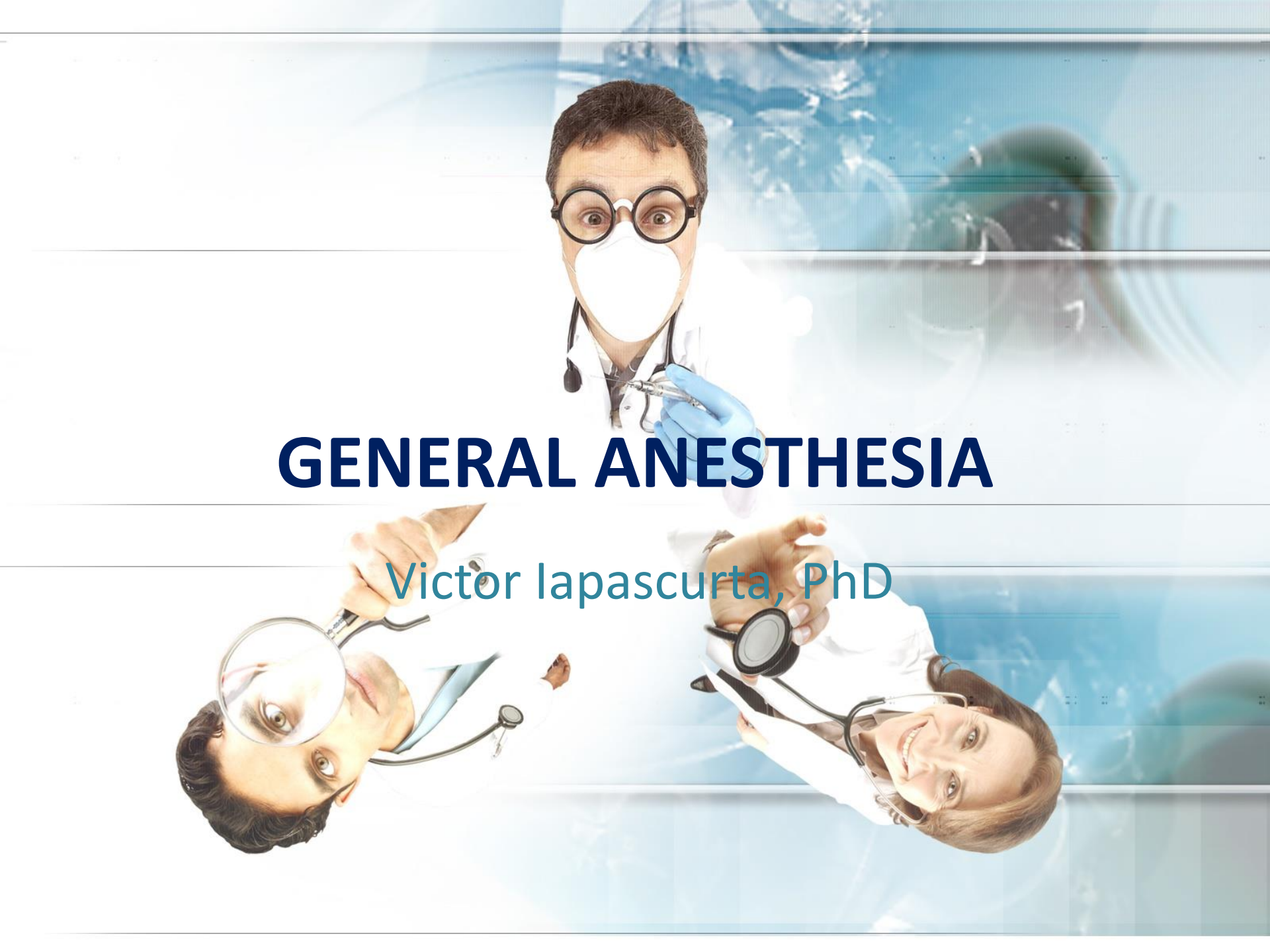

GENERAL ANESTHESIA

Victor Iapascurta, PhD

ANESTHESIA AND INTENSIVE CARE

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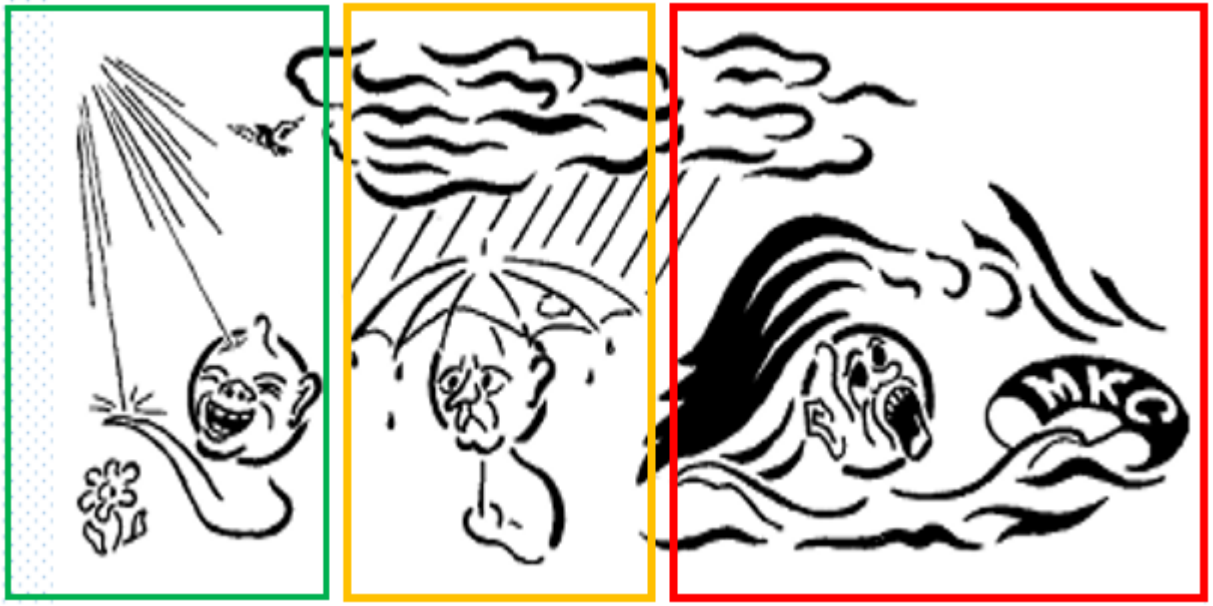
069105713

CRITICAL STATE

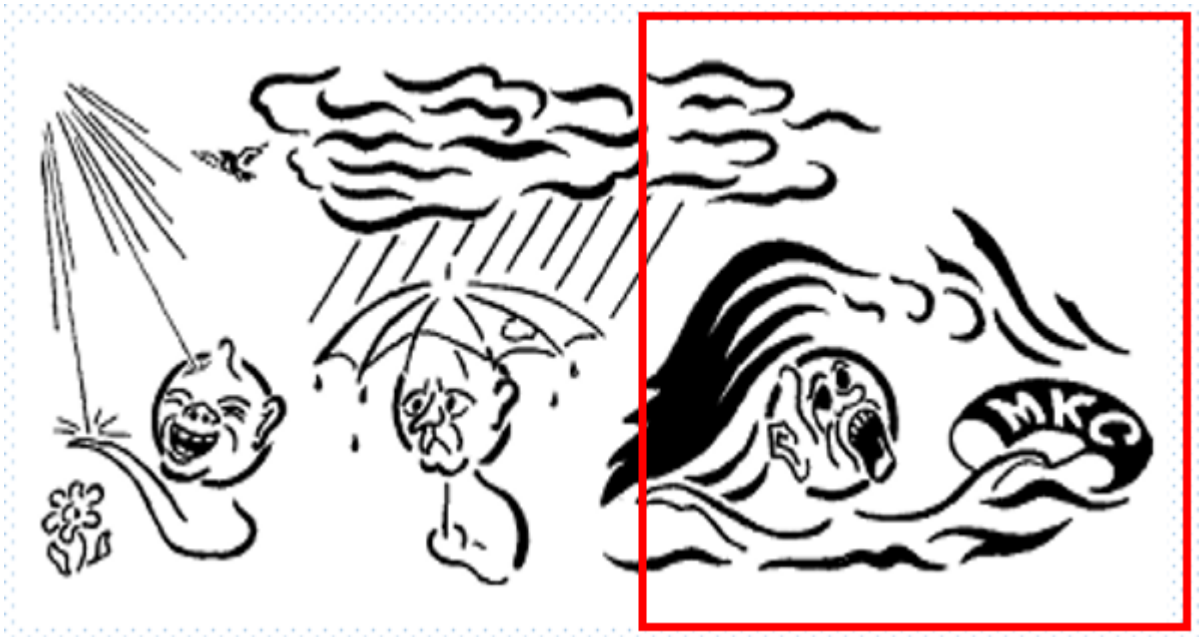
Criteria:

- Conditions of auto-regulatory mechanisms
- The need for correction or/and replacement of a function(s)



Healthy Ill Critically Ill

CRITICAL STATE



Critical state – as an extreme degree of any pathology including iatrogenic one, which requires support or replacement of vital functions

ANESTHESIA: modern concept

GA Components

Analgesia **Hypnosis**

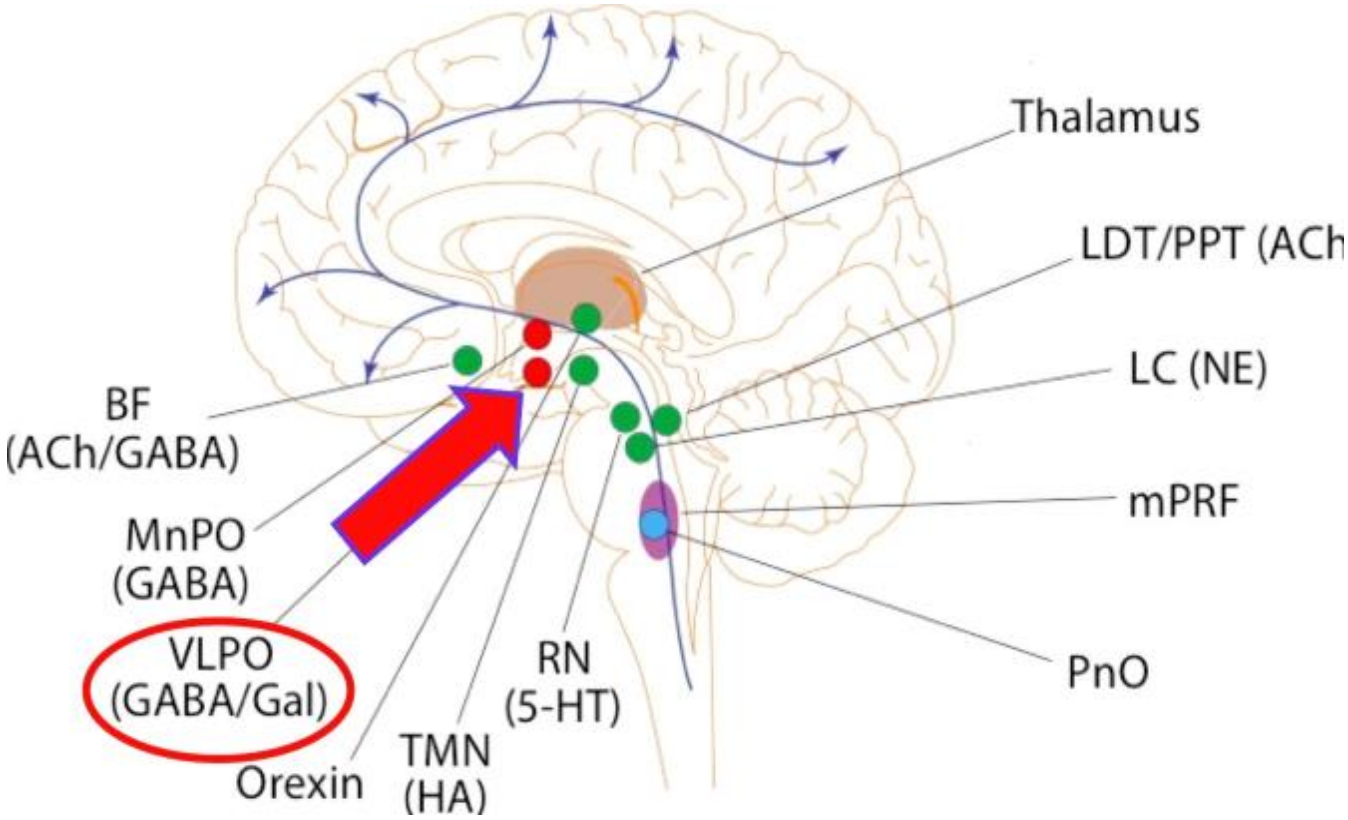
Muscle relaxation **Homeostasis**

Complications of the acute pain

- Pulmonary (Respiratory muscles spasm, cough suppression, abdominal distension due to diminished GI tract motility, atelectasis from impaired ventilation, mucus plugging from suppression of clearing mechanisms, V/Q mismatching and hypoxemia, pulmonary infection)
- Hematological (Increased blood viscosity with thrombus formation, increase activity of clotting factors, increased platelet aggregation)
- Cardiovascular (Acute rise in BP, HR, CO = increased myocardial work with increased oxygen demand (DO2): this can be fatal for a compromised myocardium (e.g. IHD) leading to myocardial infarction and/or congestive heart failure)
- Gastrointestinal (Decreased motility, nausea, vomiting, ileus)
- Urinary (Hypomotility of ureters & urinary bladder, difficult urination)
- Neuroendocrine & metabolic (increased sympathetic activity, higher level of endogenous catecholamines and catabolic hormones, increased metabolism and O2 consumption)
- Psychological (Fear, anxiety, depression, frustration)

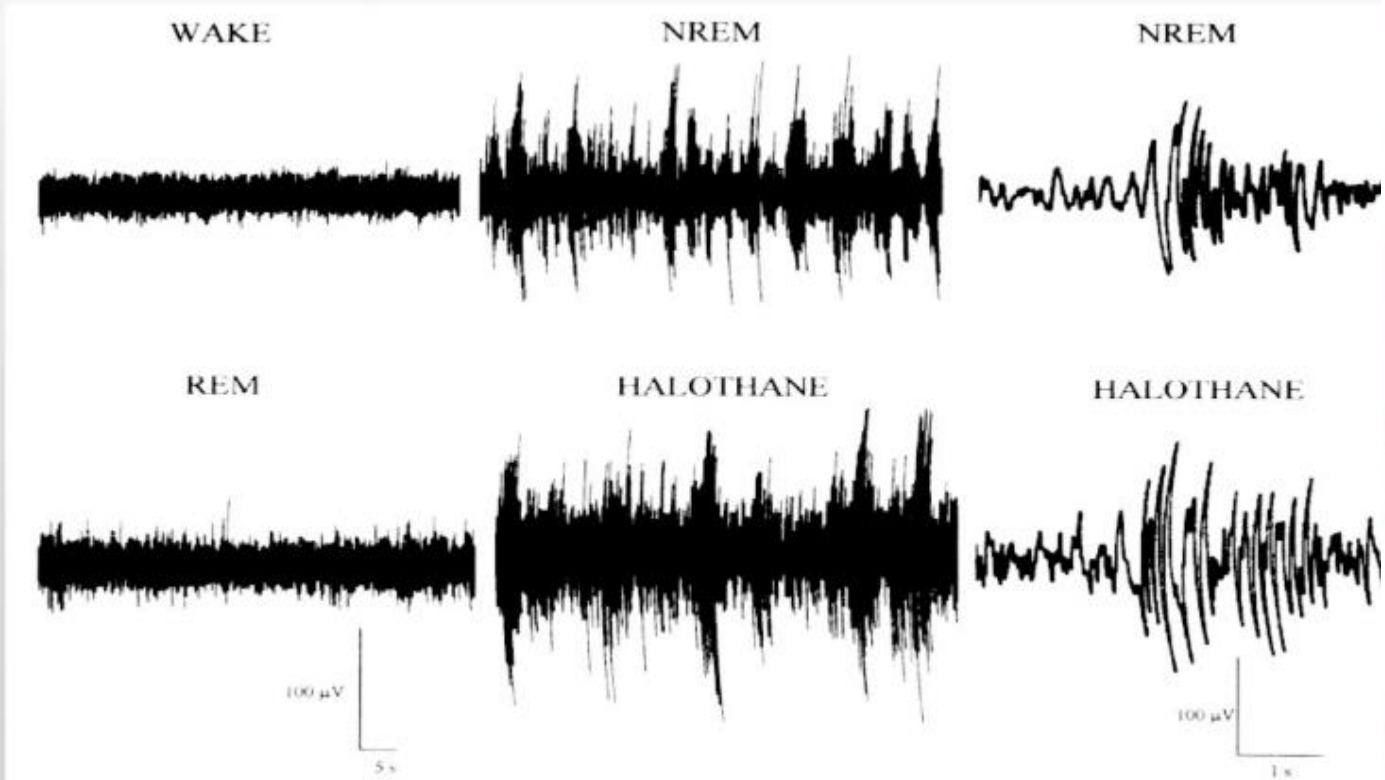
ANESTHESIA

Some neurophysiological aspects: wakefulness and sleeping states



ANESTHESIA

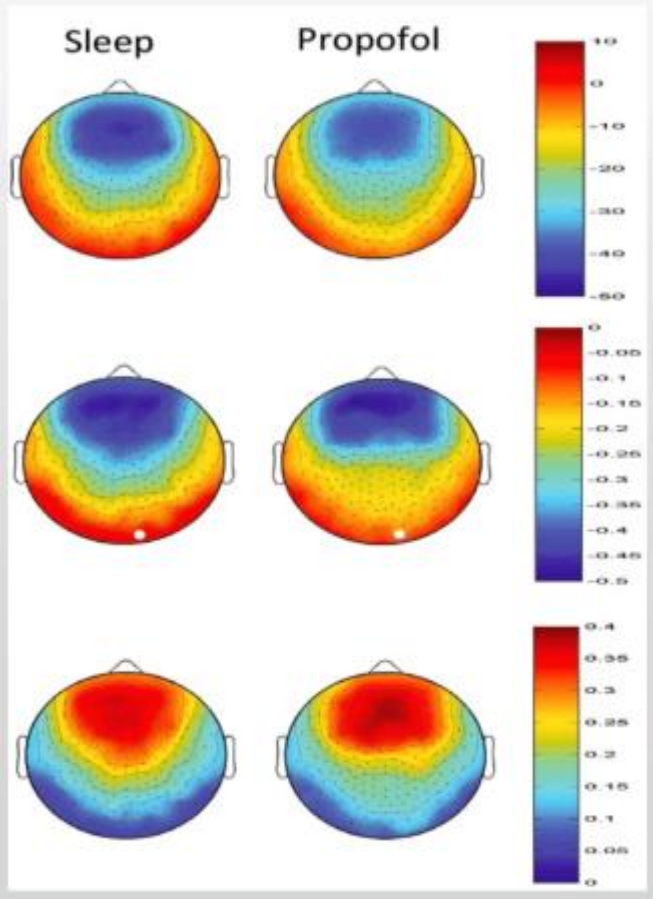
Sleep and anesthesia: similarities and differences



ANESTHESIA

Sleep and anesthesia: similarities and differences

- Slow waves in all unconscious states
- Similar frequency and distribution
- Origin - anterior, propagation - posterior



ANESTHESIA - Partial or complete loss of sensation with or with out loss of consciousness as result of disease, injury, or administration of an anesthetic agent, usually by injection or inhalation.

Anesthezia

Final goal– control of vital functions during the surgical intervention for protecting the patient

HISTORY OF ANESTHESIA
Anesthesia techniques

- **Club** Cerebral concussion achieved by placing a wooden bowl over the head of the patient, and striking this until the patient became unconscious
- **Strangulation** Practiced in Italy as late as the seventeenth century
- **Alcohol** Popular in the eighteenth and nineteenth centuries.
- **Mesmerism** In 1779 Friedrich A. Mesmer of Vienna demonstrated a capacity to bring certain subjects under hypnotic influence. First surgical procedure under mesmerism was performed by J. Cloquet, a French surgeon in 1829. Mesmerism failed because it was less efficient than ether.
- **Plants** Opium, Mandragora (Romans)

GENERAL ANESTHESIA
Inhalation Agents

- **Nitrous Oxide**
  - 1799 Davy
  - 1824 Hickman
  - 1844 Wells
- **Ether**
  - 1842 Long
  - 1847 Snow

Modern era

- Halothane 1956
- Enflurane 1972
- Isoflurane 1981
- Sevoflurane and Desflurane
- Xenon

Anestehsia components (detailed)

- 1st Line: Measures designed to diminish body reaction to surgical trauma
  - Systemic Analgesia
  - Local Anesthesia
  - Consciousness control
  - Control of Neuro-vegetative response (Atar-algesia & Neurolept-analgesia (16) +46)
  - Muscle relaxation
  - Controlled Hypotension
  - Artificial Hypothermia
- 2nd Line : Measures to control vital functions of the body (respiration, circulation, metabolism)

Anesthesia management

I. Patient evaluation and pre-operative preparation

- Preoperative Assessment
- Preoperative Medication

II. Equipment preparation and testing

III. Patient positioning

IV. Preinduction and induction

V. Anesthesia course and monitoring

VI. Ending anesthesia and weaning the patient

Preanesthetic Assessment

Anesthesia management plan

a. **Previous anesthetic experience** (malignant hyperthermia and adverse r.)

b. **Allergies** (analgesics, antibiotics, radiographic dyes, latex)

c. **Review patients medical status** (extent of the disease)

d**. Medications** (can adversely interact with anesthetics)

e. **Fasting** (to prevent aspiration pneumonitis)

f. **Physical Examination**

g. **Laboratory tests** (hemoglobin and ECG)

h. **Surgical procedure** (choosing anesthesia and monitoring techniques)

i. The anesthesia management plan

Preanesthetic Assessment

Risck and anesthesia

ASA classification of physical status

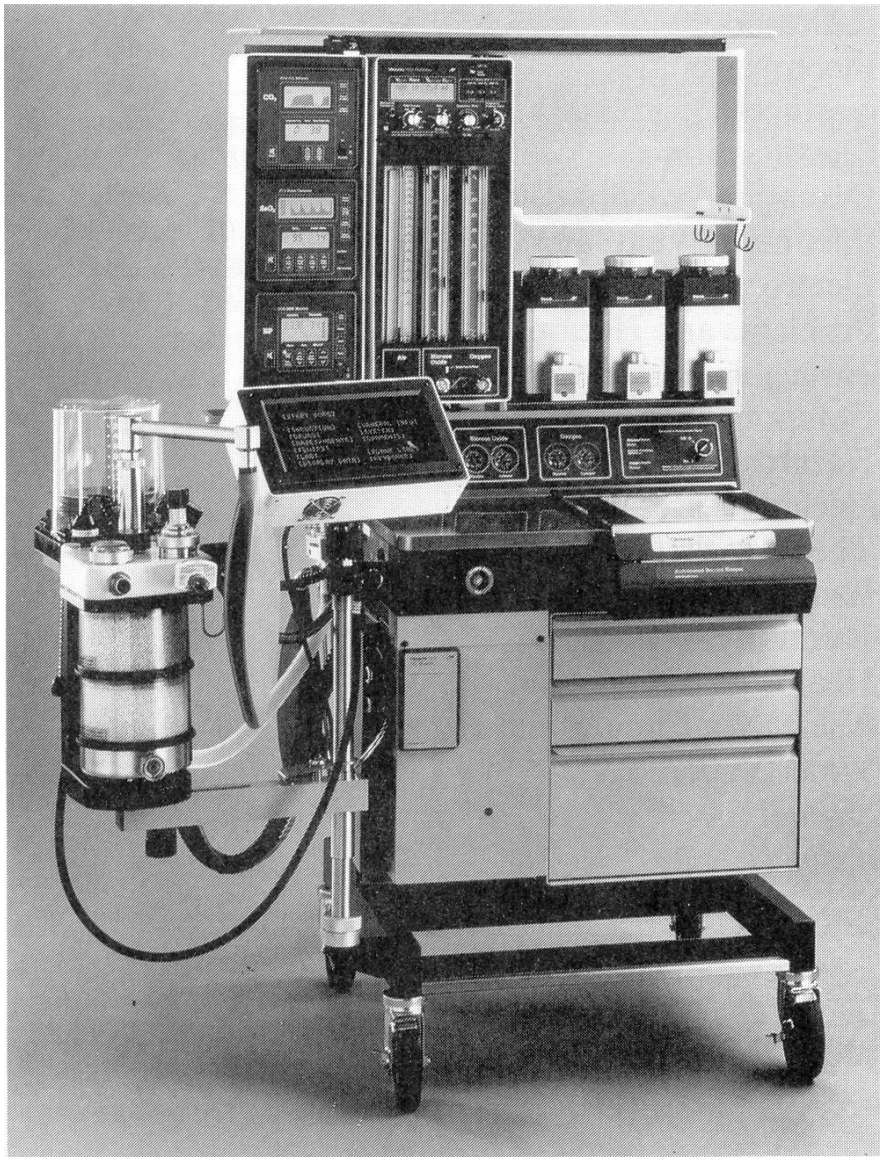
ASA category	Description
I.	Healthy patient
II.	Mild systemic disease – no functional limitations
III.	Severe s. disease = definite functional limitations
IV.	Severe s. disease that is a constant threat to life
V.	Monitored patient not expected to survive 24 hours with or without operation.
VI.	Organ donor
E	for Emergency cases

Preoperative Medication

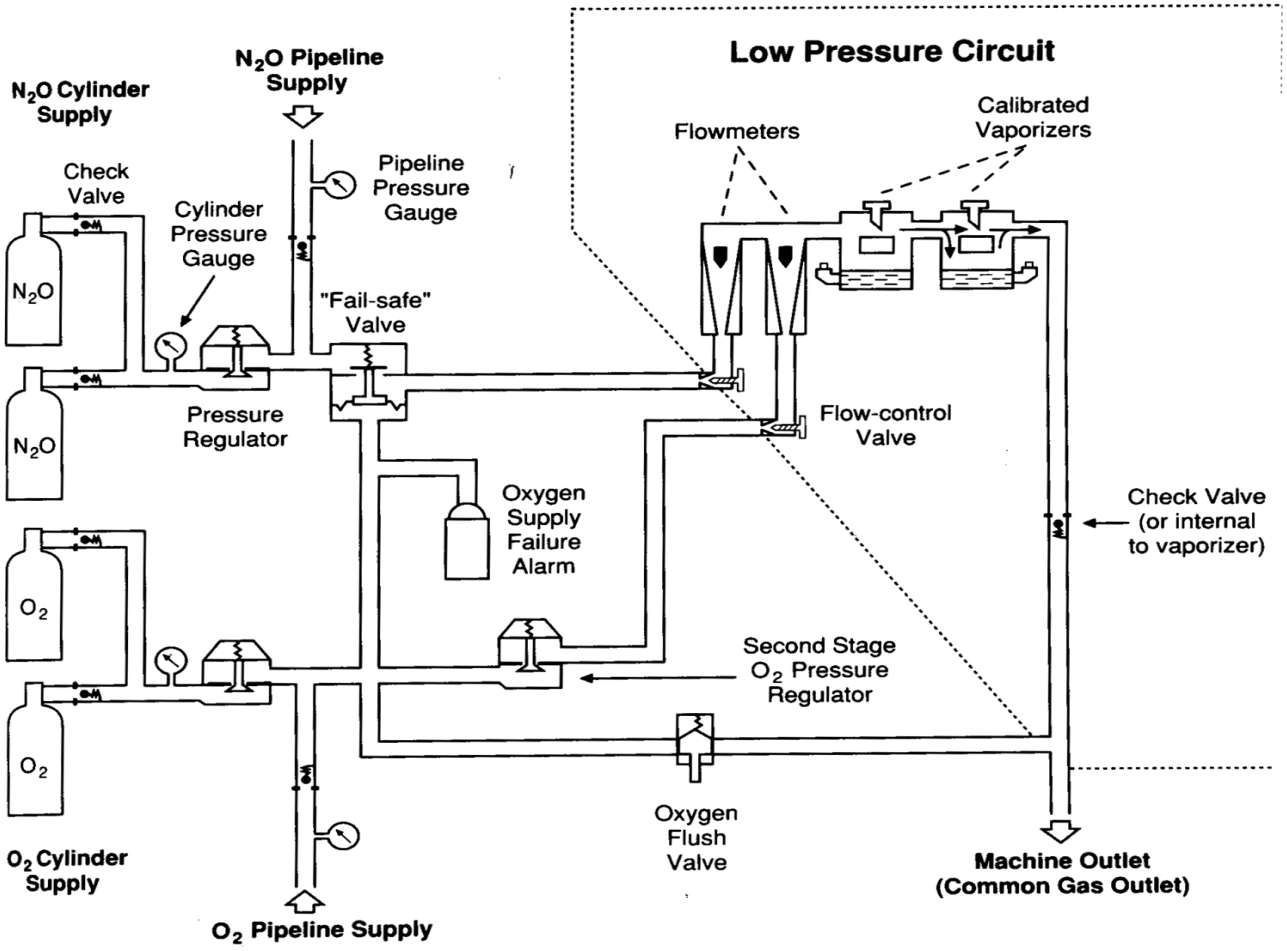
Goals for Preoperative Medication:

- Anxiety relief
- Sedation
- Amnesia
- Analgesia
- Dryinf of airway secretions
- Prevention of autonomic nervous system response
- Reduction of gastric volume and increased pH
- Antiemetic effect
- Reduction of anesthetic requirements
- Facilitate induction of anesthesia

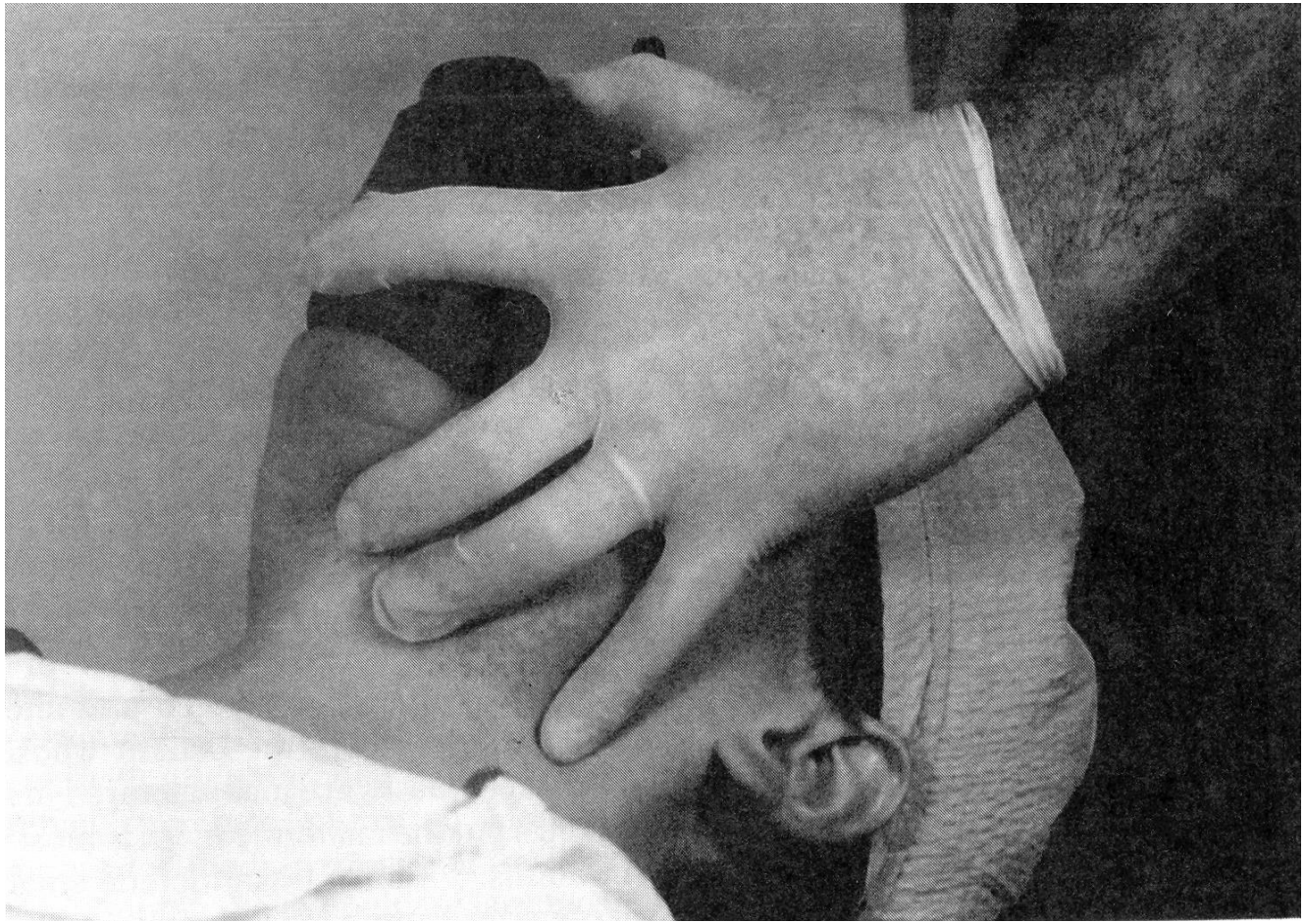
Anesthesia Equipment



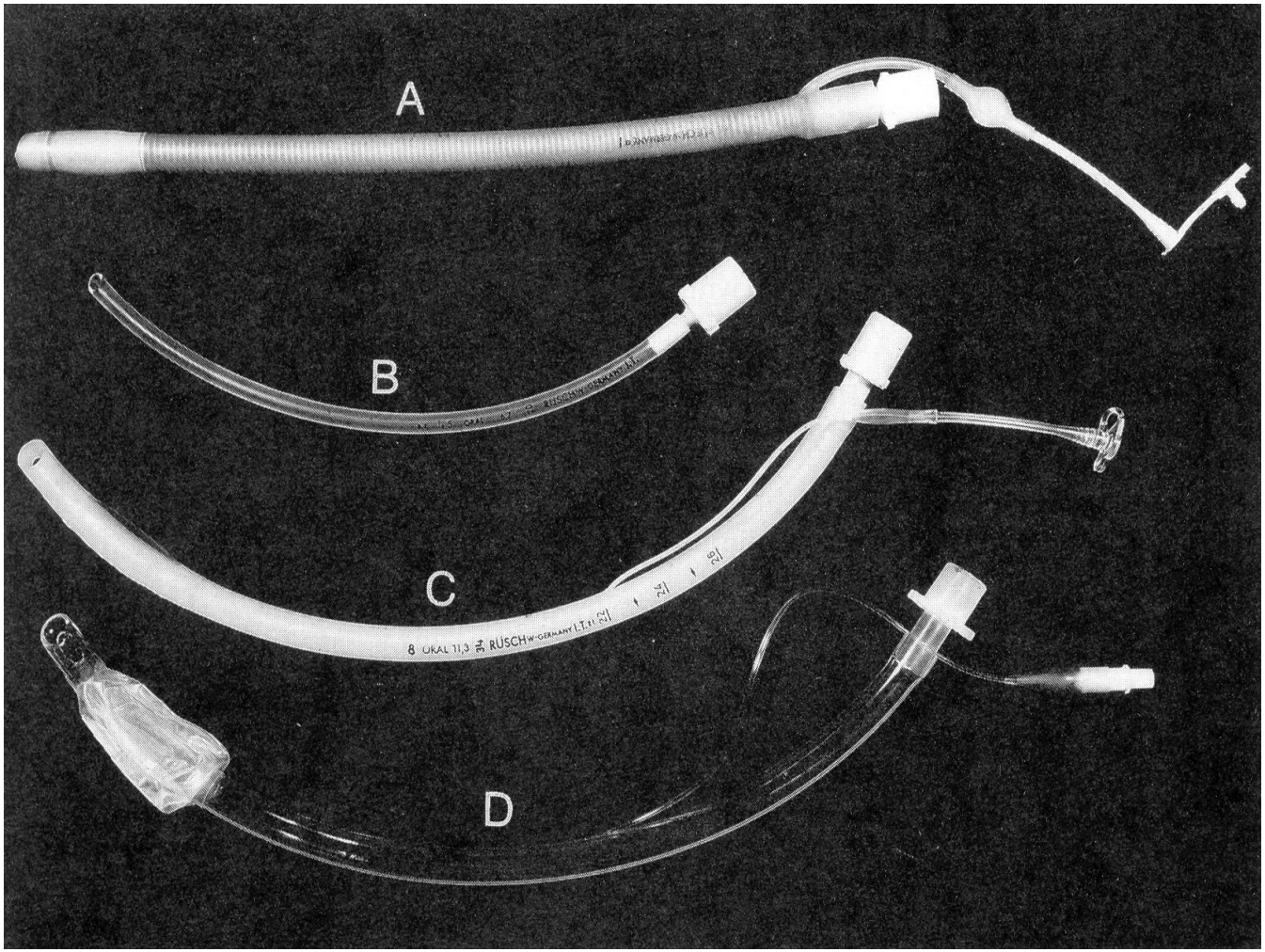
Anesthesia Equipment



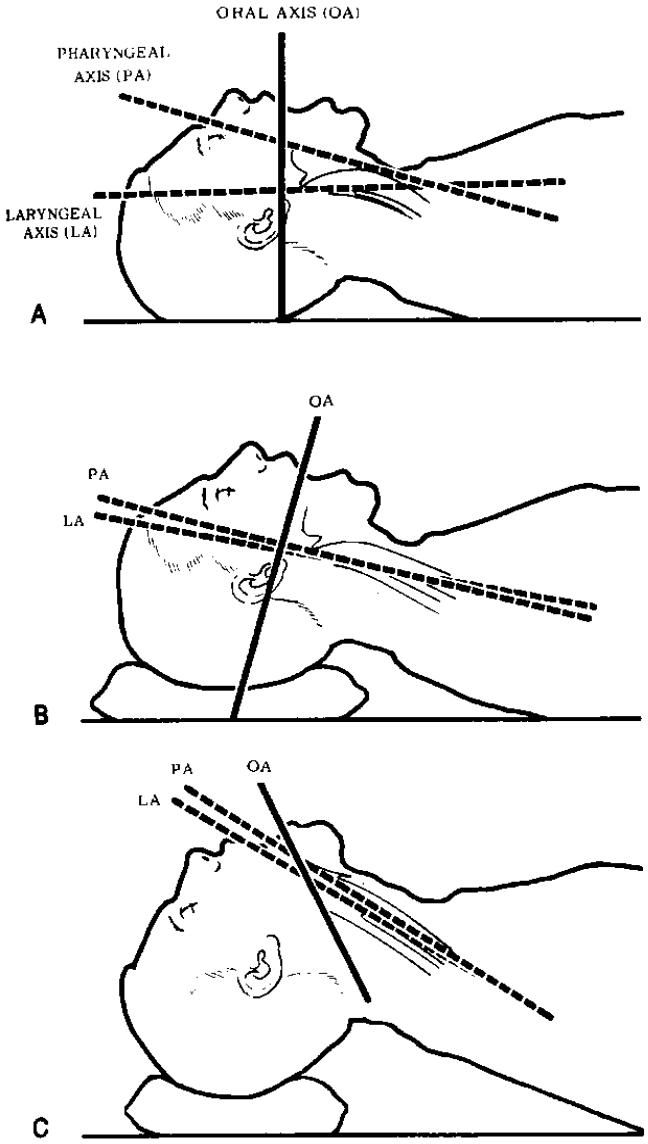
Airway Management



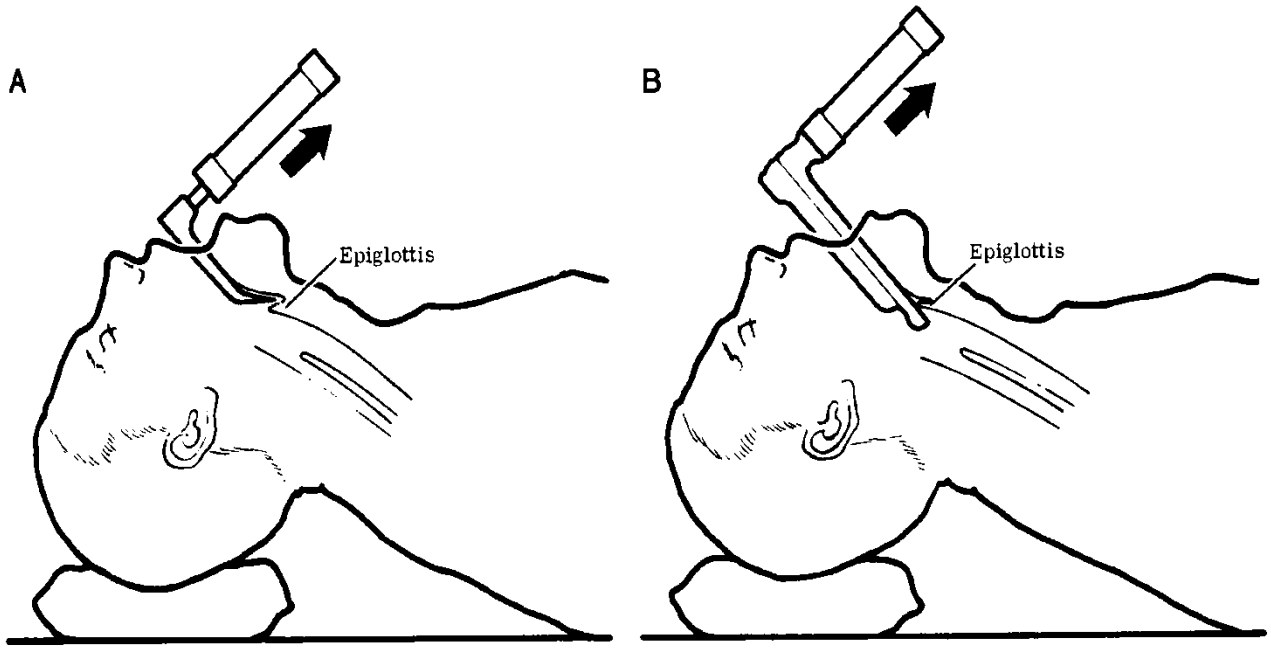
Airway Management



Airway Management



Airway Management



Inhalation anesthesia

Blood/gas partition coefficient & MAC

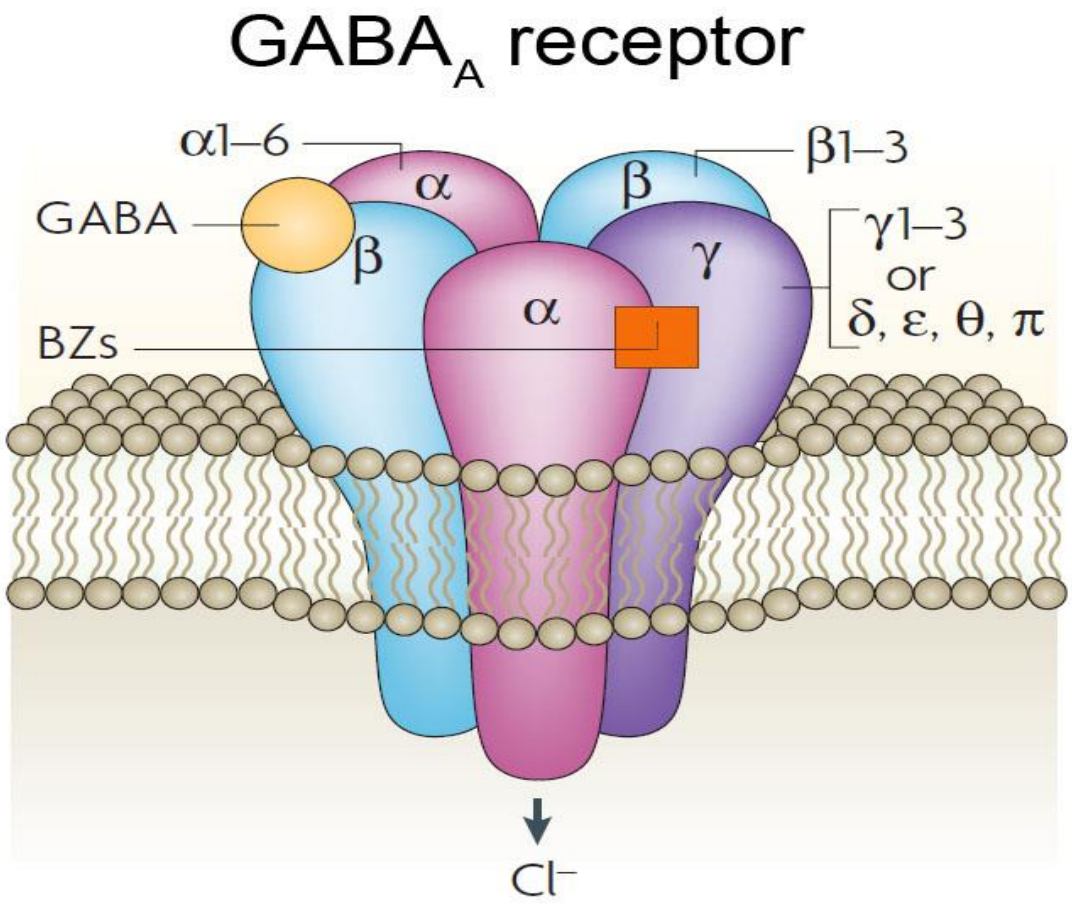
• Halothane	2.4	0.75%
• Enflurane	1.9	1.7 %
• Isoflurane (50)	1.4	1.2 %
• Nitrous oxide (27+39+49)	0.47	105%
• Desflurane	0.42	1.0 %

Intravenous Anesthesia

Intravenous Anesthetics

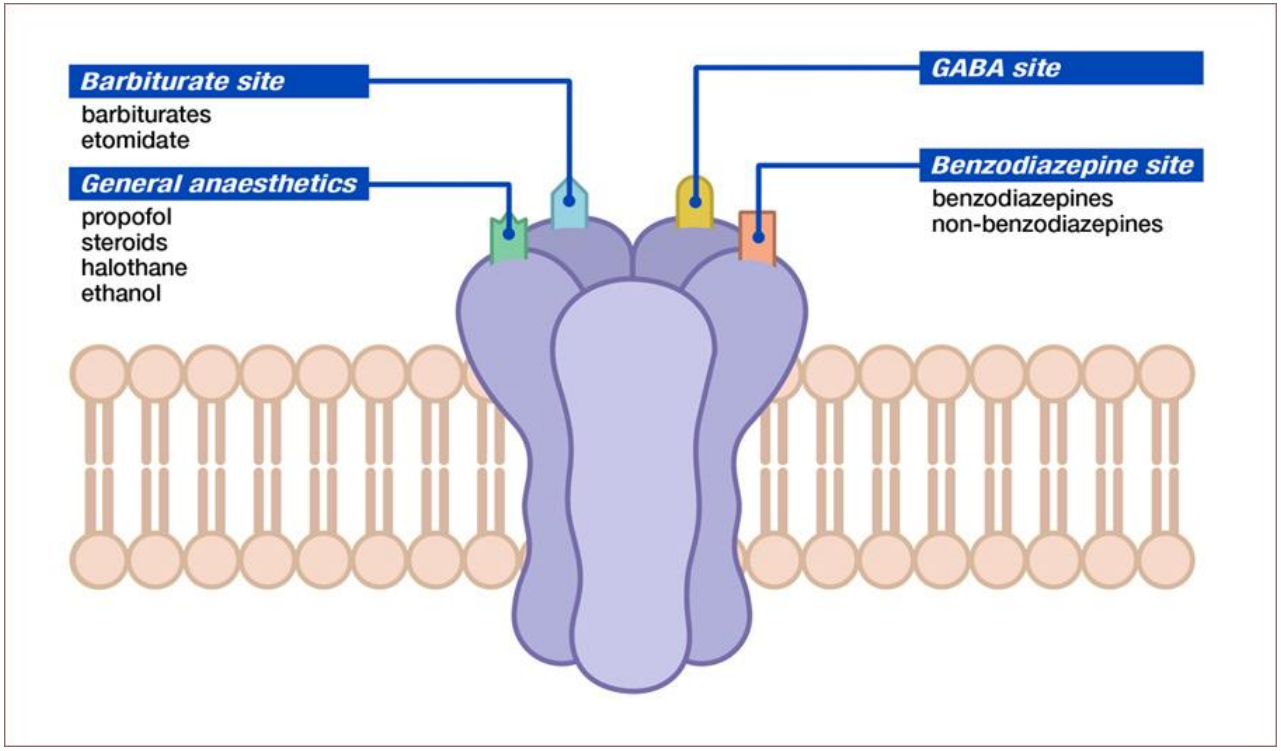
- **Barbiturates** (Thiopental (42), Thiamylal, Methoxexital) (9;17;18)
- **Benzodiazepines** (Diazepam (23), Midazolam (24))
- **Ketamine** (7;20+48)
- **Propofol** (50)

GA Mechanism of action

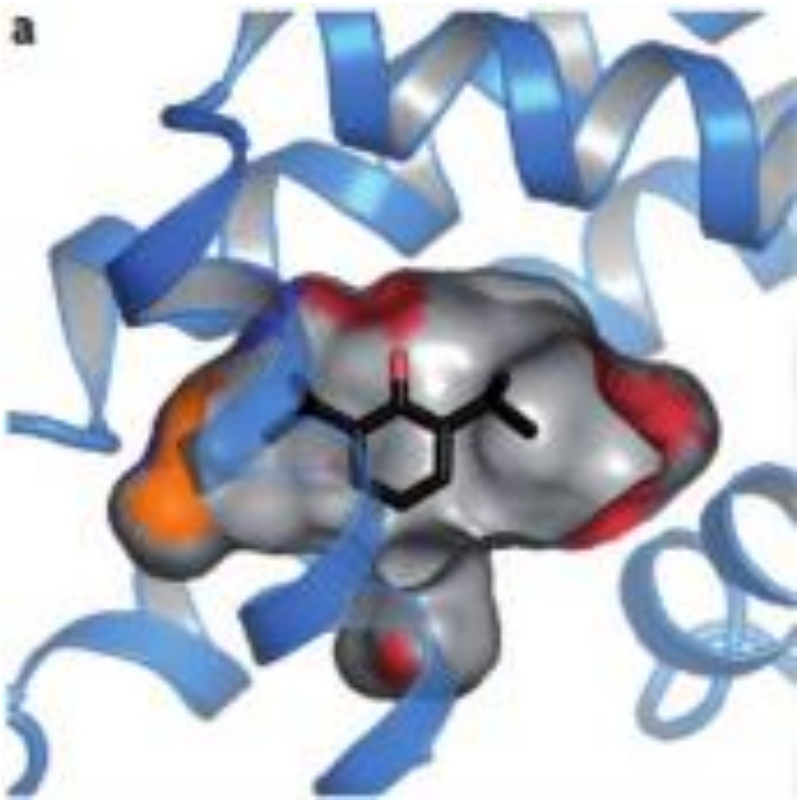


Jacob et al., Nature Reviews Neuroscience, 2008

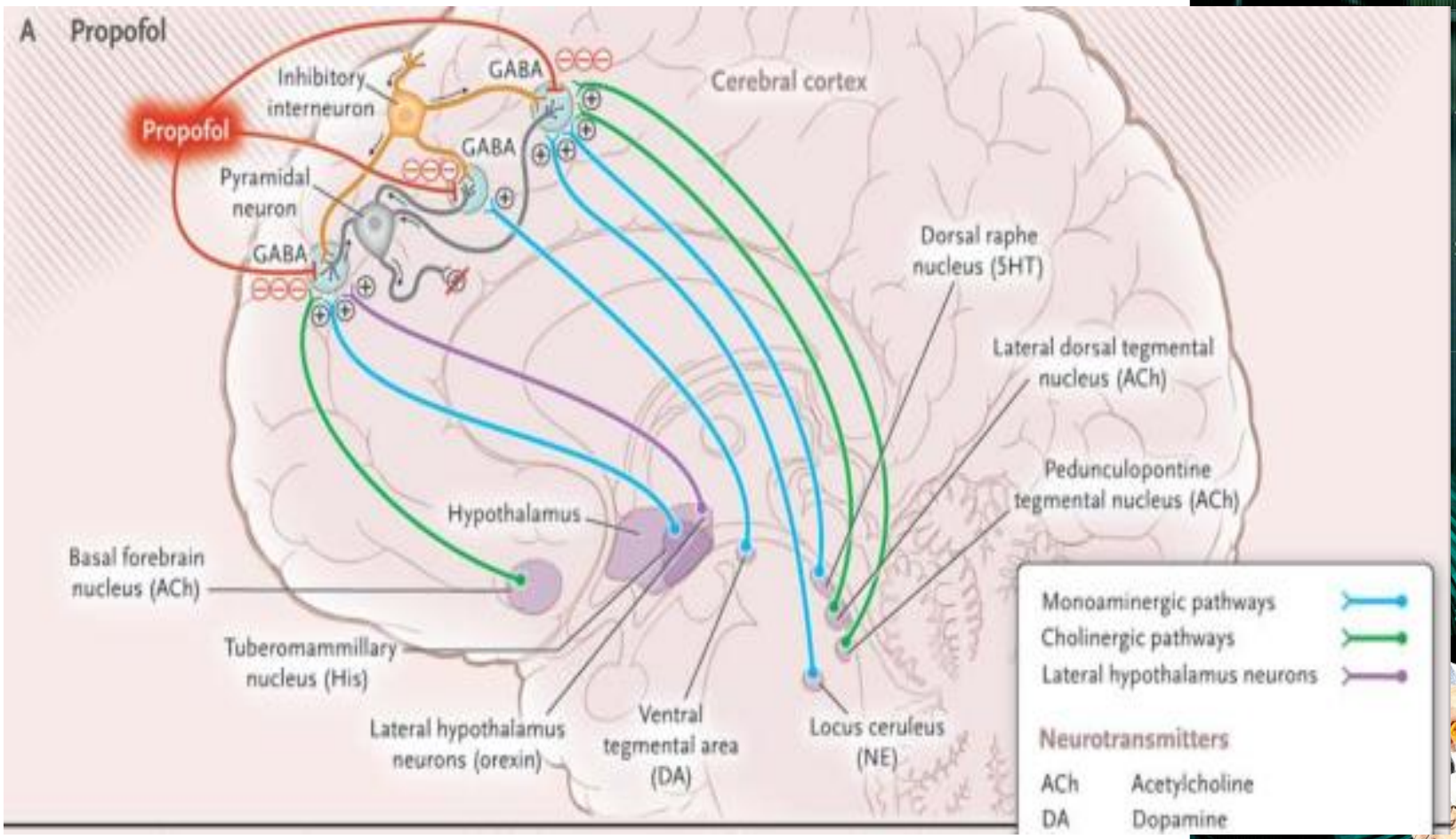
GA Mechanism of action



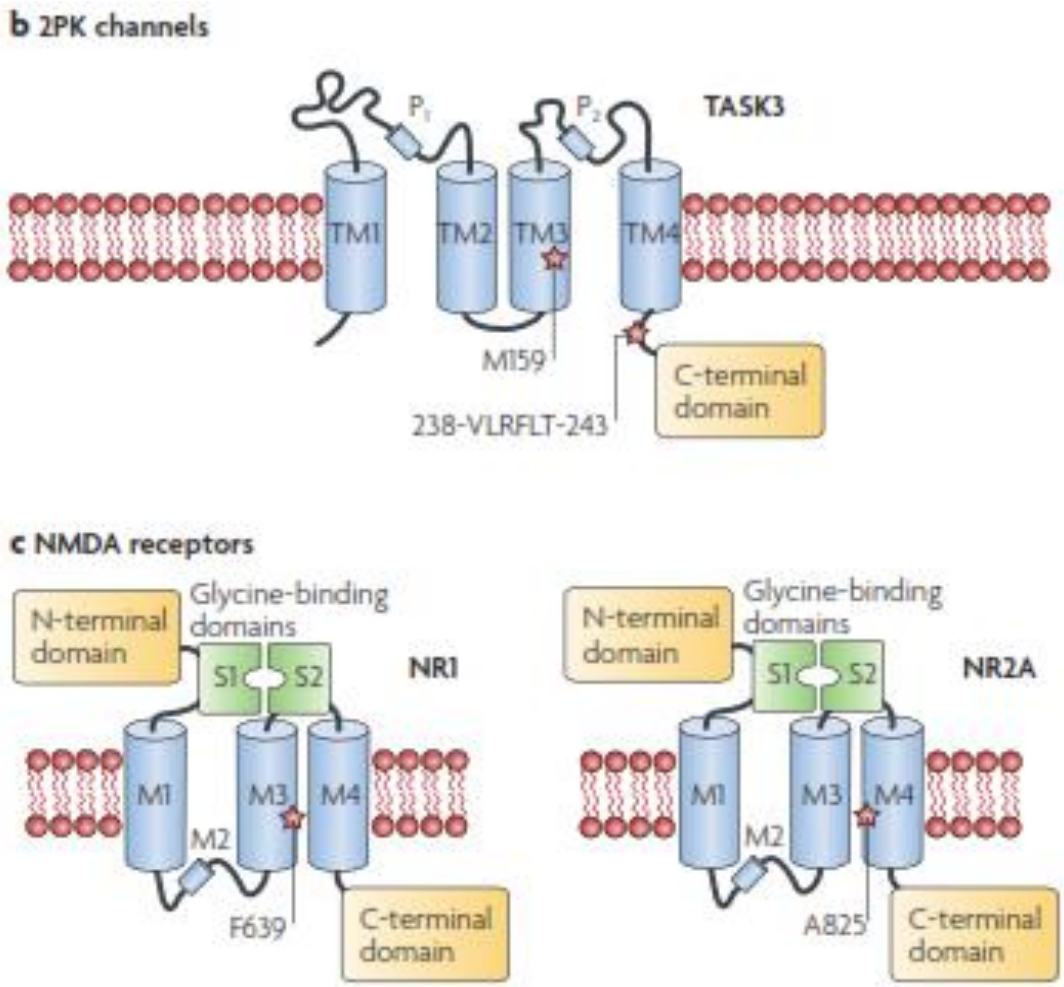
Mechanism of action
Propofol



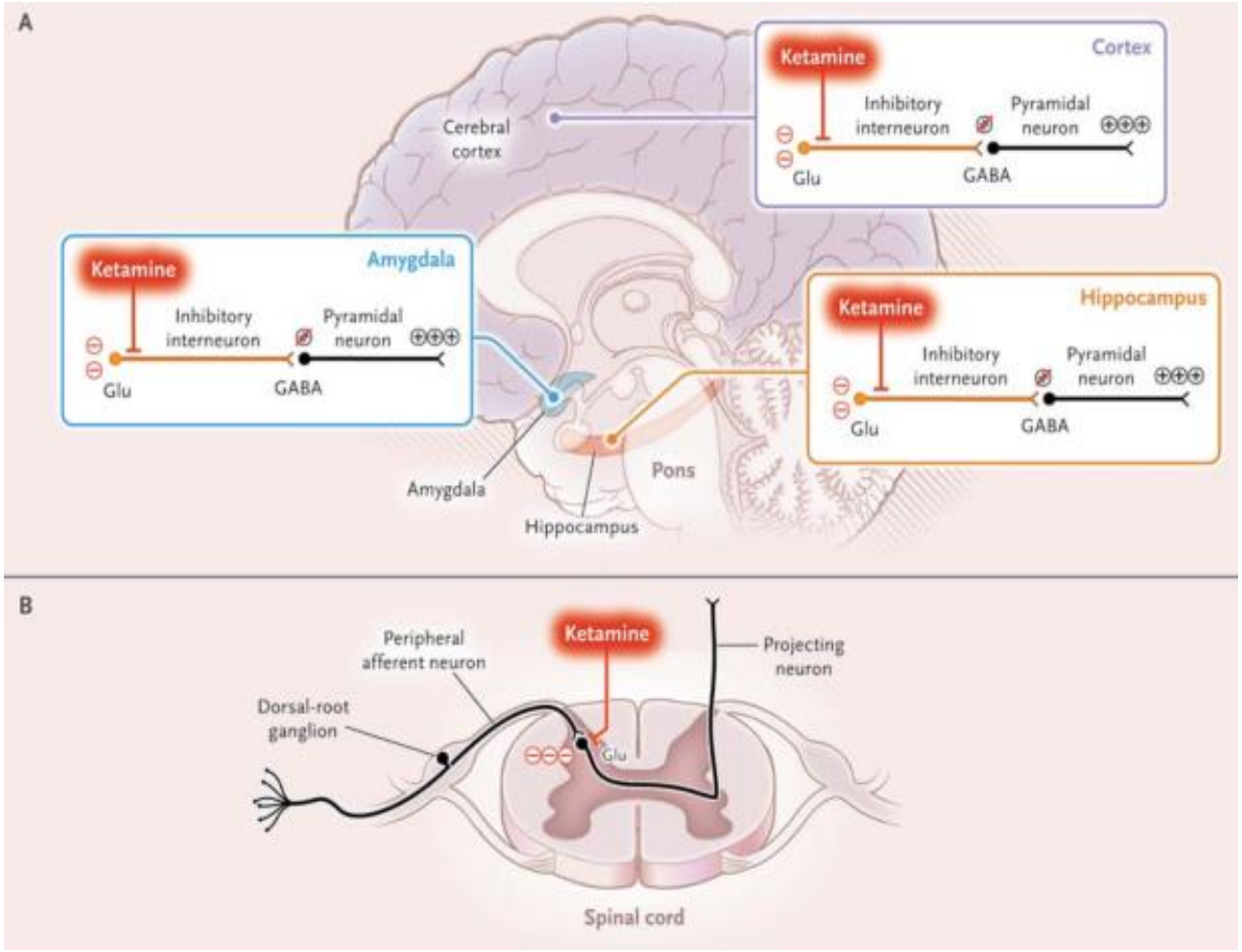
Mechanism of action
Propofol



GA Mechanism of action



Mechanism of action
Ketamine

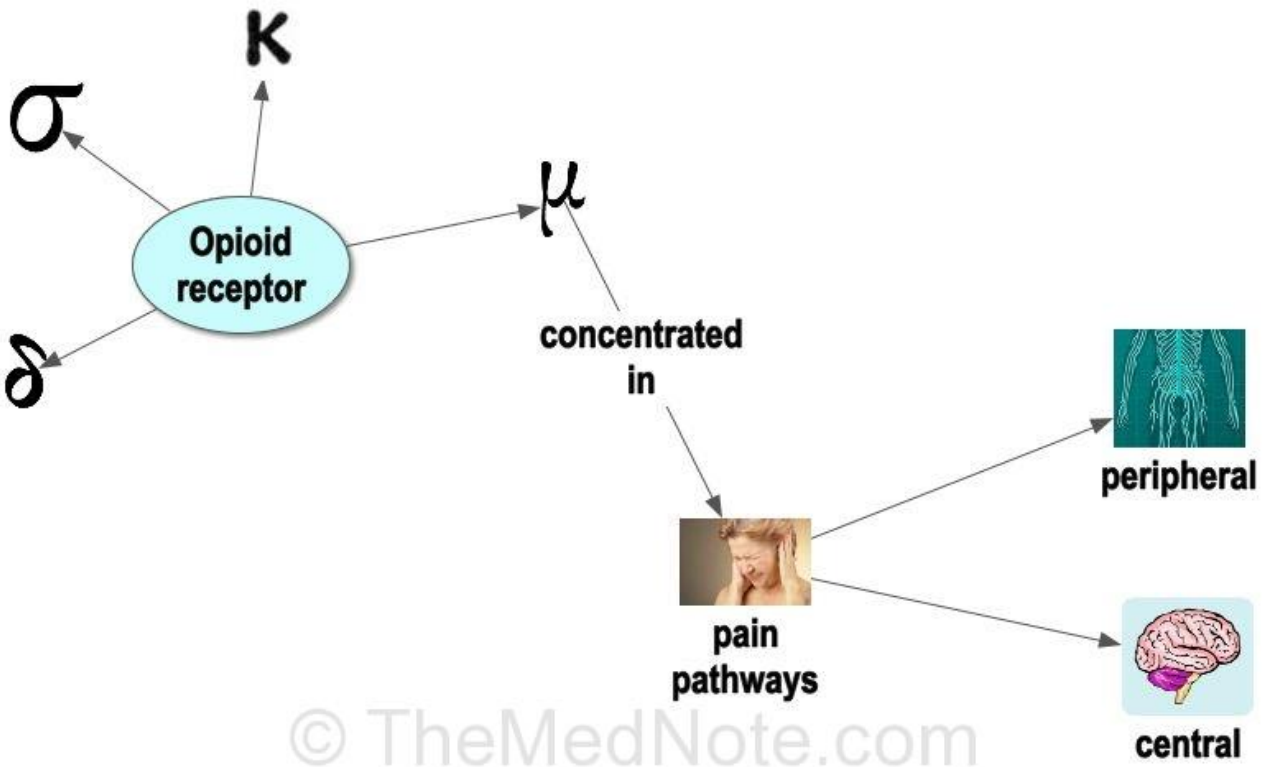


General Anesthesia

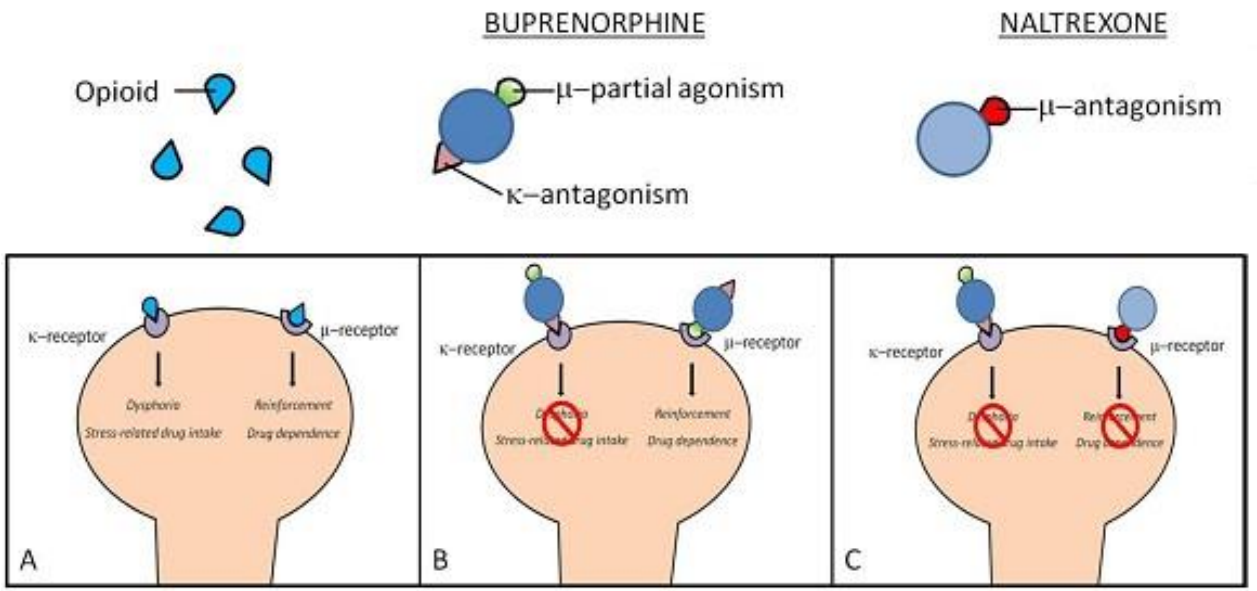
Opioid Analgesics

Morphine (10;11), Fentanyl (12;13;14)+45, Alfentanil, Remifentanil, Sufentanil, Buprenorphine, etc.

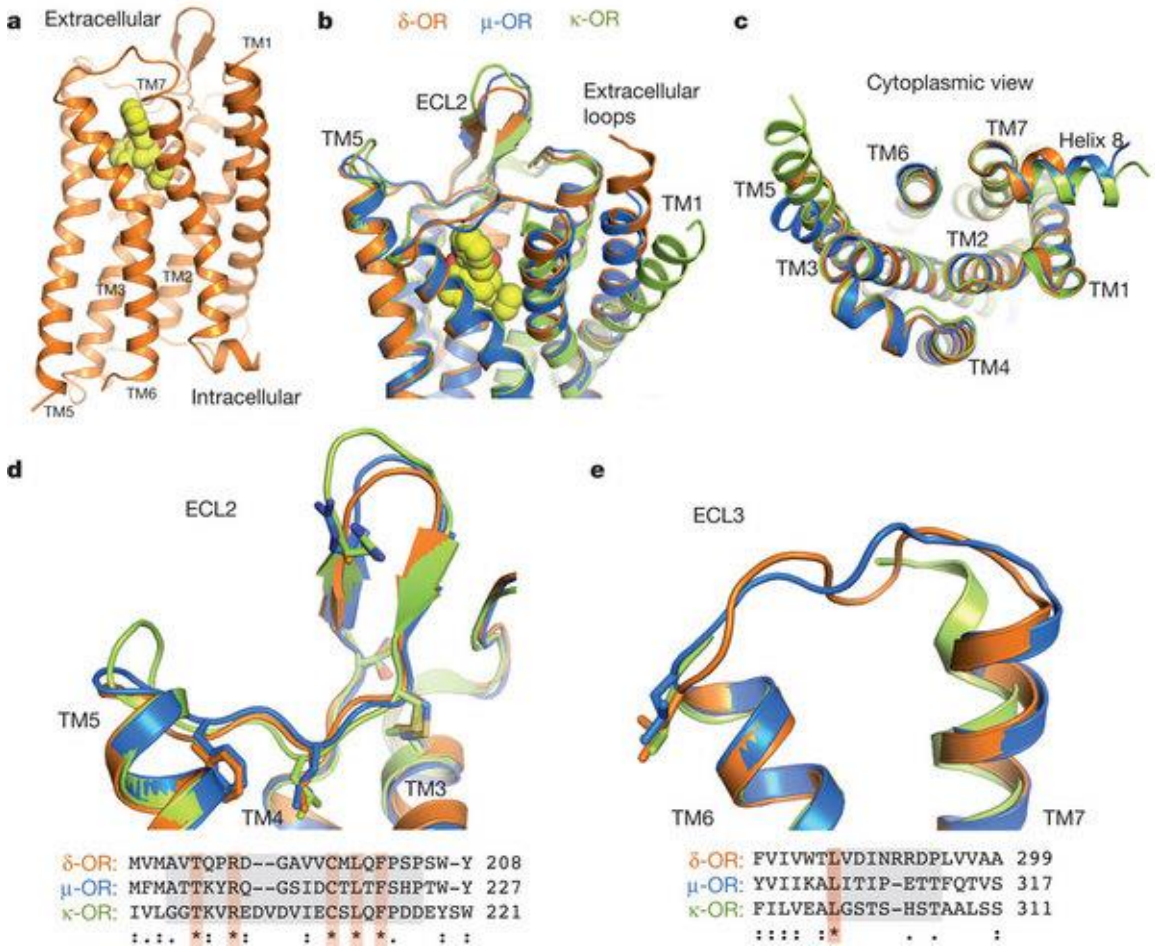
Mechanism of action
Opioid analgesics



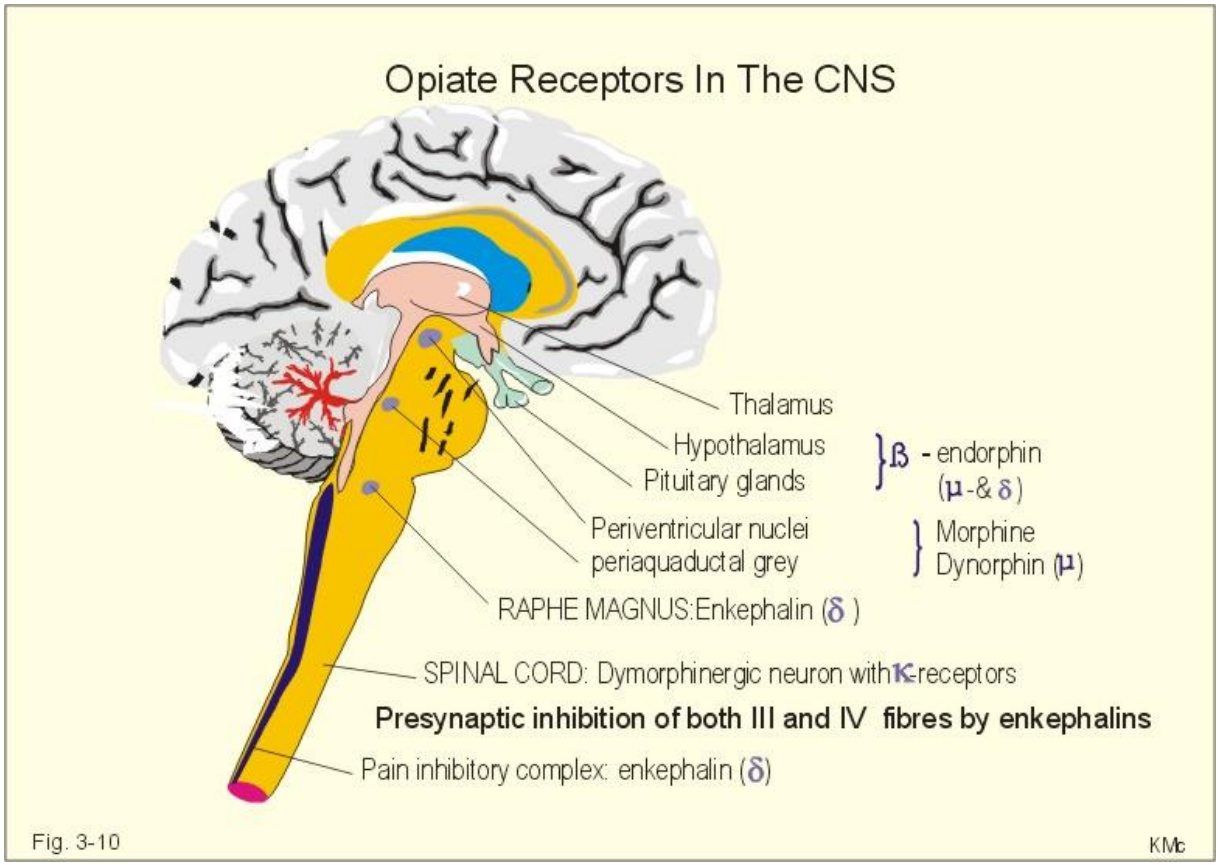
Opioid analgesics: agonists, partial agonists, antagonists



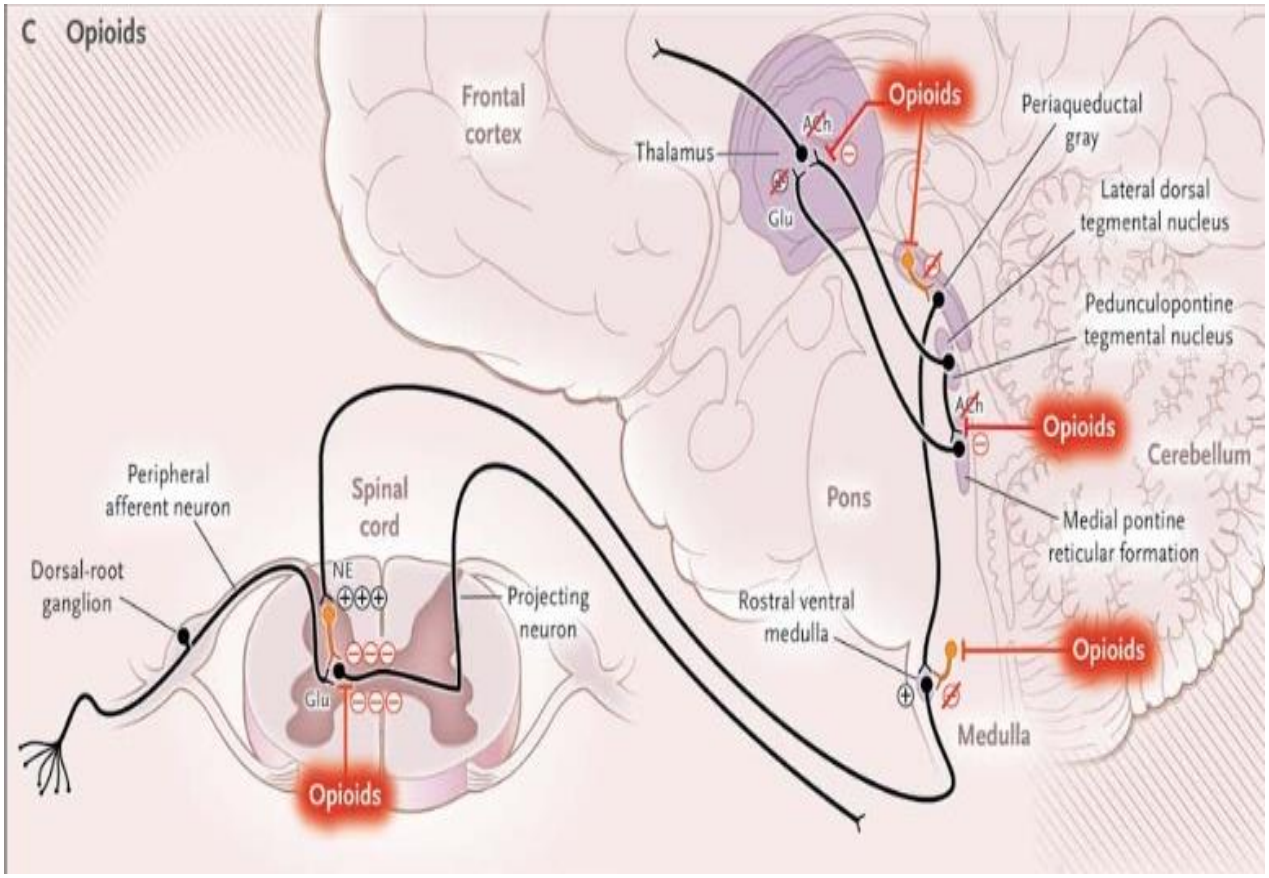
Mechanism of action
Opioid analgesics



Mechanism of action
Opioid analgesics



Mechanism of action
Opioid analgesics



Neuromuscular Blocking Agents

- **Depolarizing** (19)
  - Succinylcholine (43) (5-10 min)
- **Nondepolarizing**

Long (action 60 – 90 min)

- d- Tubocurarine
- Metocurine
- Pancuronium
- Doxacurium

Intermediate (20 - 30 min)

- Atracurium (44)
- Vecuronium

Short (10 – 20 min)

- Mivacurium

Monitoring during anesthesia

I. Routine monitoring

- Presence of an Anesthetist
- Heart Rate (q 5 min)
- Blood Pressure (non-invasive vs invasive)
- ECG (continuous) (30)
- Ventilation (observe “respirator bag”; auscultation; ET CO2 (5))
- Disconnect monitors (pressure alarms)
- Oxygen analiser
- Puls - oximetry
- Temperature
- Urine output

II. Advanced hemodynamic monitoring (CVP, PCWP, CO, etc)

Anesthesia ‘Readings’
https://www.dropbox.com/s/xpnng8tw5upvuqg/Anesthesia_readings_final.pdf?dl=0

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