

PERIOPERATIV SMÄRTLINDRING

Preventiv / Protektiv Analgesi

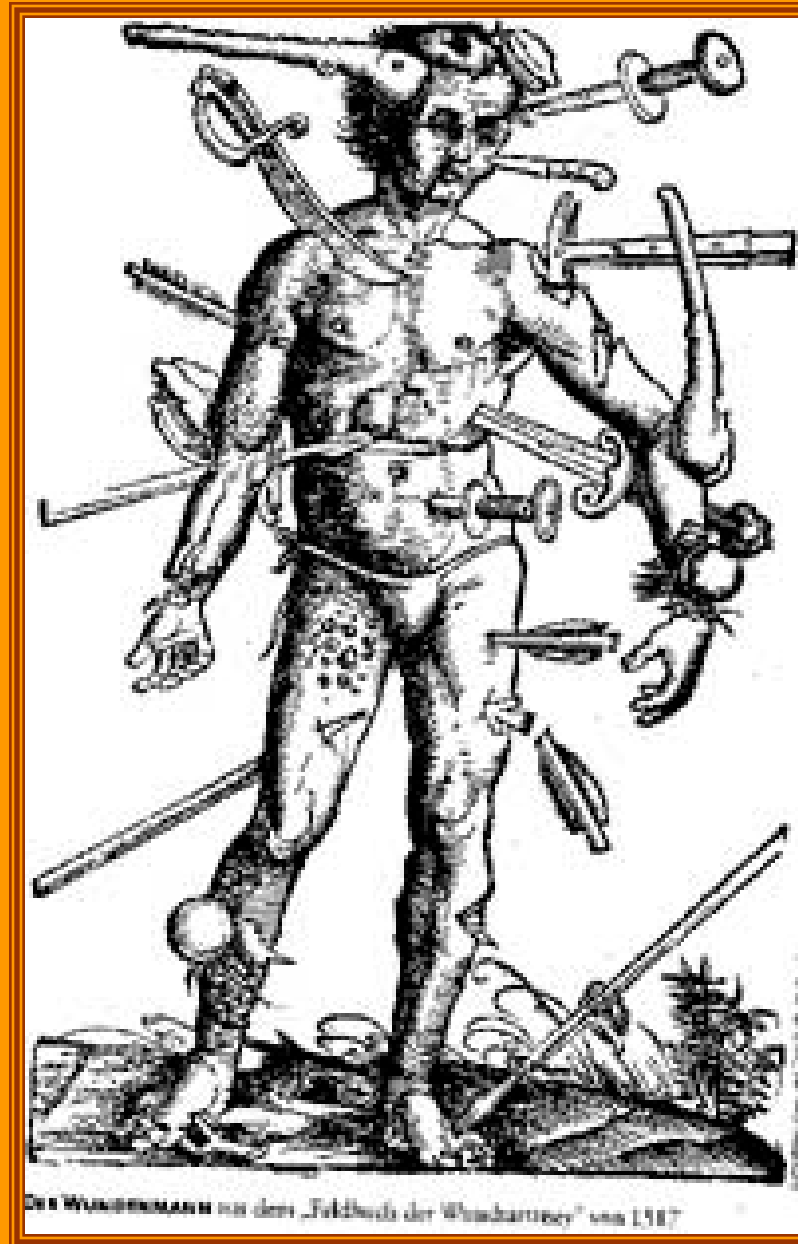
eller

”Premedicinering”

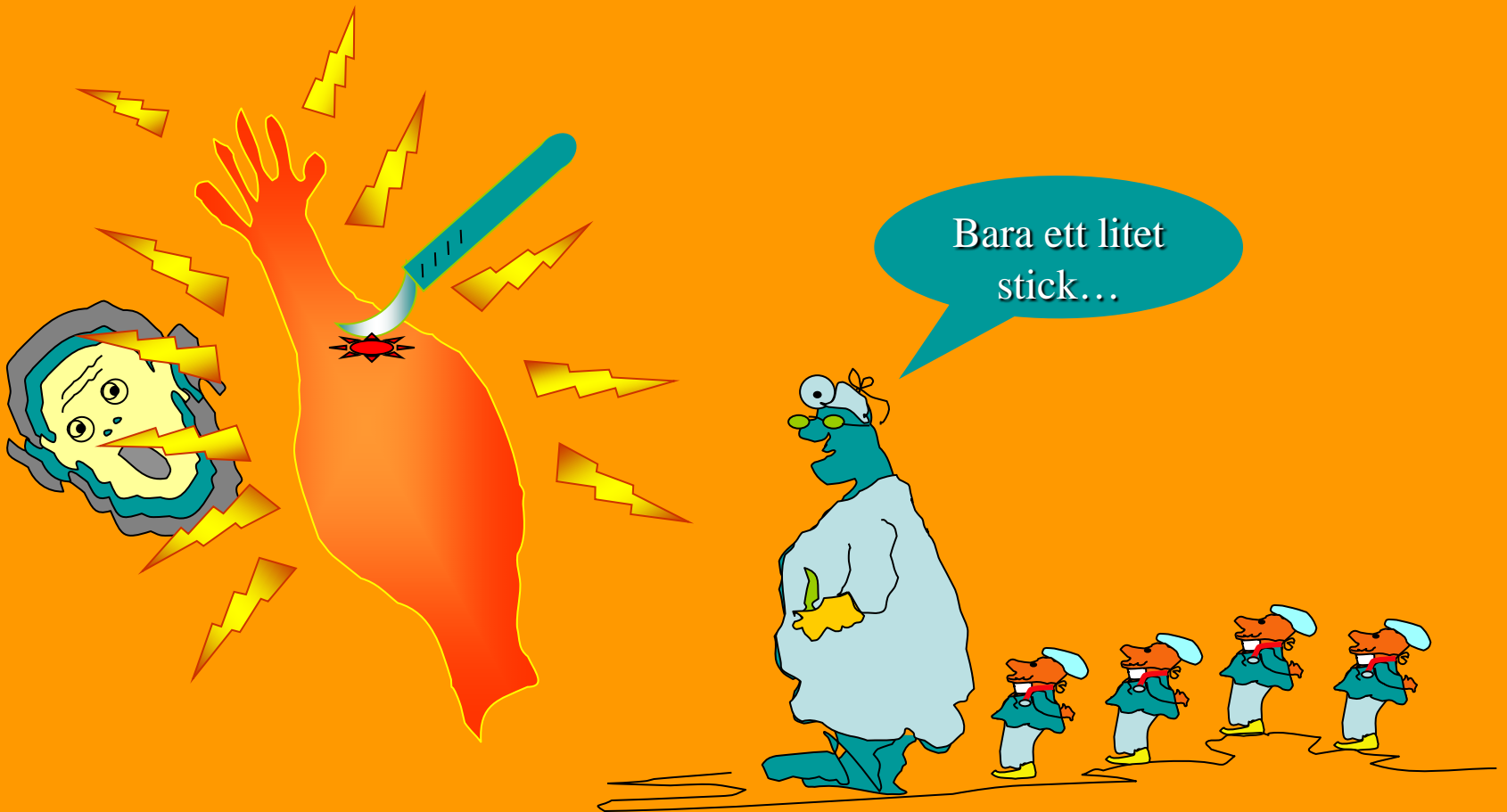
O.Naesh, docent

Anestesienheten i Helsingborg

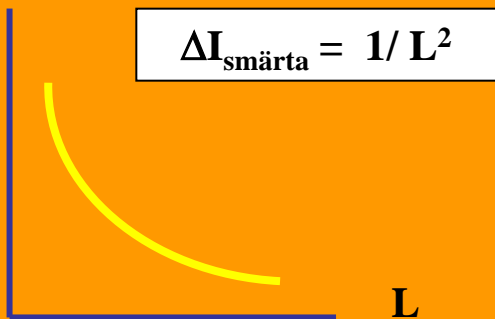
*"Der Wundenmann"
Johan Wächtlin*



Feldbuch der Wundartzney. Straßburg 1517

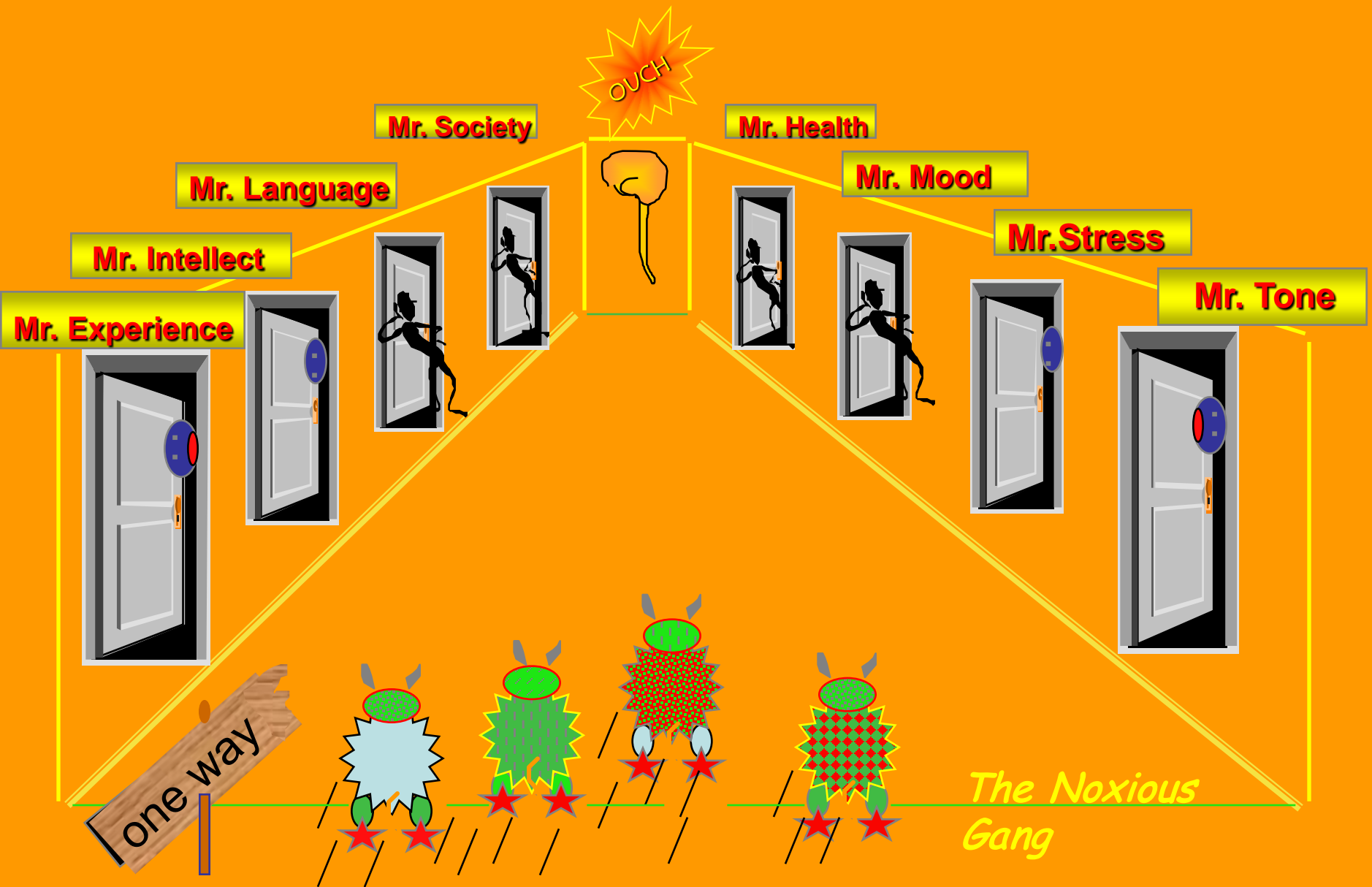


I



...andras smärta gör ofta mindre ont...

"PAINGATE"



Smärt Typer

Nociceptiv: vävnads skada (*inflammation, ischemi*)

Neurogen: nervläsion (*periferal / central*)

Psykogen: inget somatisk substrat ("*somatoform*")

Okänt orsak: inte mätbar än ...

AKUT eller Långvarig (> 6 månader)

CANCER RELATERAD eller ICKE CANCER RELATERAD

POSTOPERATIV SMÄRTA
alltid blandsmärta (nociceptiv / neurogen)

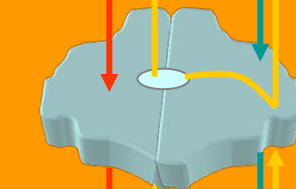
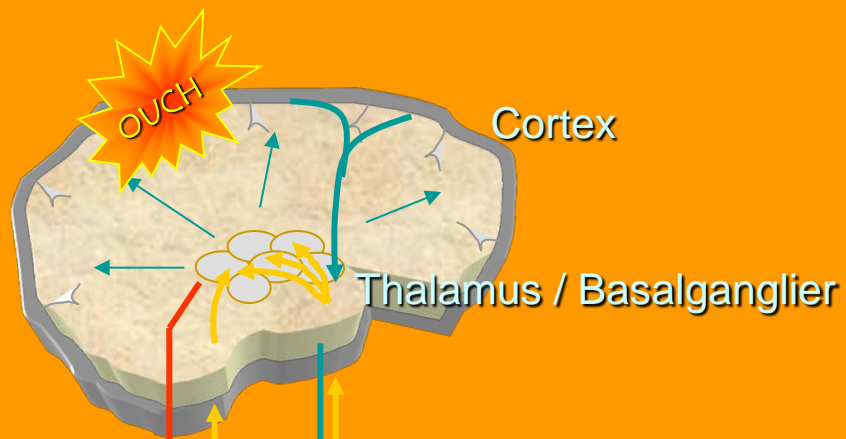


R.Descartes 1665

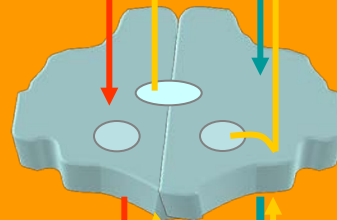
Perifert Trauma
Nociceptor signal



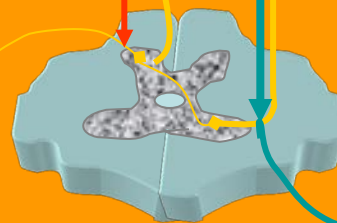
5-HT / NA



hjärnstam



ryggmärg



Motoriskt svar



Central smärtrtransmission



C - afferent:

långsamare, diffus
viscero-emotionell

A δ - afferent:

snabb, lokaliserad,
distinkt

Somato-sensorisk

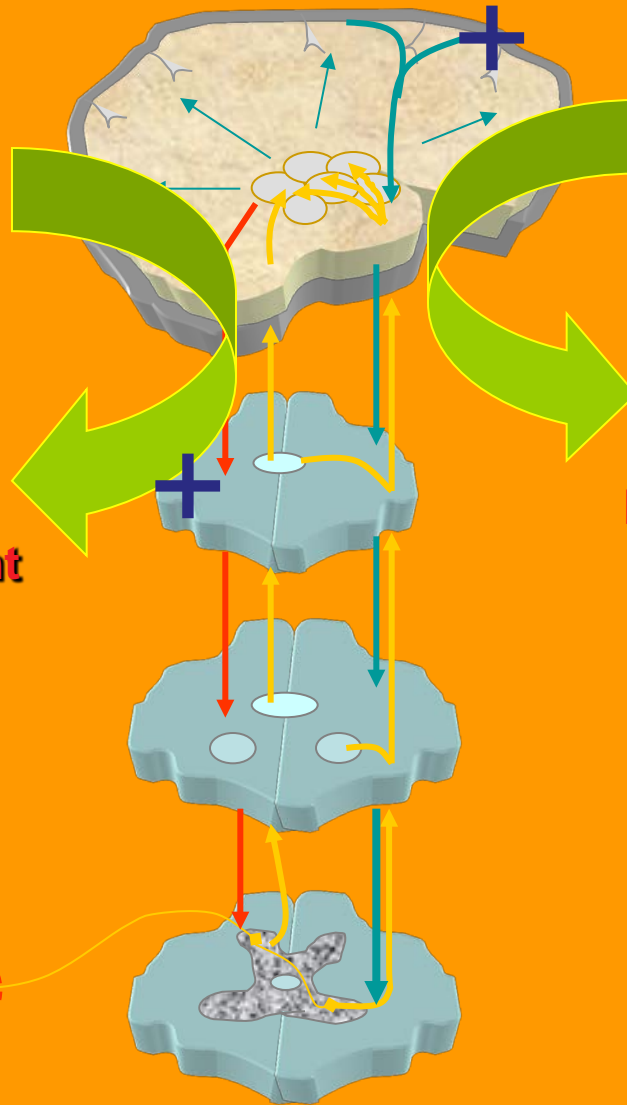
Emotionellt

Neuroendokrint

Humoralt

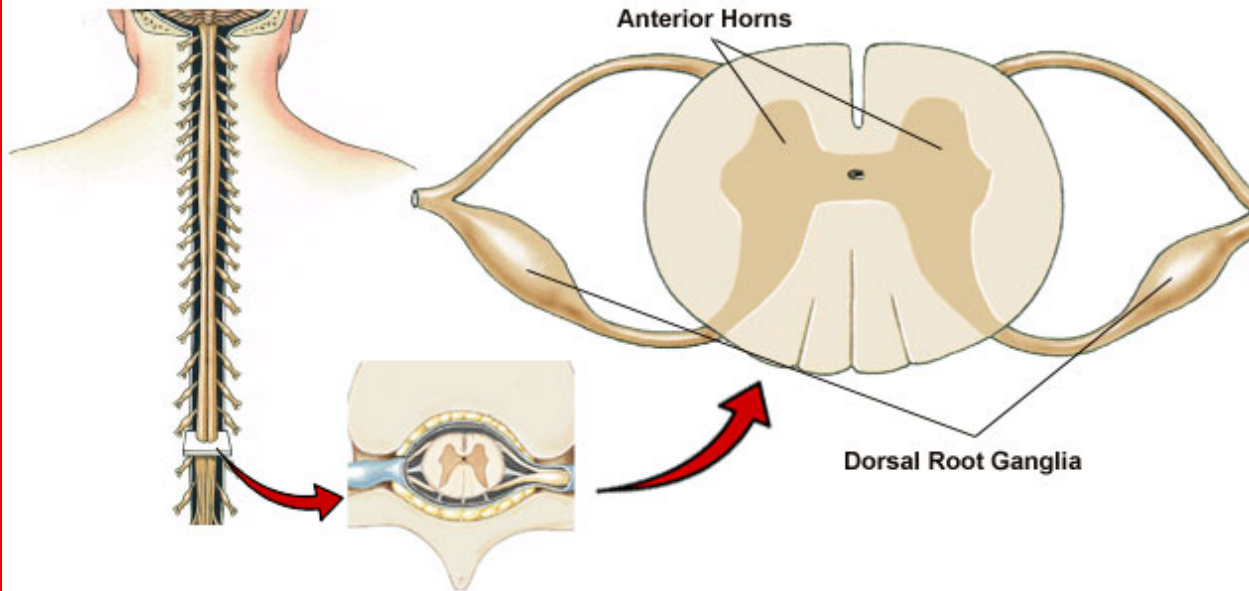
- respons

Motorisk respons

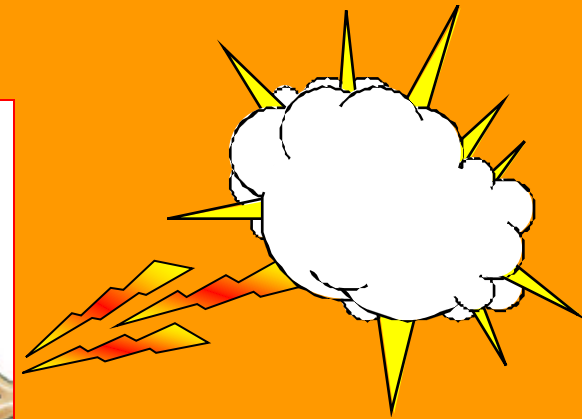


Sensitisering och neuromodulation...

Figure F-6: Dorsal Root Ganglion & Anterior Horn



The dorsal root ganglion transmits *sensory* information while the anterior horn directs *motor* neurons.



Mediatorer :

Subst. P

Glutamate

Enkephalin

Endorphin

Cholecystokinin

Norepinephrine

PGE2

CGRP

5-HT

NPY

NGF

Receptorer :

Opioid ($\mu/\delta/\kappa$ - rec.)

NMDA

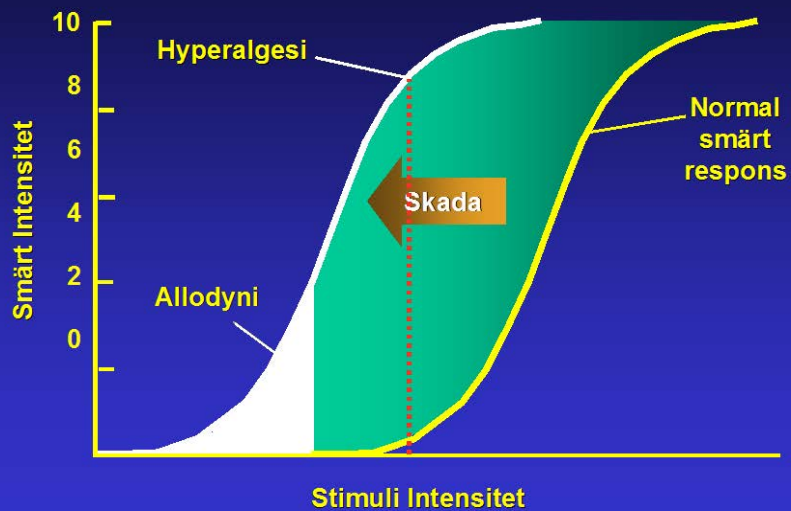
GABA

Adrenoceptors

5-HT

Vanilloid / Cannabinoid....

Smärt Sensitisering

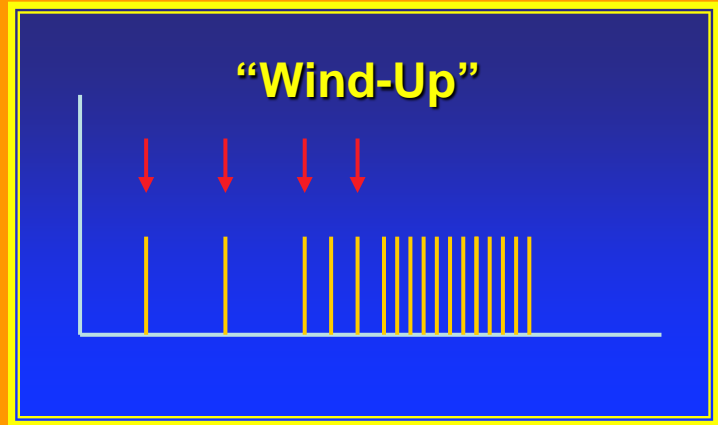
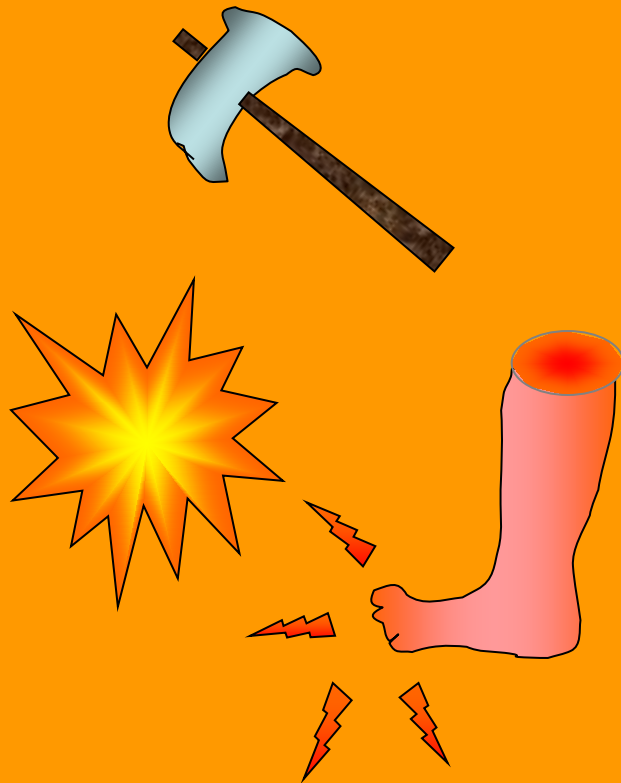


Gottschalk and Smith, Am Fam Physician 2001

Repetitivt stimulus

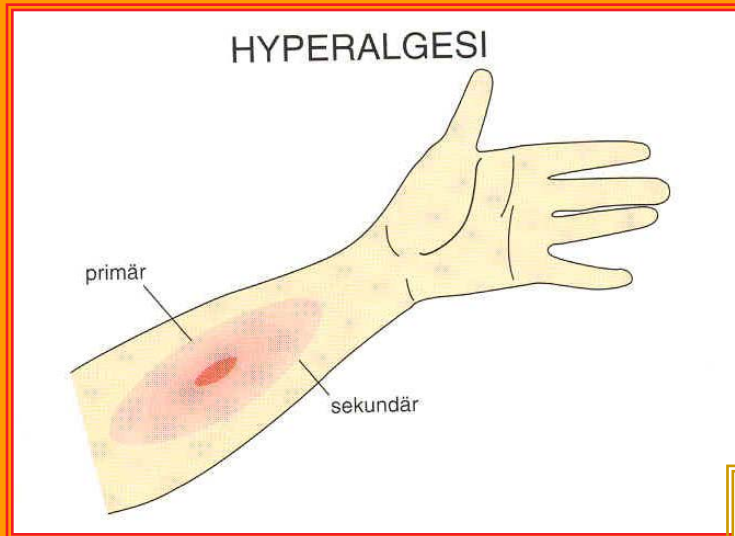


Sensitization

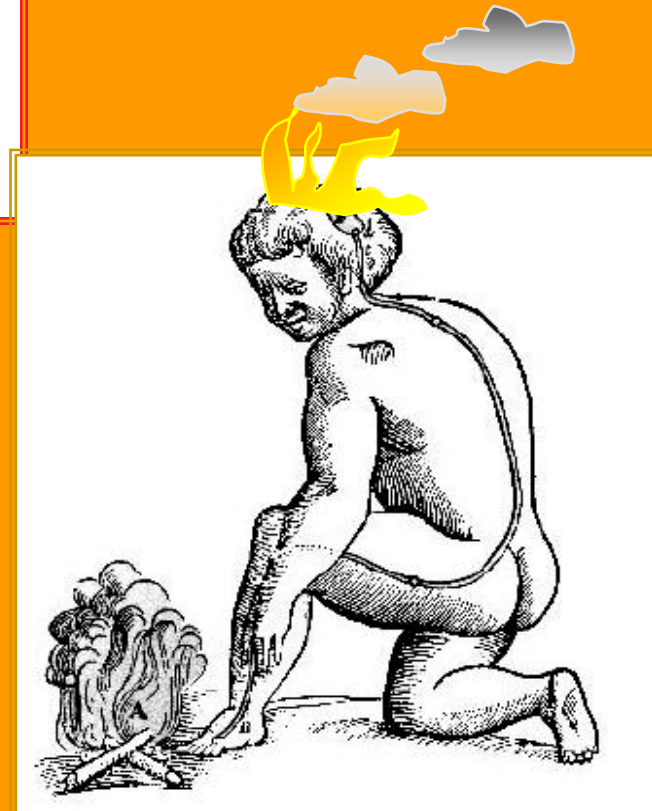


NMDA aktivering

PERIFER SENSITISERING



CENTRAL SENSITISERING

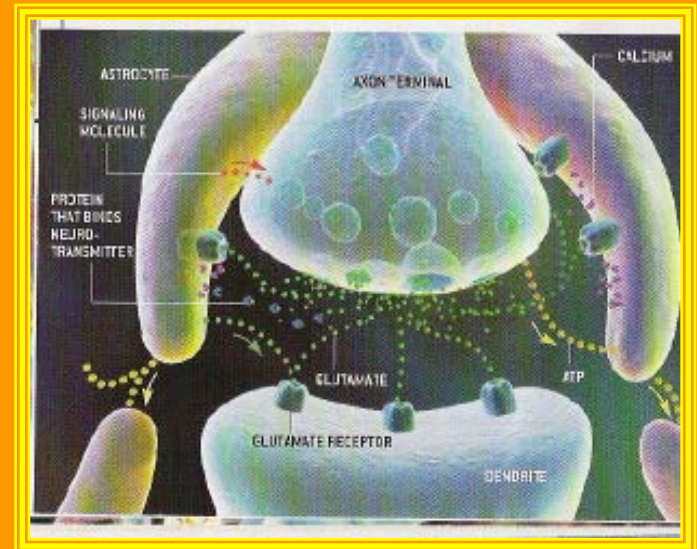


SMÄRTMINNE / "INLÄRNING"

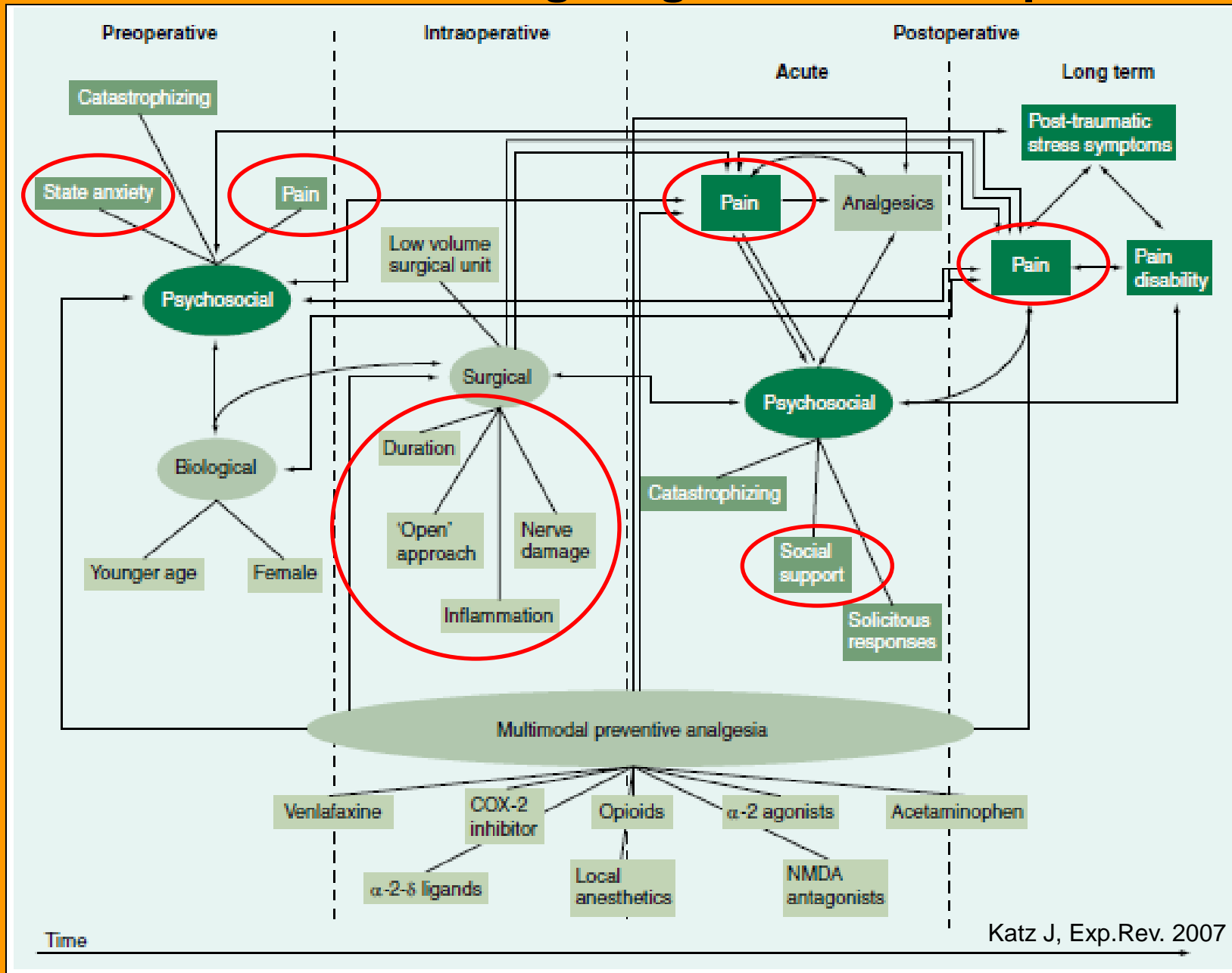


Glia

Upprepad stimulus



Från akut till långvarig smärta efter operation





Beteende ändringar

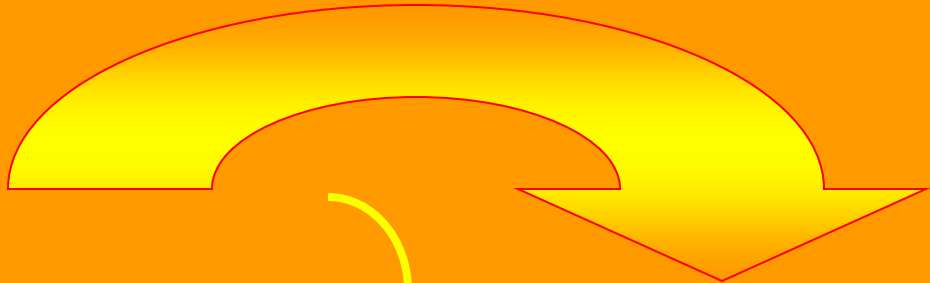
Smärtminne induktion

Cerebral sensitisering

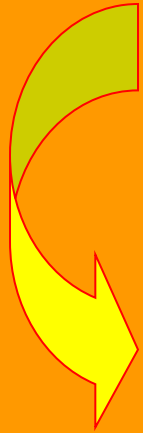
DRG plasticitets ändring/sensitisering

Ändrad smärtinhibition

Perifer sensitisering

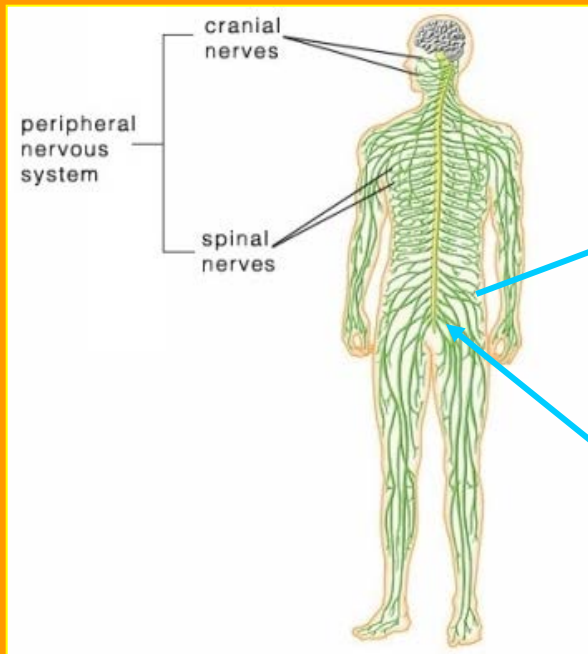


**Kronisering
av
smärtan**

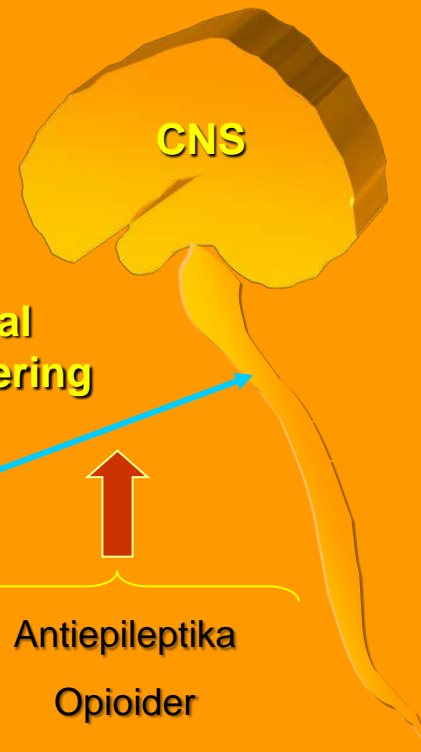


Farmakologiska Princip vid Kronisk Smärta

Perifera nervsystemet



Central Sensitisering



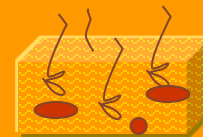
Decenderande Modulation

- Antiepileptika
- Opioider
- TCA / SNRI's

- Antiepileptika
- Opioider
- TCA / SNRI's
- NMDA antagon.

Perifer Sensitisering

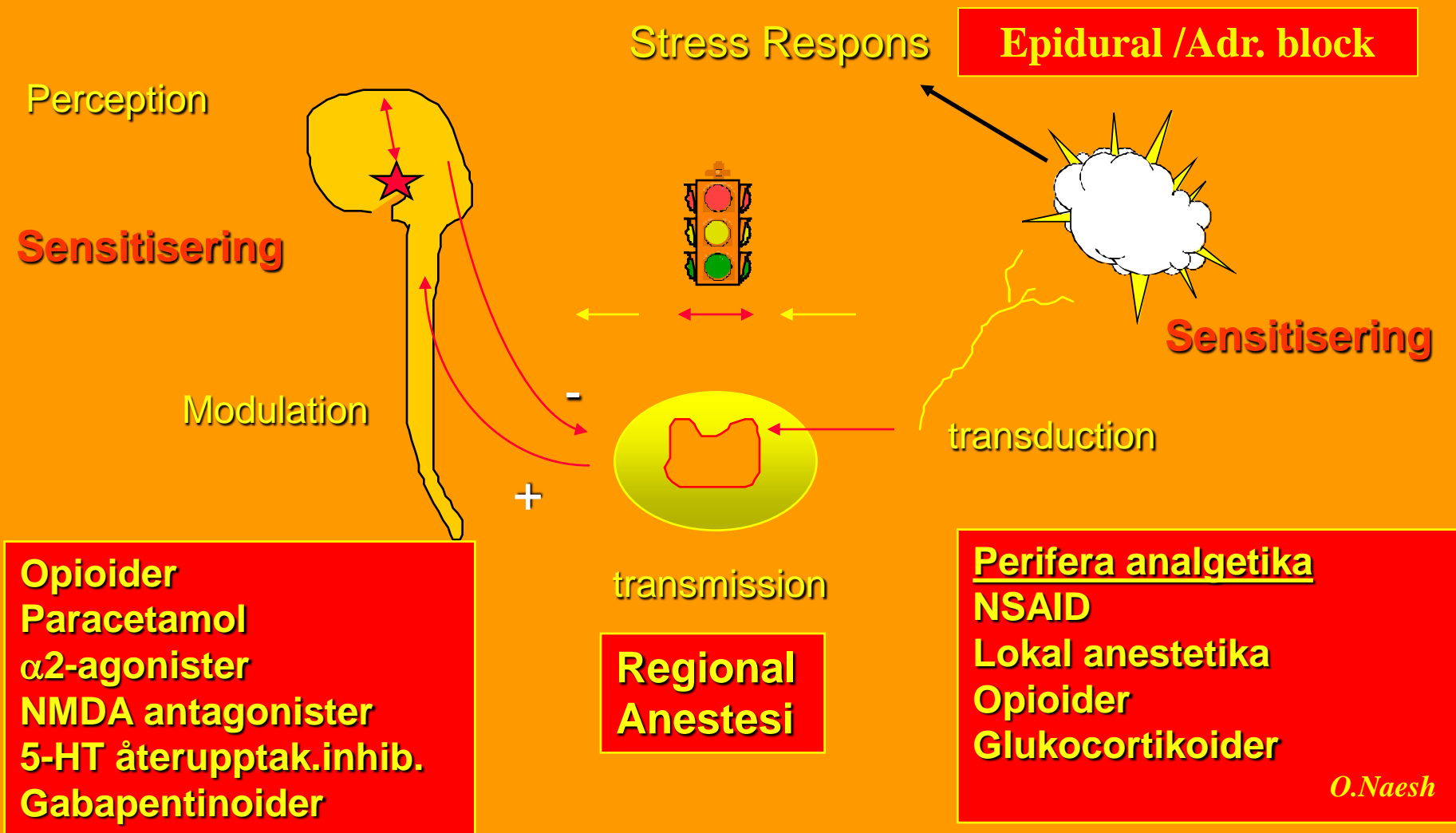
- Lokal Anestetika
- Antiepileptika
- Opioider
- TCA



?

- Glutamat.
- Cannabinoider
- NGF
- NK1
- Subst P
- CGRP

Terapeutiska Princip

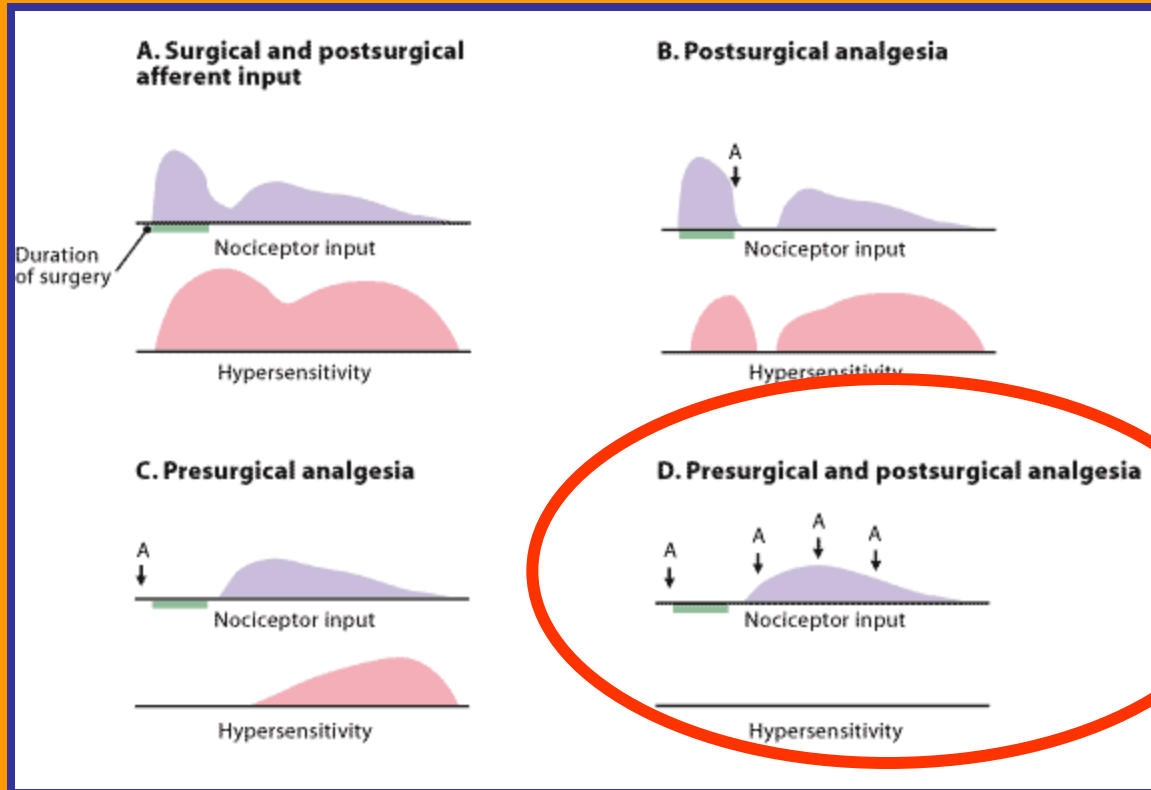


Opioider
Paracetamol
 α 2-agonister
NMDA antagonister
5-HT återupptak.inhib.
Gabapentinoider

Regional
Anestesi

Perifera analgetika
NSAID
Lokal anestetika
Opioider
Glukocortikoider

Preventiv Analgesi



...”an ounce of prevention is better than a pound of cure”



Titrera till effekt !



VAS

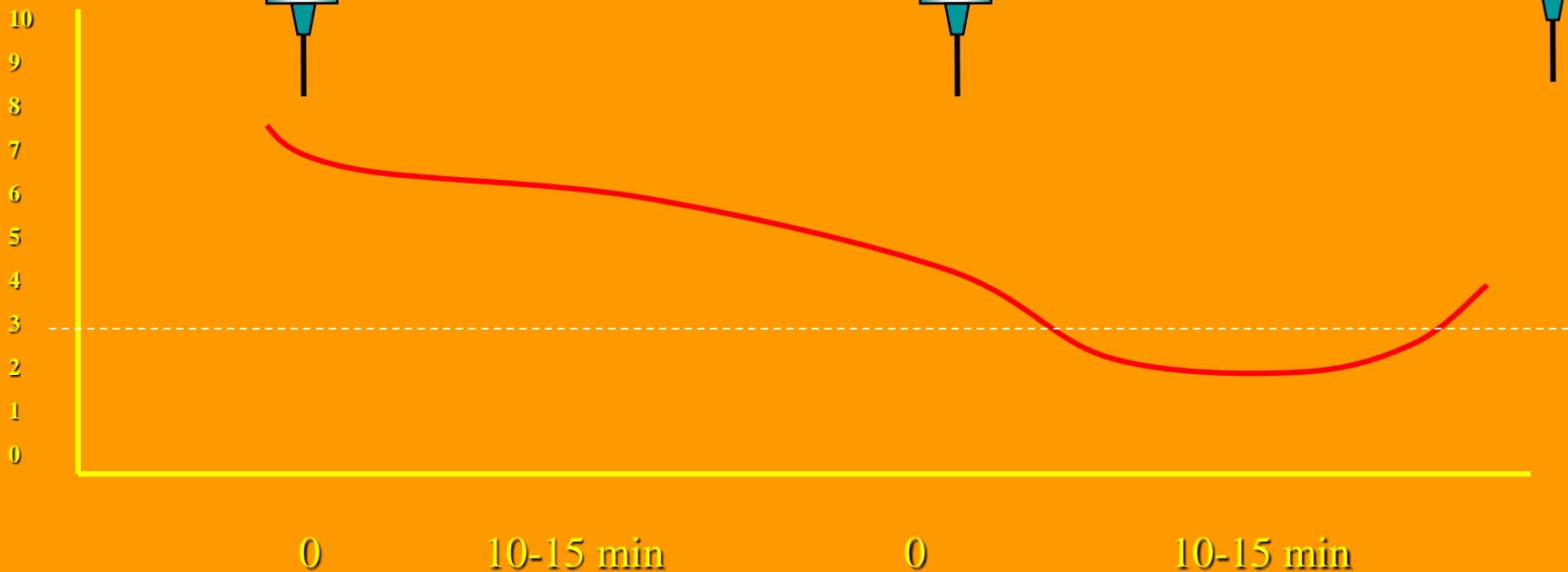
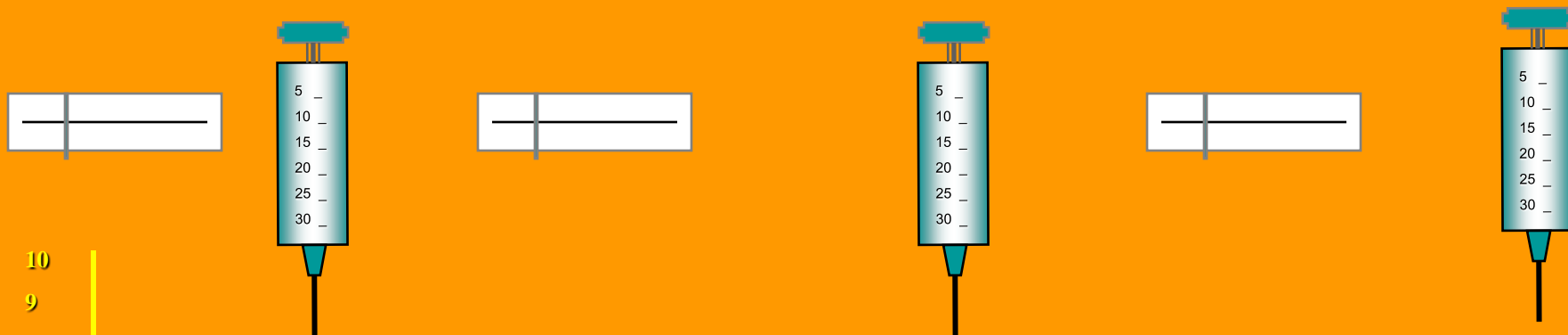
Dosera

Effekt VAS

Dosera

Effekt VAS

?



ANALGETIKA

STARKA:

Ketobemidon

Morphine

Fentanyl

Oxycodon

OPIOIDER

SVAGA:

Tramadol

Tapentadol

~~Kodein~~

OPIOIDER

NON-OPIOID:

Paracetamol

NSAID's

Ketamine

**Lokal
Anestetika**

Sedativa:

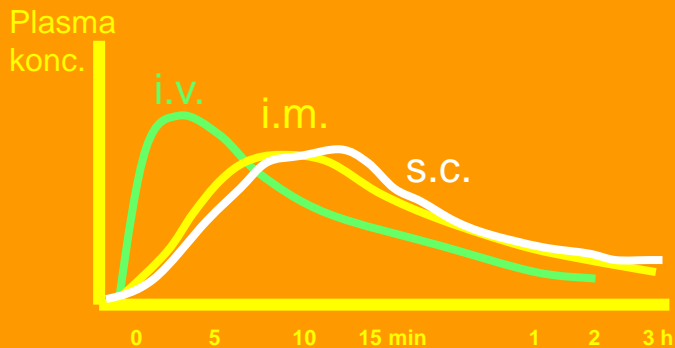
Benzodiazepiner

Gabapentinoider

α_2 agonister

Antidepressiva (TCA/ SSRI/ SRNI)

Starka Opioider



Ketobemidon

Morphine

Fentanyl

Alfentanil

Remifentanil

Oxykodon (p.o.)

Oxykontin (p.o.)

Buprenorfin (p.o.)

Effektduration

2,5 h

2,5 h

1,5 h (6h)

~1 h (2h)

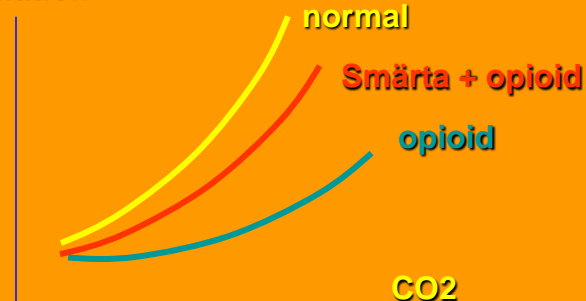
6 min

2-5 h

8-15 h

6-8 h

ventilation



Equipotens p.o :

Morfin/Ketogan p.o. = 1 ; Oxykodon p.o. = 1/2 ; Metadon = 1; Heroin = 1/2-1/10

Morfin/Ketogan i.v. = 1/2 ; Buprenorfin = 0,04; Fentanyl plåster / dygn = 1/3-1/2 µg/t

Perifert verkande analgetika

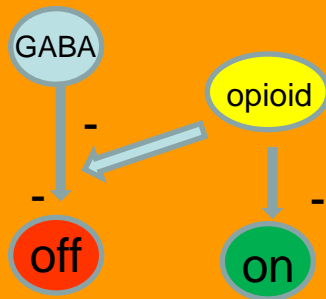
- NSAID
- Opioider
- Lokal anestetika
- Capsaicin

Centralt verkande analgetika

- Opioider
morfin, ketobemidon, oxykodon,
hydromorfon, buprenorfin,
fentanyl
- Paracetamol
- Tramadol
- Tapentadol
- Klonidin
- Gabapentin



Inhibition of excitation
Enhancement of inhibition



Myter & Rön:

Myths, Fables and Fairy Tales



Opioider: skapar alltid avhängighet

maskerar väsentliga symptom

farligt hos äldre och barn

små doser är bättre

skal inte ges till narkomaner

bör inte ges i.v. på akutmott.

risk för okontrollabelt BT fall

förorsakar sedation och resp.depression

svaga opioider bättre / säkrare

Icke opioider:

NSAID är farliga och pat. blöder

Paracetamol kan ges p.r.

Tramadol är "rävgift"

p.o. administration säkrare än i.v.

RISKER - akuta Opioider

- **ANDNINGS DEPRESSION (RF < 8)**
- **SEDERING**
- **ILLAMÅENDE**
- **KLÅDA**
- **GI PARALYS**
- **BLÅS HYPOTONI**

OBSERVERA:

RF

Sedering

SaO₂



Risk patienter: Andningsinsufficiens

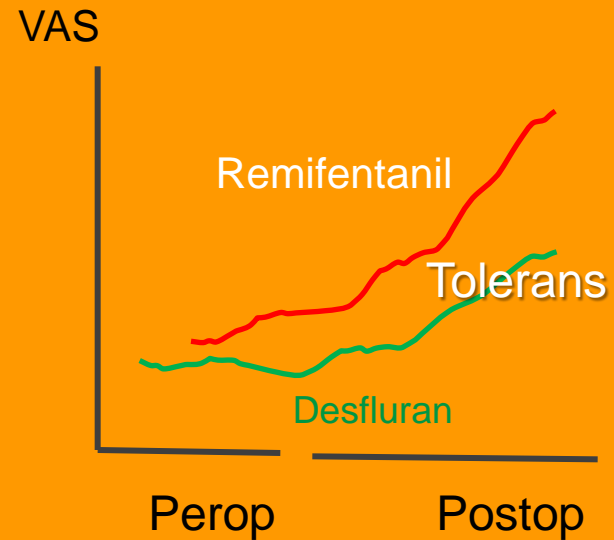
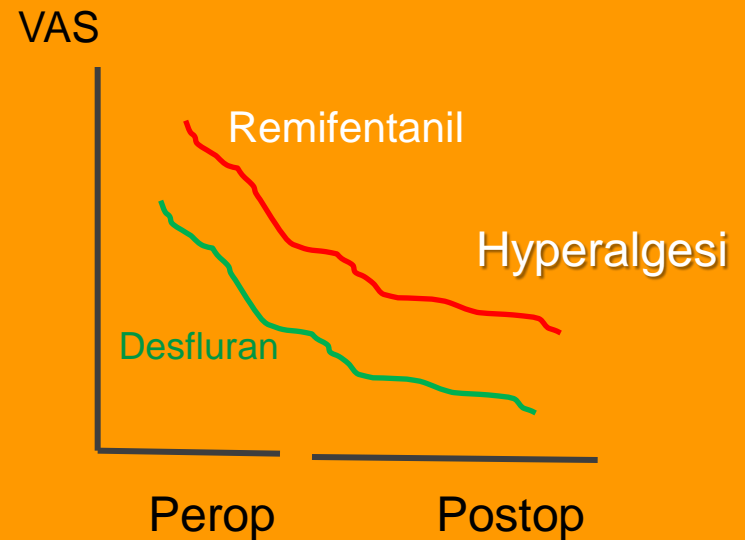
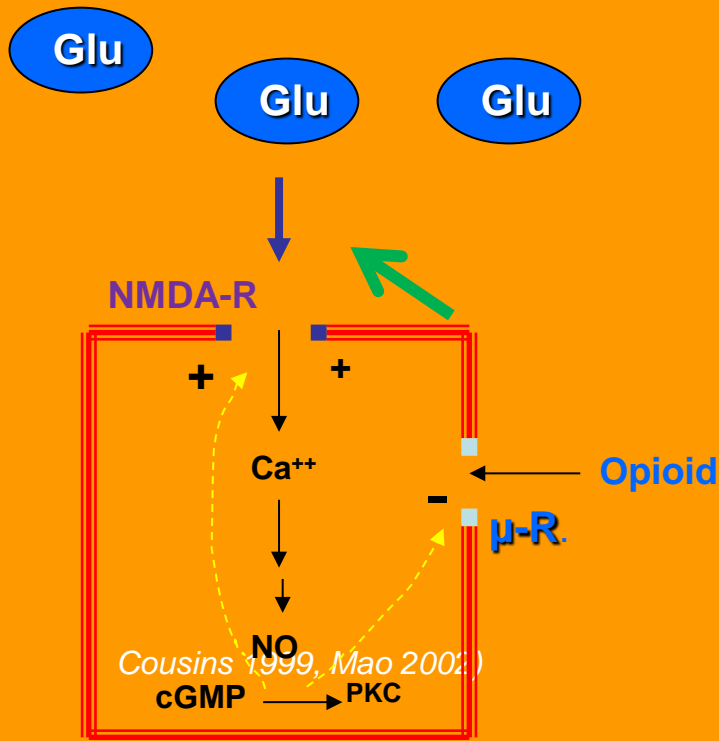
Hög ålder

Neuroskador (CO₂ !)

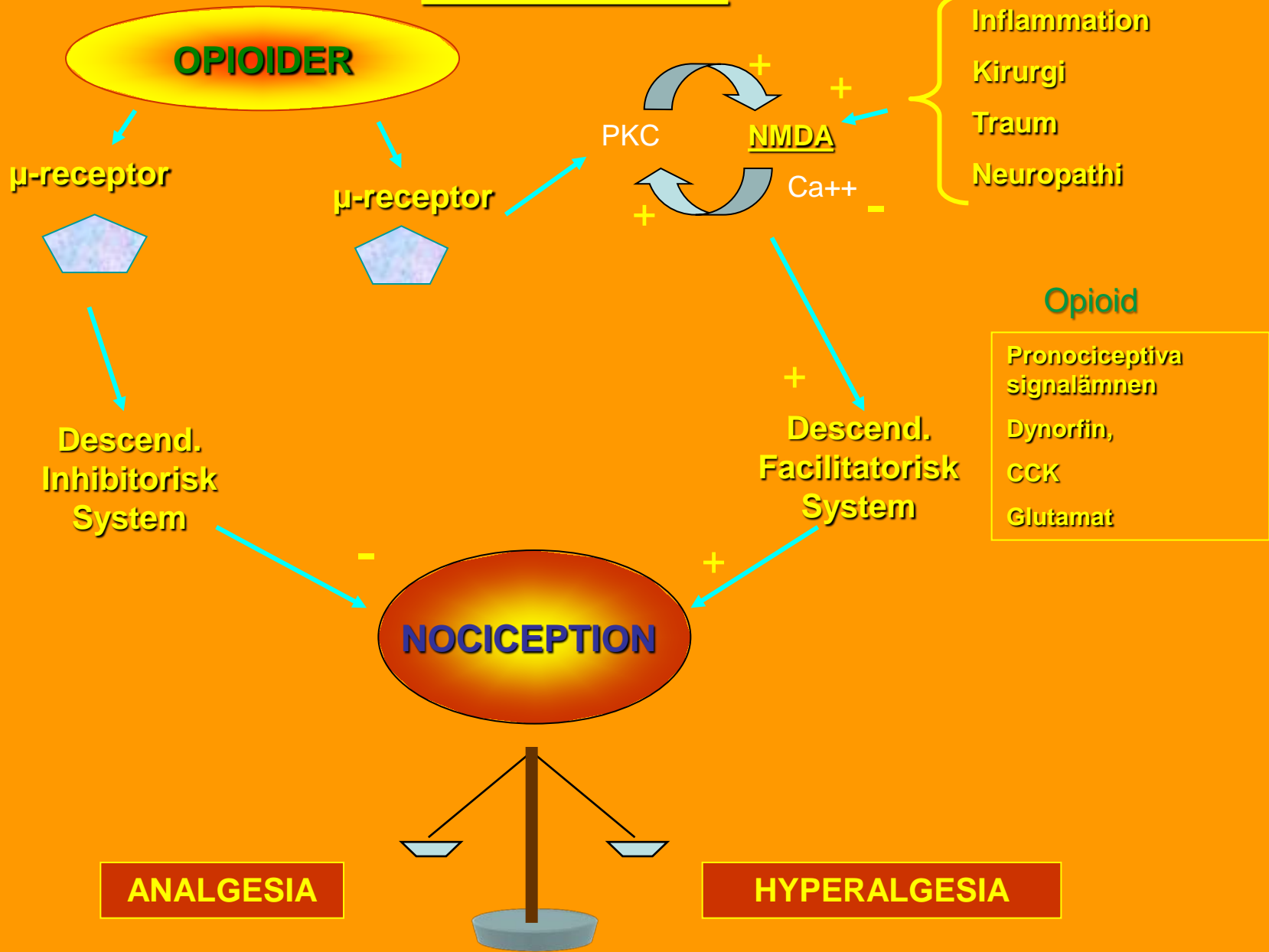
Sederade

Lever- / Njur insuff.

Opioid Induced Hyperalgesia (OIH)



AD UTRUMQUE



ANALGESIA

Kortvarig effekt

HYPERALGESIA

Långvarig effekt

Svaga Opioider

TAPENTADOL:

låg μ -rec. affinitet (NA > 5-HT re-uptake inhib.)

Ingen andningsdepression

GI biverkningar < oxycodon och < tramadol

p.o. 50-100 mg /6 tim

TRAMADOL:

låg μ -rec. affinitet (5-HT > NA re-uptake inhib.)

Ingen andningsdepression

Ger ofta illamående om p.o./i.v. bolus adm.

Kan ev. adm. som långsam infusion (100 mg i 100 ml NaCl 0.9 % över 30 min (- bättre tolerans))

CAVE: antidepressiva



Cyclooxygenase (COX)

Fysiologisk stimulus

**Inflammatorisk
Stimulus**

COX 1

COX 2

NSAID

NSAID

Arachidonsyra

COX 3 (?)

TXA₂ (thr. aggreg., vasokonstriktion)

PGI₂ (vasodilation, GI-mucosak protektion)

PGE₁ / PGE₂ (njura, GI-kanal, CNS)

Inflammatorisk proces

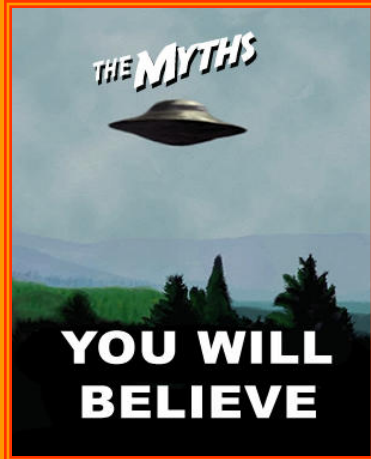
(PGE₂)

(smärt sensitisering, vasodilation)

NSAID

MYTER

*Myths, Fables and
Fairy Tales*



Tell a friend
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NSAID är farligt !

NSAID är kontraindicerad vid frakturer

NSAID får aldrig ges till astmatikere

NSAID ger alltid njursvikt

NSAID hindrar diagnostik (abdom.)

NSAID bör inte ges till barn

NSAID är inte opioid besparande

Alla NSAID är lika

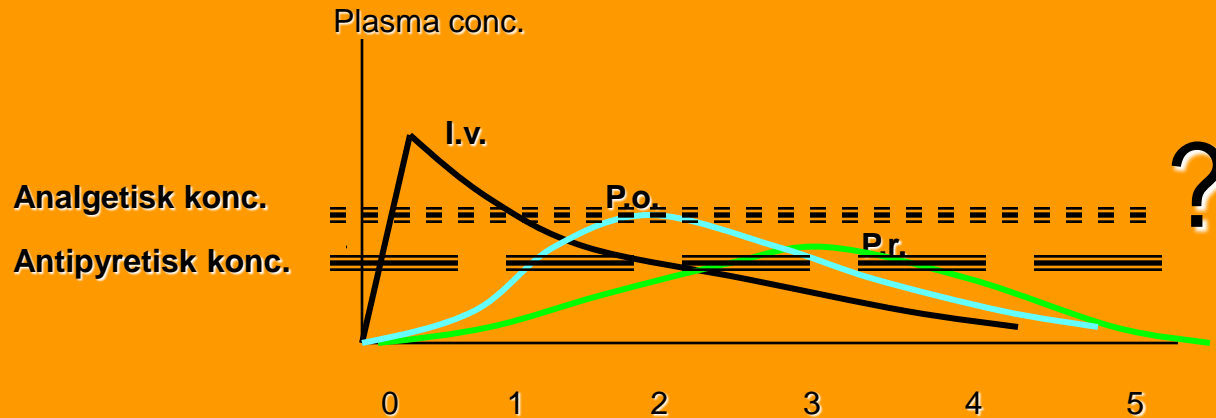
NSAID

KONTRAINDIKATIONER

- **Hög ålder**
- **ASA / NSAID sensitiv astma (atopi) (≈ 5 -10 %)**
- **Alvarligt hjärtsvikt**
- **Alvarligt leversvikt**
- **Njursvikt (inkl. prerenalt svikt ~ dehydrering)**
- **Svår diabetes**
- **Tredje trimester**
- **Sulfonamid allergi (celecoxib, parecoxib, etoricoxib)**

PARACETAMOL

Effektivt non-opioid "bas-analgetikum" (regelb.dosering) som del av multimodalt analgetika regim..



Rektal administration ej relevant till vuxna..

Oral administration (20 – 30 mg / kg)

Tas upp i duodenum (alkalisk pH)

Löslig / brus formulering i duodenum ~ 30 min

Max. konc. viktig

Intravenös administration optimal

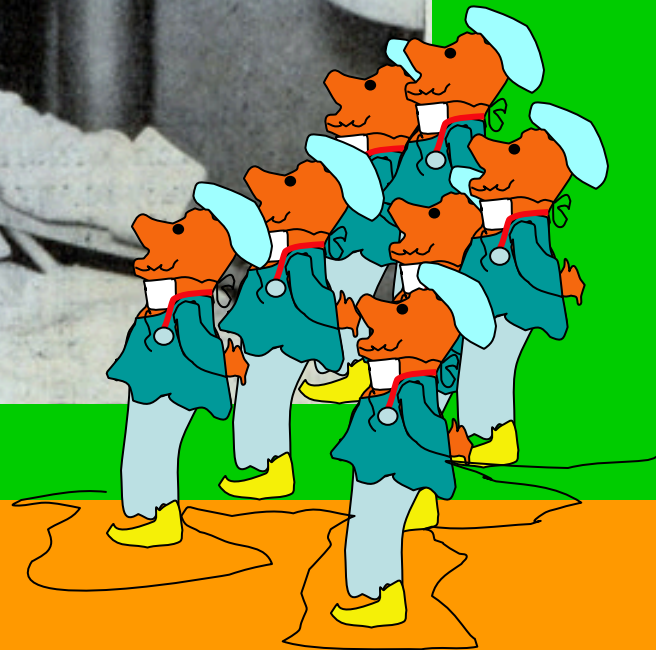
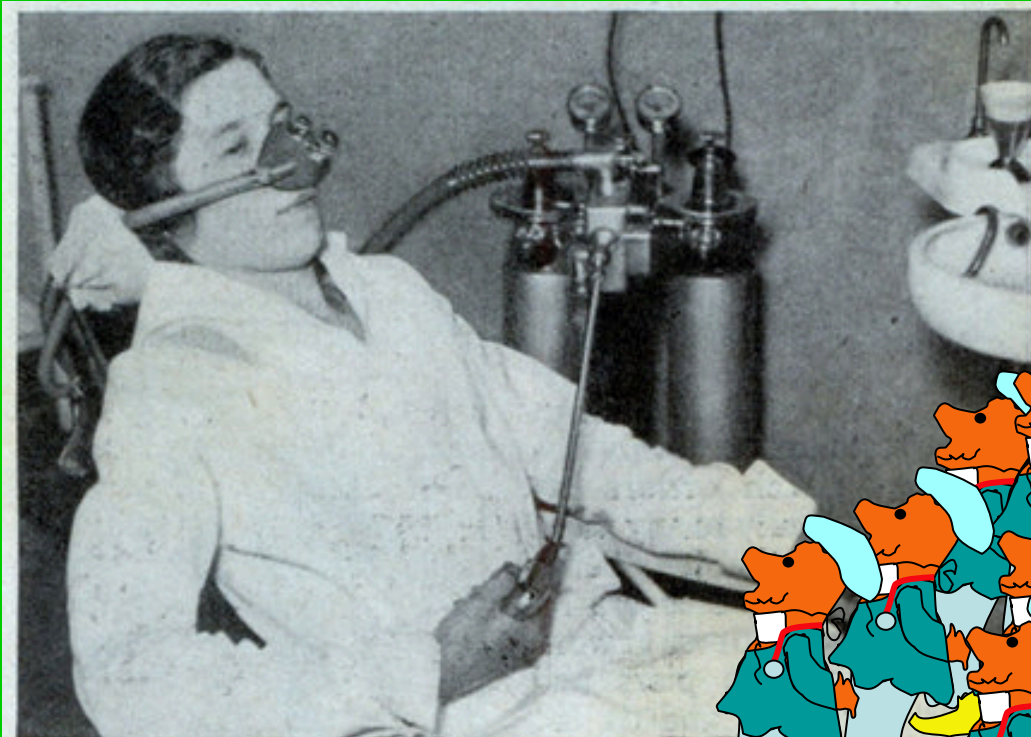
CAVE:

Leverinsufficiens

**Dysnutrition
(glutathion deplet.)**

> 60 - 90 mg/kg/d

N_2O "lustgas"



**$N_2O : O_2$ (50:50)
"Entonox"**

Anxiolytiskt / Analgetiskt

NMDA antagonist

Lätt administrerad

Snabbt upptag

Kort duration

Hemodynamisk stabilitet



Prehospitalt

Korta procedur

Kontraindicerad vid:

Pneumothorax

Skallskador

Ileus / tarmparalys

Svår KOL

Intoxikationer / Konfusion

Risk för:

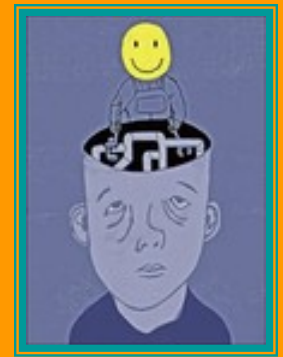
Översedering

Resp.depression (CAVE opioider)

Förorening (utsug !)

KETAMIN

*Dissociation mellan thalamocorticala och limbiska banor
resultterande i "dissociativ anestesi"*



**Effekt: "vaken sömn"
analgesi**

Sidoeffekter:

Sympatikomimetisk (BT, HF, ICP)

Ökad O₂-konsumtion

Hypersekretion

Hallucinationer

Muskelryckningar

Dosering

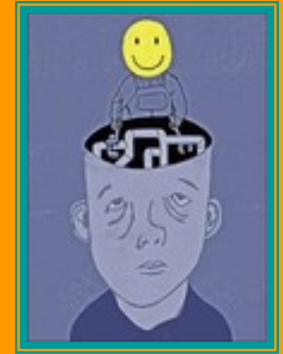
Induktion: 1 - 2 mg/kg i.v.

"Low-dose" inf 1-5 µg/kg/min

Premedicinering:

Midazolam 0,01-0,05 mg/kg

KETAMIN



Fördelar :

Bevarade svalgreflexer

Hemodynamisk stabilitet

Ingen Andningsdepression

Idealiskt vid:

Korta

Smärtsamma

Procedur

Effekt Duration: i.v. ~ 15 min

i.m. ~ 30 min

p.o. ~ 2-3 tim

"Anti-sensitiserings adjuvantia"

Gabapentinoider (gabapentin/ pregabalin):

Inkomplett databas !

Pat. står på GABA

Hyperalgesi i op. området ? (300-600 mg pre-postop)

α_2 agonister (Klonidin, Dexmedetomidin):

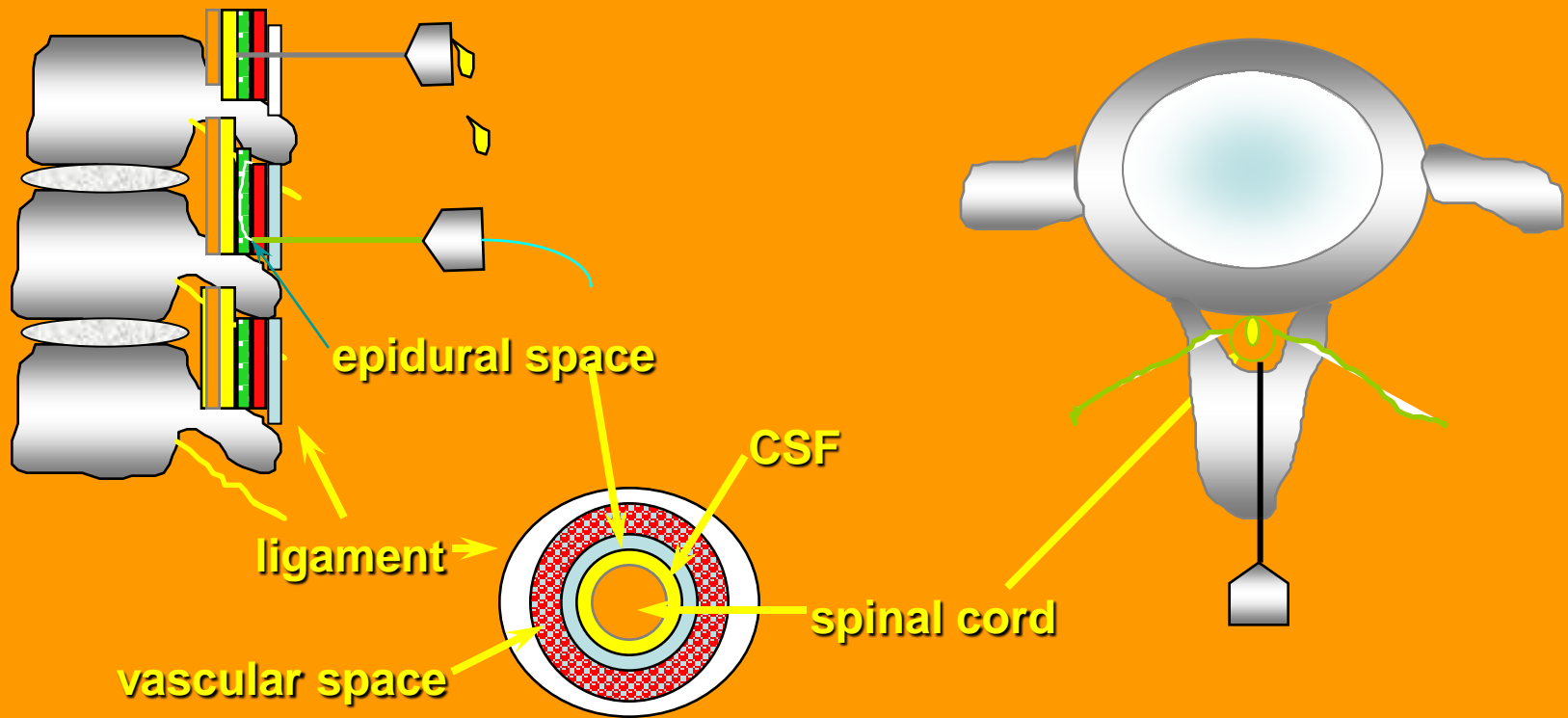
Premedicinering (Oral/Rectal) (4-5 $\mu\text{g}/\text{kg}$)

Intrathecalt (1 $\mu\text{g}/\text{kg}$) ?

Serotonin/ Noradrenalin reuptake inhibitorer:

SSNRI (duloxetin, venlafloxin) ?

Epidural / Spinal Anestesi ?





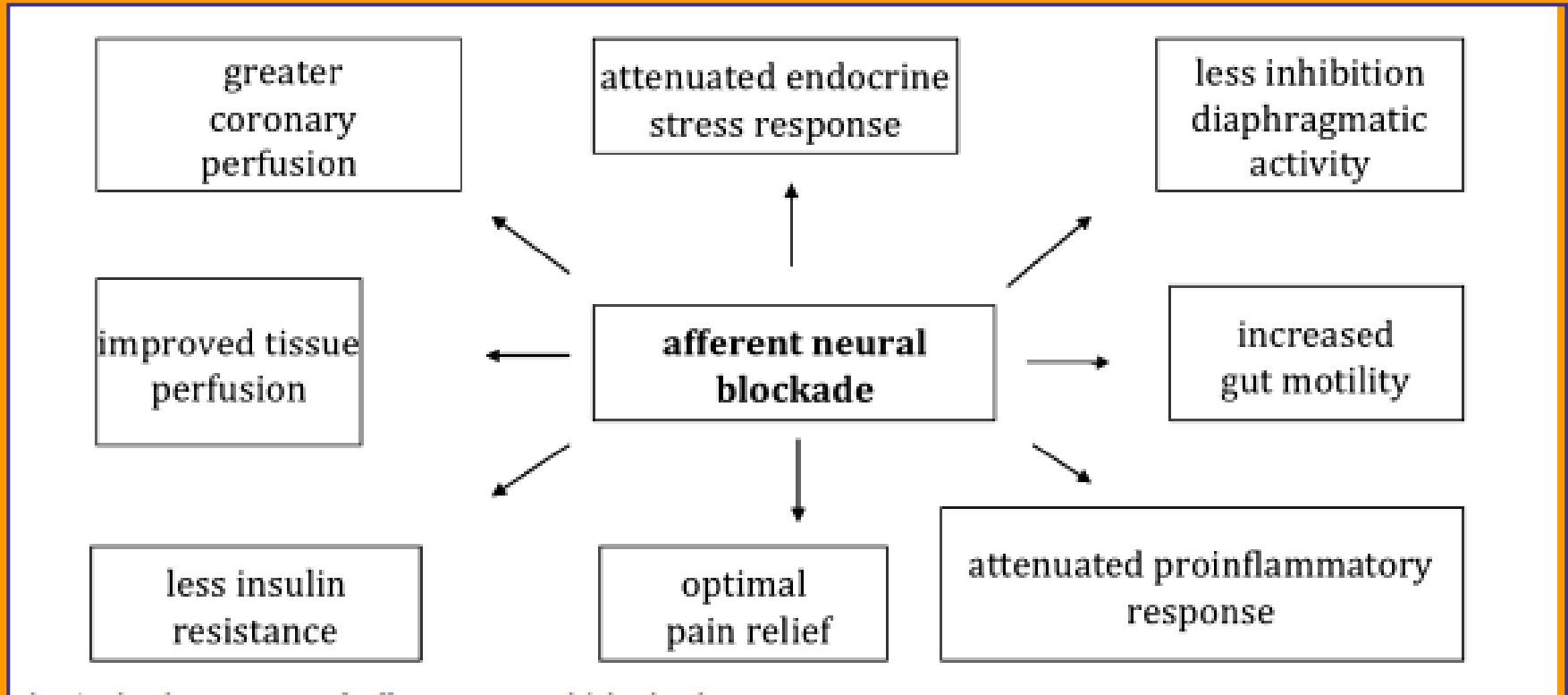
REGIONALA BLOCKADER

Single shot / kontinuerliga

**NATURLIG DEL AV
MULTIMODALT REGIM !**



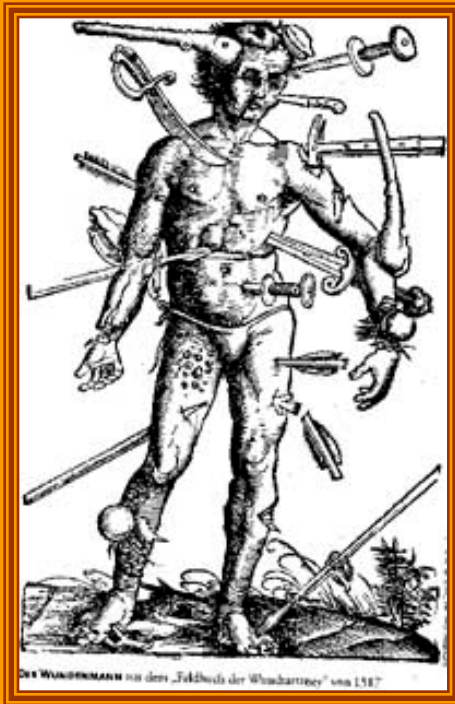
Fysiologiska fördelar med Regional Anestesi



Unimodal Anti-inflammatory Therapy



~~Monoterapi~~



Feldbuch der Wundartzney. Straßburg 1517

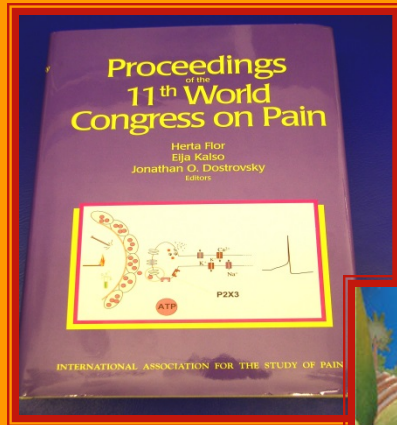
**Multimodal
terapi**

Procedurspezifik

Multimodal

Balanserad

Individualiserad



Vi Vet...

Perioperativ Smärtlindring



Vi Kann...



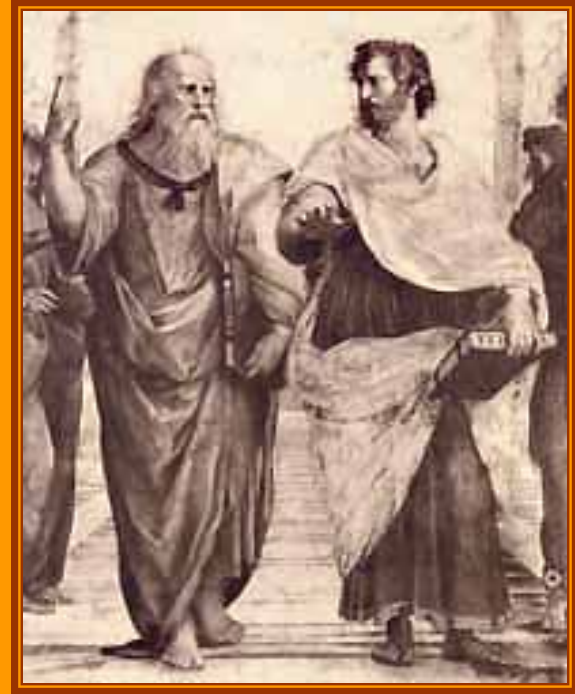
Det är Kost-Effektivt

och...



**Det är en fundamental
Männskelig Rättighet**

Kirurgi & Anestesi...
"a joint venture"



...hela vägen

Australian and New Zealand College
of Anaesthetists and Faculty of Pain Medicine

ACUTE PAIN MANAGEMENT: SCIENTIFIC EVIDENCE

Third Edition 2010

God Läslust

Edited by:
Pamela E Macintyre
David A Scott
Stephan A Schug
Eric J Visser
Suellen M Walker

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*Det kanske känns
tungt. .*

*Men insiktens
lyckokännsla*

Gör livet lättare



*Tack för
uppmärksamheten*