GENERAL ANAESTHESIA

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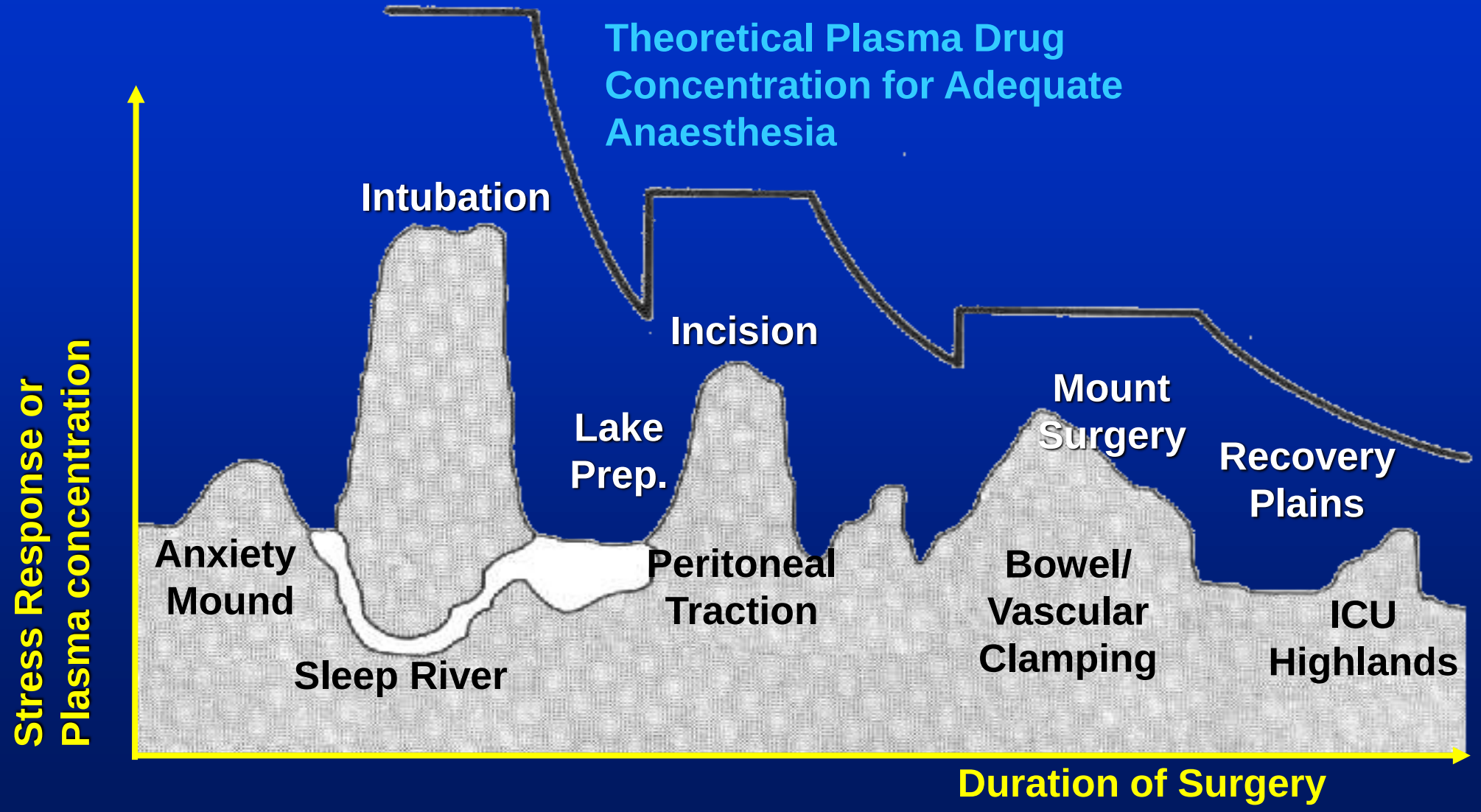
DEFINITION

- **an + aesthesia = (un) perception**
- Ancient Greek

- **general anaesthesia = „narcosis“**
- **regional anaesthesia = local**

SURGICAL STRESS MAP

Barash, 1997



PHARMACO-ANAESTHESIA METHODS

- Inhalational anaesthesia ... VIMA
- Intravenous anaesthesia... TIVA

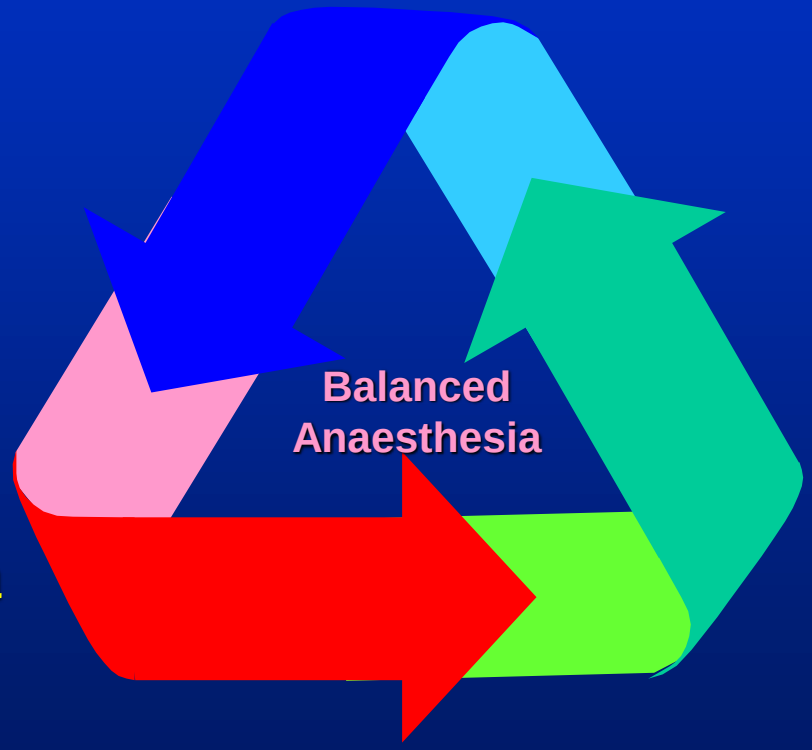
- Intramuscular
- Rectal

- Combined anaesthesia

BASAL PARTS OF GA

BIS Monitoring

Consciousness/Hypnosis



Analgesia

Hemodynamic Monitoring

Muscle relaxation/ Areflexia

Peripheral Nerve Stimulator Monitoring

Monitoring Anaesthetic Endpoints

CIRCULATORY EFFECTS INHAL. ANAESTHETICS

(Barash, 1997)

- ↓ BP according to dose (vasodilation, ↓ C.O., cardiodepresion, ↓ sympat. activity)
- ↓ consumption O_2 about 10-15%
- ↓ blood flow in liver, kidneys and gut, ↑ in brain, muscles & skin
- N_2O ↑SVR, PVR and BP, ↓ C.O.
- Sensibilisation myocardium to catecholamines: ↓ in children, HAL > ENF > ISO > DES > SEV (more in ↑CO_2, more with thiopental)
- No influence to pacemaker functions
- No coronary steal effect in man

RESPIRATORY EFFECTS INHAL. ANAESTHETICS

(Barash, 1997)

- All ↓ V_T and bronchodilational effect
- Bloc histamine effects on bronchi – bronch. asthma treatment: HAL, SEV
- Respiratory depression : N_2O>HAL>ISO>DES
- No influence to hypoxic pulmonary hypertension

- Up to 3x increase effects of muscle relaxants

CNS EFFECTS OF INHAL. ANAESTHETICS

(Barash, 1997)

- ↓ intellectual functions, HAL for 2-8 days (B?)
- ↓ intensity of cerebral metabolism ($CMRO_2$):
  ISO > EFL>HAL.
- Vasodilat. cerebr. a. & ↑ pressure CSF:
  HAL>ISO=DES=SEV,
- HAL > ISO influence production & absorption CSF
- Light hypocapnia - lower ↑ICP in ISO than HAL
- Autoregulation to CO_2 is more blocked by HAL than ISO
- Epi EFL

TOXICITY

- HAL = hepatotoxicity (imuno, repeated expositions)
- N_2O = hematotoxicity „pernicious“ anaemia
- In septic pat. weakening Ne and Le functions
- Change platelets functions
- Myometrium relaxation – bleeding during C.s. (HAL > 0,5, ISO > 1,0)

Barash, 1997

FACTORS INFLUENCED ACTIVITY OF ANESTHETICS

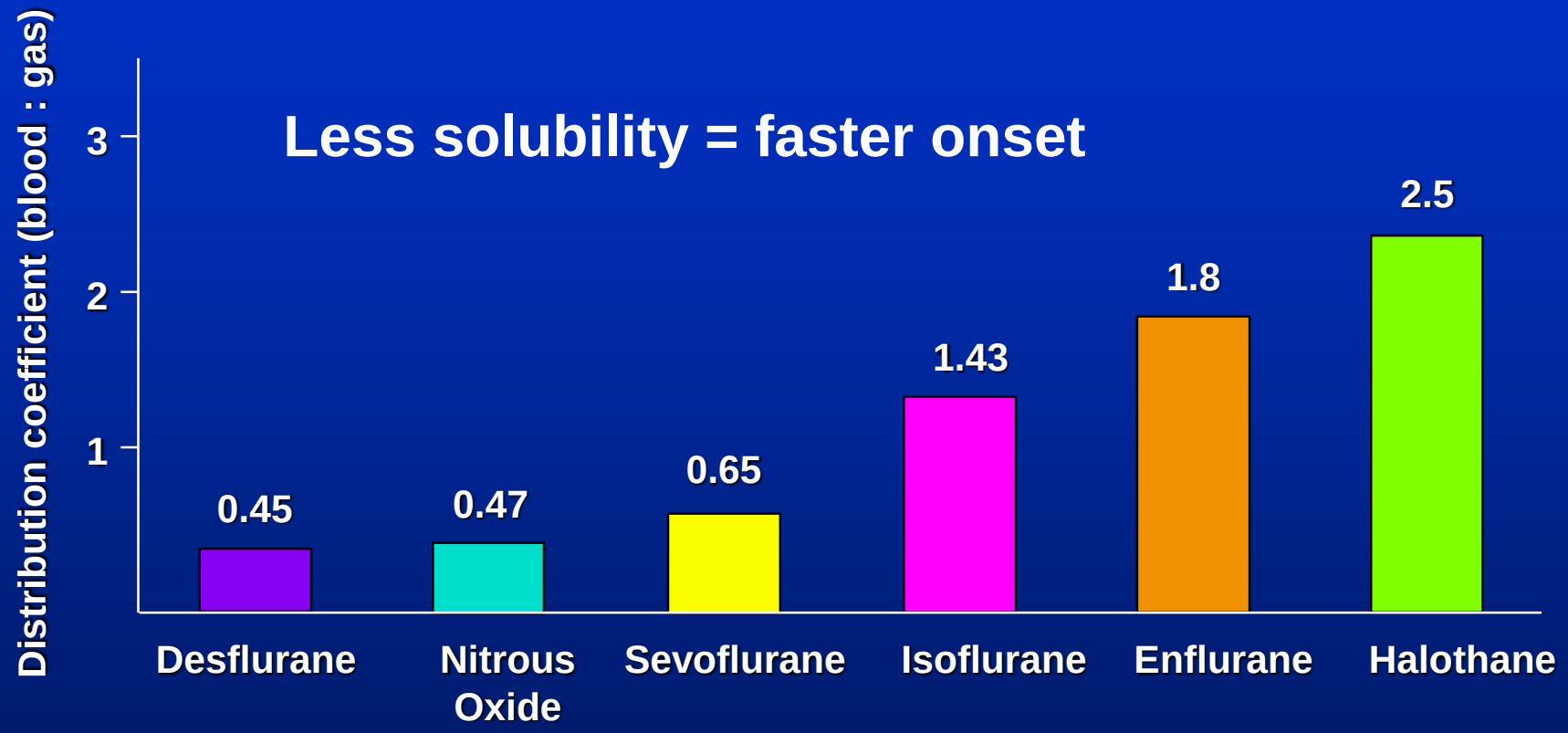
- Anaesthetics concentration in insp. gas
- Alveolar ventilation
- Anaesthetics solubility in blood
- Alveolo - capillary difference of partial pressures anaesthetics
- Cardiac output

PHARMACOKINETICS OF INHAL. ANAESTETICS

- Gas pressure gradient:

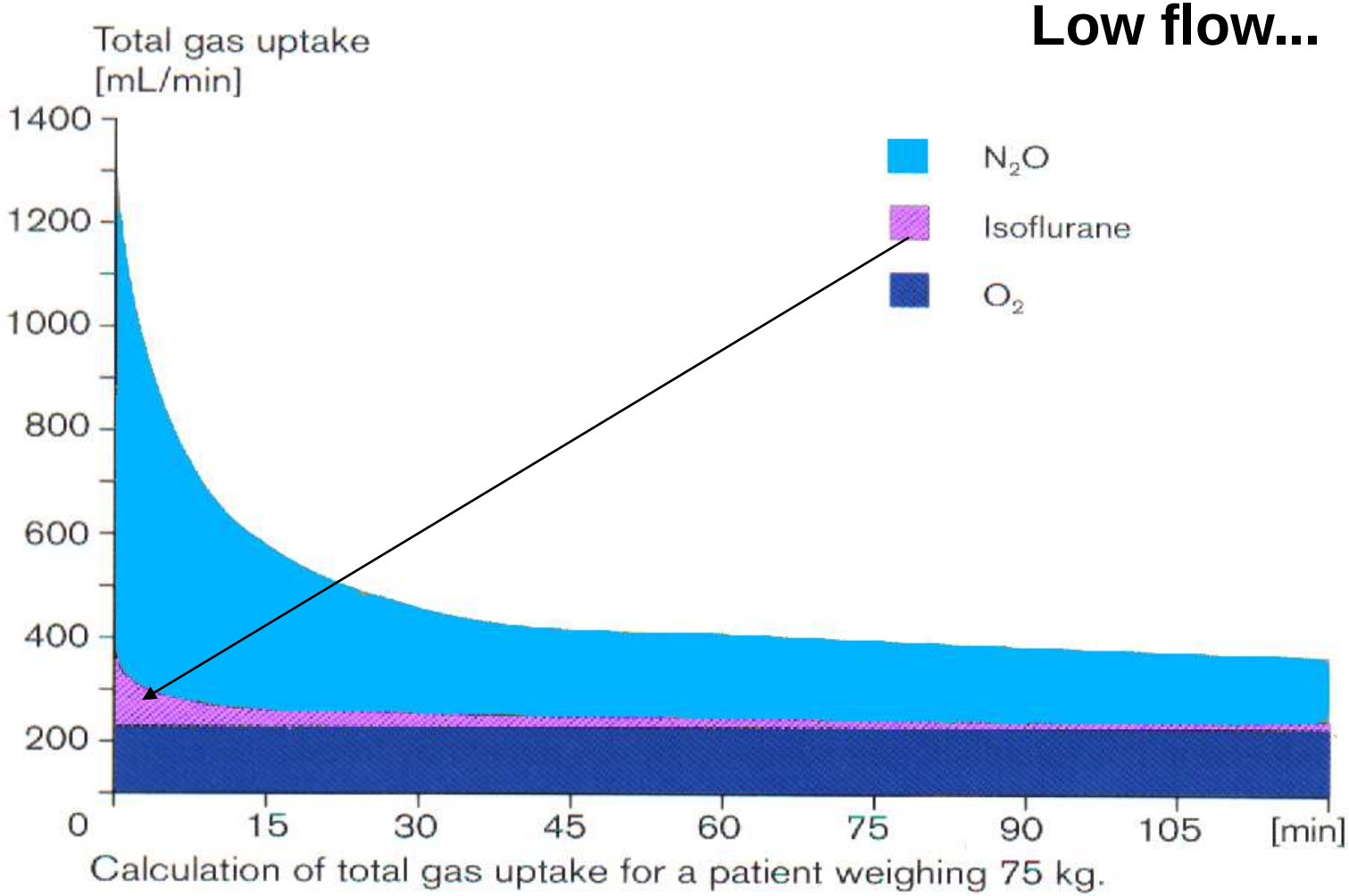
  Inspiratory > alveolar (expiratory) > arterial > > tissue
- E_TAA is indirect, but adequate indicator of anaesthetic pressure in brain
- Distributional coefficient blood:gas, tissue:blood
- Less anaesthetic solubility in blood = faster onset of activity

DISTRIBUTION COEFF. ANAESTHETICS (BLOOD / GAS)



Miller. Anesthesia. 4th ed. Churchill Livingston, 1994; Data on file, Abbott Laboratories Inc.

GAS CONSUMPTION DURING ANAESTHESIA

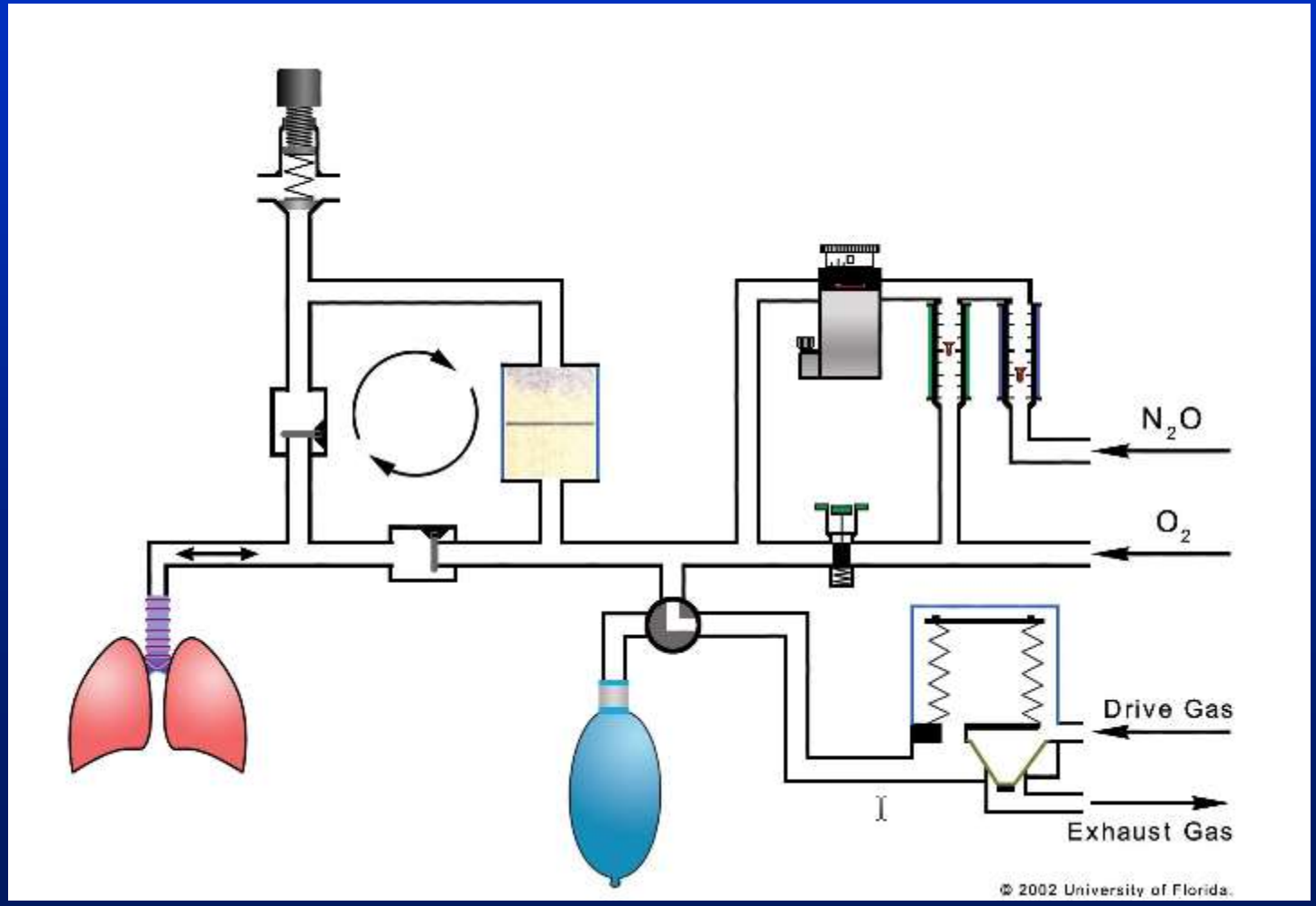


Calculation of total gas uptake for a patient weighing 75 kg.

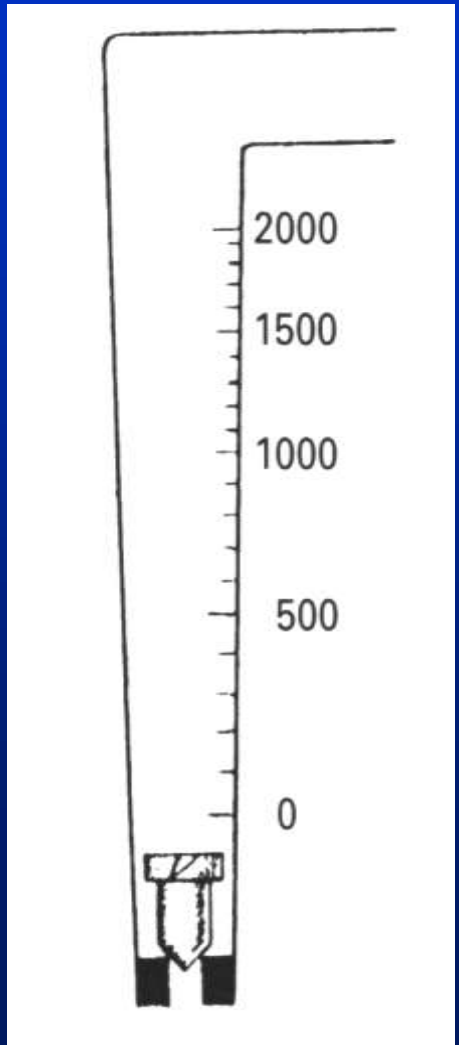
ADVANTAGES OF INHAL. ANAESTHESIA

- Easy regulation (deep of anaesthesia)
- Elimination by expiration
- Easier monitoring of anaesthesia deep
- Less risk of postanaesthesia respiratory depression
- Potentiation of muscle relaxation effect
- Ambulatory anaesthesia
- Price

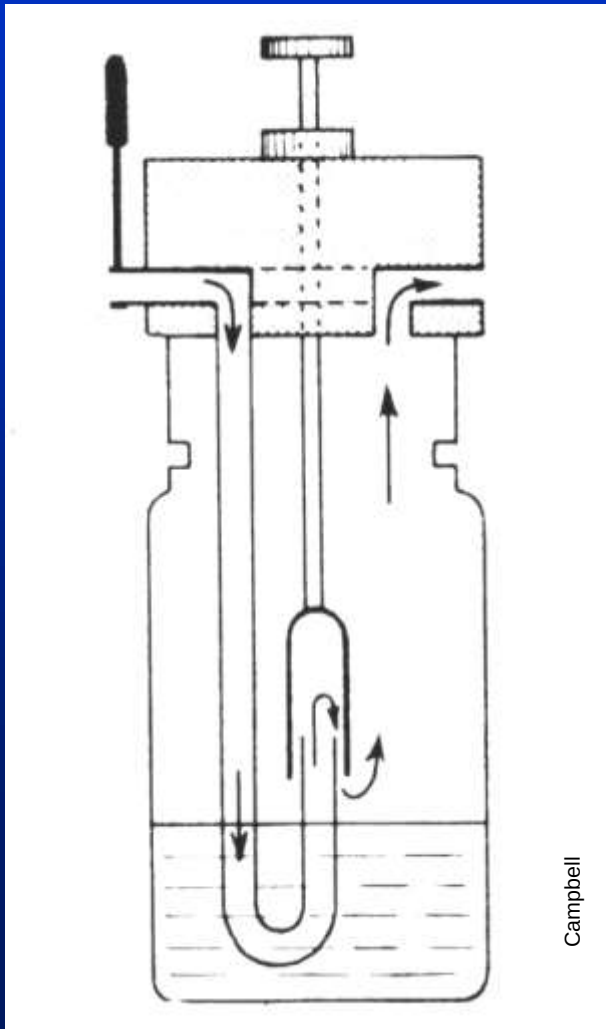
ANAESTHETIC MACHINE LAYOUT



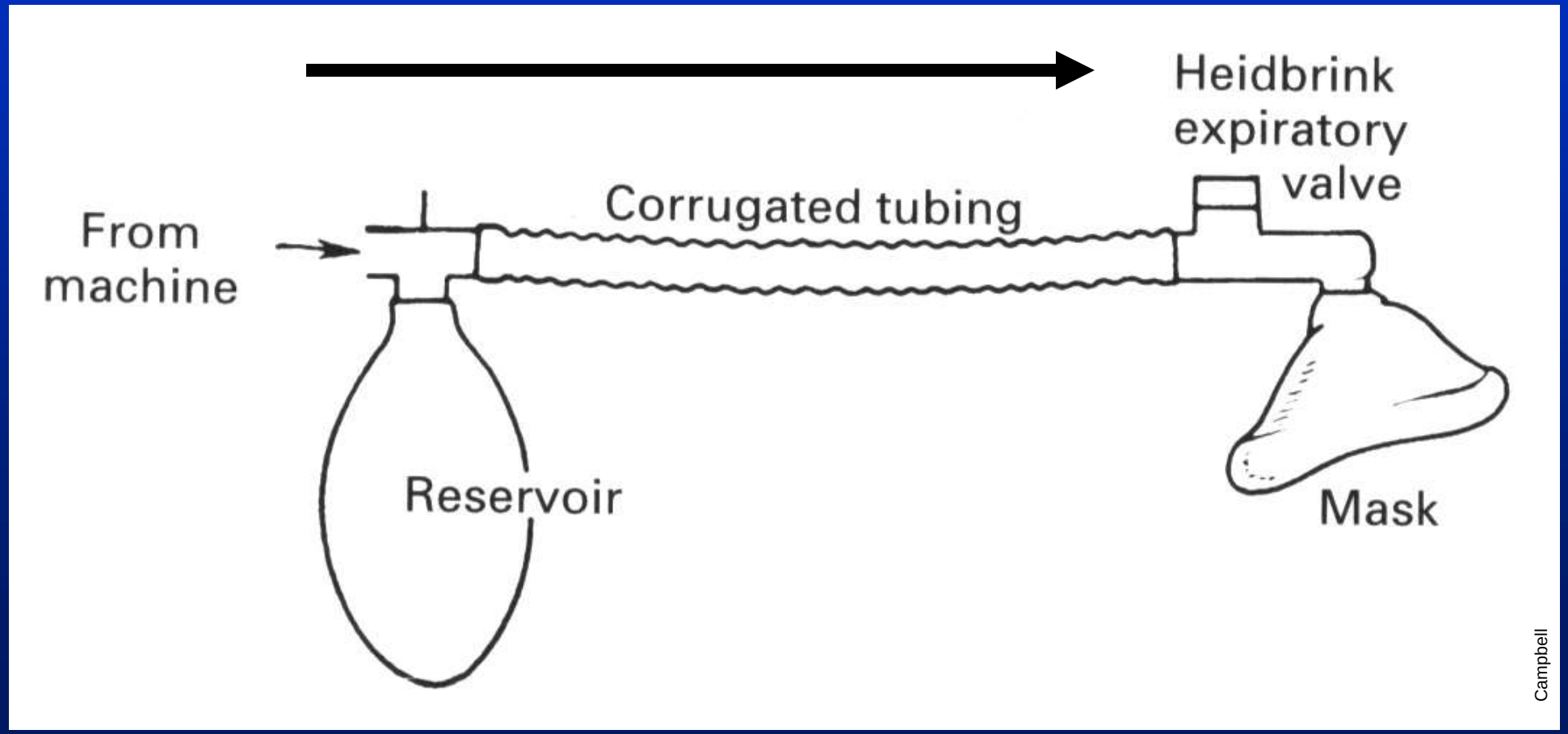
ROTAMETER
= FLOW METER



VAPORISER
VOLATIL ANAESTHETICS



UNI-DIRECTIONAL ANAESTHETIC SYSTEM LAYOUT



IVA/TIVA DEFINITIONS

- **Intravenous anaesthesia (IVA)** = administration of intravenous anaesthetics with addition of **N_2O** in inhaled mixture

- **Total intravenous anaesthesia (TIVA)** = all anaesthetics are administered only by i.v. route, inspiratory gas contains only **oxygen and air** (nitrogen)

INDICATIONS OF IV ANAESTHESIA

- Support of inhalational anaesthesia
- Sedation during local anaesthesia
- Ambulatory anaesthesia
- Difficult administration of inhal. anaesthetics (military or civil injuries, hyperbaric chamber)
- Impossible administration of N_20 (↑ FiO_2) as bronchoscopy, laryngeal or tracheal surgery
- Where is N_20 relative CI - one lung anaesthesia, vestibule ear surgery, neuroanaesthesia, ileus, air emboli...
- Extracorporeal circuit

DISADVANTAGES OF TIVA

- Difficulties in an. depth assessment
- Postoperative respiratory depression after opioids
- Necessity of several IV accesses
- Drug incompatibilities
- More infusion pumps and deliveries
- Air and oxygen source

INSTRUMENTS FOR TIVA

- Linear pump
- Infusion bottle delivery
- Two IV lines or Y connector
- Oxygen flow-meter

MEDICAMENTS USED FOR TIVA

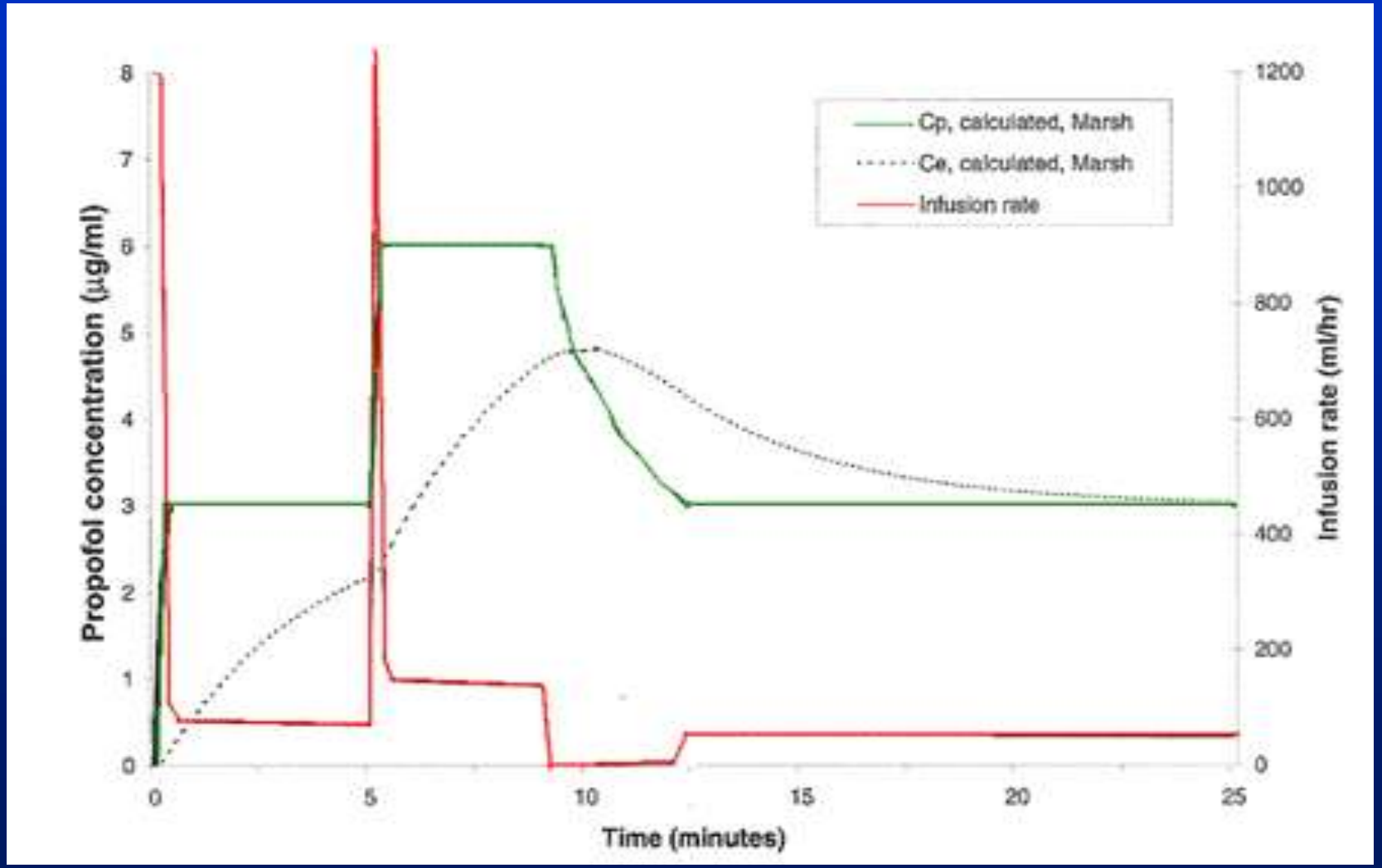
- **Anaesthetics**: propofol, thiopental, metohexital, ketamin, midazolam...
- **Opioids**: alfentanil, fentanyl, sufentanil, remifentanil...
- **Muscle relaxants**: sukcinylcholin, vecuronium, atracurium, pipecuronium...

MUSCLE RELAXATION

- N.-m. junction, mediators
- Depolarising muscle relaxation
- Un-depolarising muscle relaxation

- Curarisation
- Decurarisation
- Recurarisation

Plasma and effect site concentrations during a TCI of propofol (Marsh model)



http://www.frca.co.uk/article.aspx?articleid=101001

Target controlled infusion (TCI)

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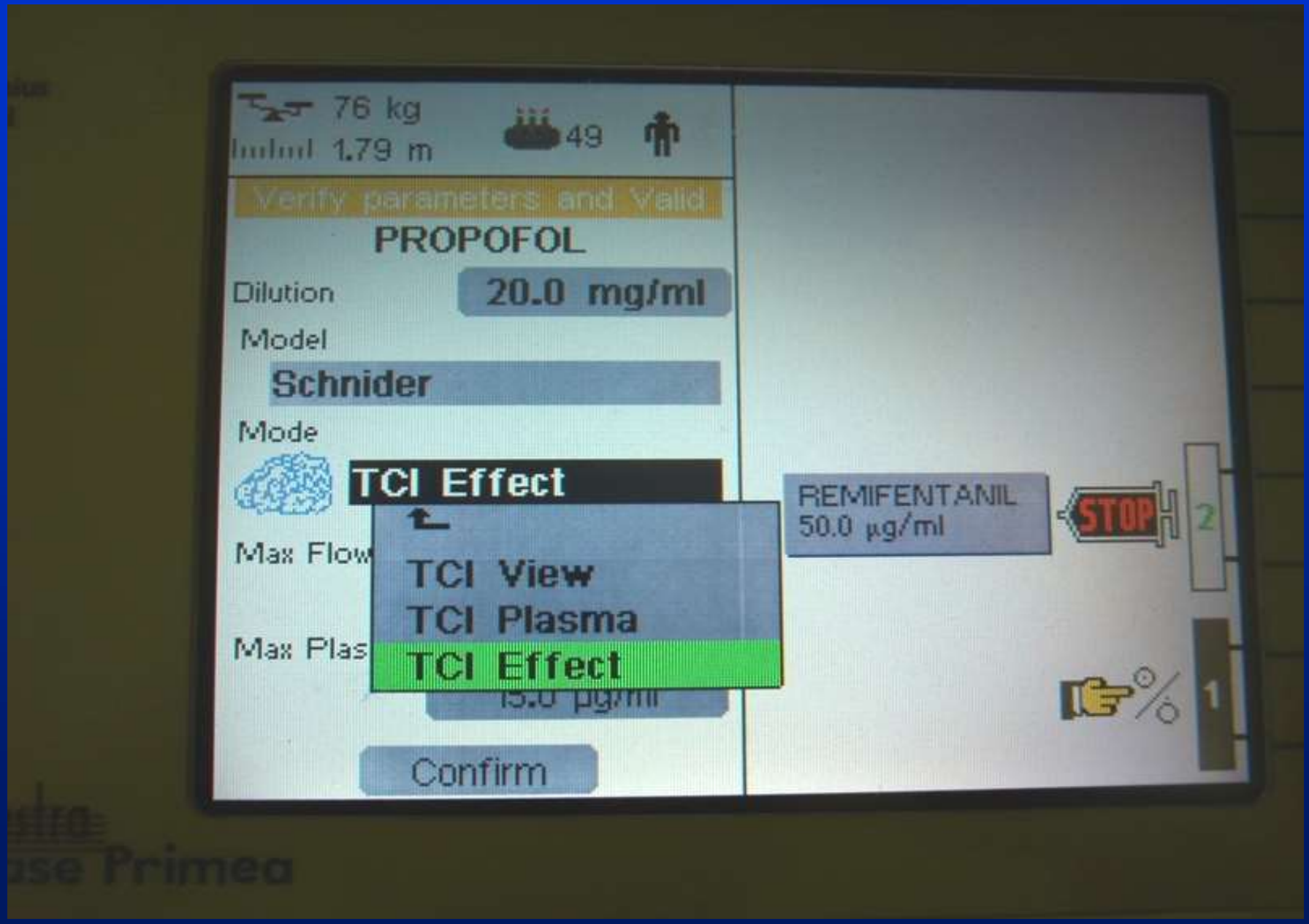
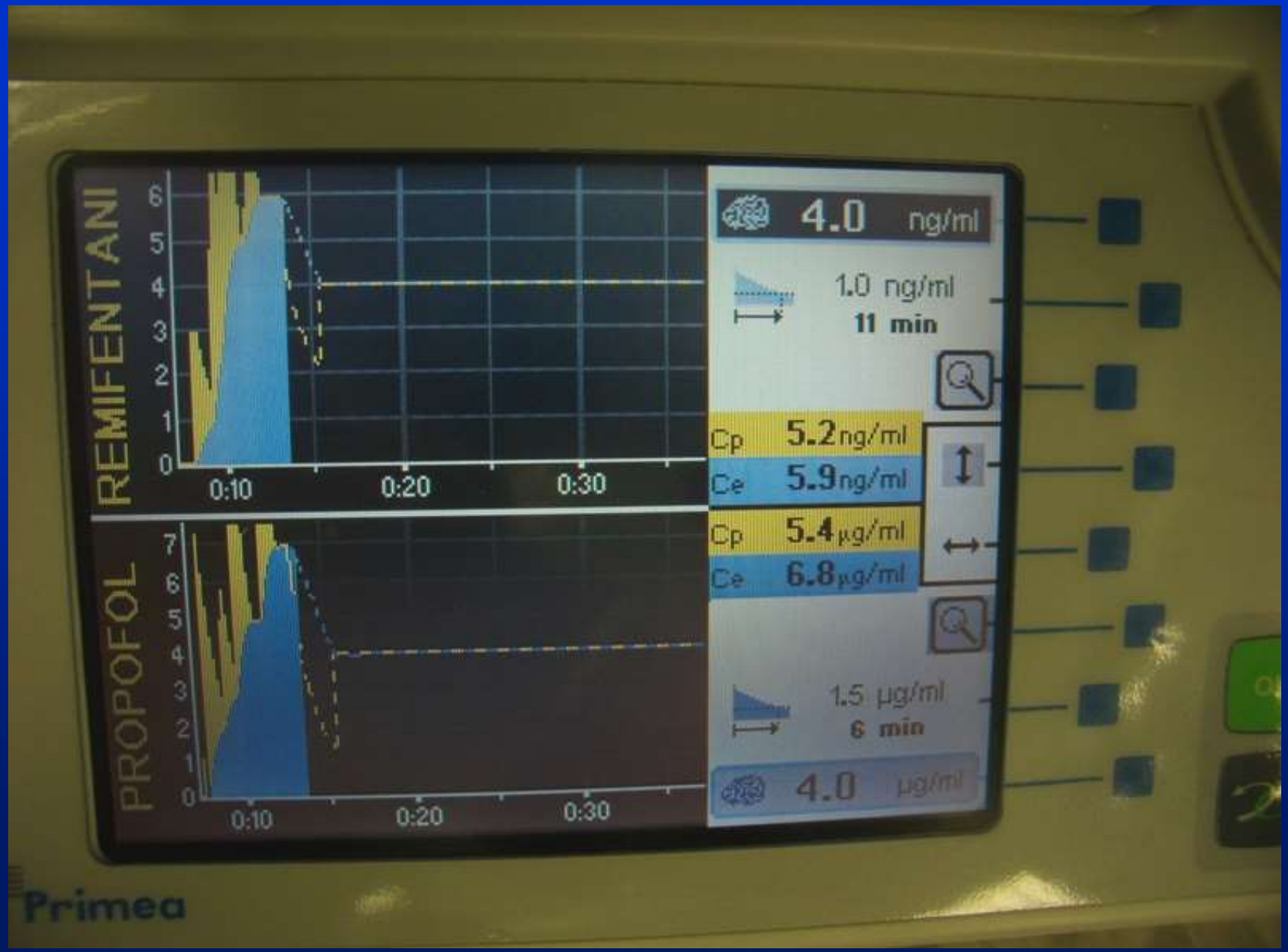


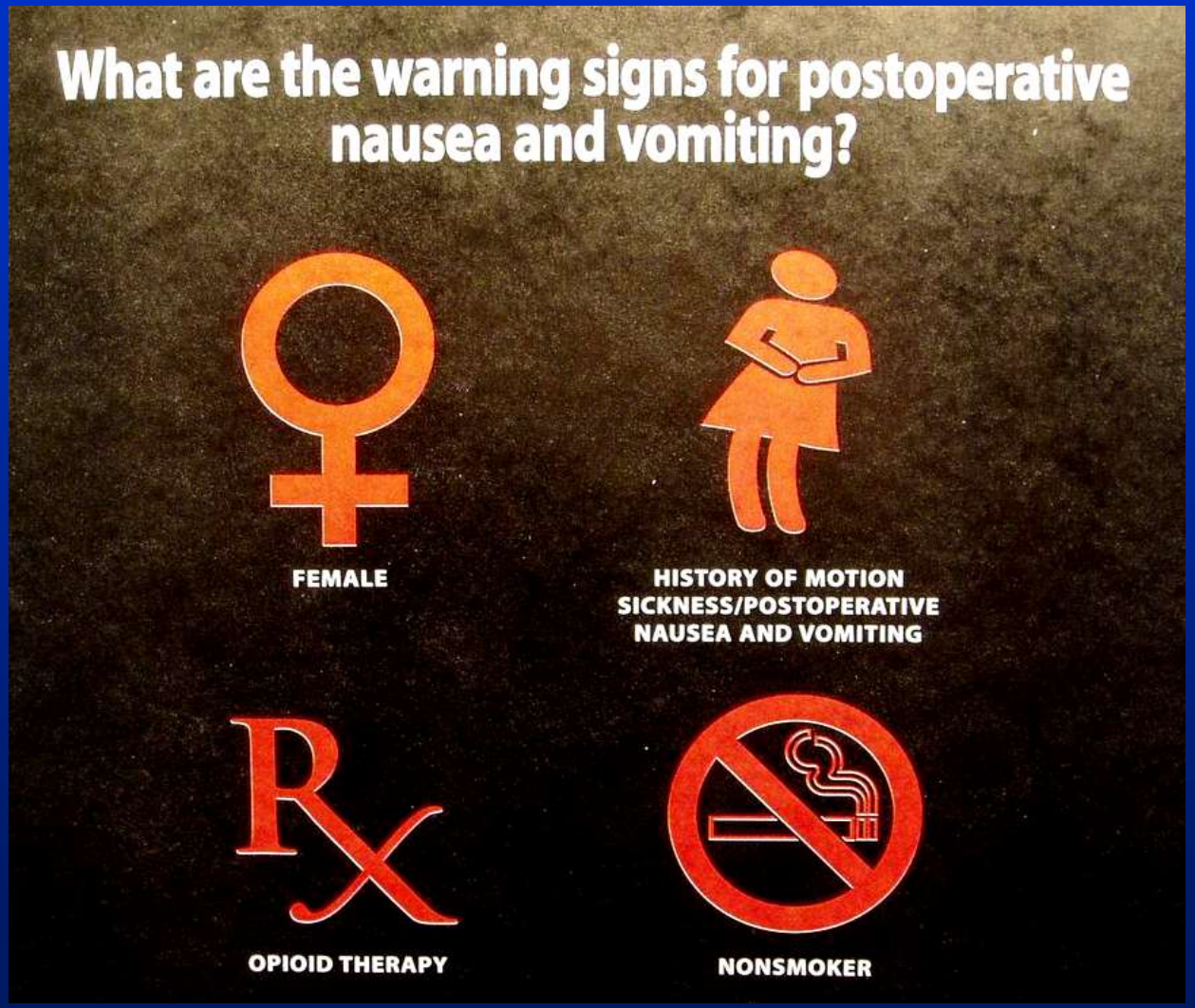
Target controlled infusion (TCI)

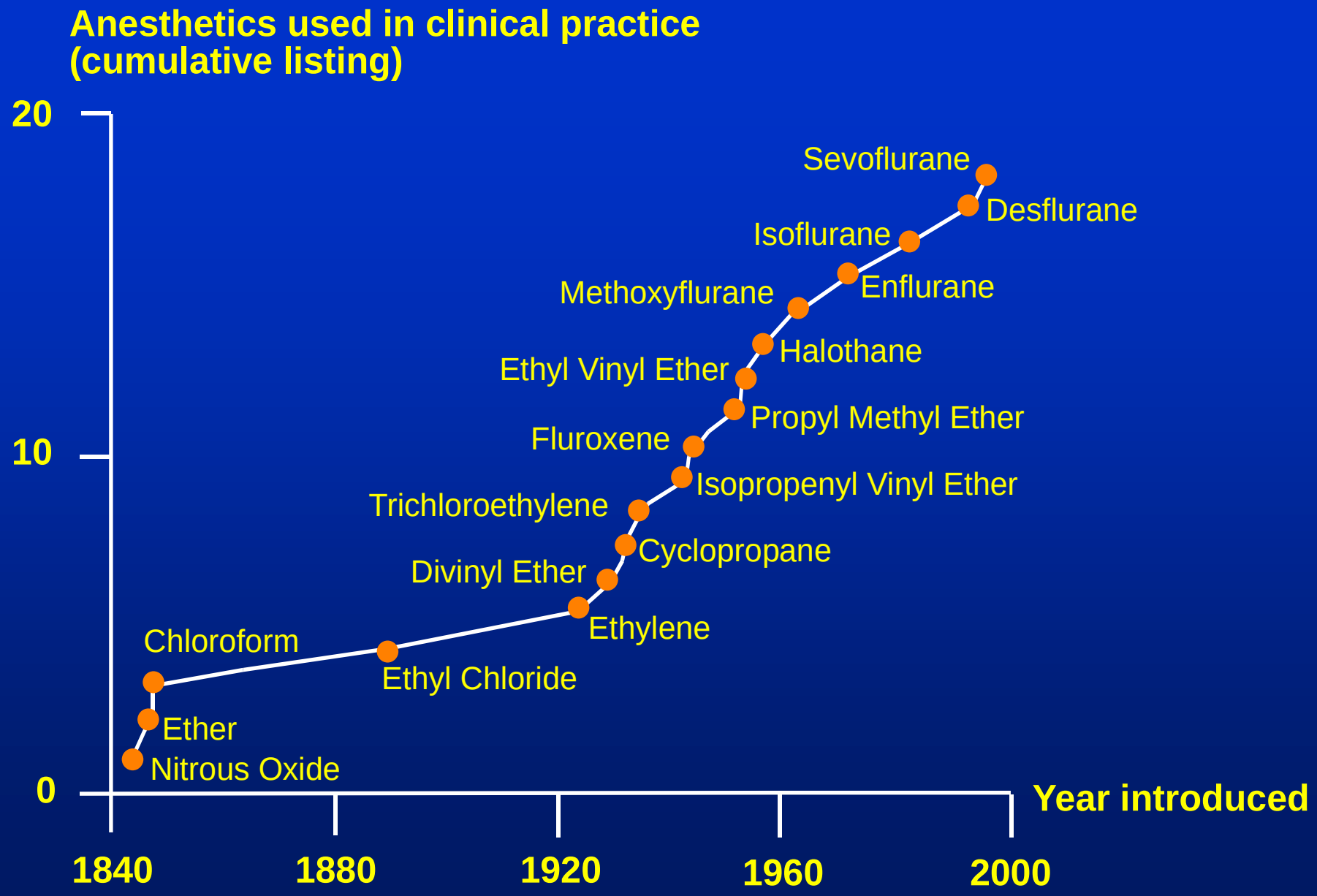


POSTOPERATIVE OBSERVATION

- No diffusion hypoxia (no N_2O)
- Absorption atelectasis (during high FiO_2)
- Early administration analgesics in cases using short-acting opioids
- Possibilities application of antidotes

RISK FACTORS FOR PONV





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RECOVERY ROOM (PACU)

High – Medium – Low dependency PACU

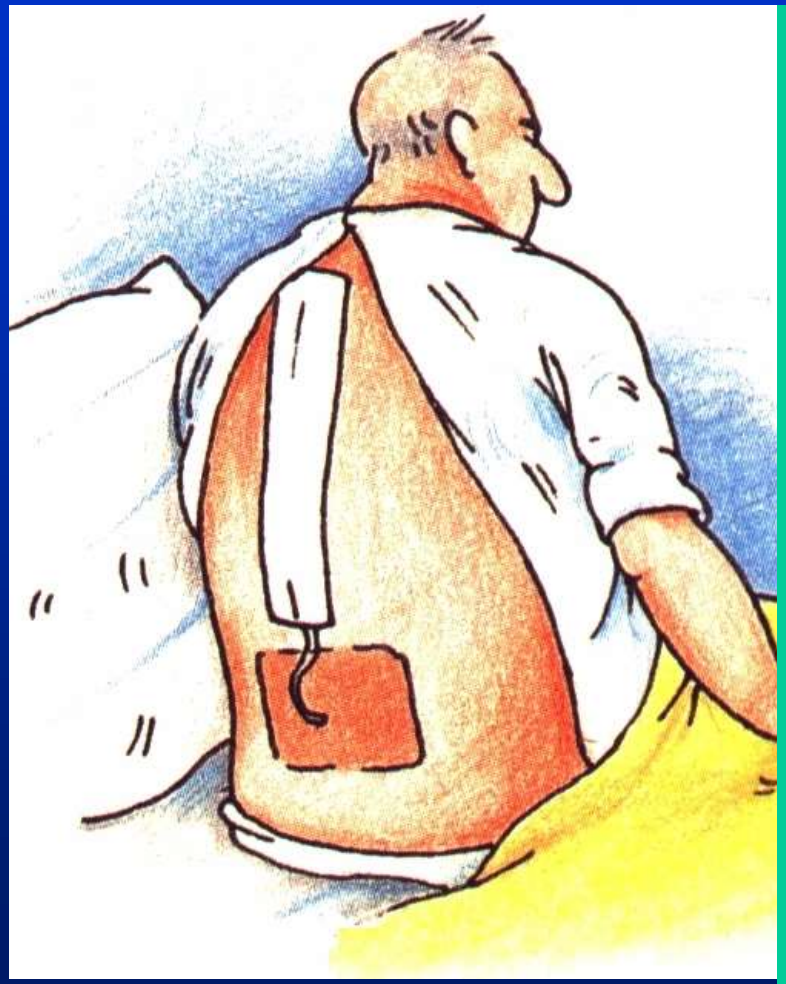
RECOVERY ROOM

- Oxygen th.
- Respiration
- Relaxation
- Circulation
- Diuresis
- Bleeding
- Analgesia
- Transport

POSTOPERATIVE PAIN THERAPY

- IM
- IV (pump)
- Epidural (pump)
- Orally
- Rectally
- Transdermal

POSTOPERATIVE EPIDURAL ANALGESIA



- Continuing
  after epidural anaesthesia or combined anaesthesia (general + ED cath.)
- Catheter closely to segment of max pain
- Level of puncture
  lower abdomen - T_9, upper abdomen - T_6
  - 7x less Mo consumption,
  - risk of respiratory depression
- Undesirable motor block lower extremities above L_2 1%, below L_2 33%