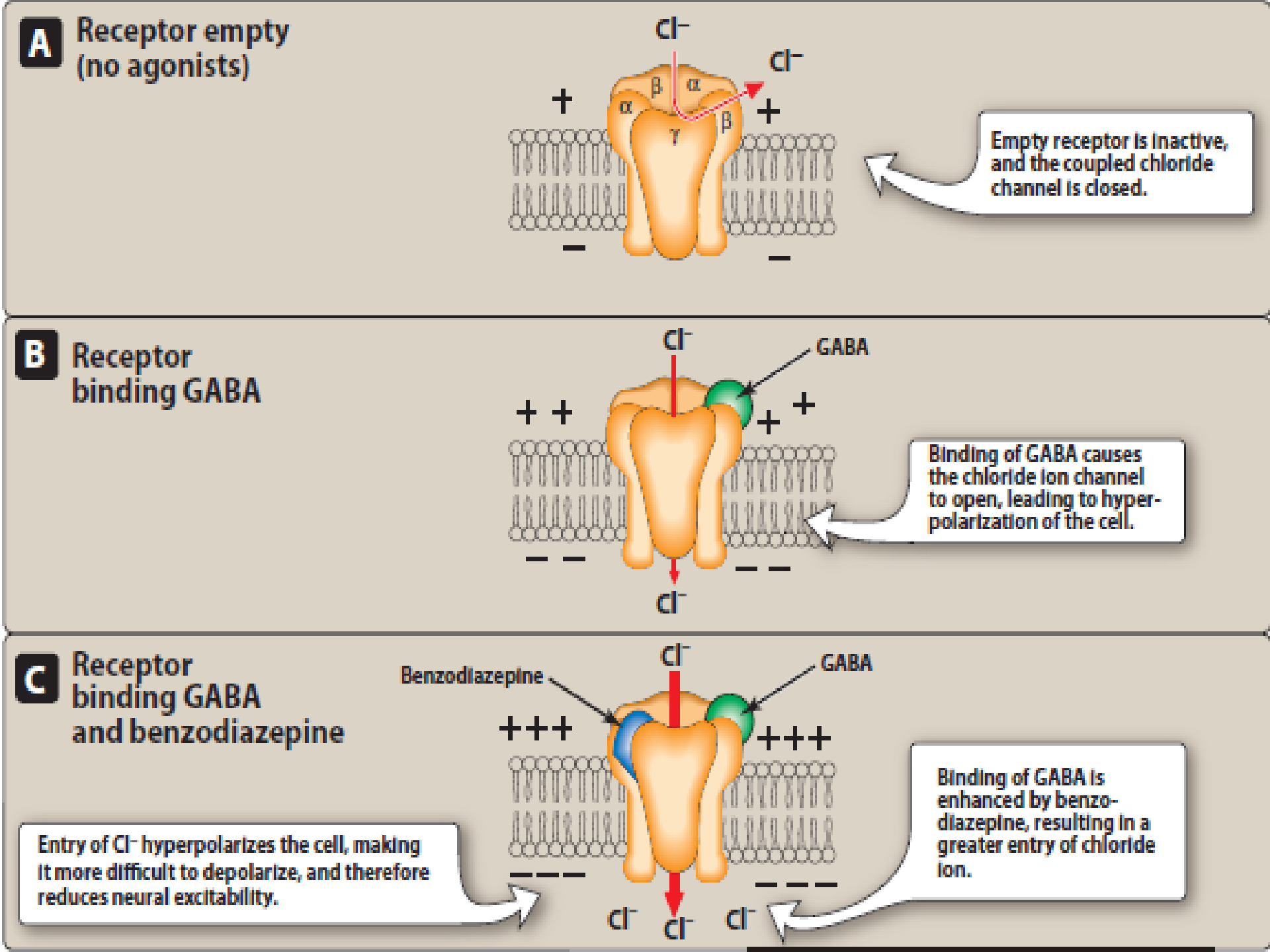
Antidepressants VARIOUS (SEE CHAPTER 10)
*Buspirone* BUSPAR

## BARBITURATES

*Amobarbital* AMYTAL
*Pentobarbital* NEMBUTAL
*Phenobarbital* LUMINAL SODIUM
*Secobarbital* SECONAL
*Thiopental* PENTOTHAL

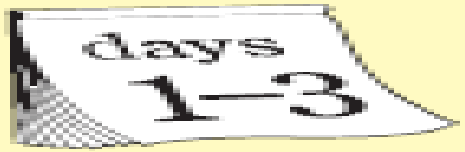
## OTHER HYPNOTIC AGENTS

Antihistamines VARIOUS (SEE CHAPTER 30)
*Doxepin* SILENOR
*Eszopiclone* LUNESTA
*Ramelteon* ROZEREM
*Zaleplon* SONATA
*Zolpidem* AMBIEN, INTERMEZZO, ZOLPIMIST


A
Receptor empty (no agonists)
Cl⁻
Cl⁻
β
α
α
β
γ
+
+
−
−
Empty receptor is inactive, and the coupled chloride channel is closed.
B
Receptor binding GABA
Cl⁻
GABA
+ +
+
+
− −
− −
Cl⁻
Binding of GABA causes the chloride ion channel to open, leading to hyper-polarization of the cell.
C
Receptor binding GABA and benzodiazepine
Cl⁻
Benzodiazepine
GABA
+++
+++
− − −
− − −
Cl⁻
Cl⁻
Cl⁻
Entry of Cl⁻ hyperpolarizes the cell, making it more difficult to depolarize, and therefore reduces neural excitability.
Binding of GABA is enhanced by benzo-diazepine, resulting in a greater entry of chloride ion.

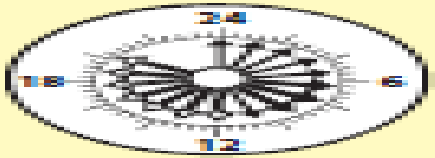
# DURATION OF ACTION OF BENZODIAZEPINES

## Long-acting




*Clorazepate*
*Chlordiazepoxide*
*Diazepam*
*Flurazepam*
*Quazepam*

## Intermediate-acting




**10–20 Hours**

*Alprazolam*
*Estazolam*
*Lorazepam*
*Temazepam*

## Short-acting


**3–8 Hours**

*Oxazepam*
*Triazolam*

# DURATION OF ACTION OF BARBITURATES

## Long-acting

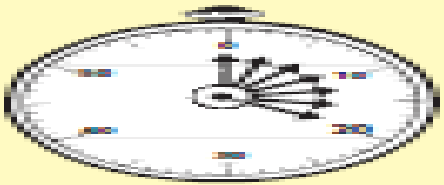

*Phenobarbital*

## Short-acting

**3–8 Hours**

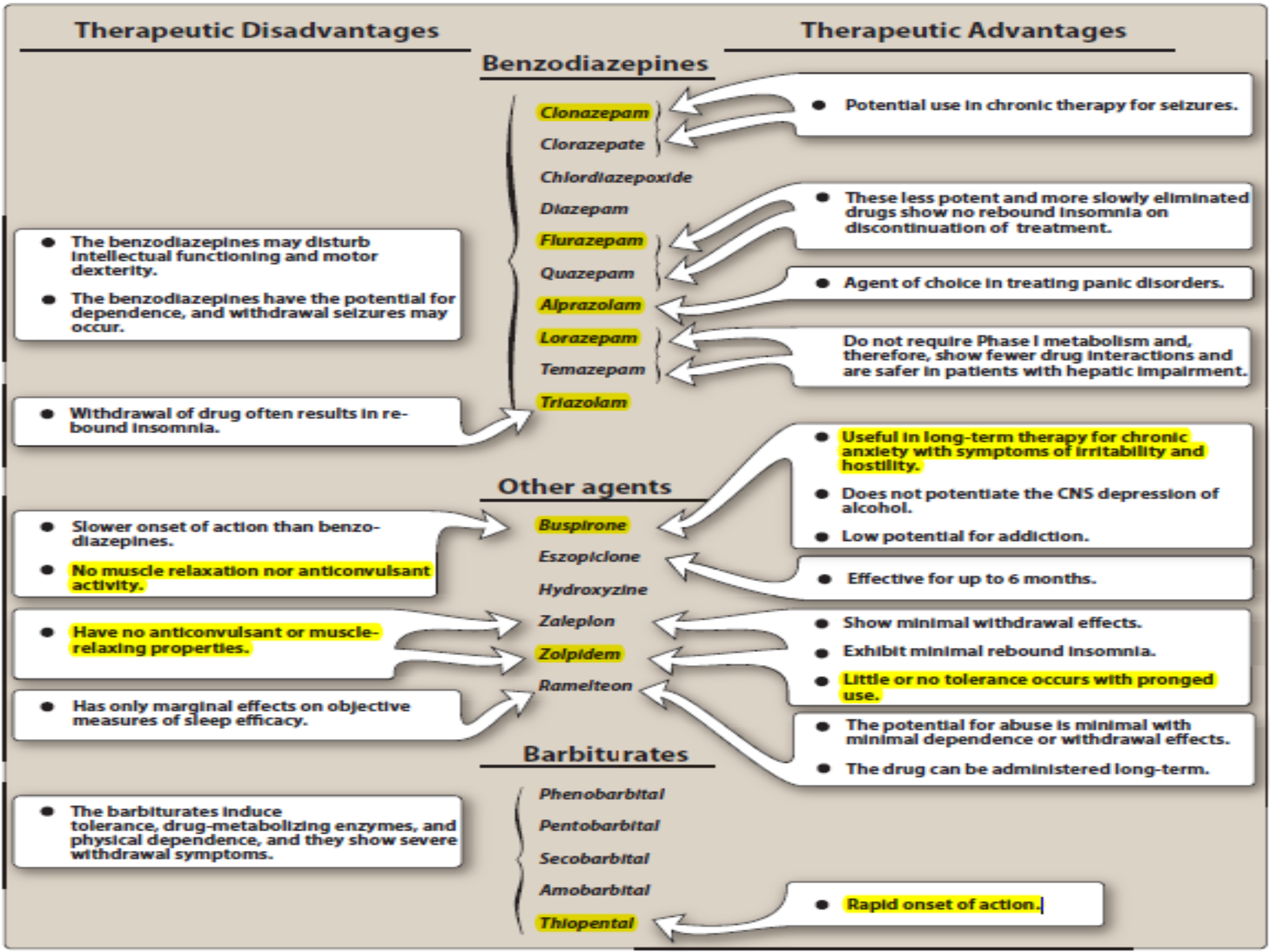
*Pentobarbital*
*Secobarbital*
*Amobarbital*

## Ultra-short-acting



**20 Minutes**

*Thiopental*


Therapeutic Disadvantages
Therapeutic Advantages
Benzodiazepines
Clonazepam
Clorazepate
Chlordiazepoxide
Diazepam
Flurazepam
Quazepam
Alprazolam
Lorazepam
Temazepam
Triazolam
Potential use in chronic therapy for seizures.
These less potent and more slowly eliminated drugs show no rebound insomnia on discontinuation of treatment.
Agent of choice in treating panic disorders.
Do not require Phase I metabolism and, therefore, show fewer drug interactions and are safer in patients with hepatic impairment.
The benzodiazepines may disturb intellectual functioning and motor dexterity.
The benzodiazepines have the potential for dependence, and withdrawal seizures may occur.
Withdrawal of drug often results in re-bound insomnia.
Other agents
Buspirone
Eszopiclone
Hydroxyzine
Zaleplon
Zolpidem
Ramelteon
Useful in long-term therapy for chronic anxiety with symptoms of irritability and hostility.
Does not potentiate the CNS depression of alcohol.
Low potential for addiction.
Effective for up to 6 months.
Slower onset of action than benzo-diazepines.
No muscle relaxation nor anticonvulsant activity.
Have no anticonvulsant or muscle-relaxing properties.
Has only marginal effects on objective measures of sleep efficacy.
Show minimal withdrawal effects.
Exhibit minimal rebound insomnia.
Little or no tolerance occurs with pronged use.
The potential for abuse is minimal with minimal dependence or withdrawal effects.
The drug can be administered long-term.
Barbiturates
Phenobarbital
Pentobarbital
Secobarbital
Amobarbital
Thiopental
Rapid onset of action.
The barbiturates induce tolerance, drug-metabolizing enzymes, and physical dependence, and they show severe withdrawal symptoms.

## PREANESTHETIC MEDICATIONS

Antacids
Anticholinergics
Antiemetics
Antihistamines
Benzodiazepines
Opioids

## GENERAL ANESTHETICS: INHALED

*Desflurane* SUPRANE
*Halothane* FLUOTHANE
*Isoflurane* FORANE
*Nitrous oxide* NITROUS OXIDE
*Sevoflurane* ULTANE

## GENERAL ANESTHETICS: INTRAVENOUS

Barbiturates
Benzodiazepines
*Dexmedetomidine* PRECEDEX
*Etomidate* AMIDATE
*Ketamine* KETALAR
Opioids
*Propofol* DIPRIVAN

## NEUROMUSCULAR BLOCKERS (see Chapter 5)

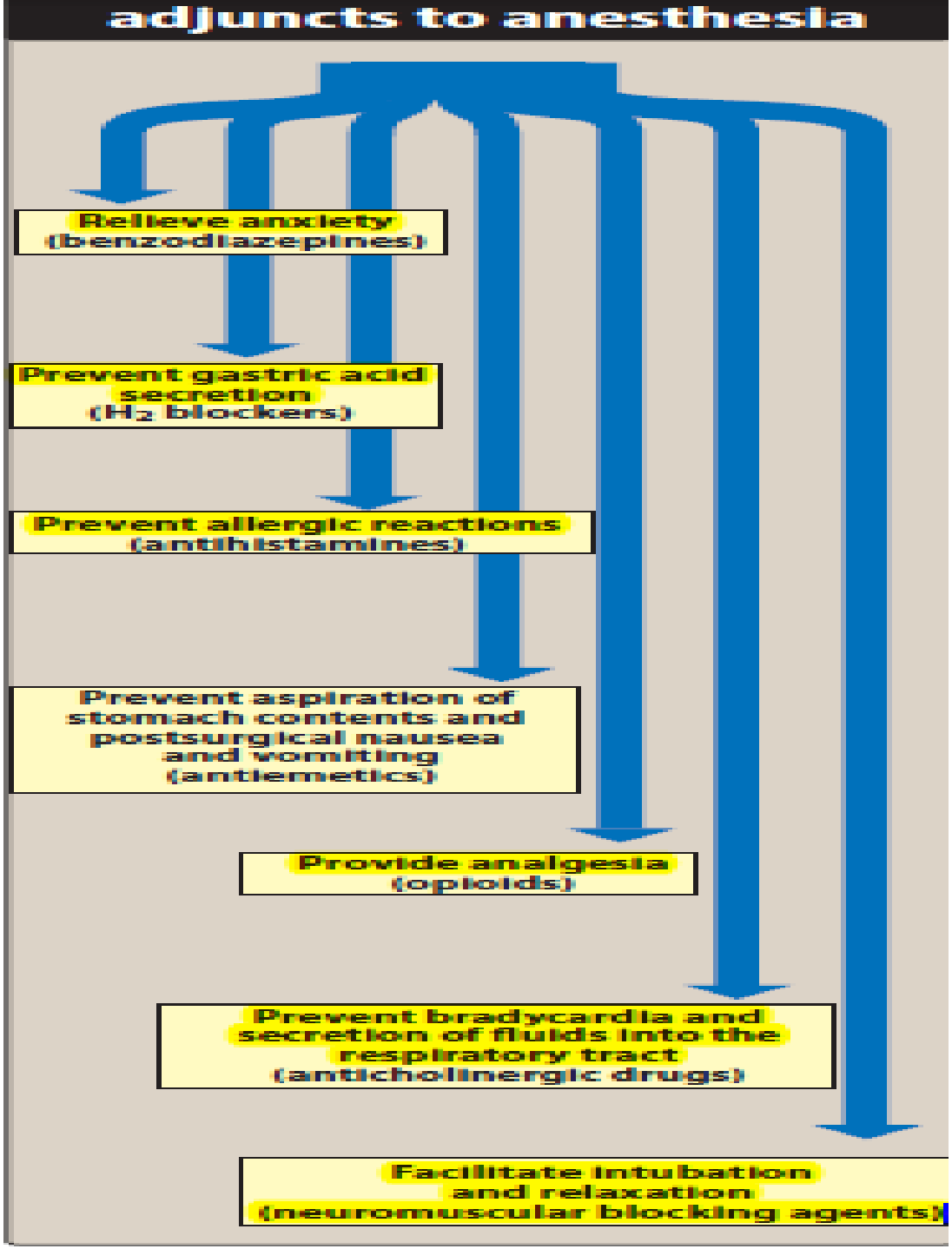
*Cisatracurium, pancuronium, rocuronium, succinylcholine, vecuronium*

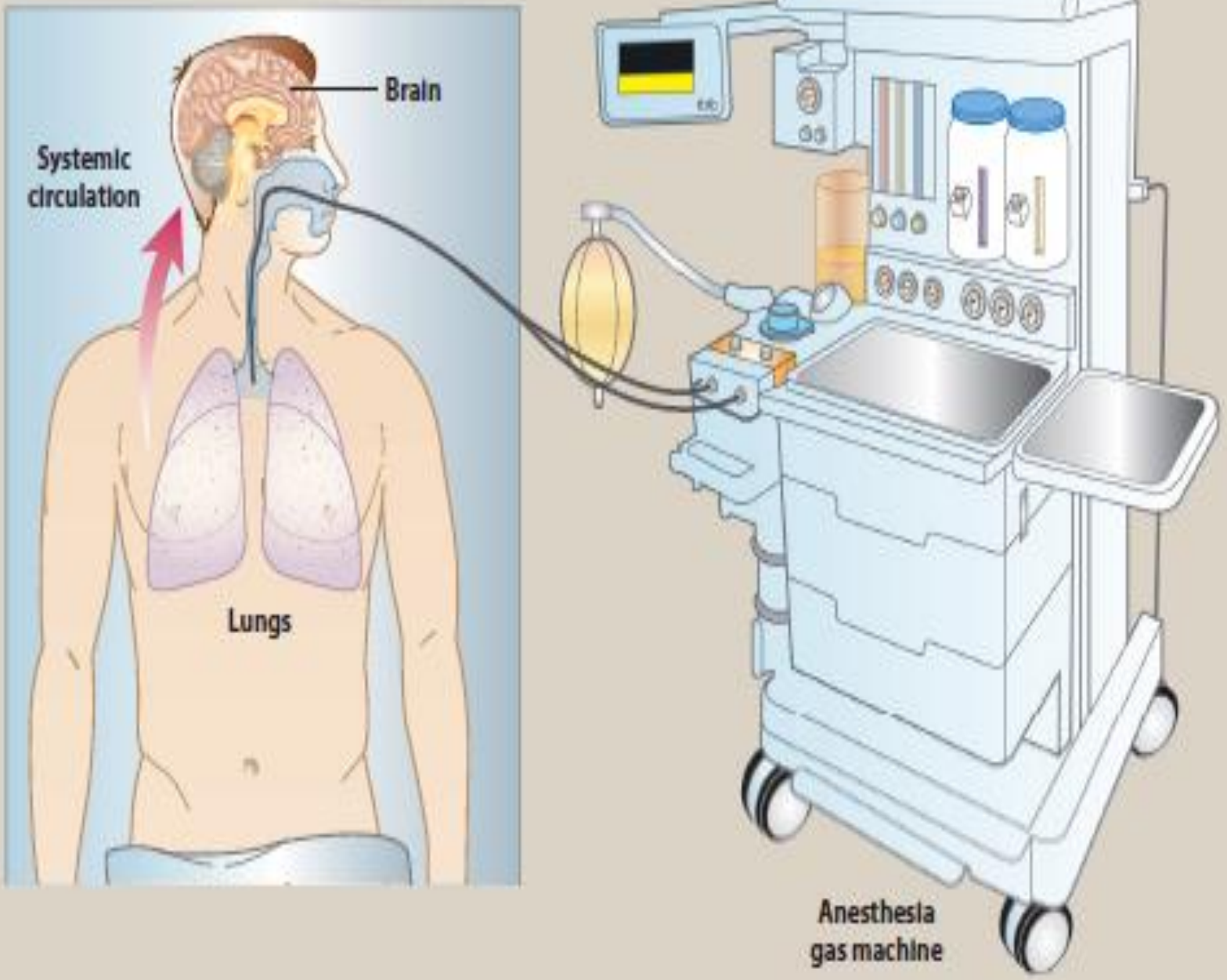
## LOCAL ANESTHETICS: AMIDES

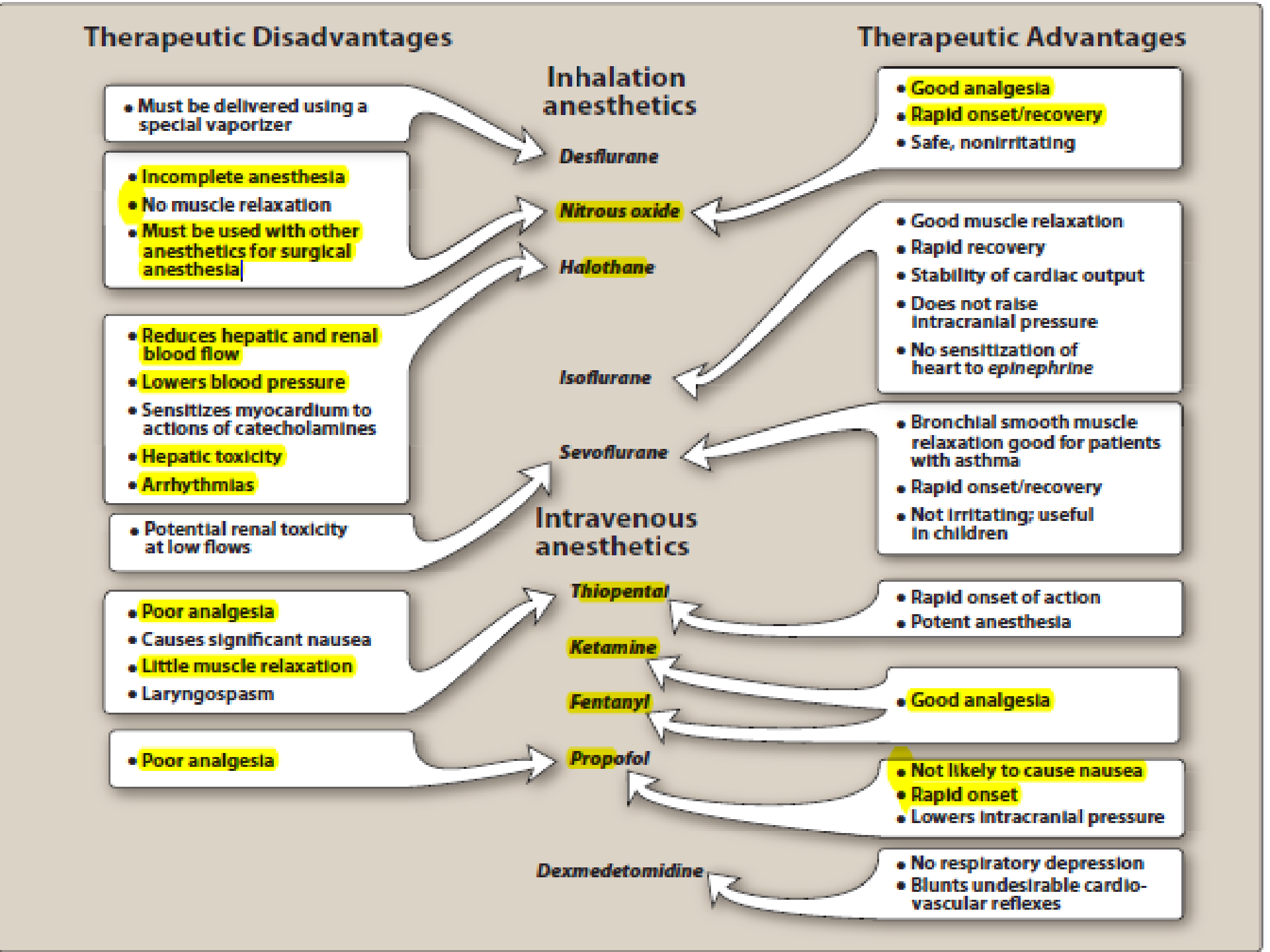
*Bupivacaine* MARCAINE
*Lidocaine* XYLOCAINE
*Mepivacaine* CARBOCAINE
*Ropivacaine* NAROPIN

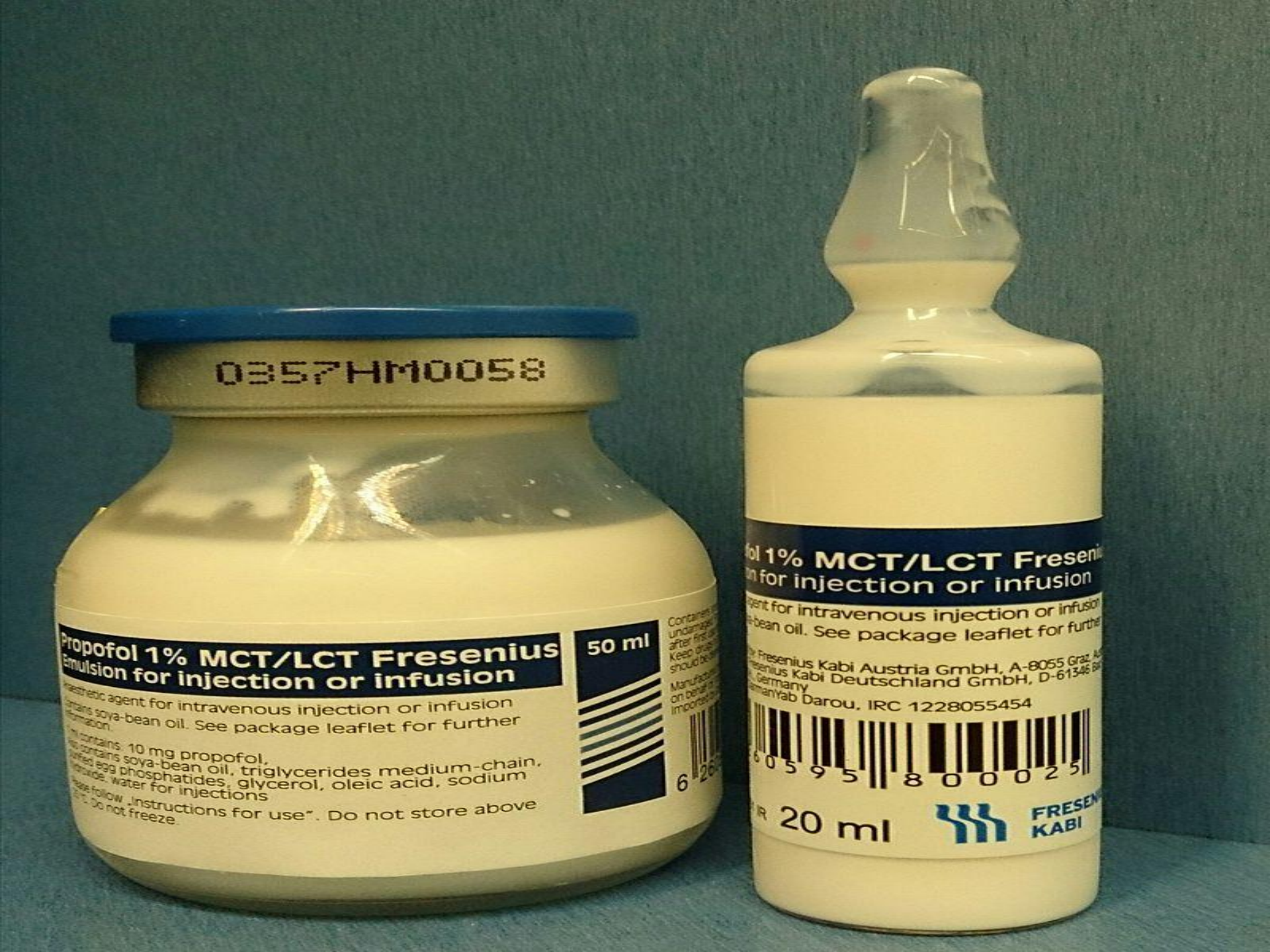
## LOCAL ANESTHETICS: ESTERS

*Chloroprocaine* NESACAINE
*Procaine* NOVOCAINE
*Tetracaine* PONTOCAINE


adjuncts to anesthesia
Relieve anxiety
(benzodiazepines)
Prevent gastric acid secretion
($H_2$ blockers)
Prevent allergic reactions
(antihistamines)
Prevent aspiration of stomach contents and postsurgical nausea and vomiting
(antiemetics)
Provide analgesia
(opioids)
Prevent bradycardia and secretion of fluids into the respiratory tract
(anticholinergic drugs)
Facilitate intubation and relaxation
(neuromuscular blocking agents)

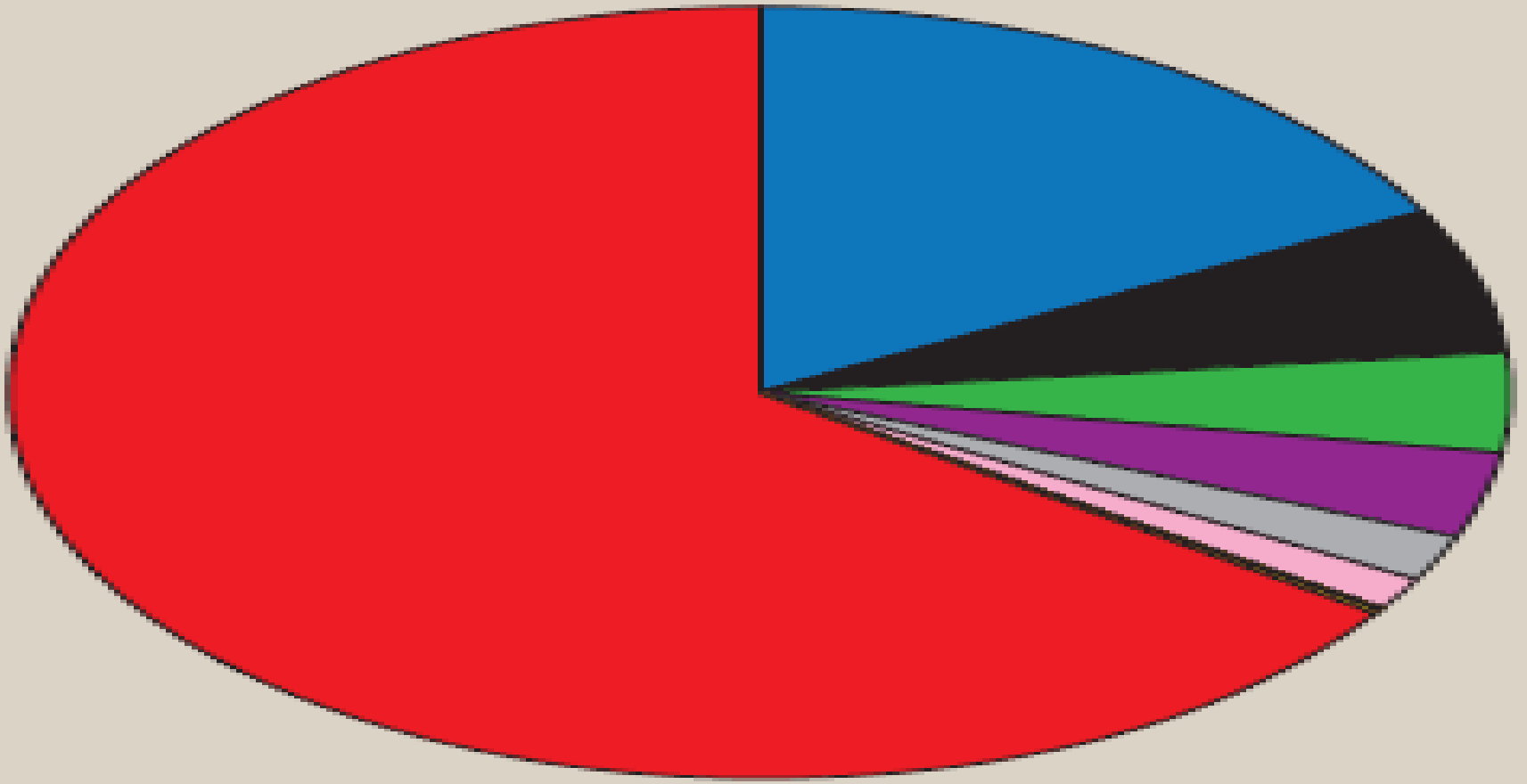

Brain
Systemic circulation
Lungs
Anesthesia gas machine


Therapeutic Disadvantages
Therapeutic Advantages
Inhalation anesthetics
Must be delivered using a special vaporizer
Incomplete anesthesia
No muscle relaxation
Must be used with other anesthetics for surgical anesthesia
Reduces hepatic and renal blood flow
Lowers blood pressure
Sensitizes myocardium to actions of catecholamines
Hepatic toxicity
Arrhythmias
Potential renal toxicity at low flows
Desflurane
Nitrous oxide
Halothane
Isoflurane
Sevoflurane
Good analgesia
Rapid onset/recovery
Safe, nonirritating
Good muscle relaxation
Rapid recovery
Stability of cardiac output
Does not raise intracranial pressure
No sensitization of heart to epinephrine
Bronchial smooth muscle relaxation good for patients with asthma
Rapid onset/recovery
Not irritating; useful in children
Intravenous anesthetics
Poor analgesia
Causes significant nausea
Little muscle relaxation
Laryngospasm
Poor analgesia
Thiopental
Ketamine
Fentanyl
Propofol
Dexmedetomidine
Rapid onset of action
Potent anesthesia
Good analgesia
Not likely to cause nausea
Rapid onset
Lowers intracranial pressure
No respiratory depression
Blunts undesirable cardiovascular reflexes


0357HM0058
Propofol 1% MCT/LCT Fresenius
Emulsion for injection or infusion
50 ml
anaesthetic agent for intravenous injection or infusion
contains soya-bean oil. See package leaflet for further
information.
ml contains: 10 mg propofol,
ml contains soya-bean oil, triglycerides medium-chain,
purified egg phosphatides, glycerol, oleic acid, sodium
hydroxide, water for injections
usage follow „Instructions for use". Do not store above
25°C. Do not freeze.
Fresenius Kabi Austria GmbH, A-8055 Graz, Au
Fresenius Kabi Deutschland GmbH, D-61346 Bad
, Germany
Darou, IRC 1228055454
20 ml
FRESEN
KABI

| CHARACTERISTIC | ESTERS • *Procaine* • *Chloroprocaine* • *Tetracaine* • *Cocaine* | AMIDES • *Lidocaine* • *Bupivacaine* • *Ropivacaine* • *Mepivacaine* • *Prilocaine* |
|---|---|---|
| Metabolism | Rapid by plasma cholinesterase | Slow, hepatic |
| Systemic toxicity | Less likely | More likely |
| Allergic reaction | Possible- PABA derivatives form | Very rare |
| Stability in solution | Breaks down in ampules (heat, sun) | Very stable chemically |
| Onset of action | Slow as a general rule | Moderate to fast |
| $pK_a$'s | Higher than physiologic pH (8.5–8.9) | Close to physiologic pH (7.6–8.1) |

| DRUG | POTENCY | ONSET | DURATION |
|---|---|---|---|
| *Procaine* | Low | Rapid | Short |
| *Chloroprocaine* | Low | Rapid | Short |
| *Tetracaine* | High | Slow | Long (spinal) |
| *Lidocaine* | Low | Rapid | Intermediate |
| *Mepivacaine* | Low | Moderate | Intermediate |
| *Bupivacaine* | High | Slow | Long |
| *Ropivacaine* | High | Moderate | Long |



Marijuana (65.6%)
Pain Relievers (17.0%)
Inhalants (6.3%)
Tranquilizers (4.1%)
Stimulants (3.6%)
Hallucinogens (2.0%)
Sedatives (1.3%)
Cocaine (0.1%)
Heroin (0.1%)

2.9 Million initiates of illicit drugs

## STRONG AGONISTS

*Alfentanil* ALFENTA
*Fentanyl* ABSTRAL, ACTIQ, DURAGESIC, FENTORA, LAZANDA, SUBSYS
*Heroin*
*Hydrocodone* LORTAB, VICODIN, various
*Hydromorphone* DILAUDID, EXALGO
*Meperidine* DEMEROL
*Methadone* DOLOPHINE
*Morphine* AVINZA, KADIAN, MS CONTIN, ORAMORPH
*Oxycodone* OXYCONTIN
*Oxymorphone* OPANA
*Remifentanil* ULTIVA
*Sufentanil* SUFENTA

## MODERATE/LOW AGONISTS

*Codeine*

## MIXED AGONIST–ANTAGONIST AND PARTIAL AGONISTS

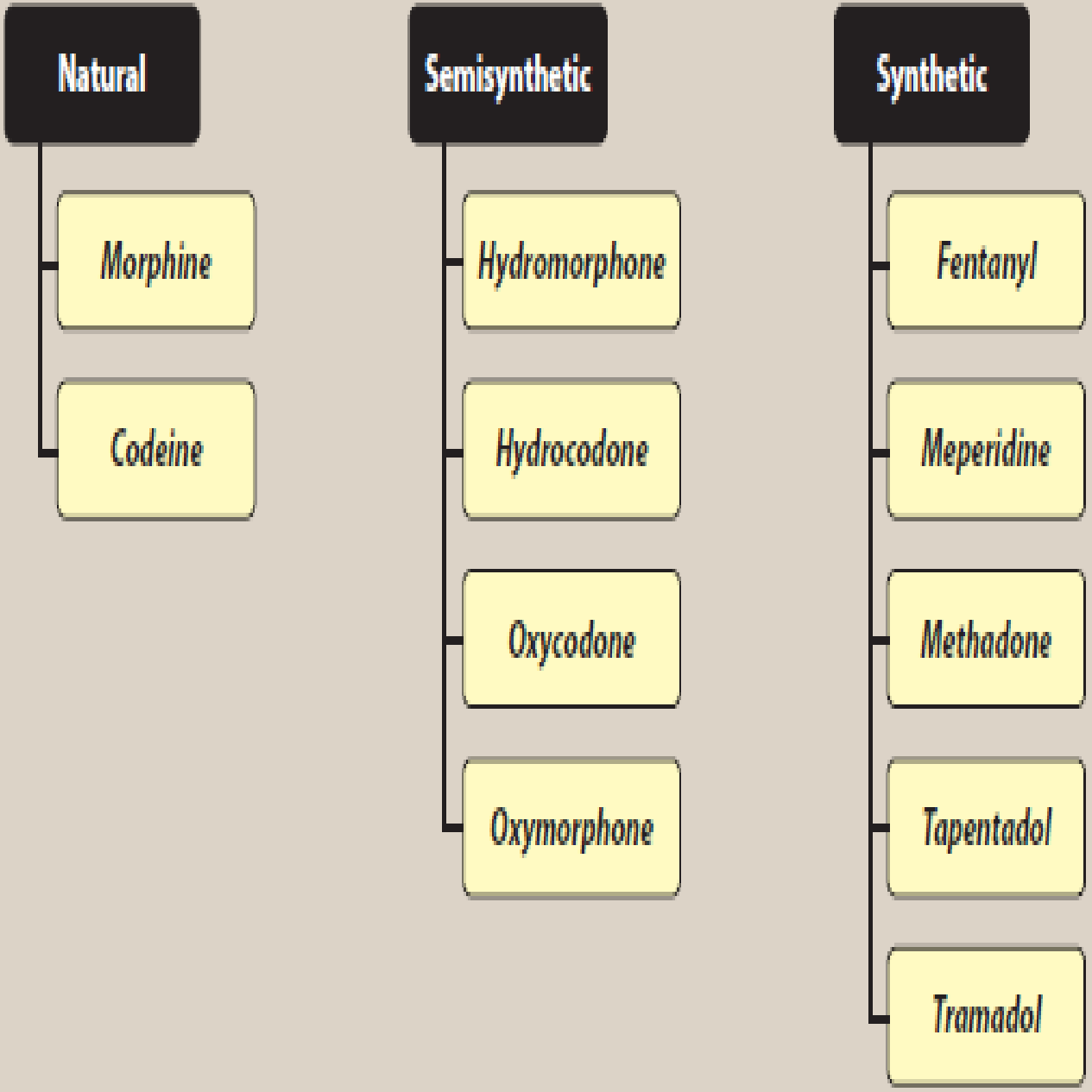
*Buprenorphine* BUPRENEX, SUBUTEX
*Butorphanol*
*Nalbuphine* NUBAIN
*Pentazocine* TALWIN

## ANTAGONISTS

*Naloxone* NARCAN
*Naltrexone* REVIA, VIVITROL

## OTHER ANALGESICS

*Tapentadol* NUCYNTA
*Tramadol* ULTRAM


Natural
Morphine
Codeine
Semisynthetic
Hydromorphone
Hydrocodone
Oxycodone
Oxymorphone
Synthetic
Fentanyl
Meperidine
Methadone
Tapentadol
Tramadol

| Therapeutic Use | Comments |
| --- | --- |
| **Analgesia** | *Morphine* is the prototype opioid agonist. Opioids are used for pain in trauma, cancer, and other types of severe pain. |
| **Treatment of diarrhea** | Opioids decrease the motility and increase the tone of intestinal circular smooth muscle. [Note: Agents commonly used include *diphenoxylate* and *loperamide* (see Chapter 31).] |
| **Relief of cough** | *Morphine* does suppress the cough reflex, but *codeine* and *dextromethorphan* are more commonly used. |
| **Treatment of acute pulmonary edema** | Intravenous *morphine* dramatically relieves dyspnea caused by pulmonary edema associated with left ventricular failure, possibly via the vasodilatory effect. This, in effect, decreases cardiac preload and afterload, as well as anxiety experienced by the patient. |
| **Anesthesia** | Opioids are used as preanesthetic medications, for systemic and spinal anesthesia, and for postoperative analgesia. |