



ANESTHEZIA GENERALA

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ANESTESIOLOGIE SI TERAPIE INTENSIVA

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STAREA CRITICA

Criterii:

- Starea mecanismelor de autoreglare si control
- Necesitatea corectiei si/sau protezarii functiilor



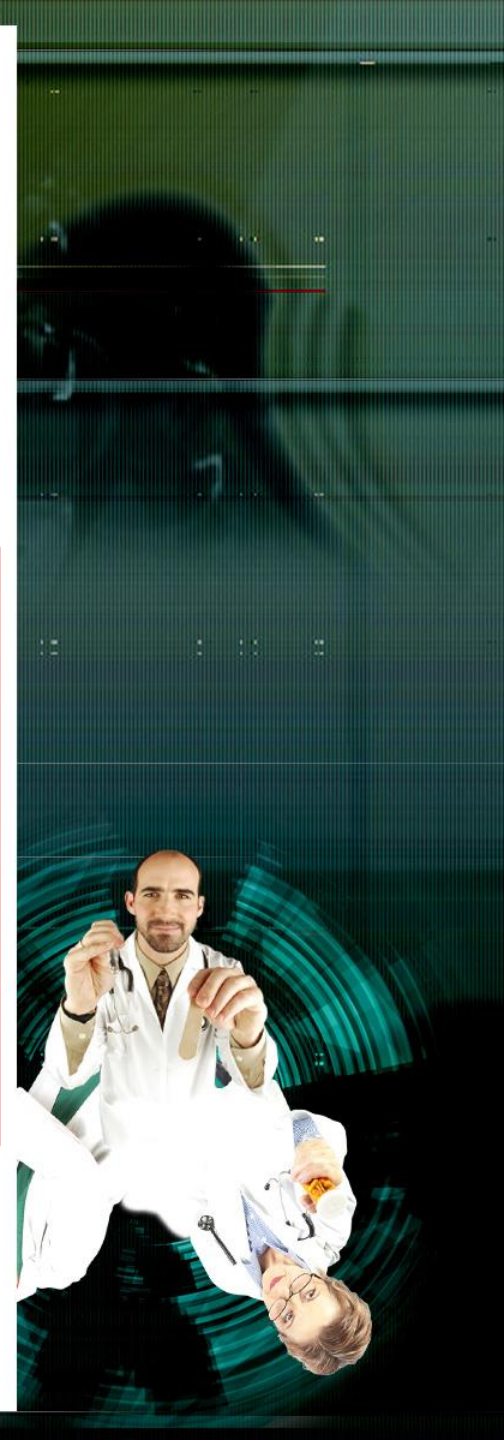
Sanatate



Boala



Stare critica



STAREA CRITICA



Satre critica – grad extrem de avansare a oarecarei patologii, inclusiv iatrogene, care necesita suportul sau protezarea functiilor vitale



ANESTEZIA: conceptul modern

Componentele anesteziei

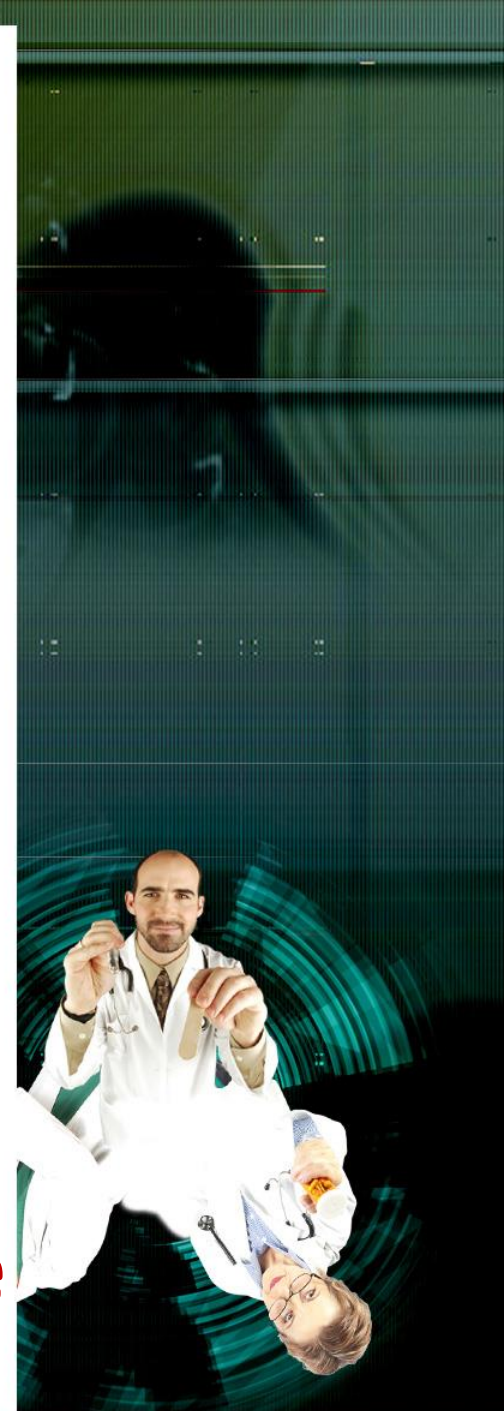
Analgezie

Hipnoza



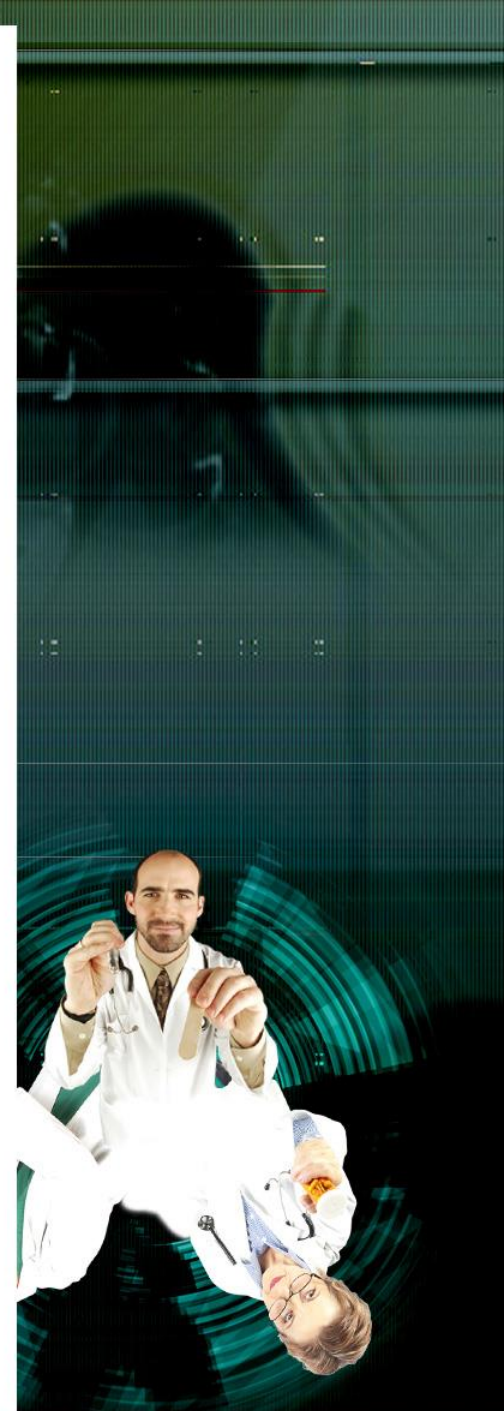
Miorelaxare

Homeosatzie



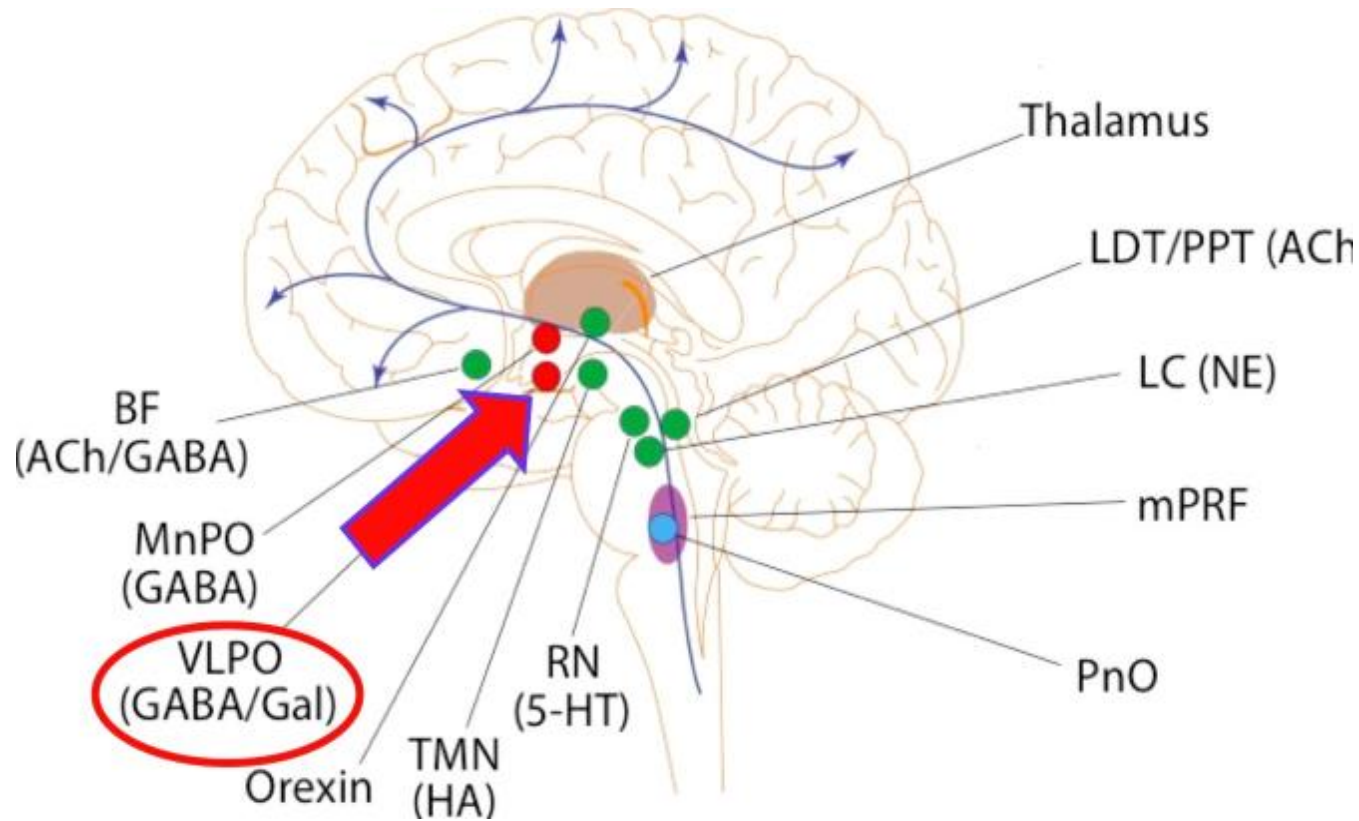
Complicatiile durerii acute

- **Pulmonare** (Spasmul muschilor respiratori, supresia tusei, distensie abdominala din cauza diminuarii motilitatii TGI, atelectazie din cauza dereglarii ventilarii pulmonare , retentia sputei din cauza ineficientii mecanismelor de clearance, alterarea raportului V/Q si hipoxemie, infectie pulmonara)
- **Hematologice** (Cresterea viscozitatii singelui cu formare de trombi, cresterea activitatii factorilor de coagulare, cresterea agregarii plachetare)
- **Cardiovasculare** (Cresterea acuta a TA, FCC, debitului cardiac = amplificarea lucrului cordului si cresterea consumului de oxigen (DO₂): poate fi fatal in cazul maladiilor ischemice ale cordului si poate cauza infarct miocardic si/sau insuficienta cardiaca congestiva)
- **Gastrointestinale** (Diminuarea motilitatii intestinale, greturi, voma, ileus)
- **Urinare** (Hypomotilitatea uretrei si vezicii urinare, urinare dificila)
- **Neuroendocrine si metabolice** (Cresterea tonusului simpatic, cresterea nivelui catecolaminelor endogene si hormonilor catabolici, augmentarea metabolismului si consumului de O₂)
- **Psihologice** (Frica, anxietate, depresie, frustrare)



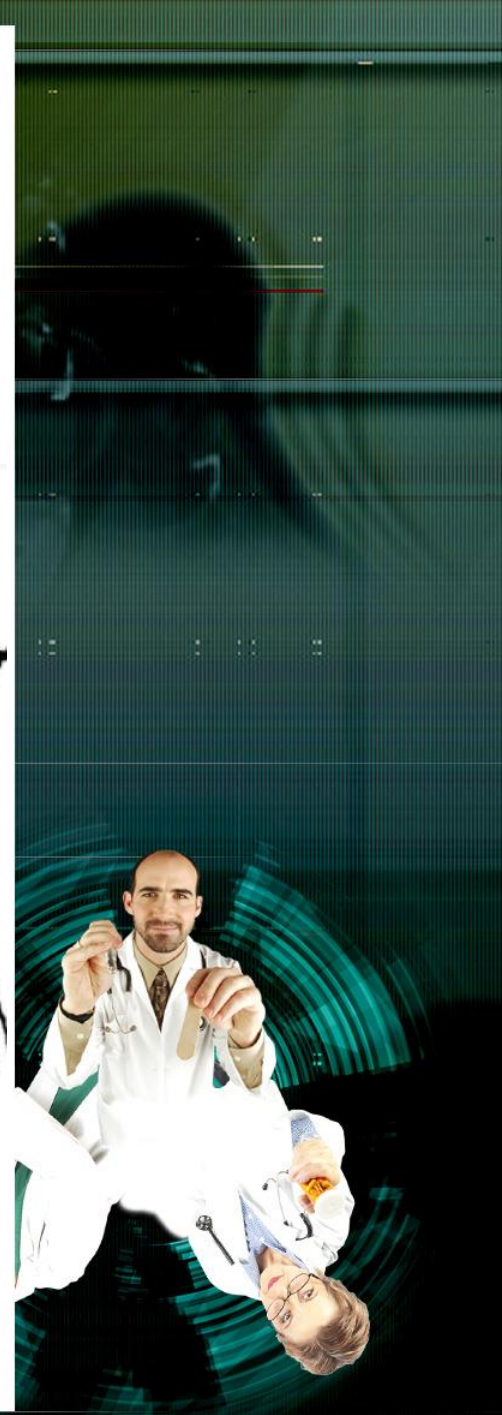
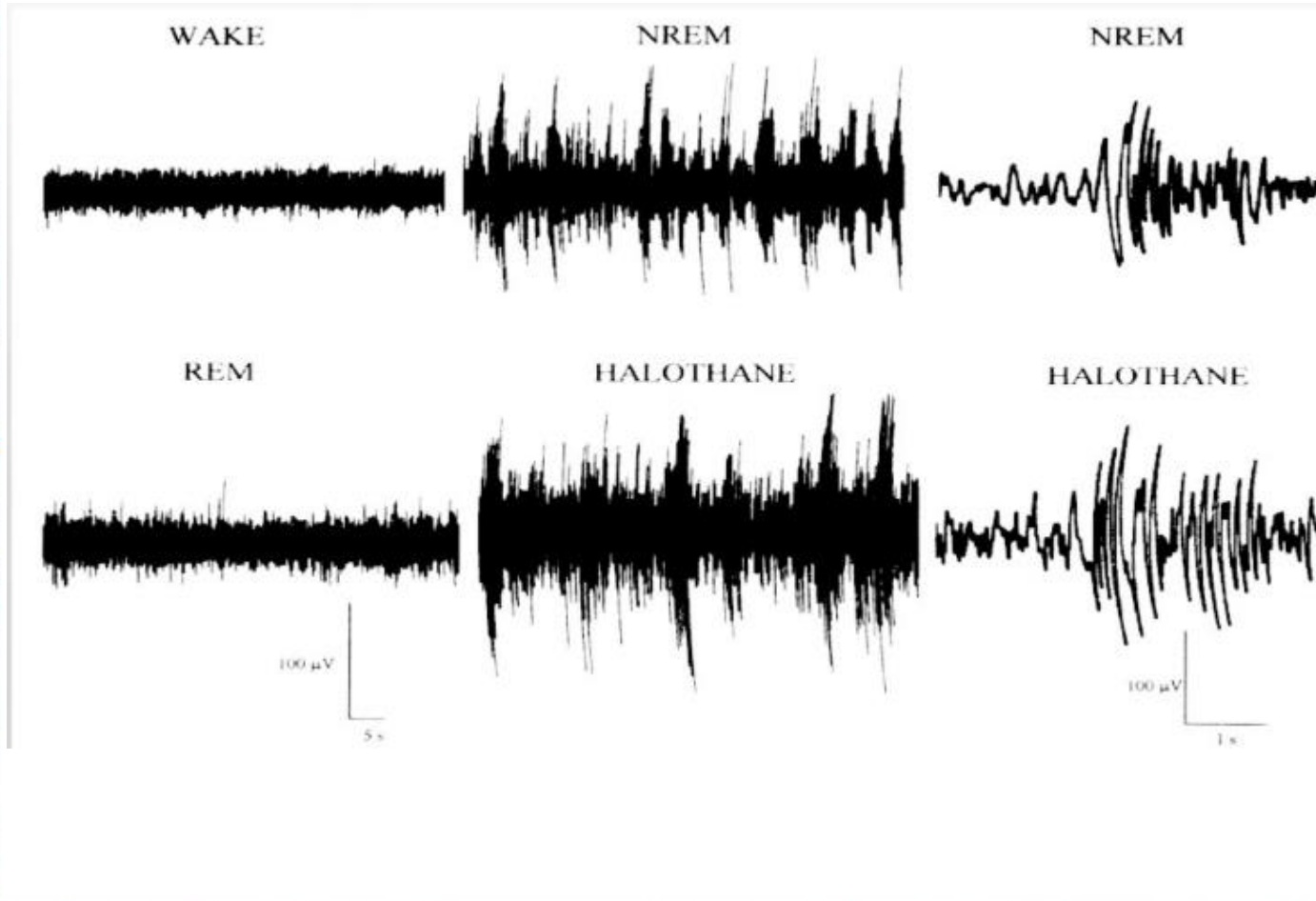
ANESTEZIA

Aspecte neurofiziologice ale satrii de veghe si somn



ANESTEZIA

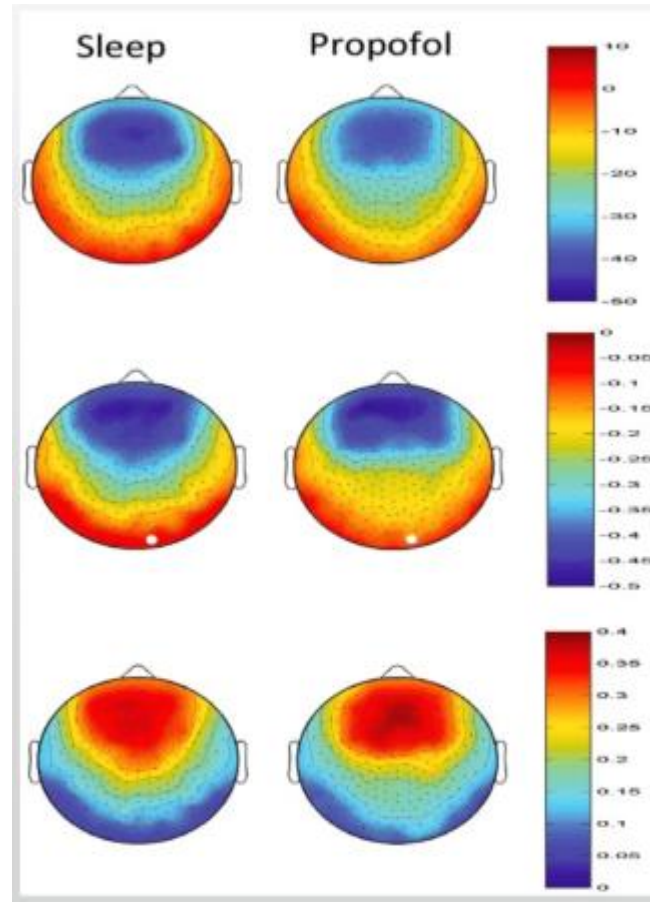
Somnul si anestezia: similaritati si deosebiri



ANESTEZIA

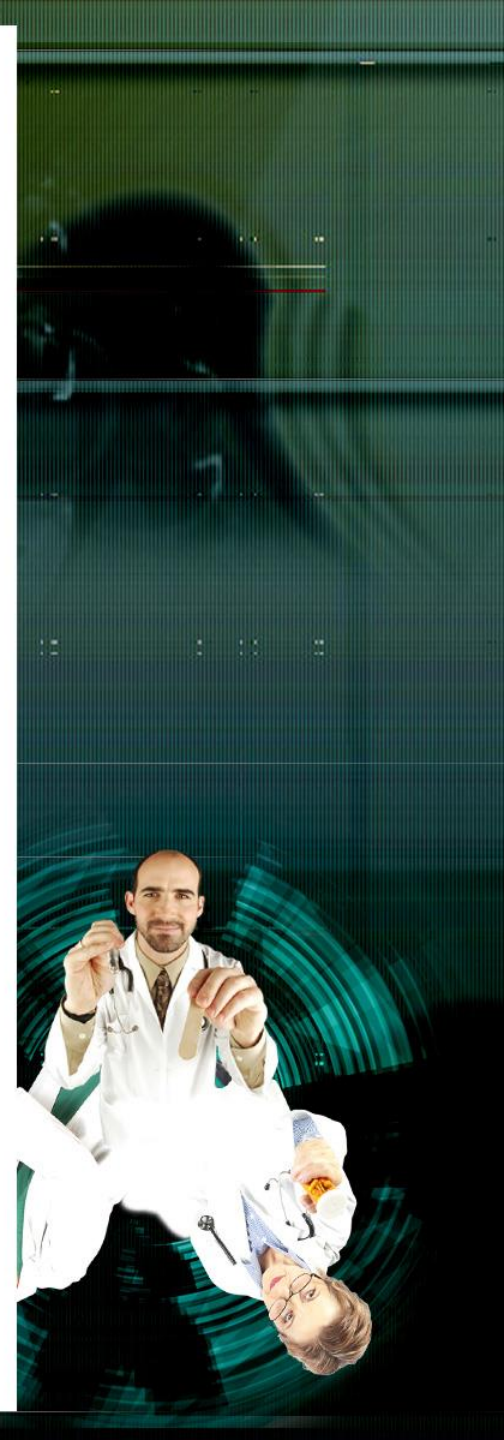
Somnul si anestezia: similaritati si deosebiri

- Unde lente in toate starile de inconstienta
- Frecventa si distribuire similara
- Origine - anterioara, propagare - posterioara



ANESTEZIA –

Pierdere completa sau partiala a *sensibilitatii* cu sau fara *pierdere constientei* ca rezultat al unei maladii, traume sau *prin administrarea unui anesteziec*, de obicei, *prin injectare sau inhalare*



Anesthezia

Scop: protectia pacientului de stresul operator, inclusiv si prin controlul functiilor vitale



ISTORIA ANESTEZIEI

Tehnici anestezice

- **Calota** Cerebral concussion achieved by placing a wooden bowl over the head of the patient, and striking this until the patient became unconscious
- **Strangularea** Practiced in Italy as late as the seventeenth century
- **Alcoolul** Popular in the eighteenth and nineteenth centuries.
- **Mesmerismul** 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.
- **Plante** Opium, Mandragora (Romans)



ISTORIA ANESTEZIEI

AGENTI INHALATORI

- **Protoxid de azot**
 - 1799 Davy
 - 1824 Hickman
 - 1844 Wells
- **Eterul**
 - 1842 Long
 - 1847 Snow

Era moderna

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

sfluran

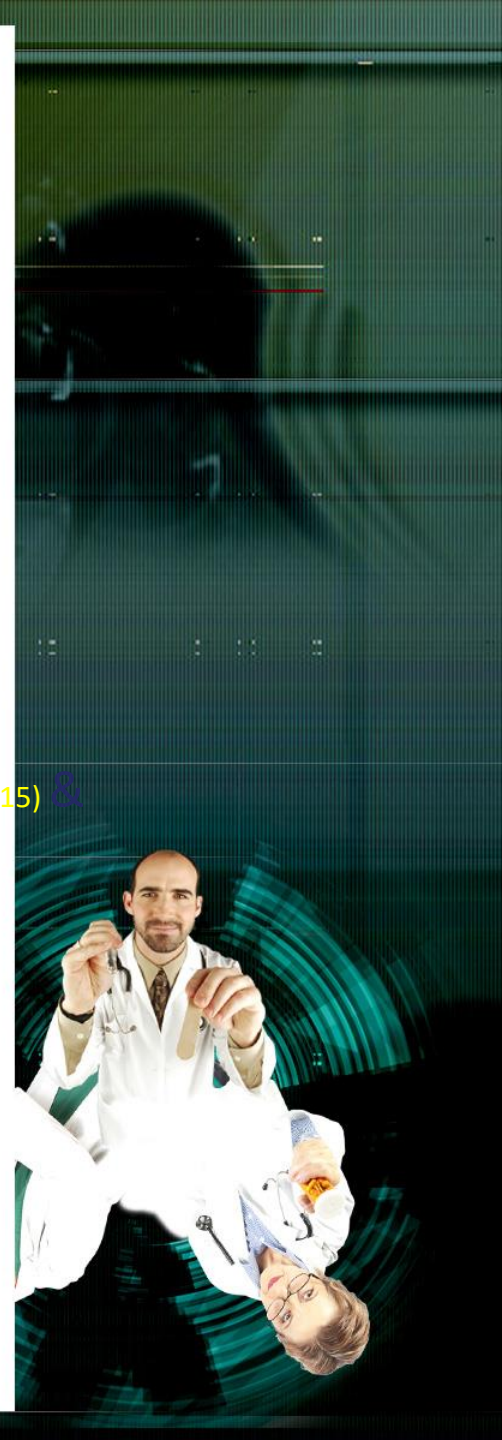


Componentele anesteziei (detaliat)

1 Linie: Masuri orientate spre micșorarea reacției organismului la trauma chirurgicală

- Analgezia sistemică
- Anestezia locală
- Controlul constienței
- Controlul rasupunsului neurovegetativ (Atar-algezia (15) & Neurolept-analgezia (16) +46)
- Moirelaxare
 - *Hipotensiune dirijată
 - *Hipotermie dirijată

2 Linie : Masuri p-u controlul funcțiilor vitale (respirație, hemodinamică, metabolism)



Managementul anesteziei

I. Evaluarea si pregatirea preanestezica

- Evaluarea preanestezica
- Medicatia preanestezica

II. Testarea si pregatirea echipamentului

III. Pozitionarea pacientului

IV. Perioada de preinductie si inductia in anestezie

V. Anestezia propriu-zisa si monitorizarea

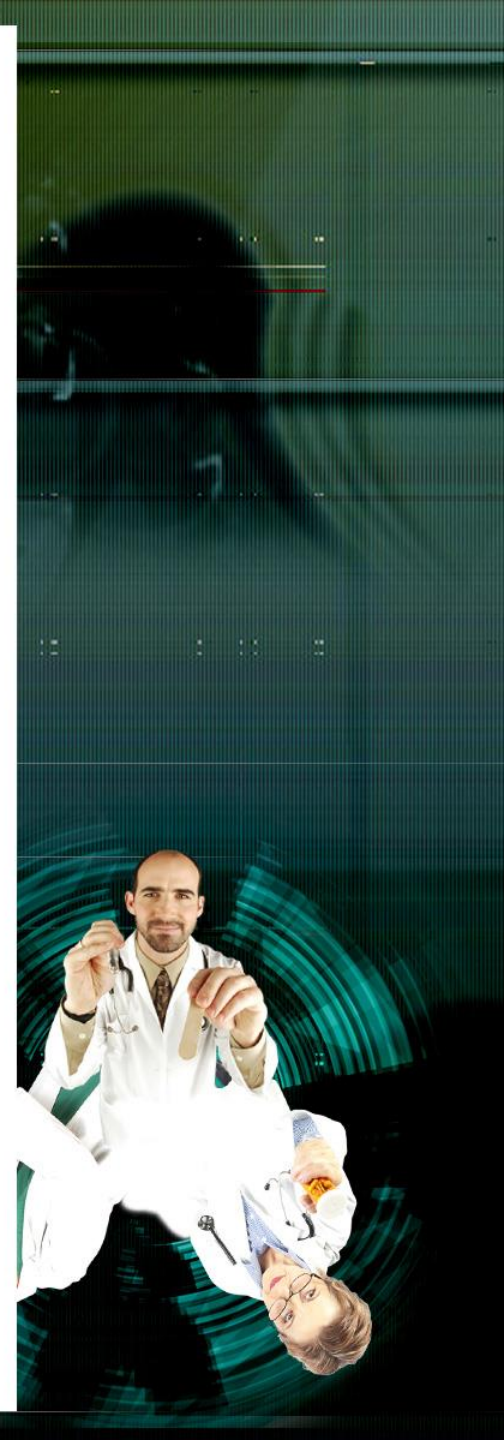
VI. Finalizarea anesteziei si trezirea pacientului



Evaluarea preanesteziei

Planul de management al anesteziei

- a. **Experienta anestezica anterioara** (hipertermia maligna si reactii adverse)
- b. **Alergii** (analgetice, antibiotice, remedii radiografice, etc.)
- c. **Gradul de manifestare a maladiei**
- d. **Medicatie** (interactiuni nedorite cu anestezicele)
- e. **Stomac gol** (prevenirea pneumonitei aspirationale)
- f. **Examenarea fizica**
- g. **Teste de laborator si instrumentale** (hemoglobina, ECG) (+8)
- h. **Interventia chirurgicala** (p-u selectarea tehnicii de anestezie si monitoring)
- i. **Planul de management al anesteziei**



Evaluarea preanestezica

Riscul si anestezia

Scorul ASA

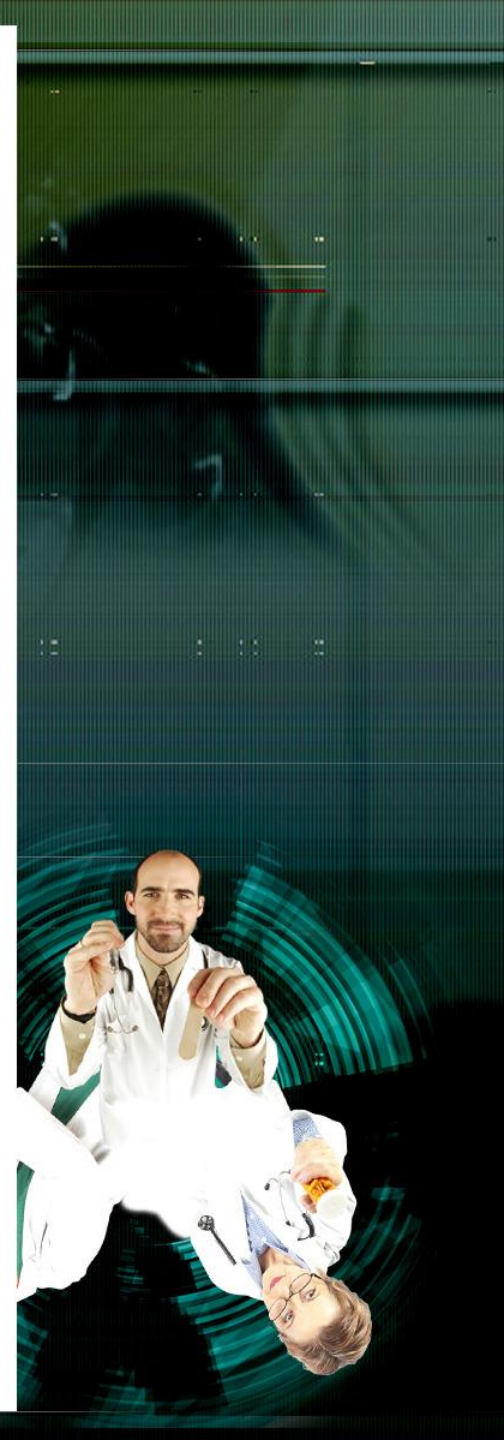
Categorie ASA	Descriere
I.	Pacient practic sanatos
II.	Maladii sistemice moderate – fara limitari functionale
III.	Maladii sistemice severe – cu limitari functionale (25)
IV.	Maladii sistemice severe cu evident pericol p-u viata
V.	Pacient monitorizat care nu va supravetui peste 24 ore cu sau fara interventie
VI.	Donator de organe
E	Urgente (Emergency)



Medicatia preanestezica

Scopurile medicatiei preanestezice:

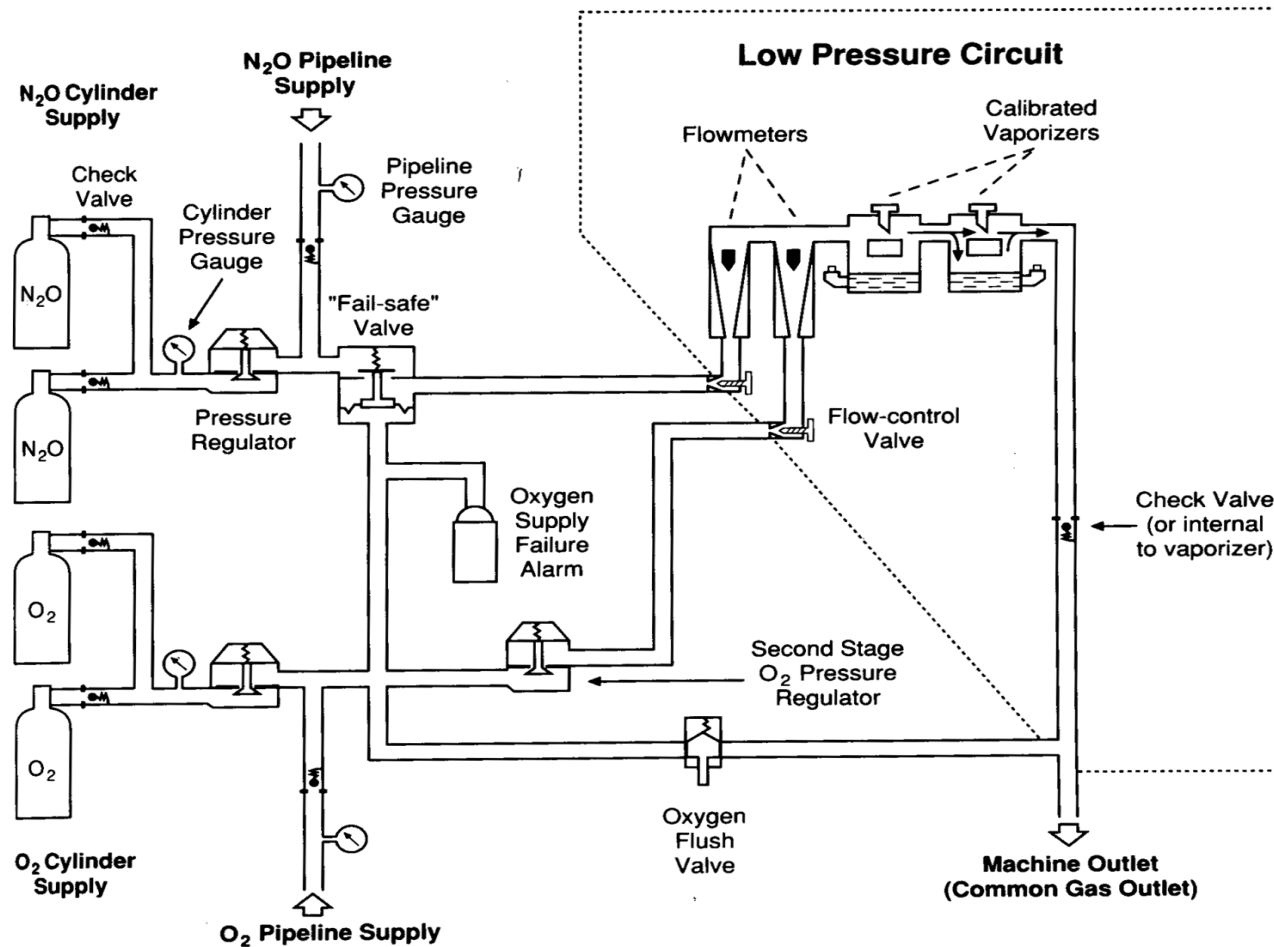
- Diminuarea anxietatii
- Sedare
- Amnezie
- Analgezie
- Diminuarea secretiei in caile respiratorii
- Prevenirea raspunsului neurovegetativ
- Diminuarea volumului si pH continutului gastric
- Efect antiemetic
- Reducerea necesarului de anestezice
- Facilitarea inductiei
- Profilaxia reactiilor alergice



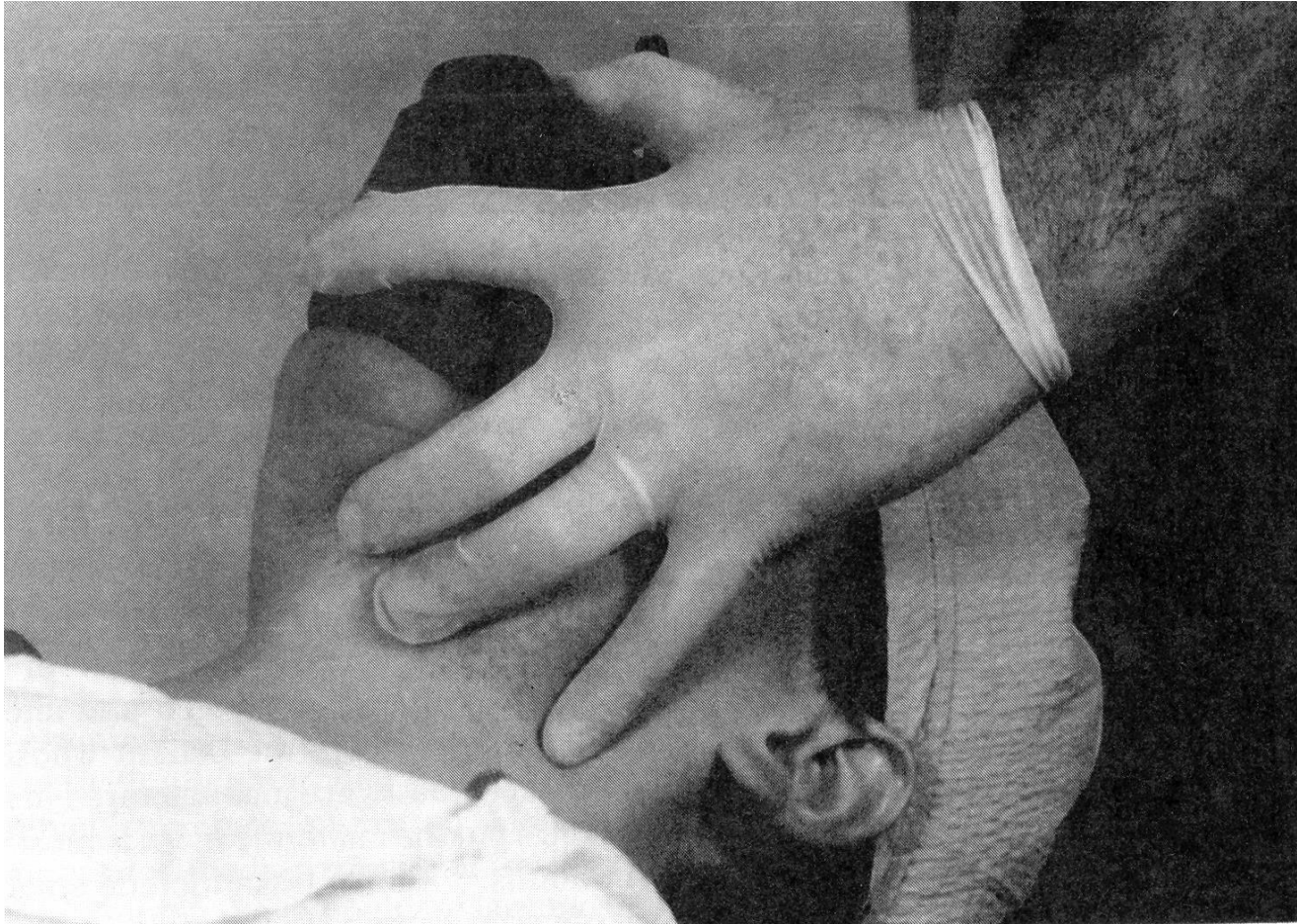
Echipamentul anestezic



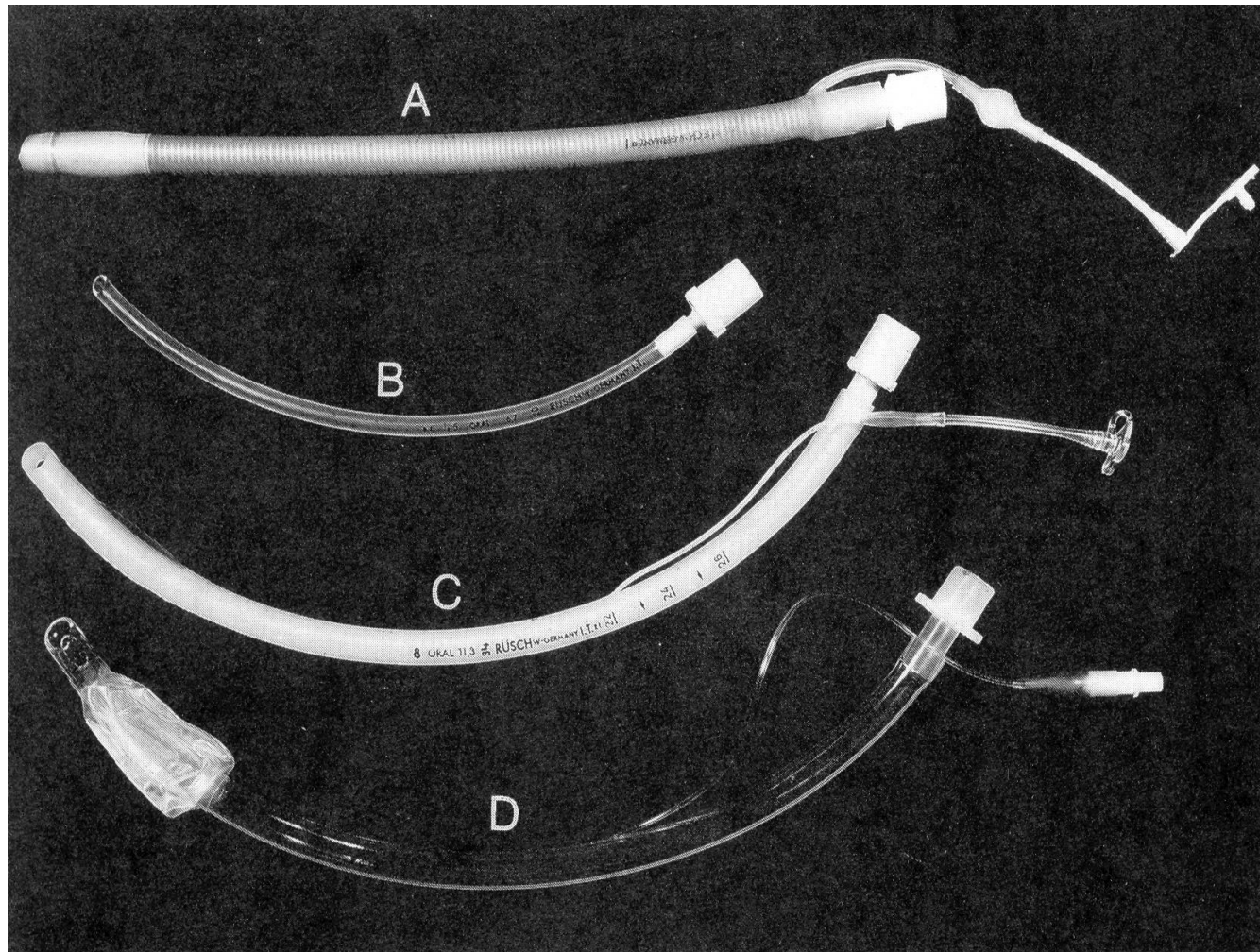
Echipamentul anestezic (36,38+39)



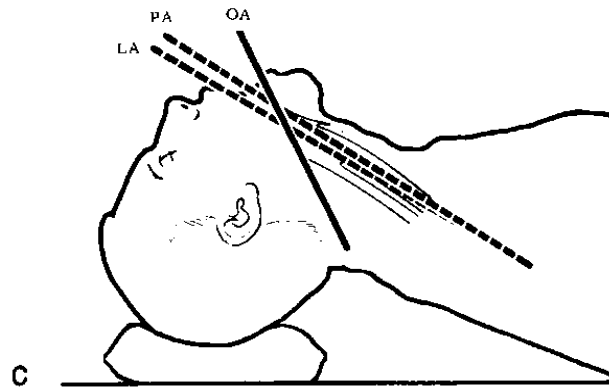
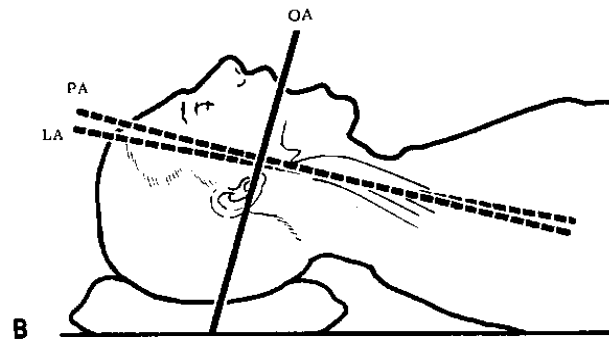
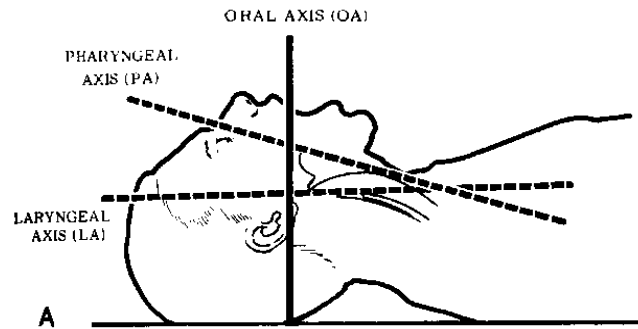
Managementul cailor aeriene



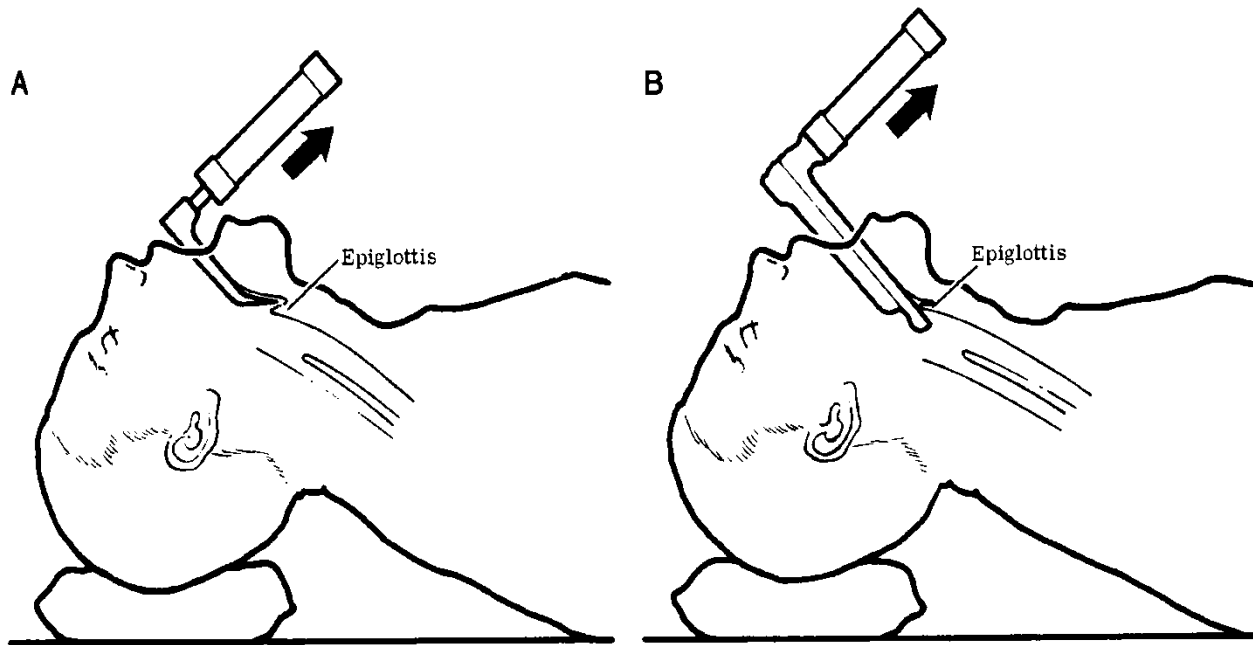
Managementul cailor aeriene



Managementul cailor aeriene



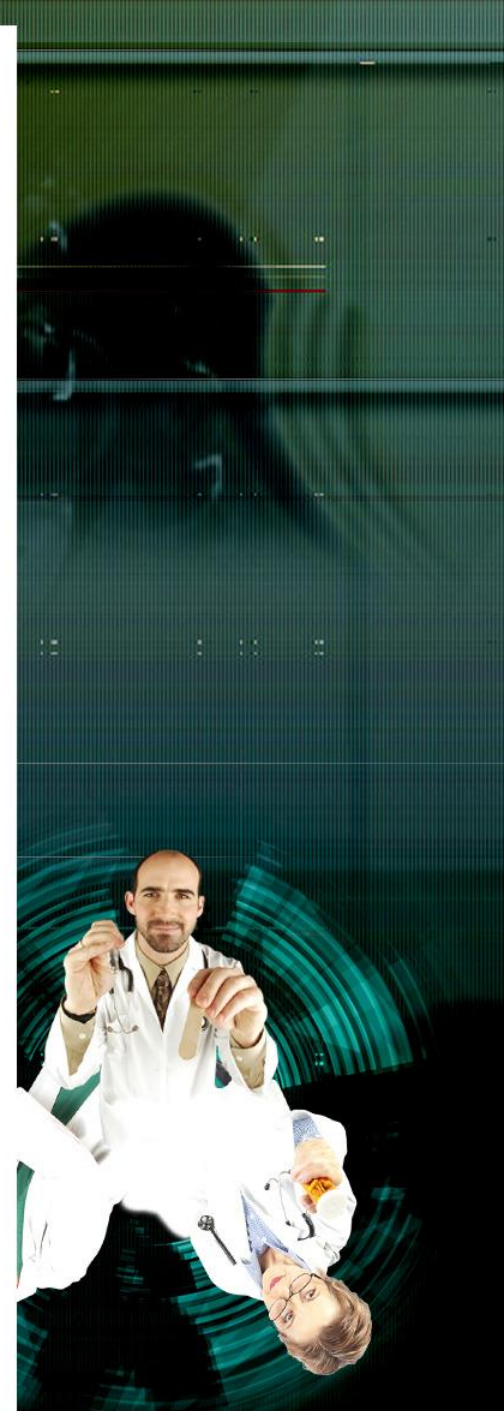
Managementul cailor aeriene



Anestezia inhalatorie

Coeficientul de repartizare singe/gaz & **MAC**

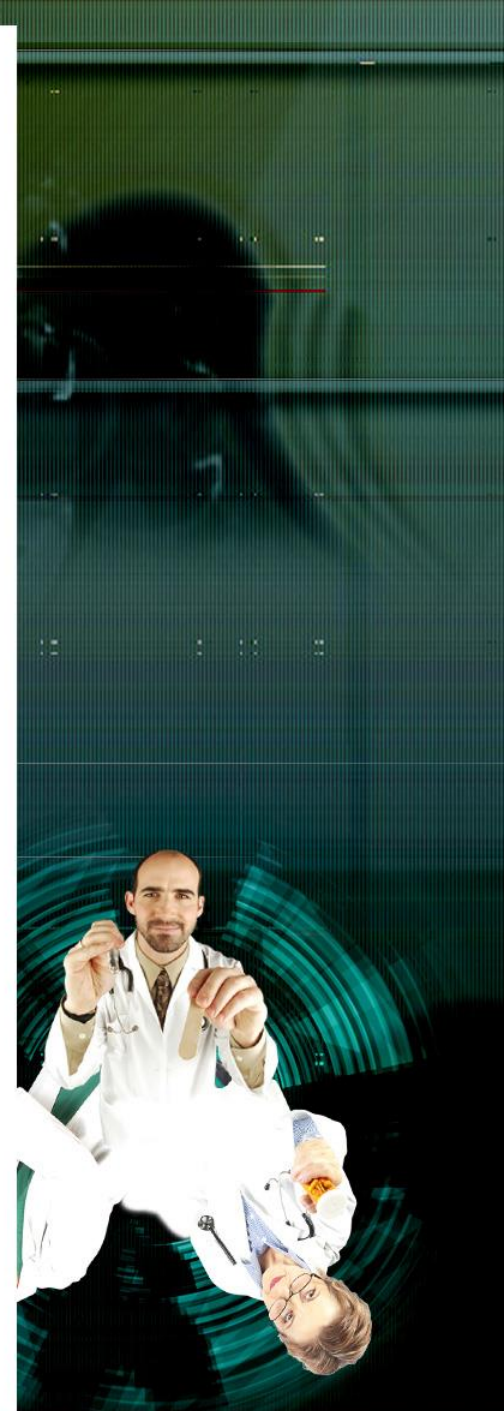
• Halothane	2.4	0.75%
• Enflurane	1.9	1.7 %
• Isoflurane (50)	1.4	1.2 %
• Protoxid de azot (27+39+49)	0.47	105%
• Desflurane	0.42	1.0 %



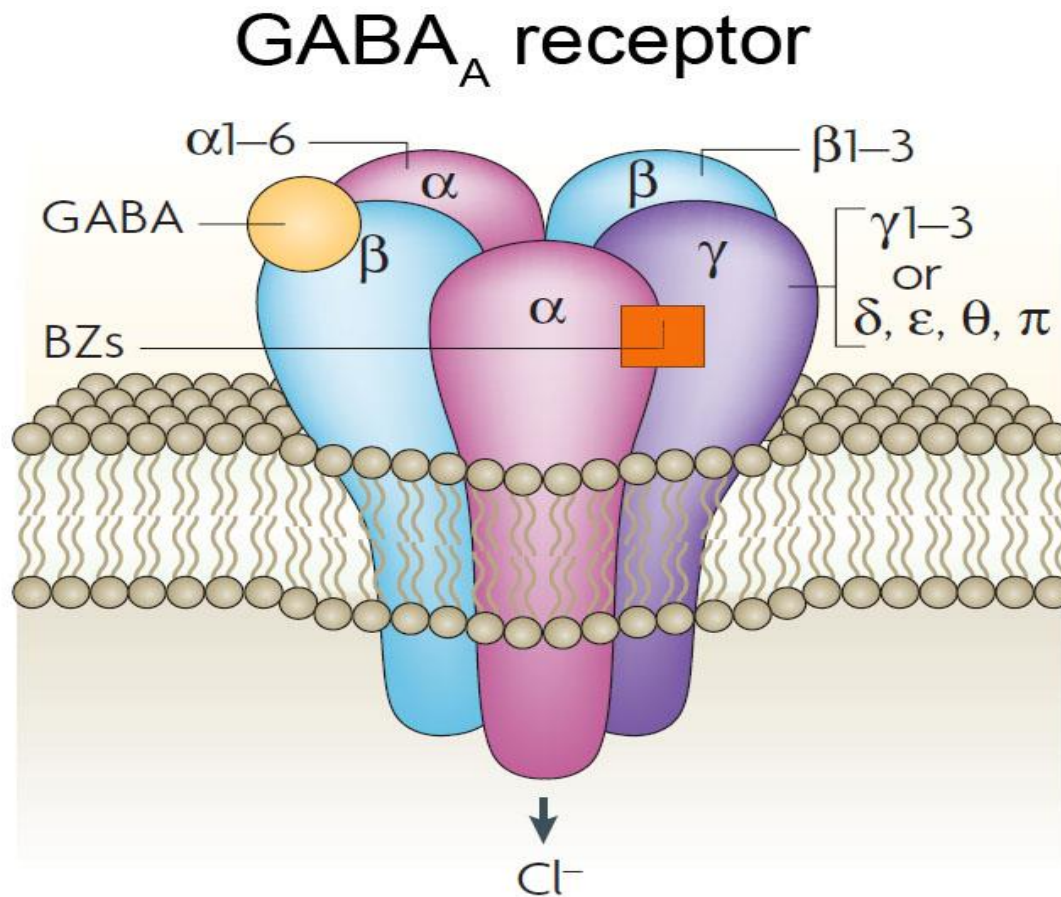
Anestezia intravenoasa

A. Anestezice intravenoase

- **Barbiturice** (Thiopental ⁽⁴²⁾, Thiamylal, Methoxexital) ^(9;17;18)
- **Benzodiazepine** (Diazepam ⁽²³⁾, Midazolam ⁽²⁴⁾)
- **Ketamina** ^(7;20+48)
- **Propofol** ⁽⁵⁰⁾



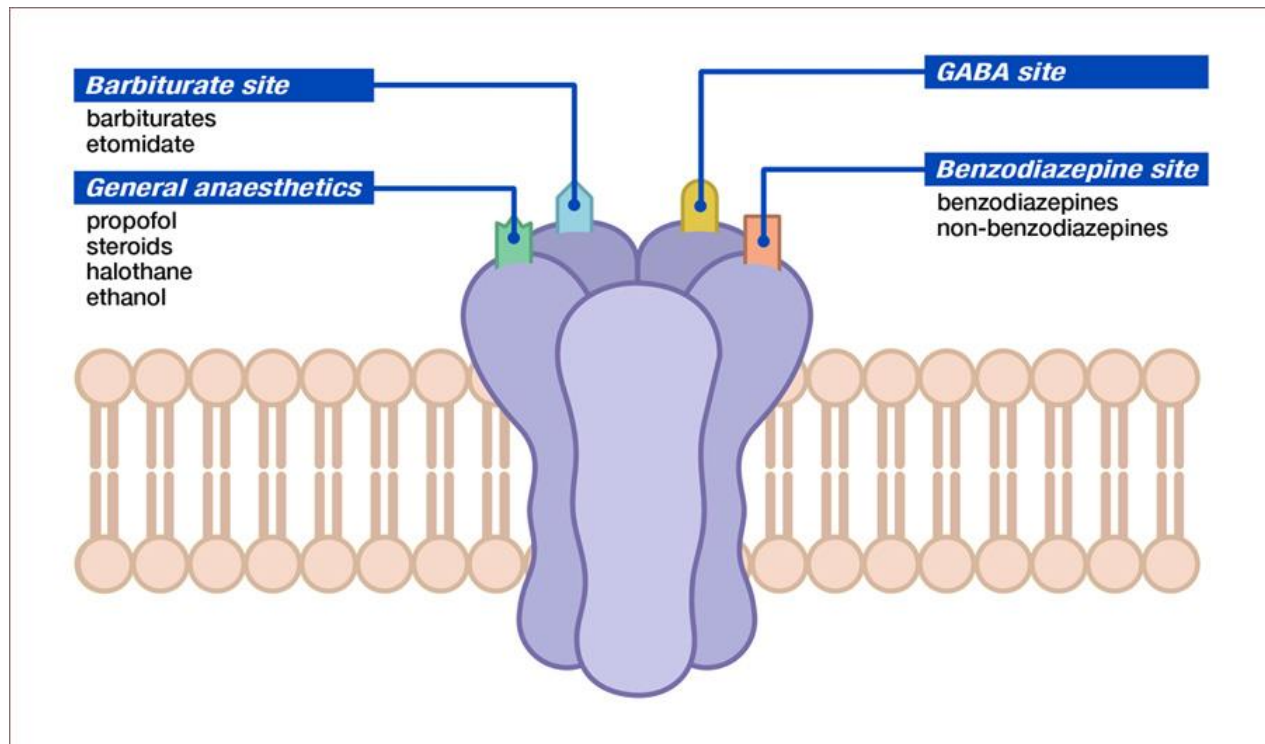
Mecanismul de actiune al anestezicelor



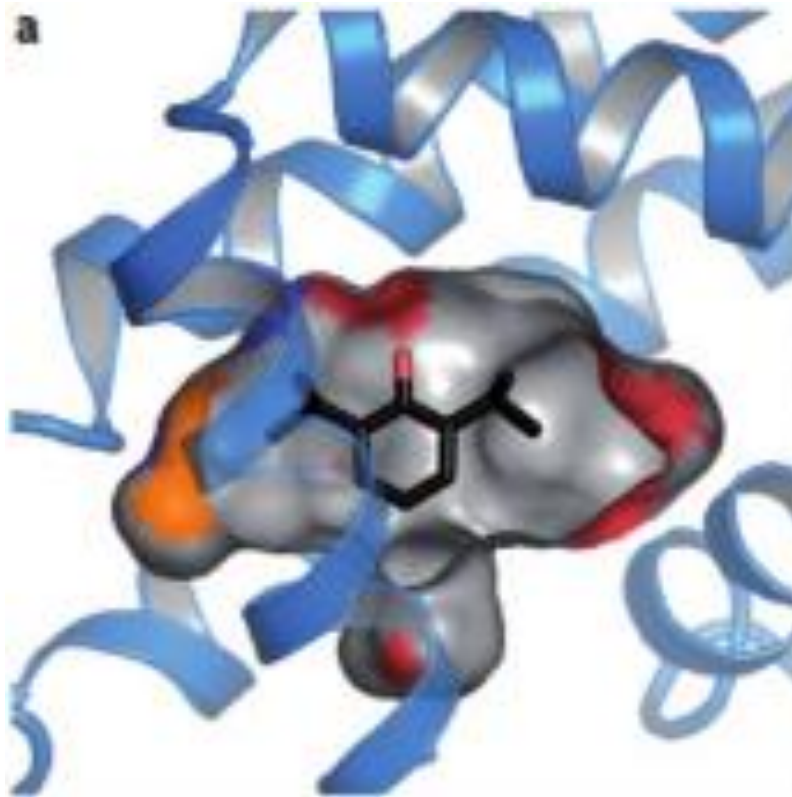
Jacob et al., Nature Reviews Neuroscience, 2008



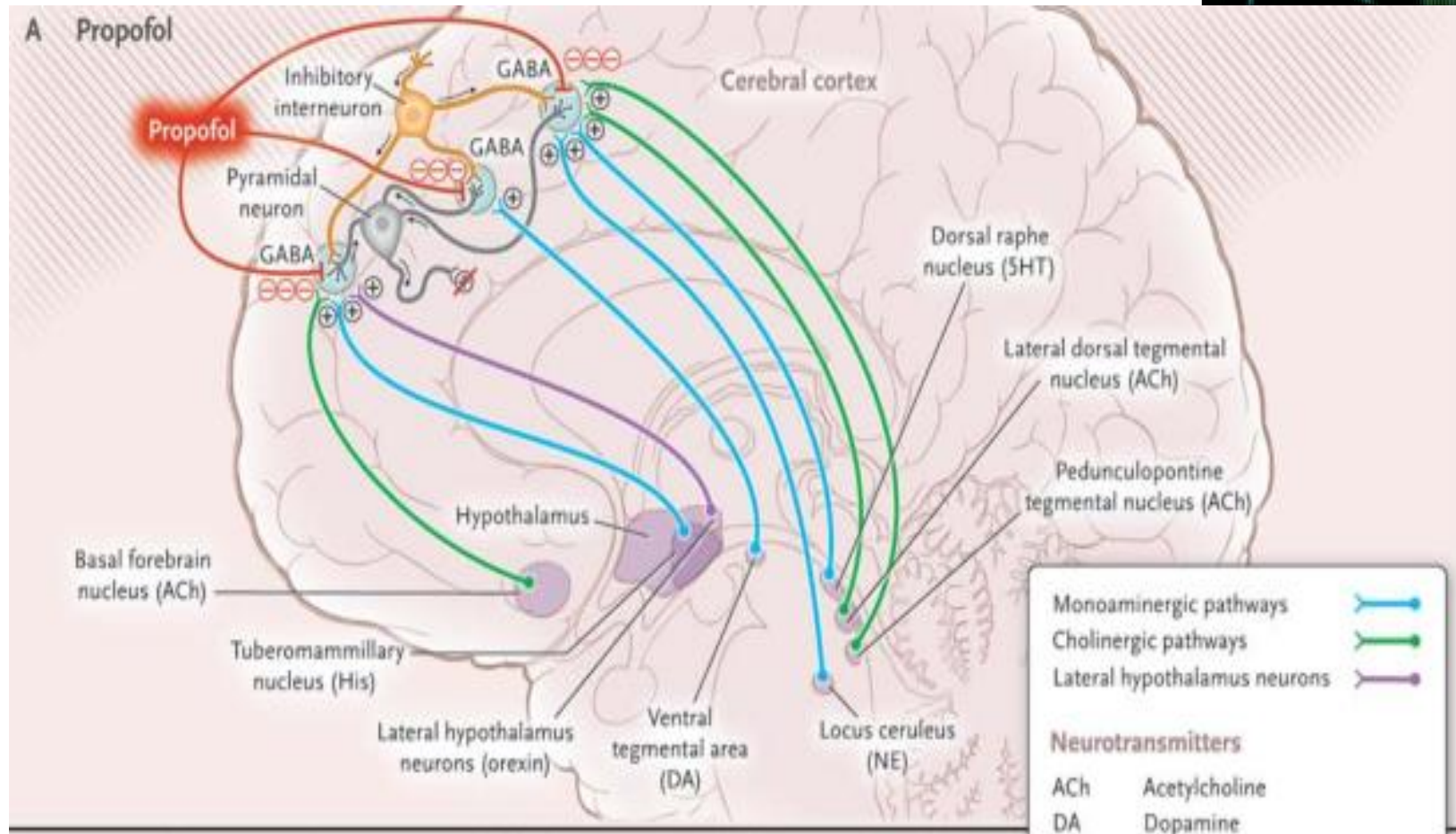
Mecanismul de actiune al anestezicelor



Mecanismul de actiune al anestezicelor Propofolul

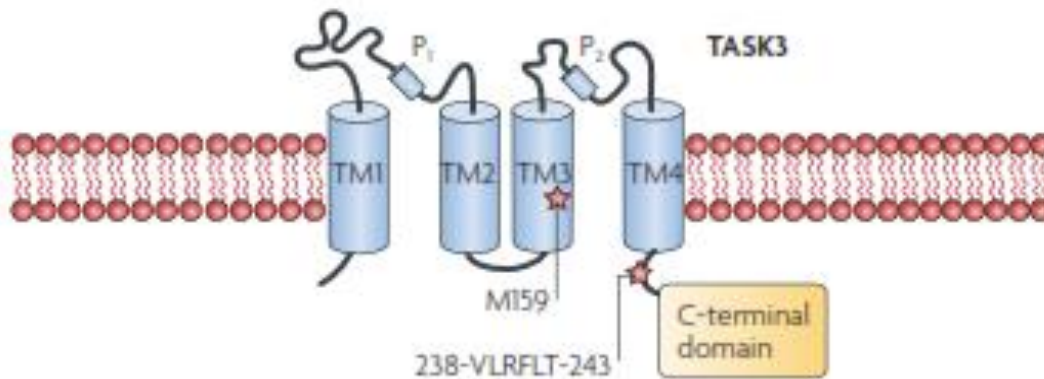


Mecanismul de actiune al anestezicelor

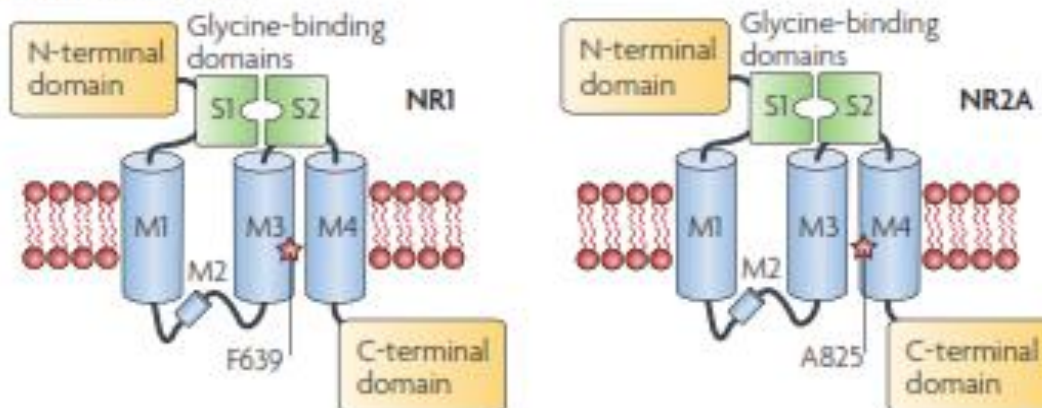


Mecanismul de actiune al anestezicelor

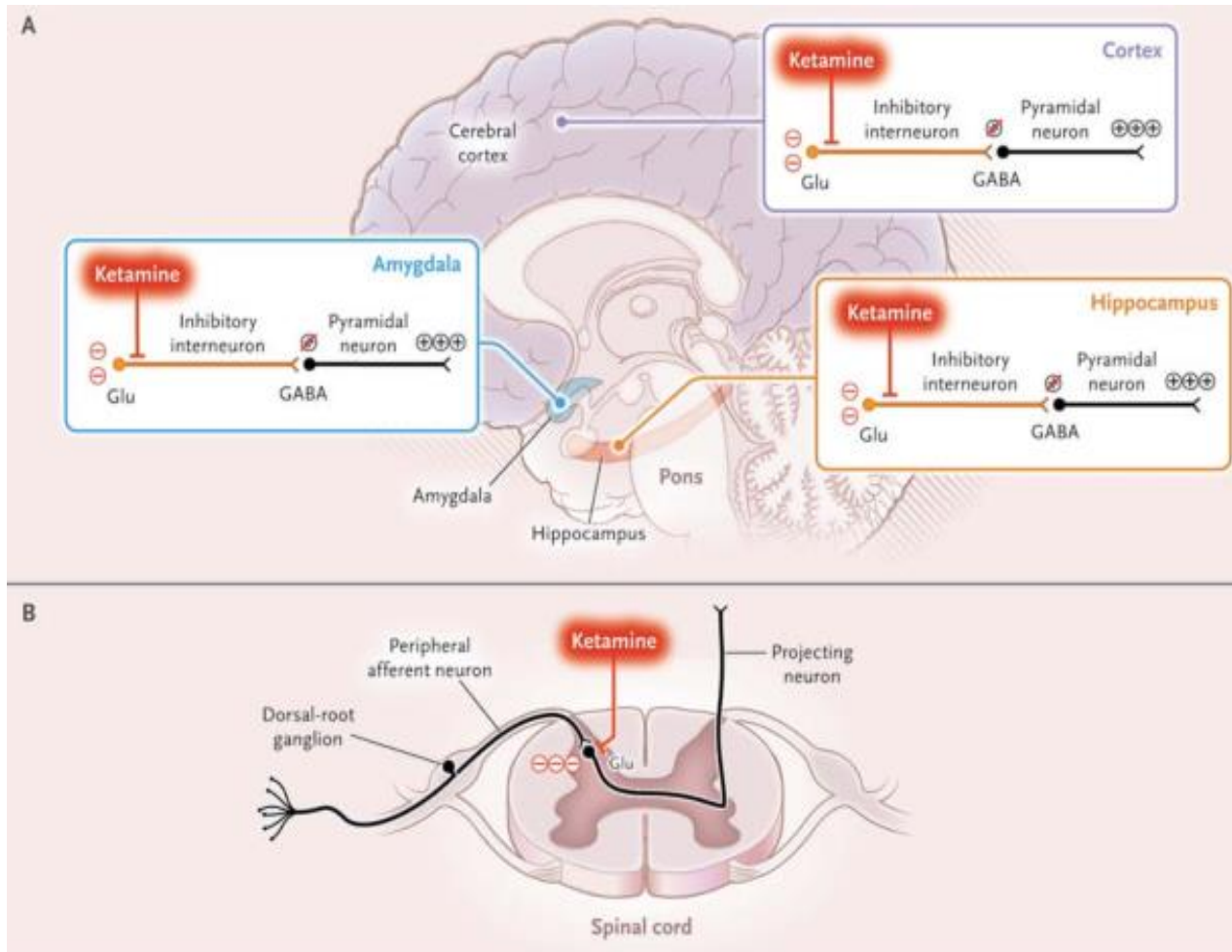
b 2PK channels



c NMDA receptors



Mechanism of action Ketamine



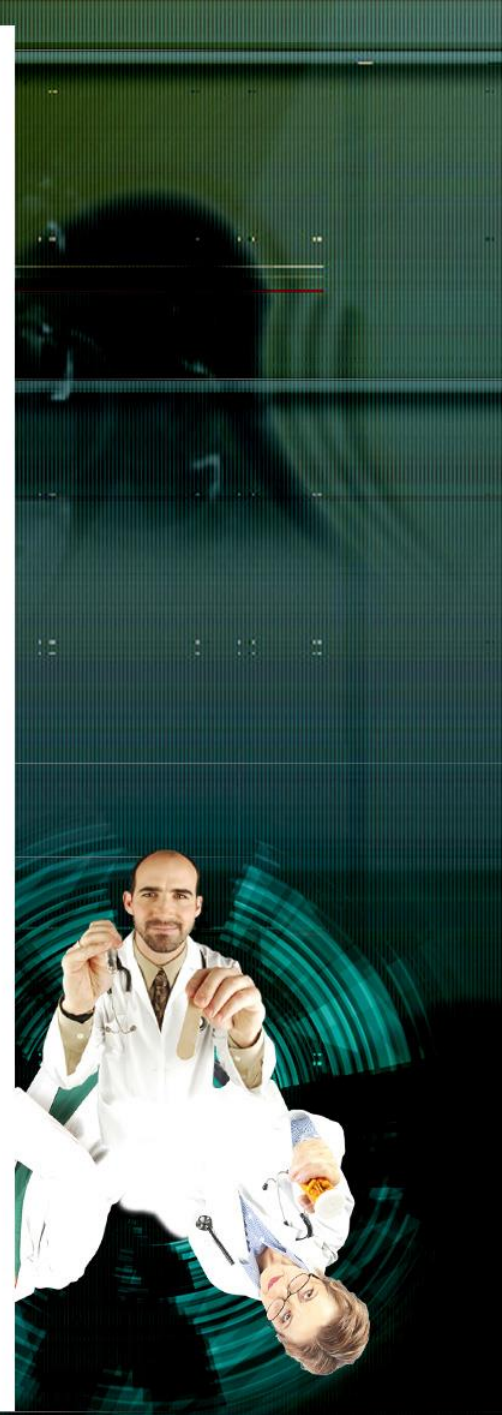
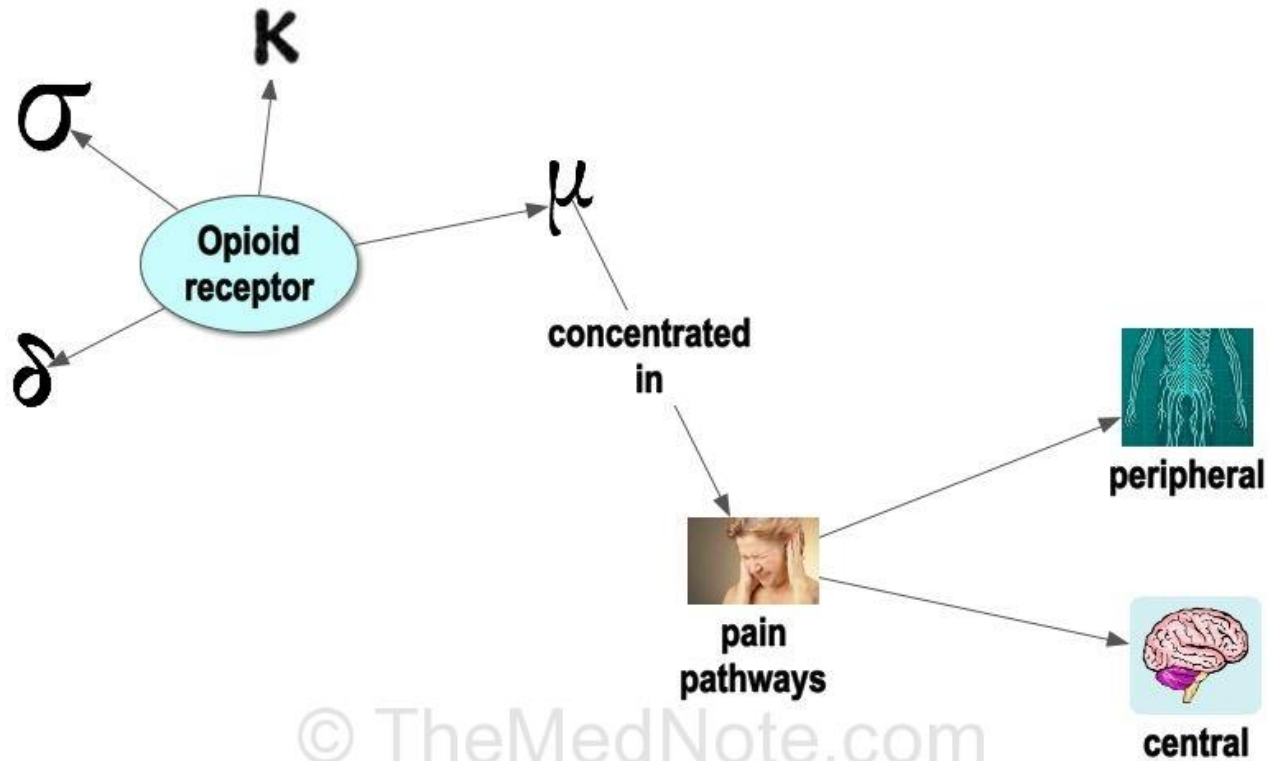
Anestezia generala

B. Analgezice opioide

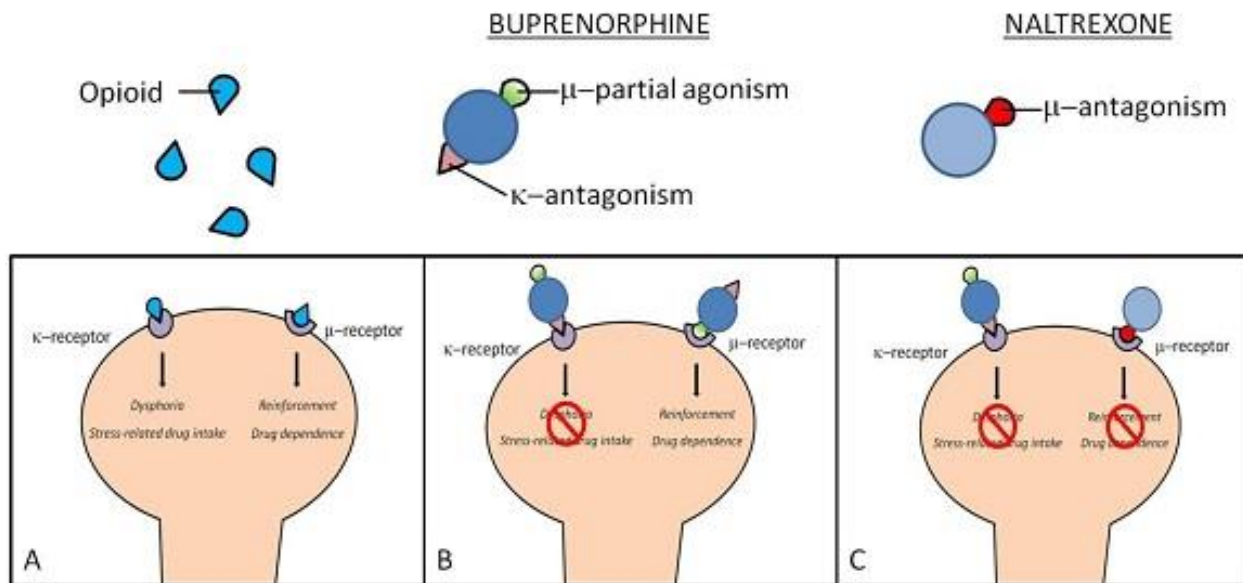
Morphine ^(10;11), Fentanyl ^{(12;13;14)+45},
Alfentanil, Remifentanil, Sufentanil,
Buprenorphine, etc.



Mecanismul de actiune al analgezicelor opioide



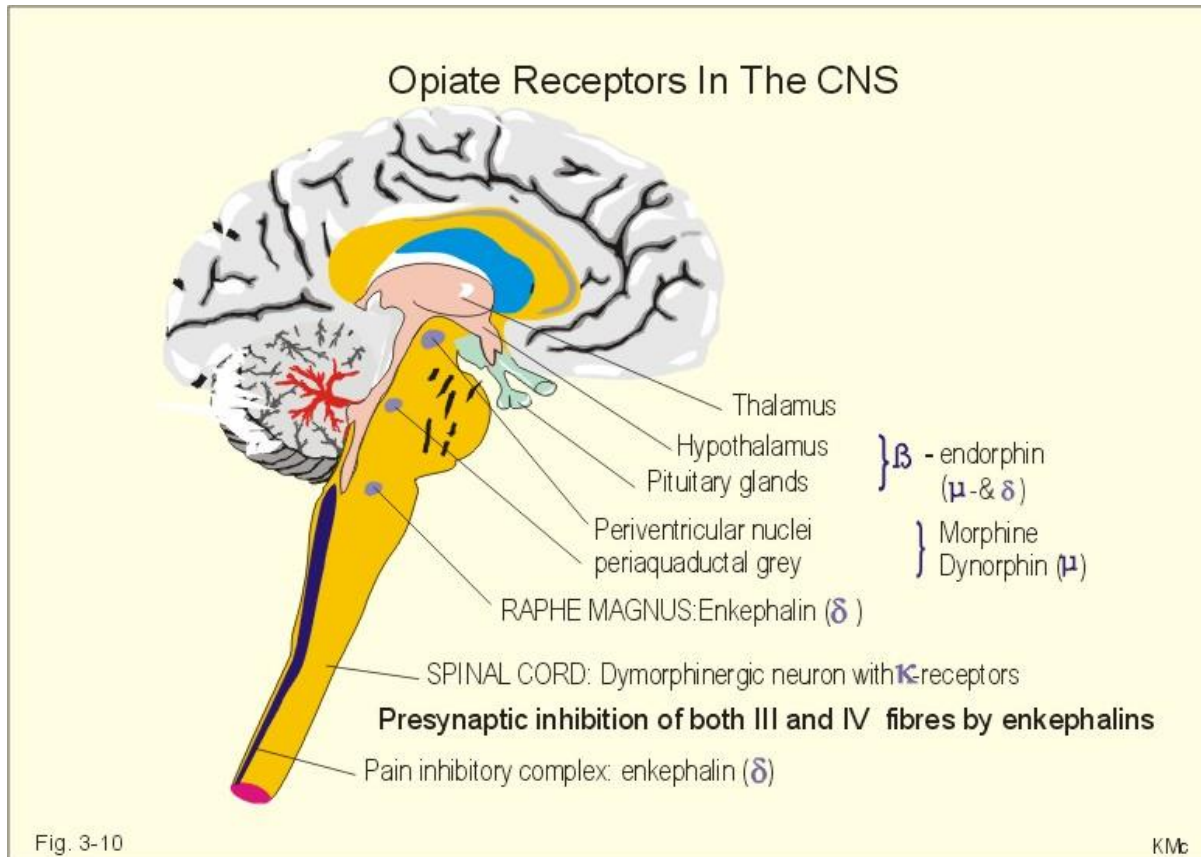
Analgezicele opioide: agonisti, agonisti partiali, antagonisti



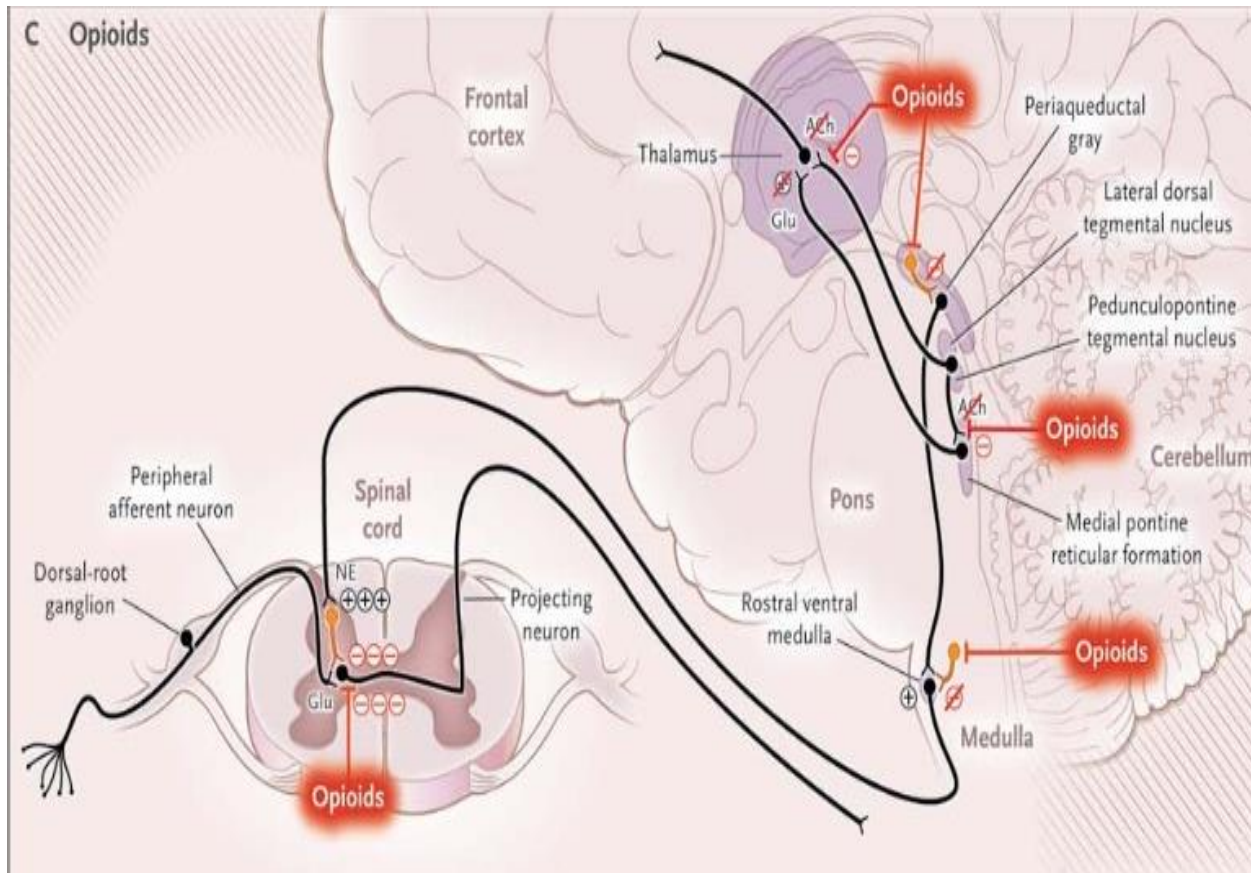
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Mecanismul de actiune al analgezicelor opioide



Mecanismul de actiune al analgezicelor opioide



RELAXANTELE MUSCULARE

• Depolarizante ⁽¹⁹⁾

- Succinylcholine ⁽⁴³⁾ (5-10 min)

• Nondepolarizante

Actiune de lunga durata (60 – 90 min)

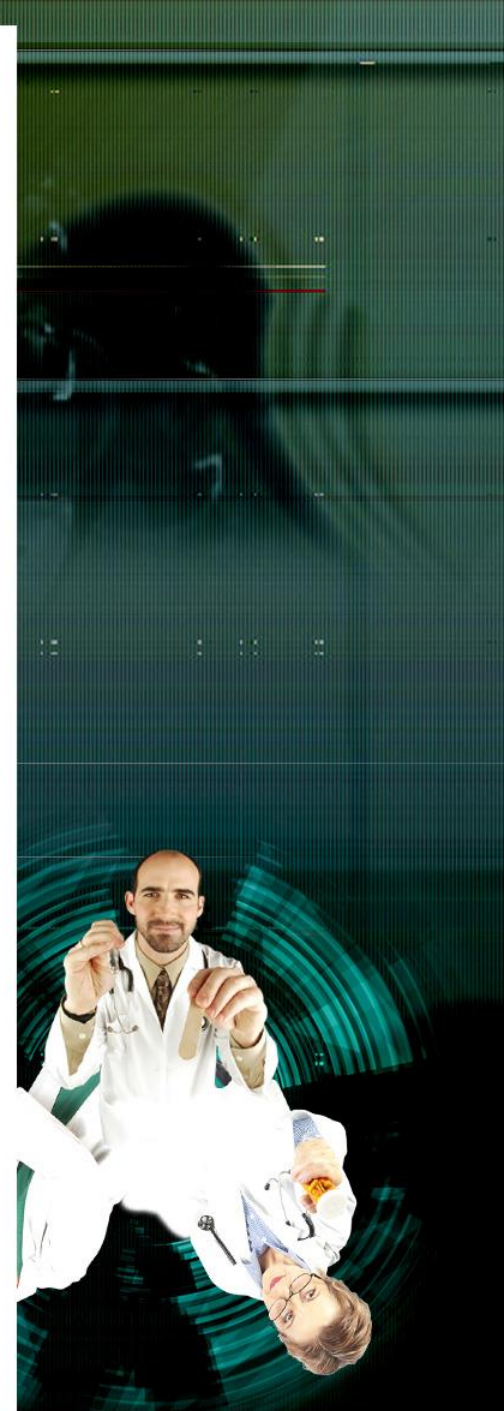
- d- Tubocurarine
- Metocurine
- Pancuronium
- Doxacurium

Medie (20 - 30 min)

- Atracurium ⁽⁴⁴⁾
- Vecuronium

Scurta (10 – 20 min)

- Mivacurium

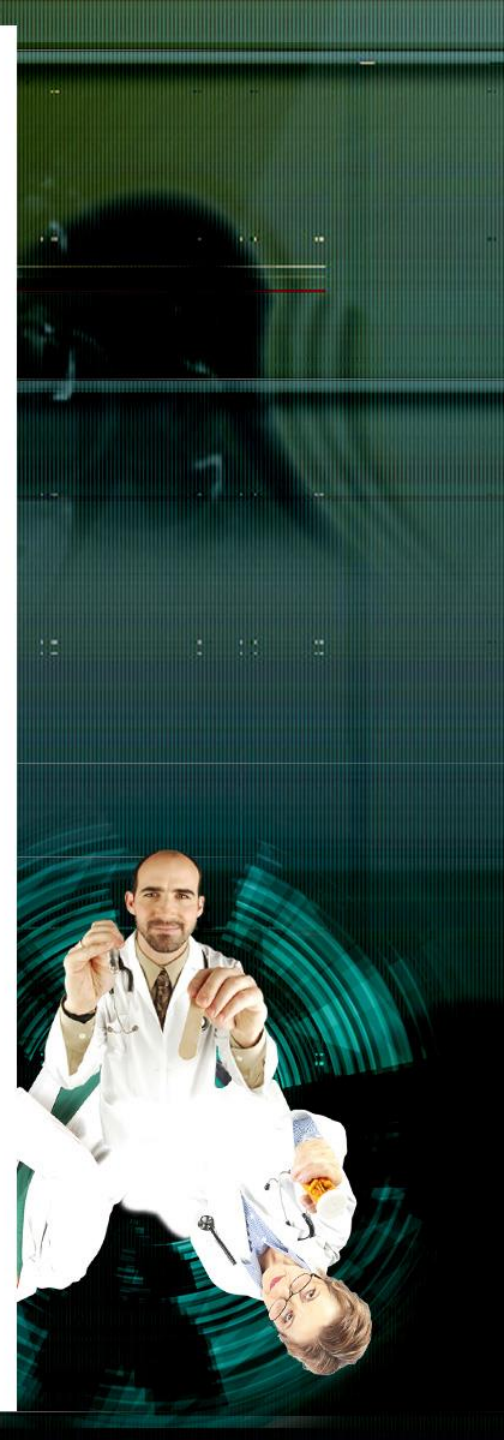


Monitorizarea intraanestezica

I. De rutina

- Prezenta unui anesteziolog
- FCC (q 5 min)
- TA (non-invasiva vs invasiva)
- ECG (continuu) (30)
- Ventilarea (observarea “sacului respirator; auscultatia; ET CO2 (5))
- Presiunea in contur (pressure alarms)
- Analizator al oxigenului
- Puls - oximetria
- Temperatura
- Diureza

II. Monitoring hemodinamic avansat (CVP, PCWP, CO, etc)

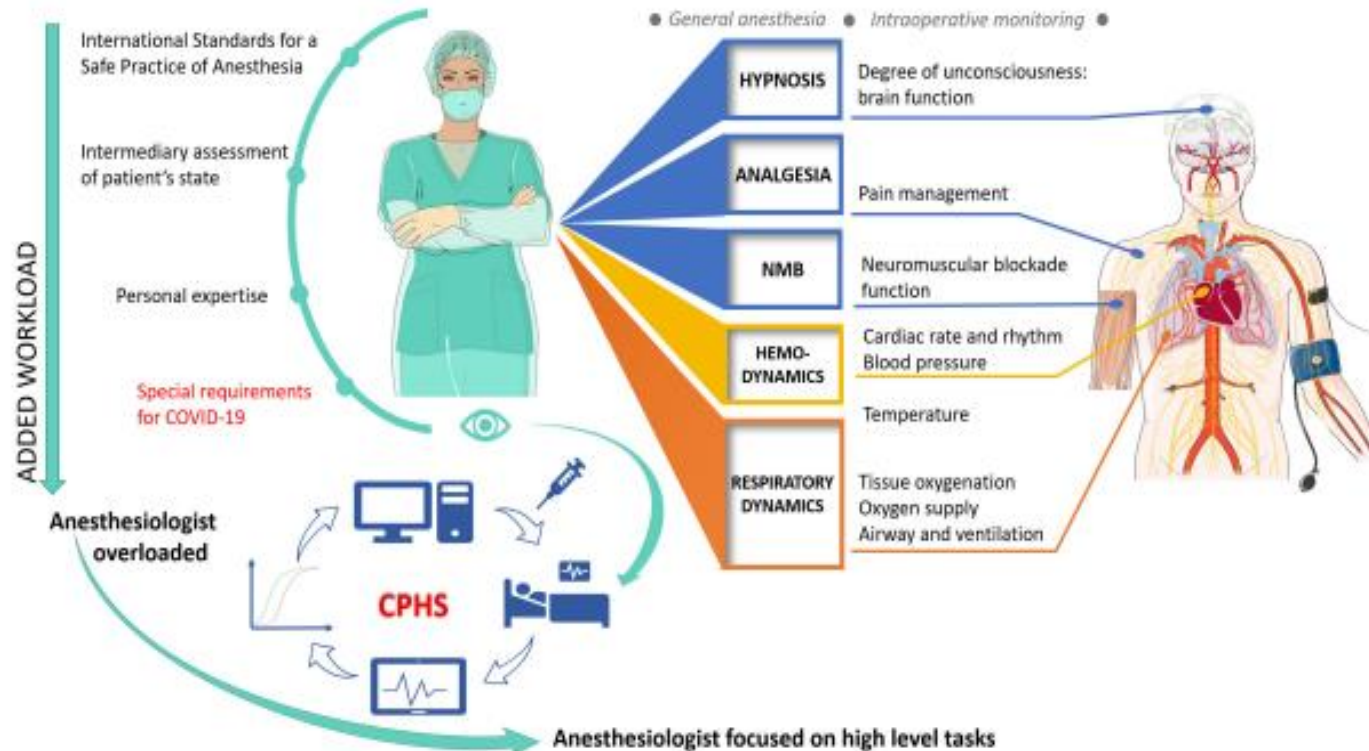




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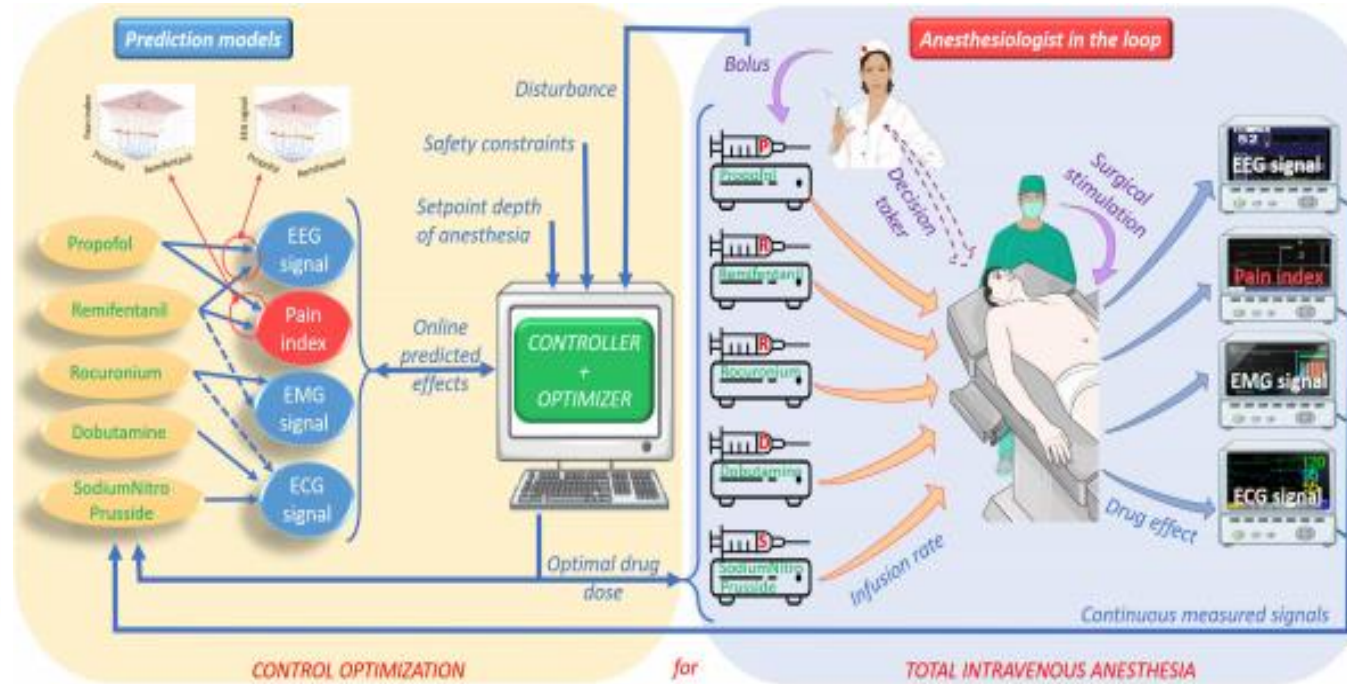
Anestezia moderna: provocari si perspective



Paradigma clinica pentru monitorizarea starii pacientului in cazul anesteziei generale: potentialul sistemelor hibride (cu prezenta specialistului uman)



Anestezia moderna: provocari si perspective



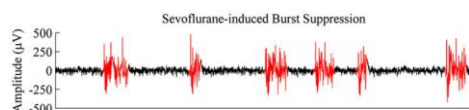
Schema uni sistem de tip inchis: paradigma automatizarii complete a anesteziei in practica clinica



Anestezia moderna: provocari si perspective

Semnal EEG / profunzimea anesteziei

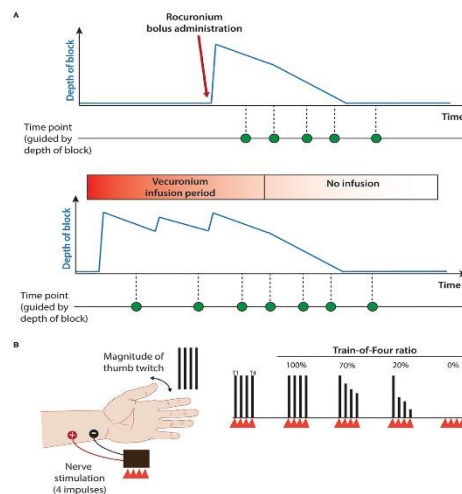
- Bispectral Index monitor (BIS)
- Auditory Evoked Potential monitor (AEP)
- Patient State Analyser (PSA)
- Cerebral state monitor (CSM)
- Index of Consciousness monitor (IoC)
- Entropy monitor



Nociceptia/ Pain Indexes

- Surgical Pleth Index (SPI)
- Analgesia Nociception Index (ANI)
- Pupillometry monitoring methods

Semnal EMG / gradul blocului neuromuscular



Monitoring hemodynamic

- ECG
- Other hemodynamic parameters

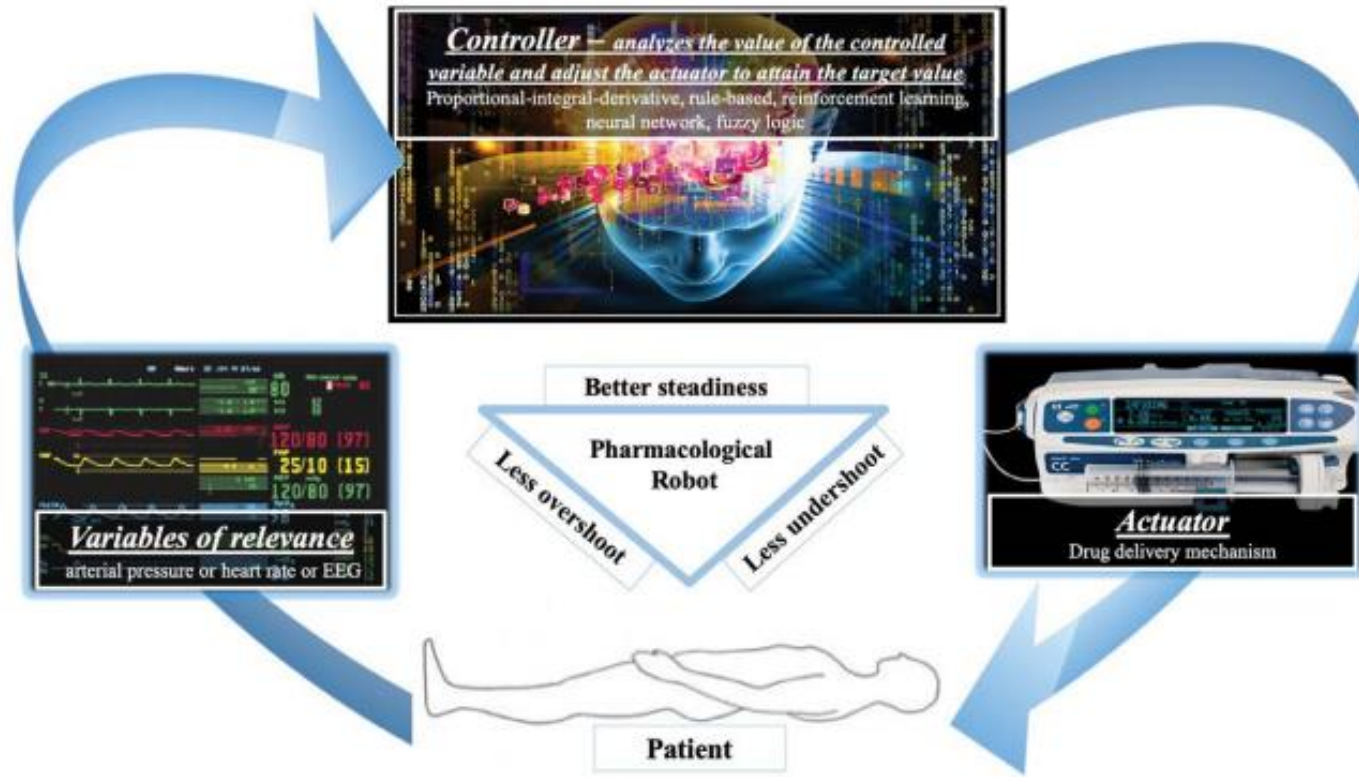
“If you can’t measure it, you can’t manage it.”

Peter Druker



Anestezia moderna: provocari si perspective

Figure 1. Description of a closed-loop system. EEG indicates electroencephalogram.



Sistem TIVA cu ciclu inchis



Anestezia moderna: provocari si perspective



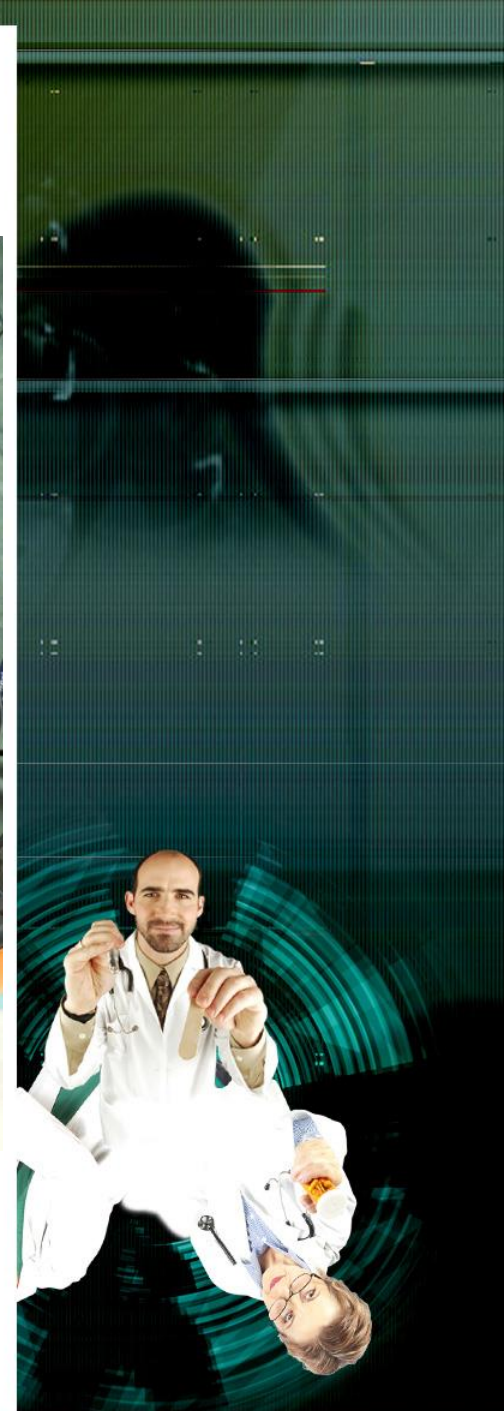
McSleepy



Anestezia moderna: provocari si perspective



Kepler Intubation System (KIS)



Anestezia moderna: provocari si perspective



Sistemul Magellan: bloc de nerv popliteal
prin abordare posterioara





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