



MODULAIRE OPLEIDING PIJN – PIJNBESTRIJDING OP SPOEDGEVALLEN

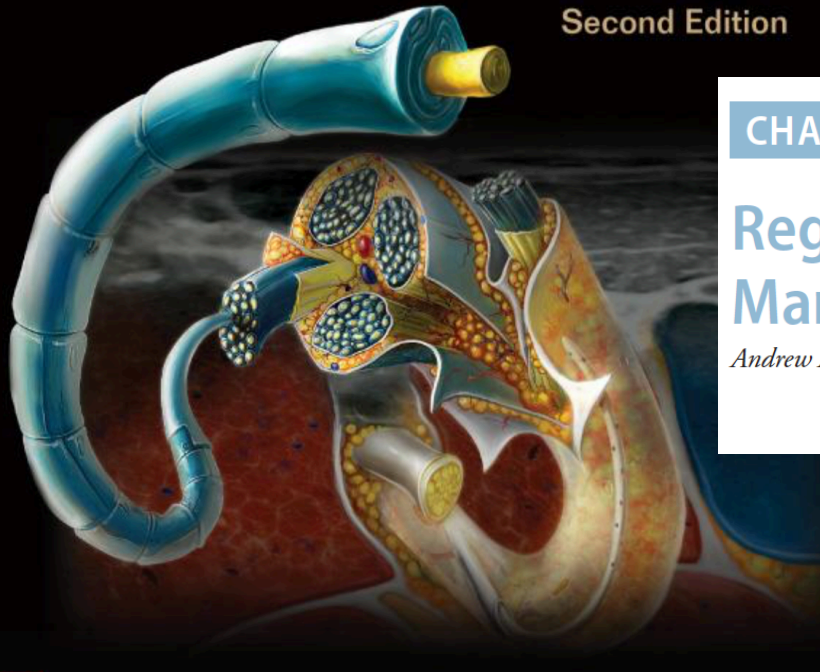
Pascal Vanelderren, MD, PhD

Diensthofd Spoedgevallen

Ziekenhuis Oost-Limburg, Genk

Hadzic's TEXTBOOK OF
Regional Anesthesia
AND ACUTE PAIN MANAGEMENT

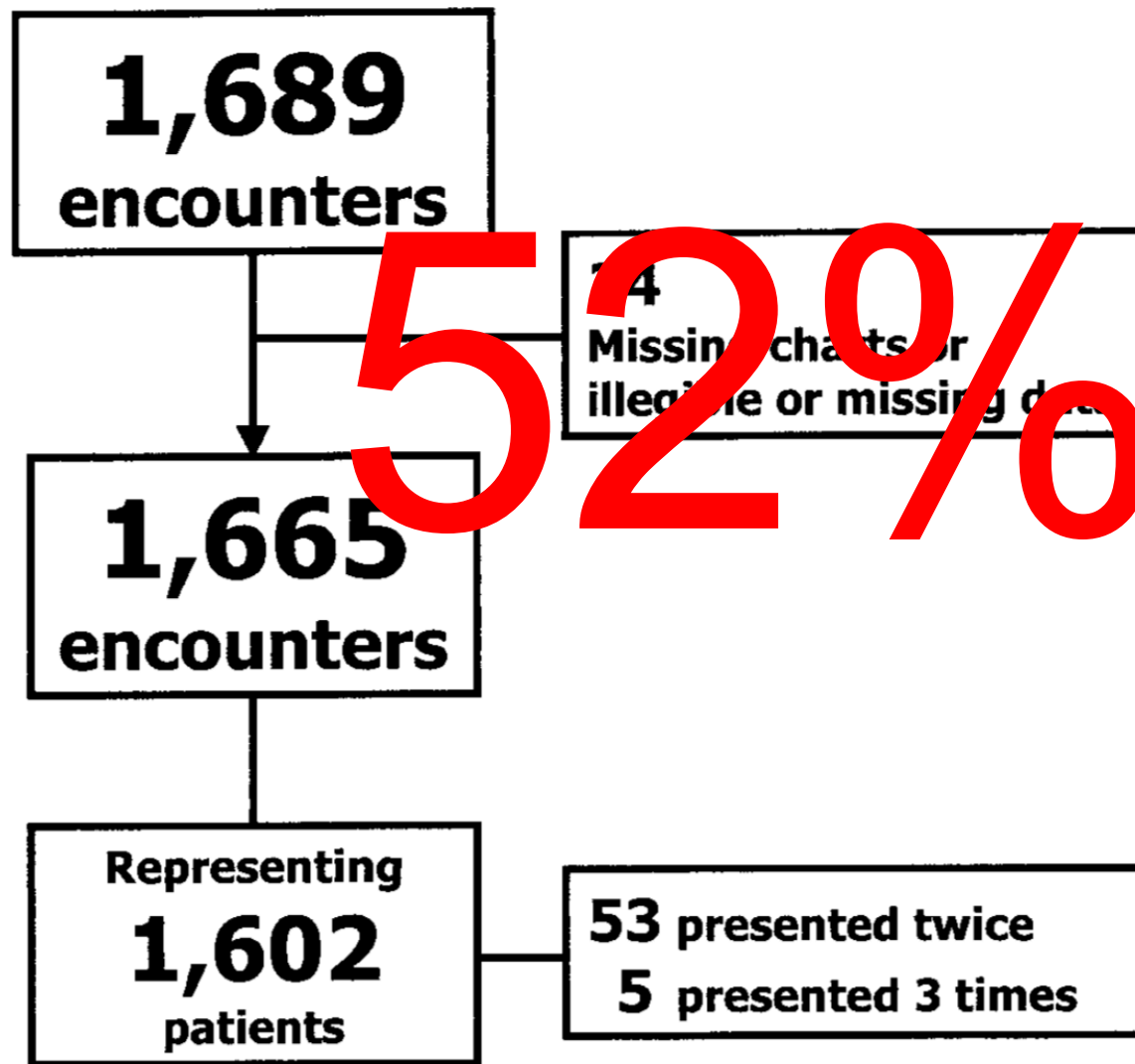
Second Edition



CHAPTER 59

**Regional Anesthesia and Acute Pain
Management in the Emergency Department**

Andrew A. Herring, Sam Van Boxtael, Pascal Vanelderen, and Knox H. Todd



	Frequency	%
Region (N = 1019)		
1 region of pain	819	80.4
2 regions of pain	139	13.6
3 or more regions	61	6.0
For those who had 1 or 2 regions of pain (N = 958), the location was:		
Head, face, mouth	225	23.5*
Cervical	46	4.8
Upper limbs, shoulder, and clavicle	104	10.9
Thoracic (including anterior chest, scapulae, and thoracic spine)	176	18.4
Abdominal pain (including pelvic pain)	235	24.5
Lower back, lumbar spine, sacrum, and coccyx	126	13.2
Lower limbs	144	15.0
Pelvis	11	1.2
Anal, perineal, and genitalia	30	3.1
Etiology (N = 1019)		
Neoplasm and malignancy	8	0.8
Sickle cell crisis	6	0.6
Trauma	317	31.1
Migraine and other headache	29	2.8
Colic (renal or biliary)	19	1.9
Infectious	178	17.4
Inflammatory	60	5.9
Specific chronic pain syndromes	11	1.1
Dental pain	19	1.9
Other	163	16.0
Unknown	209	20.5
Duration (N = 1018)		
< 48 hours	576	56.6
48 hours up to 1 month	312	30.6
1 month up to 6 months	20	2.0
≥ 6 months	32	3.1
Not recorded or not known	78	7.7



OVERWEGINGEN

- Acute pijn vs. Chronische pijn
- Traumatische vs. niet-traumatische pijn
- Maskeren van pathologie
- Nevenwerkingen van analgetica:
 - Hemodynamisch
 - Neurologisch
 - Respiratoir
 - Stolling
 - Nierfunctie
- Per os medicatie mogelijk?
- Ingreep nodig in de nabije toekomst?

Oligoanalgesia in the Emergency Department

JAMES E. WILSON, MD,*† JILL M. PENDLETON, BS†

A review of the charts of 198 patients who were admitted through the emergency department with a variety of acutely painful medical and surgical conditions revealed that 56% received no analgesic medication while in the emergency department. In the 44% of patients who received pain medication, 69% waited more than 1 hour while 42% waited more than 2 hours before narcotic analgesia was administered. In addition, 32% initially received less than an optimal equianalgesic dose of narcotic when compared with morphine. This study demonstrates that narcotic misuse, in the form of oligoanalgesia, is prevalent and is the shared responsibility of both emergency physicians and housestaff consultants. (Am J Emerg Med 1989;7:620-623. © 1989 by W.B. Saunders Company.)

TABLE 1. Proportion of Patients Given Analgesics by Diagnosis

Categories/Diagnoses	Proportion	95% CI (%)
Intra-abdominal	39/96 (41%)	30.7-51.1
Gastrointestinal	23/64 (36%)	24.3-48.9
Appendicitis	8/24 (33%)	15.6-55.3
Abdominal pain, undetermined etiology	4/12 (33%)	9.8-65.1
Bowel obstruction	2/10 (20%)	2.4-55.6
Cholelithiasis/cholecystitis	5/10 (50%)	18.6-81.4
Miscellaneous (ulcer, diverticulitis, pancreatitis)	4/8 (50%)	15.6-84.4
Gynecologic	3/15 (20%)	4.2-48.1
Ruptured ectopic pregnancy	2/10 (20%)	2.4-55.6
Miscellaneous (PID, twisted ovarian cyst, Fitz-Hugh-Curtis syndrome)	1/5 (20%)	0.3-71.8
Genitourinary	13/17 (76%)	50.1-93.3
Urolithiasis	12/13 (92%)	64.0-99.9
Miscellaneous (testicular torsion, epididymitis)	1/4 (25%)	0.3-80.8
Musculoskeletal	38/74 (51%)	39.4-63.2
Single fracture	23/44 (52%)	36.7-67.5
Multiple fracture	10/21 (48%)	25.7-70.2
Miscellaneous (back pain, gun shot wound, severe laceration)	5/9 (56%)	21.1-86.4
Intrathoracic	11/28 (39%)	21.5-59.4
Cardiac	5/18 (28%)	9.6-53.5
Noncardiac	6/10 (60%)	26.2-88.0
Pneumothorax	5/8 (62%)	24.4-91.6
Chest pain, undetermined etiology	1/2 (50%)	0.7-99.3
Total	89/198 (44%)	37.4-51.7

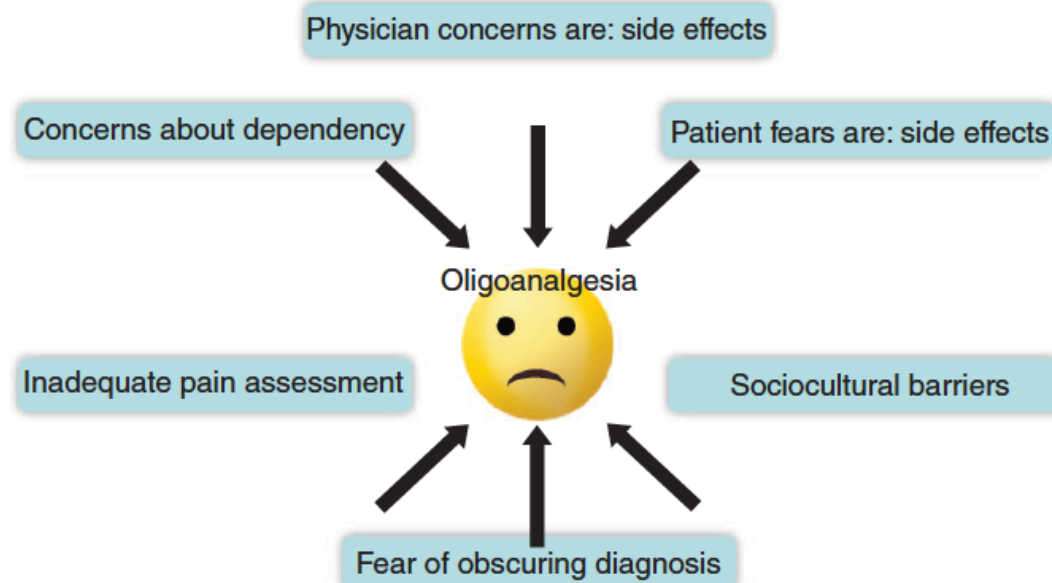
ABBREVIATIONS: CI, confidence interval; PID, pelvic inflammatory disease.

TABLE 59–1. Adverse consequences of inadequate analgesia.

Patient Experience	• Decreased patient satisfaction, needless suffering
Physiologic	• Metabolic stress response • Hyperglycemia • Protein catabolism • Increased free fatty acids (decreased myocardial contractility, increased myocardial oxygen demand, impaired vasodilation) • Hypercoagulability • Thromboembolic events • Pulmonary complications • Immunosuppression • Delirium • Development of chronic pain states • Complex regional pain syndrome
Long-term psychologic	• Posttraumatic stress disorder • Insomnia
Logistic	• Increased duration of intensive care unit and hospital stay • Decreased participation in rehabilitation

OLIGOANALGESIE

OLIGOANALGESIE



PIJN METEN?

Visual Analogue Scale

Least
Possible
Pain

Worst
Pain
Imaginable

Indicate the severity of your pain by placing a single mark through the line above at the appropriate point.

Numeric Rating Scale: 0-10

**2 Punten
of 30%**

Farrar JT et al. Pain 2001 Nov;94(2):149-58.

SYSTEEM GEBASEERDE MULTIMODALE AANPAK

- Farmacologisch
 - Paracetamol
 - NSAID's/COX-2 inhibitoren
 - Tramadol
 - Opiaten
 - Co-analgetica
 - Transdermale preparaten
 - Sedatie/Narcose

- Niet-farmacologisch:
 - Immobilisatie en reductie van fracturen en dislocaties
 - Ijsapplicatie
 - Locoregionale anesthesie technieken

- Onderdeel van een strategie
- Geincorporeerd in standing orders
- Frequent herevaluaties
- > Protocollen

2. Inhoud

Reduceren, aligneren en immobiliseren van fractuur = beste analgeticum.

Exclusie van patiënten met neurotrauma of massaal bloedverlies.

Cave: Instabiel abdominaal trauma of thoracaal trauma

1. Controleer vitale parameters (pols, bloeddruk, ademhalingsfrequentie en bewustzijn).
2. Noteer vitale parameters in het verpleegdossier.
3. Neem een pijnvrijheidsmeting op in het verpleegdossier
4. Vraag naar PONV, maaglijden, nierlijden en allergie. Indien op een van deze vragen (PONV, maaglijden, nierlijden of allergie) een positief antwoord wordt gegeven door de patiënt, spreek pijnbeleid af met anesthesist verantwoordelijk voor de patiënt.
5. Vraag na of de patiënt thuis reeds pijnstilling is komen heeft, zo ja: spreek pijnbeleid af met verantwoordelijke anesthesist.
6. Geef bij hemodynamisch stabiele patiënt pijnmedicatie volgens ernst.

Pijnbehandeling ernstige pijn

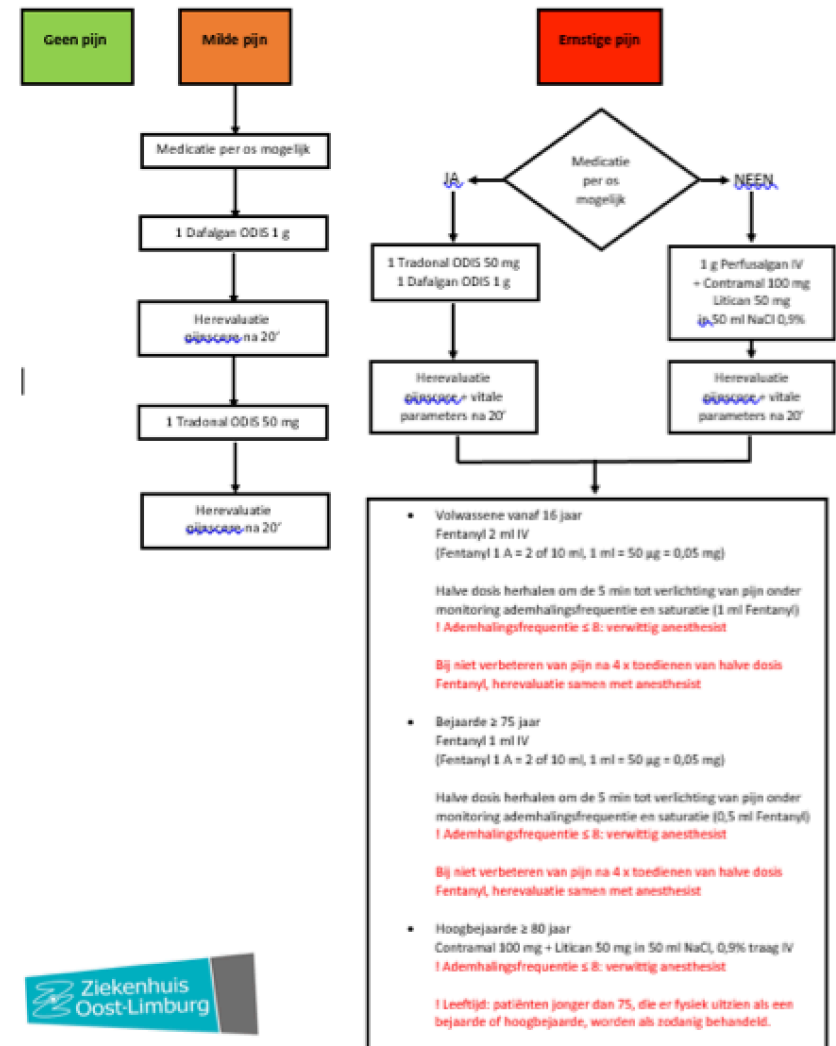
- Altijd monitoring EKG, saturatie, bloeddruk, ademhalingsfrequentie.
- Altijd zuurstof toedienen.

Bij overdosering oplaten, Naloxone titreren, op voorschrift van anesthesist.

Naloxone IV titreren per 0,1 mg tot ademhalingsfrequentie > 8/'

(Naloxone 1 A = 0,4 ml/10 ml, titreren per 2,5 ml).

3. Flowchart Pijnprotocol spoedgevallen

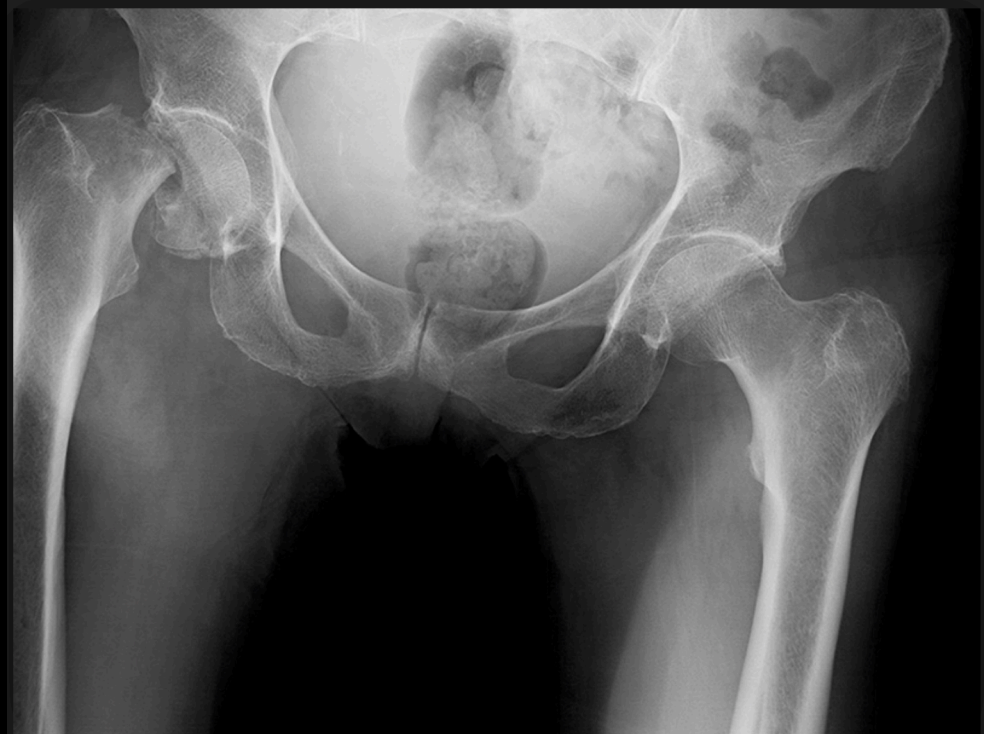


SYSTEEM GEBASEERD AANPAK

- **Standing orders:**
 - Snelle toediening van analgetica:
 - Tijdens de ziekenhuistriage, zonder de tussenkomst van een arts
 - Op een veilige manier 'one size fits all':
 - Correcte analgetica keuze
 - Step-up benadering
 - Dienend als basis van een verder uitgewerkte analgetische strategie
- **Strategie:**
 - Geen 'one size fits all'
 - In functie van de Fysiologie van de patient
 - In functie van de Pathologie van de patient

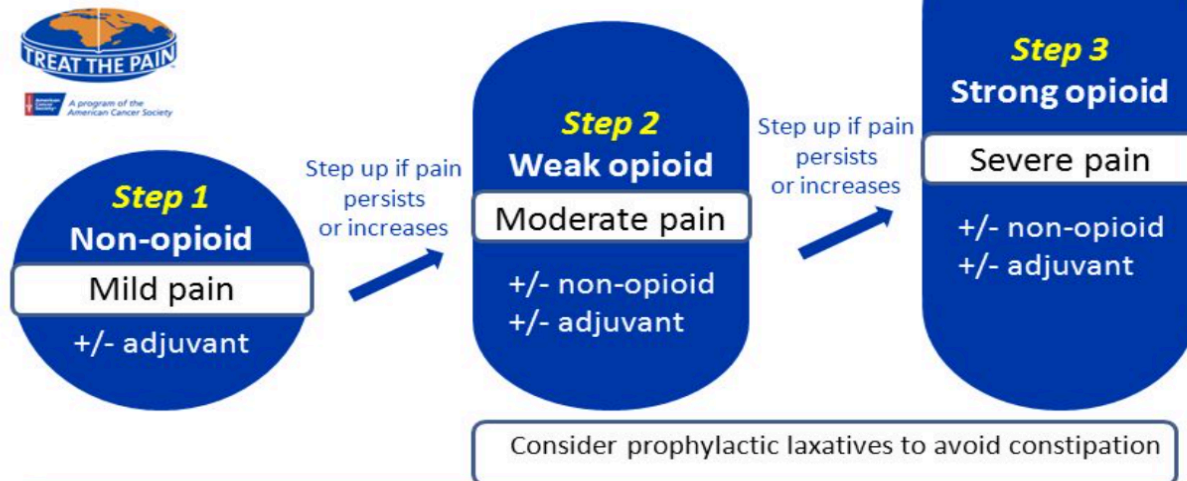


VS.



FARMACOLOGISCH: STEP-UP

WHO Analgesic Ladder: adults

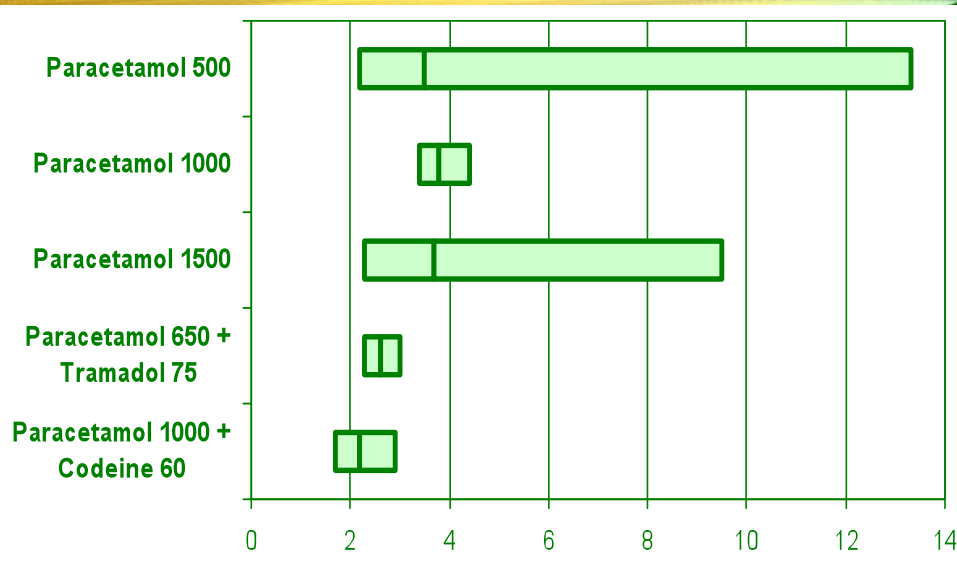


<i>Non-opioids</i>	ibuprofen or other NSAID, paracetamol (acetaminophen), or aspirin
<i>Weak opioids</i>	codeine, tramadol, or low-dose morphine
<i>Strong opioids</i>	morphine, fentanyl, oxycodone, hydromorphone, buprenorphine
<i>Adjuvants</i>	antidepressant, anticonvulsant, antispasmodic, muscle relaxant, bisphosphonate, or corticosteroid

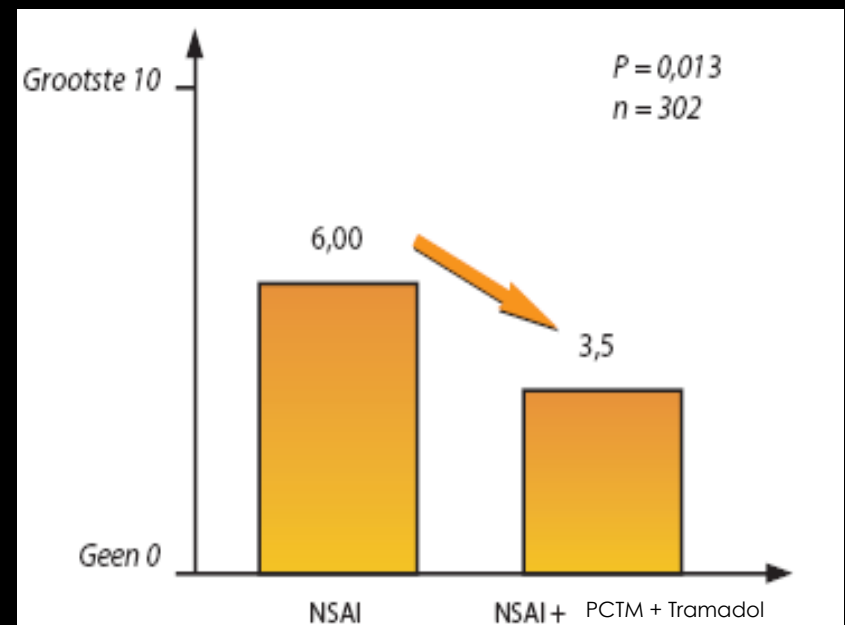
Combining an opioid and non-opioid is effective, but do not combine drugs of the same class.

Time doses based on drug half-life ("dose by the clock"); do not wait for pain to recur

STEP-UP WORKS!



NNT



Silverfield JC et al. Clinical Therapeutics 2002; 24 (2): 282-297

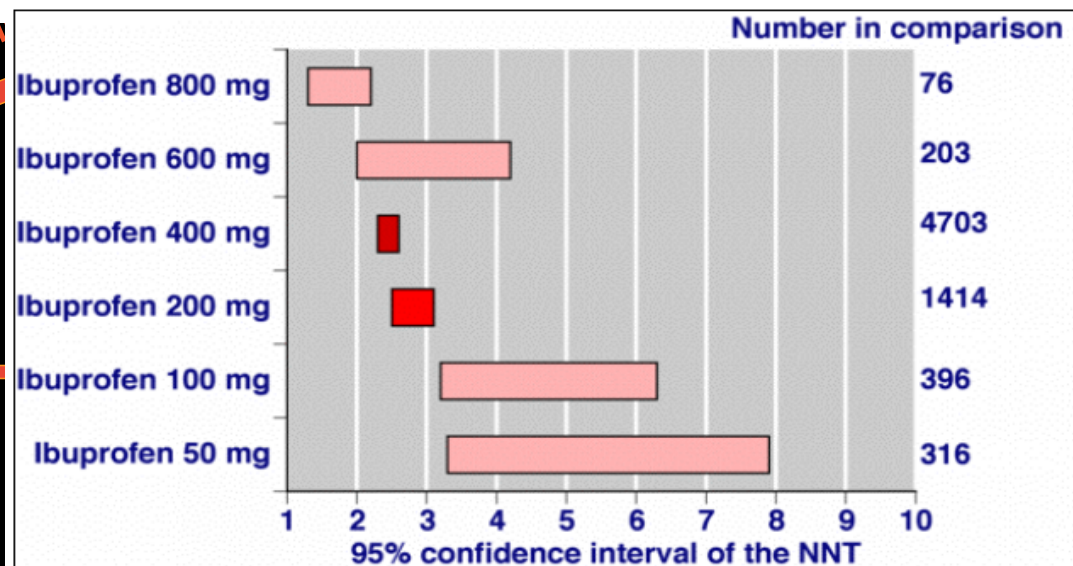
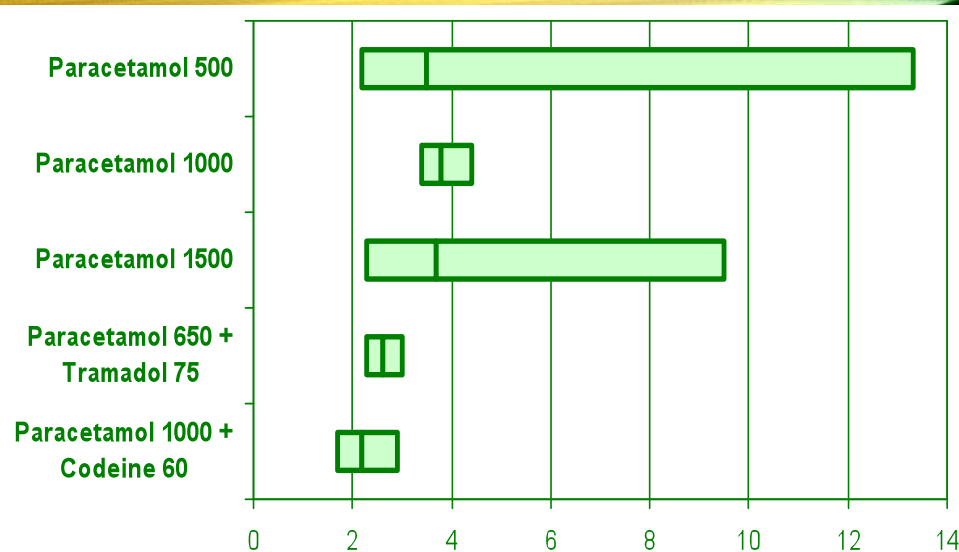
The Oxford Pain Internet Site
<http://www.jr2.ox.ac.uk/bandolier/booth/painpag/Acutrev/Analgesics/AP004.html>

STEP-UP

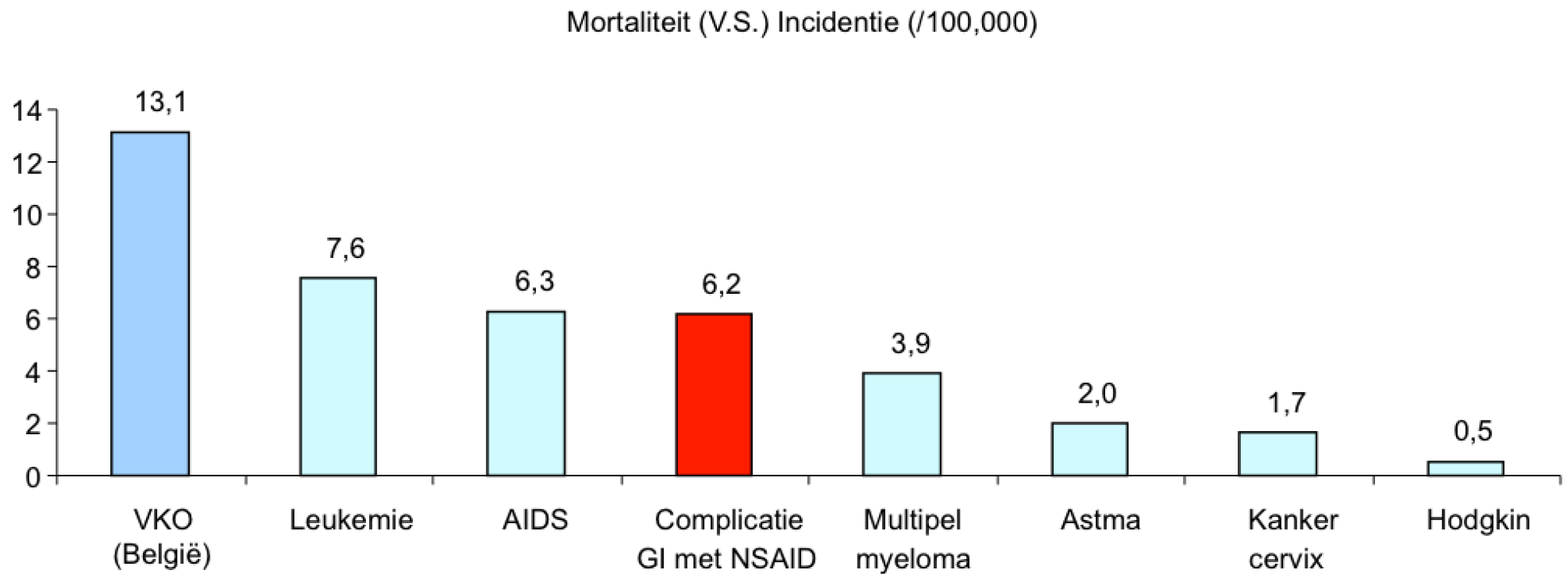
Trial and error over Cytochrome P450
gen polymorphism

- CYP2D6: Tramadol, Codeine, Oxycodone, Alfentanil
- CYP3A4: Methadone, Fentanyl
- CYP2C9: NSAID

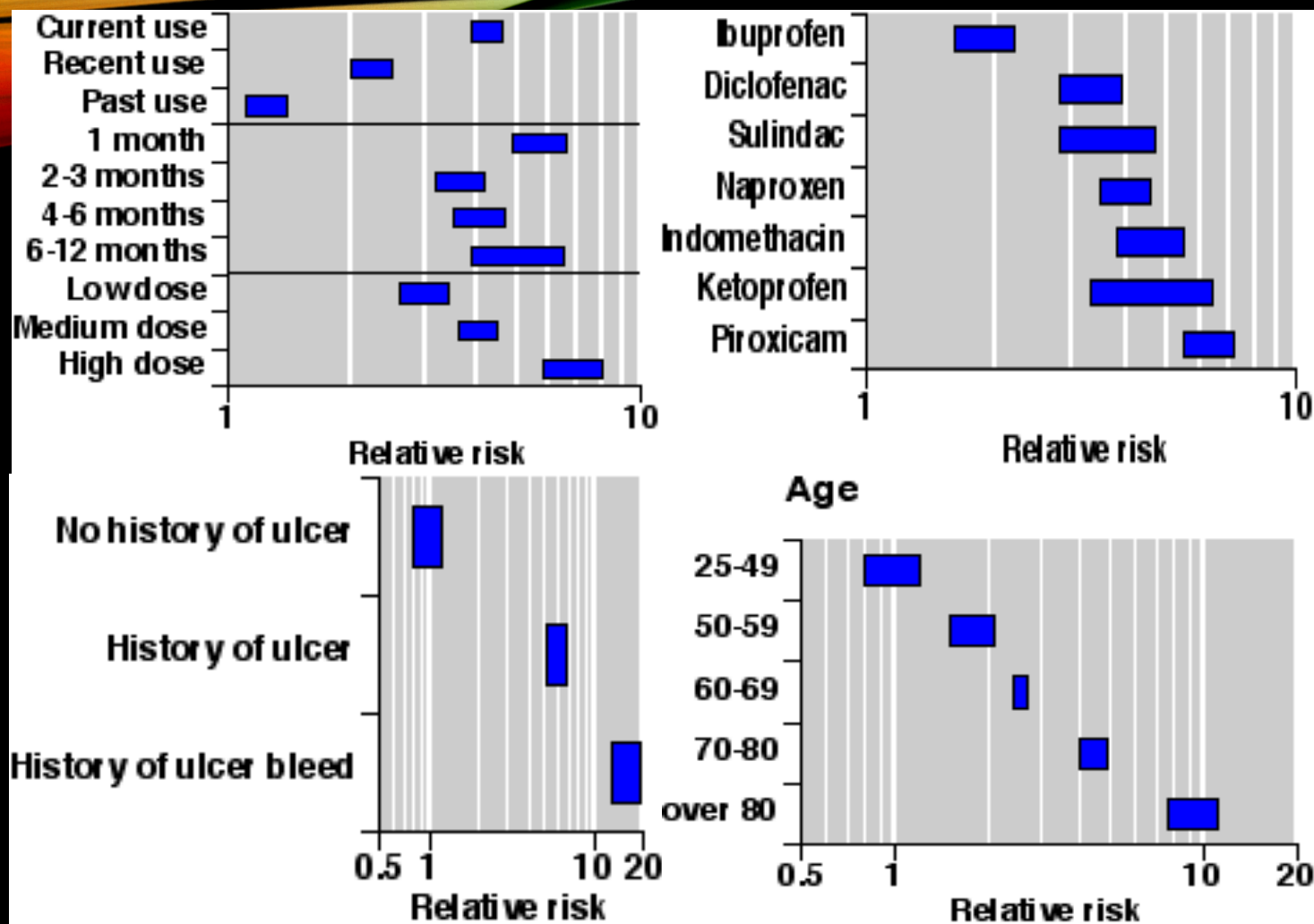
DOSE-RESPONSE?



DOSE-RESPONSE, MAAR...



Singh G. and Triadafilopoulos G. Epidemiology of NSAID induced gastrointestinal complications. J Rheumatol Suppl. 56, 18-24, 1999.
IBSR website accessed on 26/9/2007



Forebrain

Midbrain

Medulla

Spinal cord

A

Somatosensory and association cortex

PALEOHACKS

CARROT *Ginger* SOUP WITH ANTI-INFLAMMATORY TURMERIC

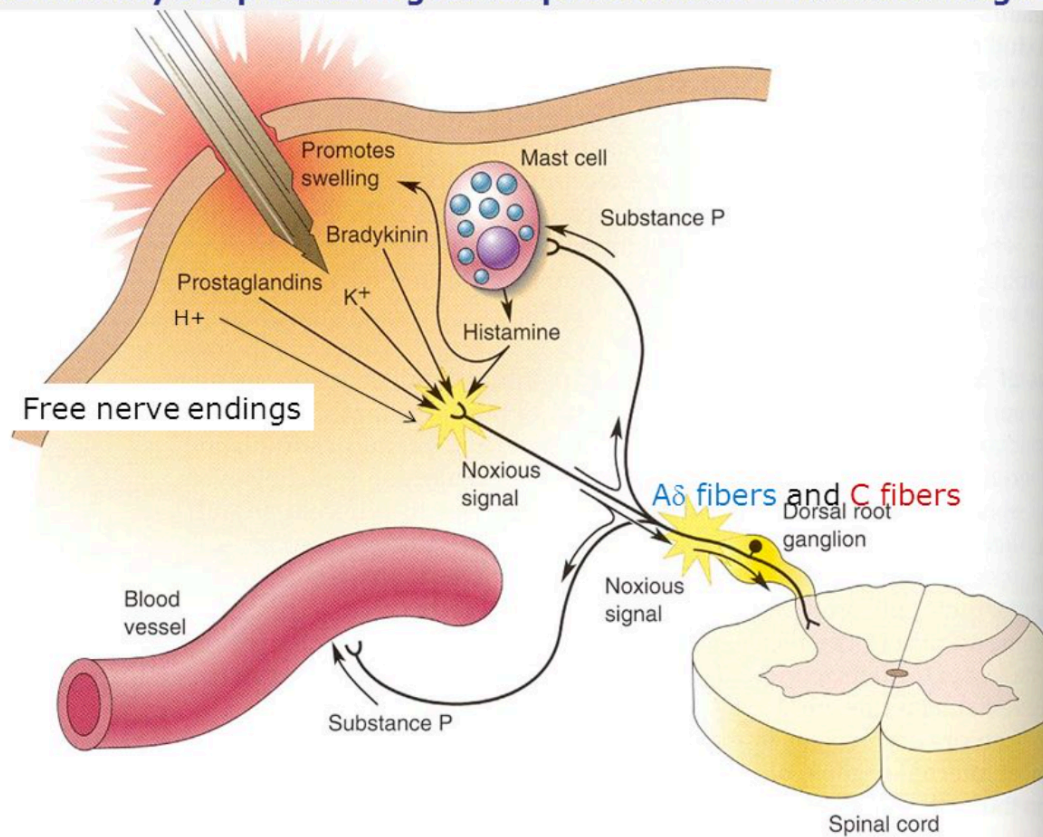
dorsal horn via C and Aδ primary afferent neurons



TE PIJN

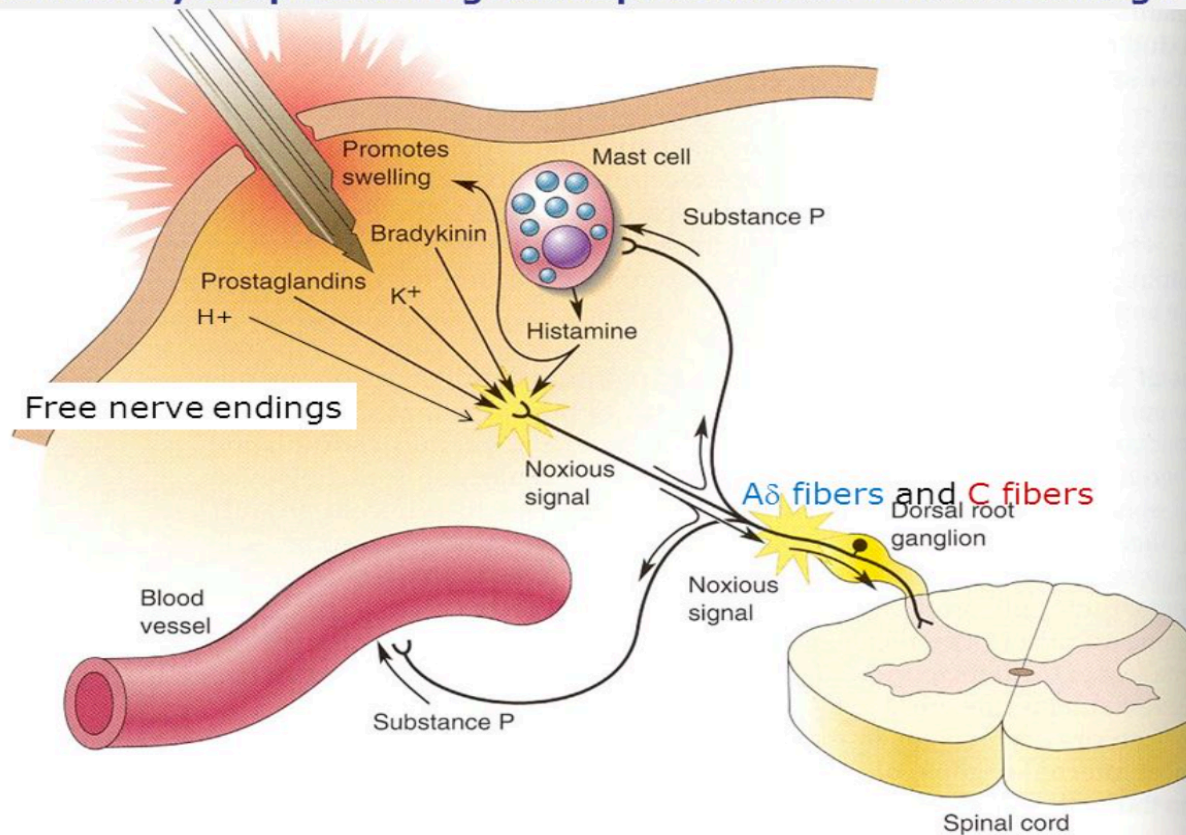
PARACETAMOL

Inflammatory Soup Following Nociceptive Stimuli + Tissue Damage



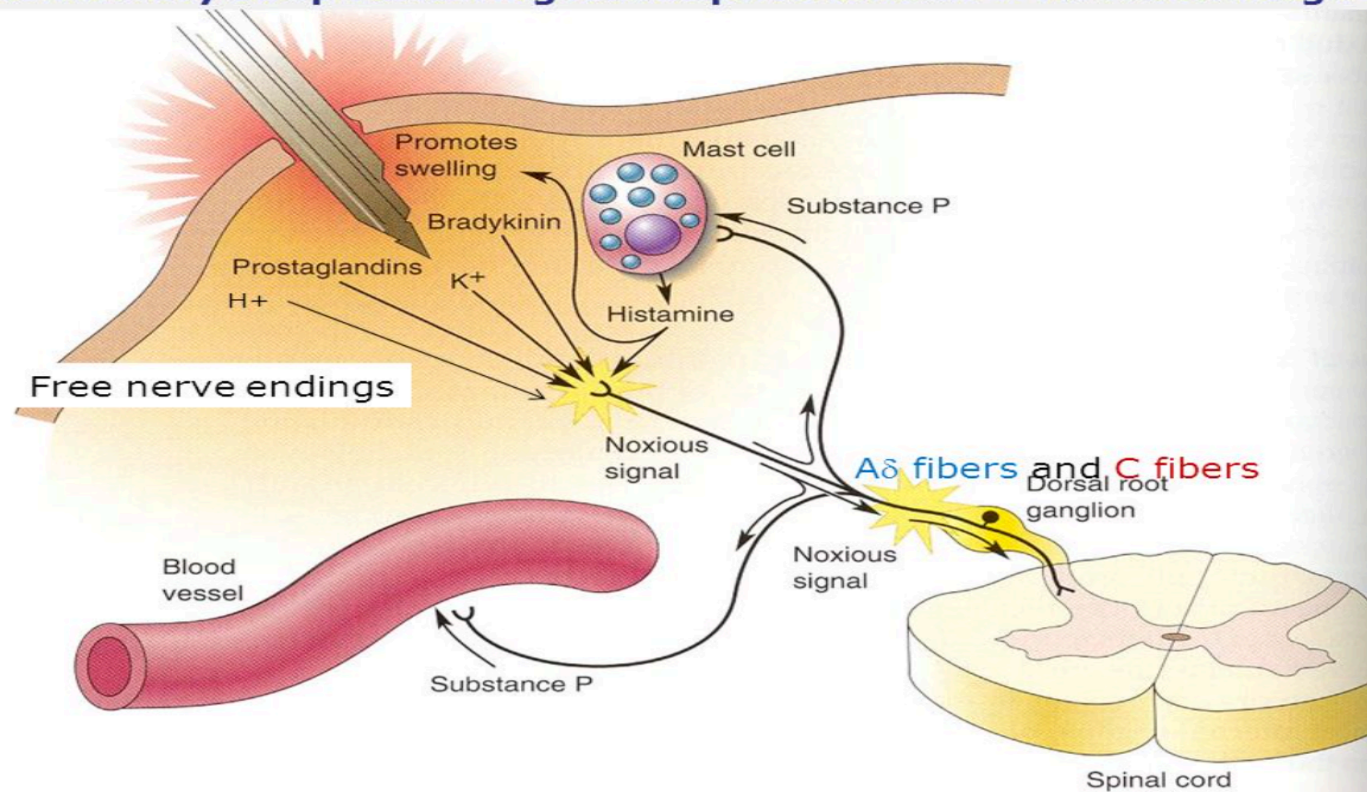
NSAID'S

Inflammatory Soup Following Nociceptive Stimuli + Tissue Damage



ZWAKKE OPIATEN: TRAMADOL

Inflammatory Soup Following Nociceptive Stimuli + Tissue Damage



STERKE OPIATEN: (SU)FENTANIL, MEPERIDINE,...

- Werkingsmechanisme:
 - Sterke mu-agonisten
- Overwegingen op spoedgevallen:
 - Nausea
 - **Sedatie**
 - **Ademhalingsdepressie**
 - **Delier**
 - **Hypotensie** (wegvallen van orthosympatische tonus)
 - Constipatie
 - Urineretentie



Onderdeel van multimodale aanpak
Lage startdosis
Optitreren in functie van effect
Monitoring van vitale functies

SEDATIE- NARCOSE

TABLE 59-2. Emergency sedation.

Drug	Emergency Dosing	Comments
Midazolam	1–2 mg IV titrated to effect; more than 5 mg IV cumulative should be avoided.	Sedative only with dose-dependent cardiovascular respiratory depression.
Propofol	0.5–1.0 mg/kg IV loading dose titrated to effect.	Sedative only with dose-dependent cardiovascular respiratory depression; very quick onset and rapid recovery.
Ketamine	Broad range from as low as 5 mg IV (<0.1 mg/kg) for analgesia to 150 mg IV (2–3 mg/kg) for dissociative anesthesia; rapid onset within 3–4 min allows rapid titration.	Powerful analgesic at low doses; at higher doses results in a surgical dissociative anesthesia; dose-dependent dissociative effects are bothersome to some patients. Addition of an opioid or benzodiazepine tends to increase patient tolerability of the dissociative effects.
"Ketofol" (1:1 mixture of ketamine and propofol combined in a single syringe)	0.5 mg/kg ketamine + 0.5 mg/kg propofol delivered together.	Potentially balancing side effect profile.
Etomidate	0.1–0.2 mg/kg slow IV push.	Myoclonus and adrenal suppression are considerations; clinically, most commonly used for cardioversion and endotracheal intubation.



- Monitoring van vitale functies: EKG, NIBP, saturatie, EtCO₂
- O₂ met masker en ambu toedienen
- Staf lid ervaren in toediening van algemene anesthesie
- Suctie stand- by
- Intubatie materiaal stand- by

A photograph taken from inside a brown cardboard box, looking out through a diamond-shaped opening. The text "THINK OUTSIDE THE BOX" is written in white, hand-painted capital letters on the dark interior surface of the box. The lighting is warm and directional, coming from the bottom left, which casts soft shadows on the inner flaps of the box and highlights the texture of the cardboard. The background outside the box is a solid, dark grey or black.

THINK
OUTSIDE
THE BOX

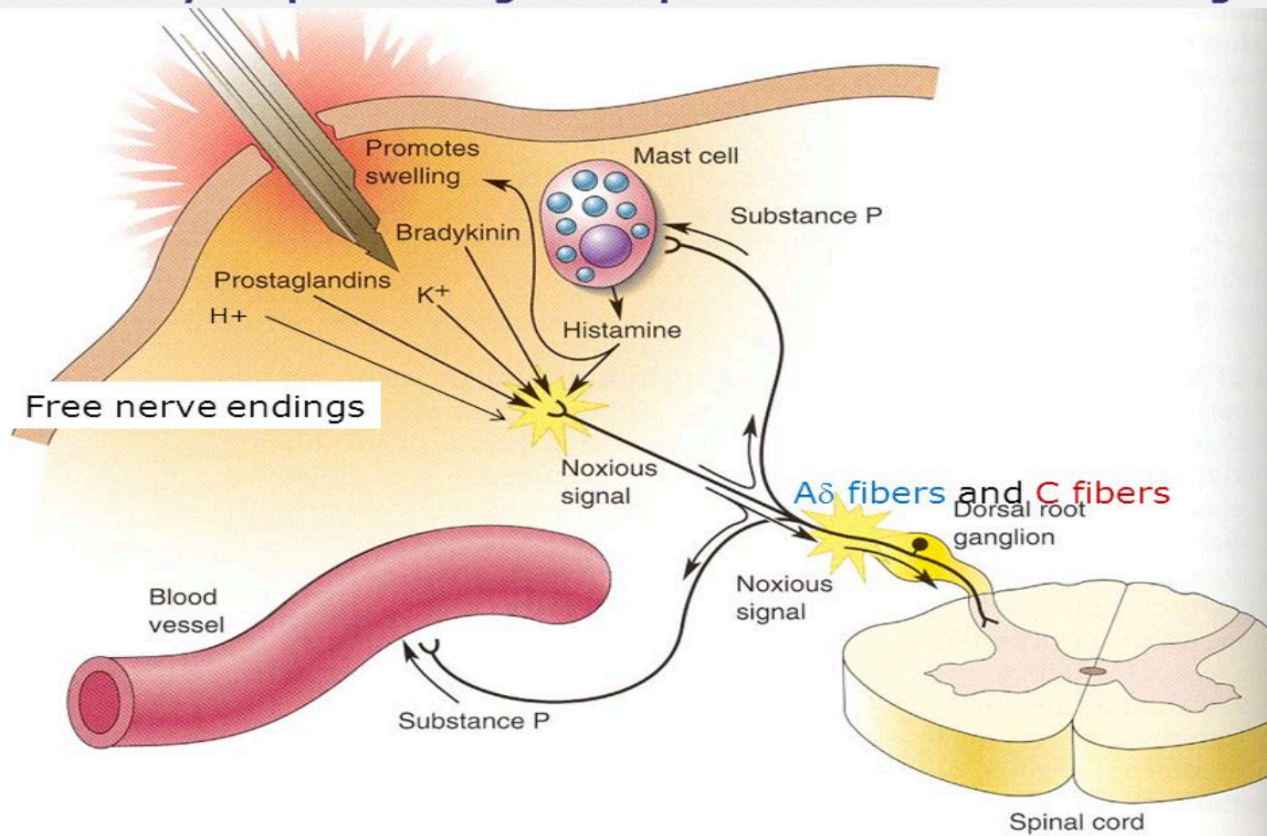
LOKALE/DERMALE PREPARATEN

- TAC:
 - Cocaïne, Tetracaïne, Adrenaline
 - Op steriel compres aanbrengen op de gereinigde wonde: 1ml TAC/cm wonde
- Gelaat- en scalpwonden kleiner dan 4cm
- Niet op muceuze membranen, ogen, eind-arteriolaire localisaties (vingers, tenen, oren, penis, neus)

Smith SM, Barry RC. Pediatr Emerg Care. 1990 Dec;6(4):266-70.

LOCOREGIONALE ANESTHESIE/ ANALGESIE

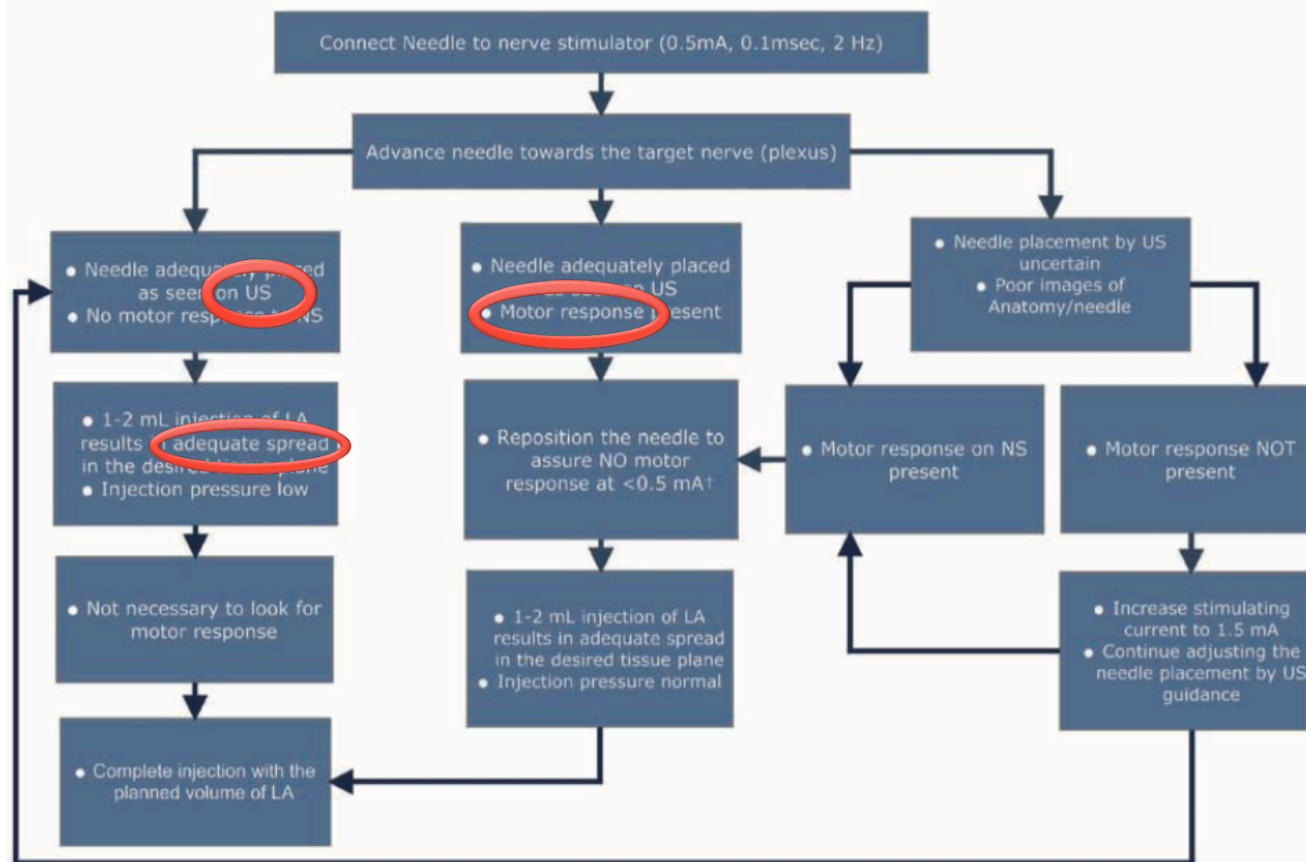
Inflammatory Soup Following Nociceptive Stimuli + Tissue Damage





Suggested Standard Monitoring For Nerve Blocks

Combined Monitoring: Ultrasound + Nerve Stimulation + Resistance to Injection



Legend: US-ultrasound, NS-nerve stimulator, Low Injection Pressure <15 psi*.

* Experimental studies in large models/human cadavers suggest that opening pressure for intrafascicular injection requires >15 psi

† Experimental studies suggest that EMR at < 0.2 mA (0.1 ms) indicates intraneural needle placement; For additional safety margin, 0.5 mA is recommended in the guidelines by the collaborative group. EMR-Evoked Motor Response

TECHNIEK



-Zenuwschade
-Intravasculaire injectie

Interscalene Block

Indications:
Surgery on shoulder,
distal clavicle,
proximal humerus

-Phrenicus paralyse
-Intravasculaire injectie: a. Vertebralis, Carotis

Supraclavicular Block

Indications:
Surgery on humerus,
elbow, hand

-Pneumothorax
-Intravasculaire injectie: a. v. Subclavia

Infraclavicular Block

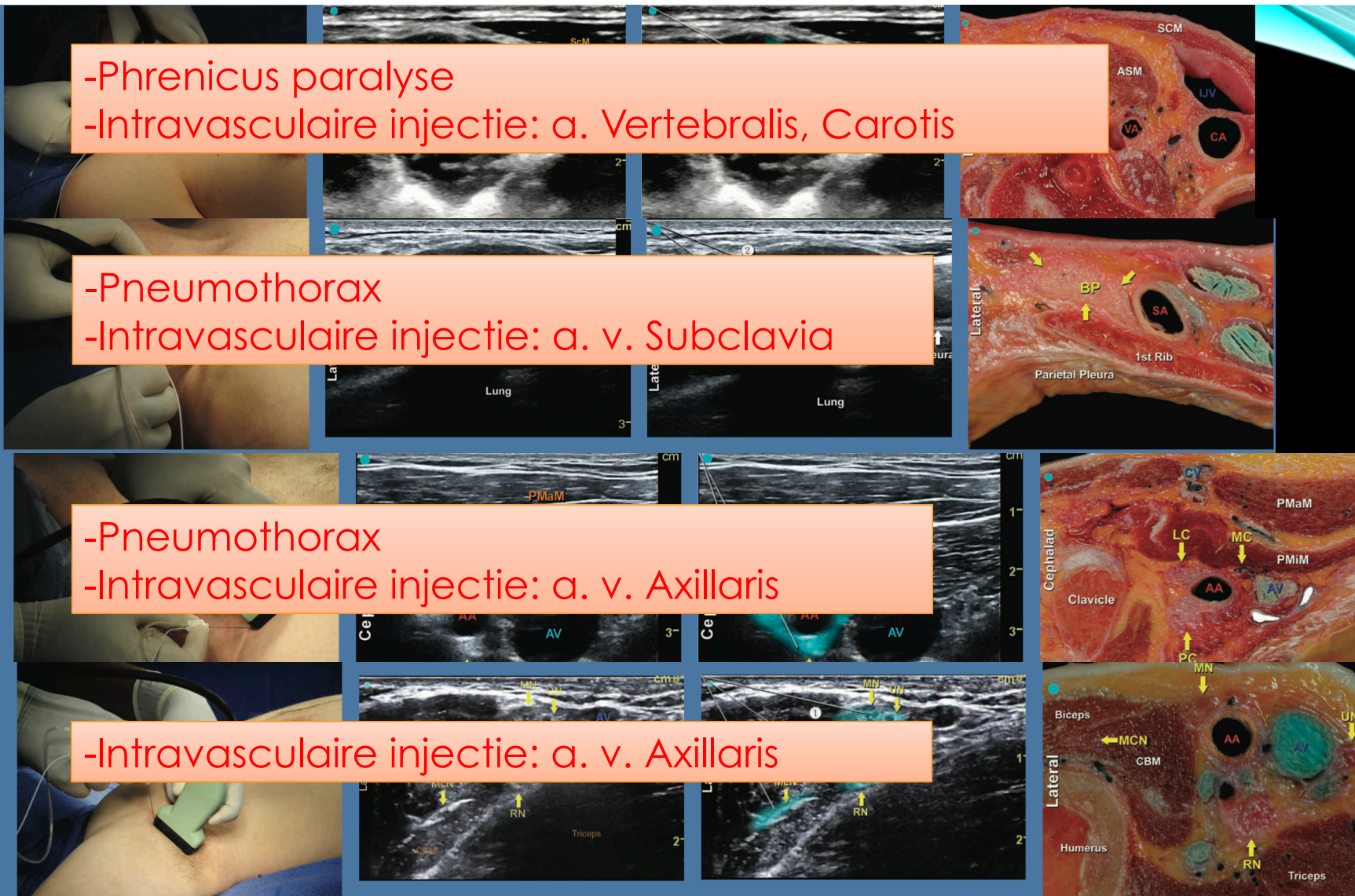
Indications:
Surgery on humerus,
elbow, hand

-Pneumothorax
-Intravasculaire injectie: a. v. Axillaris

Axillary Block

Indications:
Surgery on elbow,
forearm, hand

-Intravasculaire injectie: a. v. Axillaris



Femoral Nerve Block

Indications:

Surgery on femur, anterior thigh, and knee

-Intravasculaire injectie: a. v. Femoralis

Sciatic Nerve Block (Subgluteal level)

Indications:

Surgery at and below the knee

-Positionering: zijlig of buiklig

Popliteal Block

Indications:

Surgery on ankle, achilles tendon, and foot

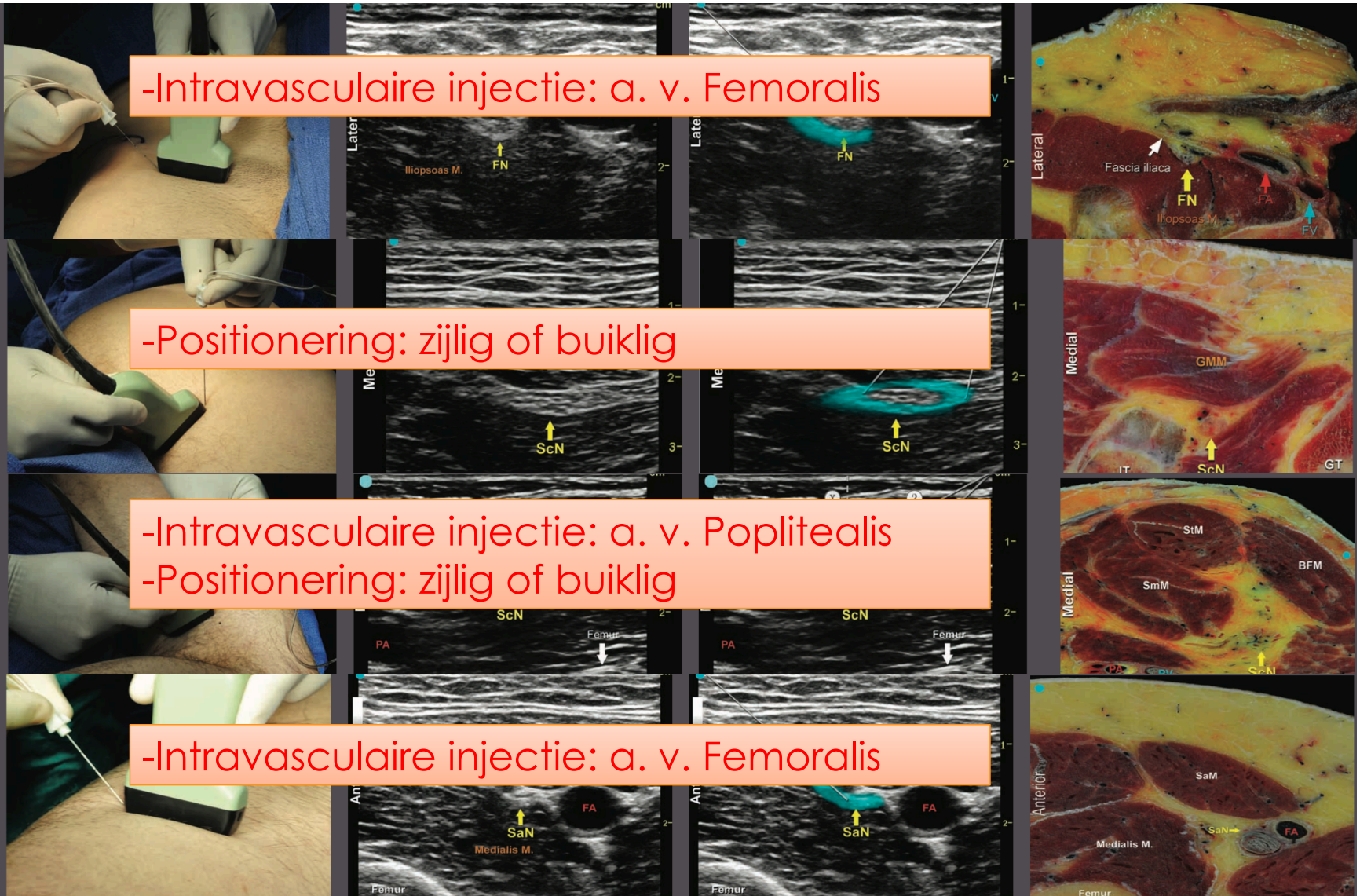
-Intravasculaire injectie: a. v. Poplitealis
-Positionering: zijlig of buiklig

Saphenous Nerve Block

Indications:

Supplement to popliteal or sciatic blocks for surgery below the knee

-Intravasculaire injectie: a. v. Femoralis



LOKAAL ANESTHETICUM TOXICITEIT

- LAST: progresses from central nervous system to cardiovascular manifestations in 83% of the patients.
- The most common sign of **central nervous system toxicity**:
 - Seizure (54%)
 - Other symptoms included confusion, dizziness, tinnitus, dysgeusia, hallucinations, slurred speech, gait problems, limb twitching, extremity paresthesia, intention tremor, hypotonia, and facial sensorimotor and eye movement abnormalities.
- The most common sign of **cardiovascular toxicity**:
 - Bradycardia, hypotension and shock (41%)
 - followed by tachycardia, hypertension, ventricular fibrillation (15%) and cardiac arrest (7%).

LAST THERAPIE

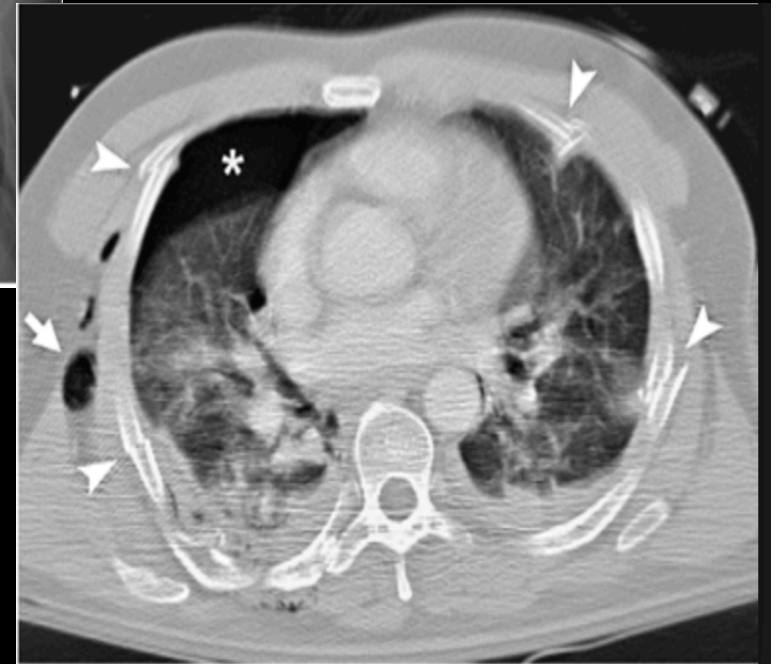
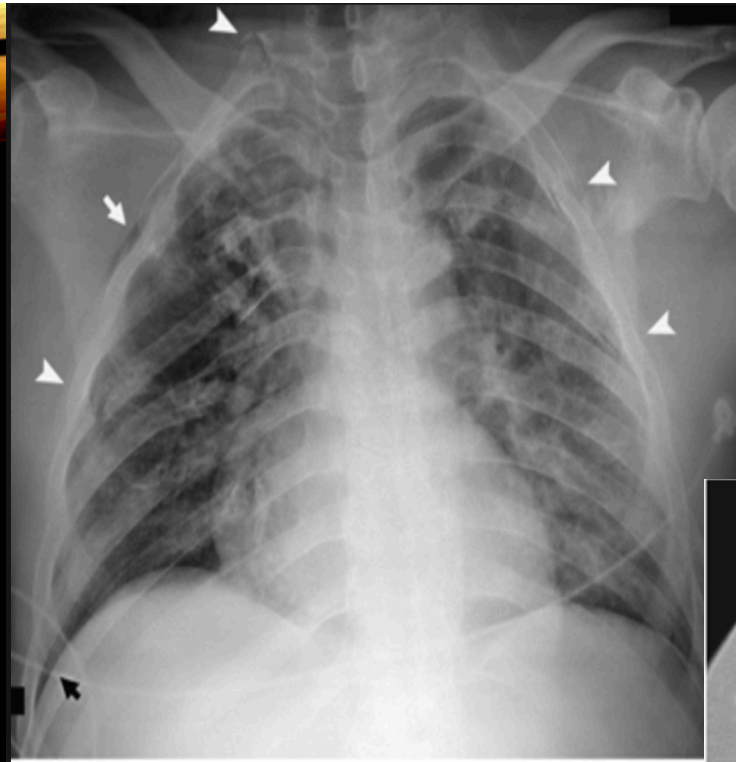
- Stop injecting local anesthetic
- Get help
 - Consider lipid emulsion therapy at the first sign of a serious LAST event
 - Call for the LAST Rescue Kit
 - Alert the nearest cardiopulmonary bypass team - resuscitation may be prolonged
- Airway management
 - Ventilate with 100% oxygen / avoid hyperventilation / advanced airway device if necessary
- Control seizures
 - Benzodiazepines preferred
 - **Avoid** large doses of **propofol**, especially in hemodynamically unstable patients
- Treat hypotension and bradycardia – **If pulseless, start CPR**

Lipid Emulsion 20%	
(Precise volume and flow rate are not crucial)	
Greater than 70 kg patient	Less than 70 kg patient
Bolus 100 mL Lipid Emulsion 20% rapidly over 2-3 minutes	Bolus 1.5 mL/kg Lipid Emulsion 20% rapidly over 2-3 minutes
• Lipid emulsion infusion 200-250 mL over 15-20 minutes	• Lipid emulsion infusion ~0.25 mL/kg/min (ideal body weight)
If patient remains unstable: • Re-bolus once or twice at the same dose and double infusion rate; be aware of dosing limit (12mL/kg) • Total volume of lipid emulsion can approach 1 L in a prolonged resuscitation (e.g., > 30 minutes)	

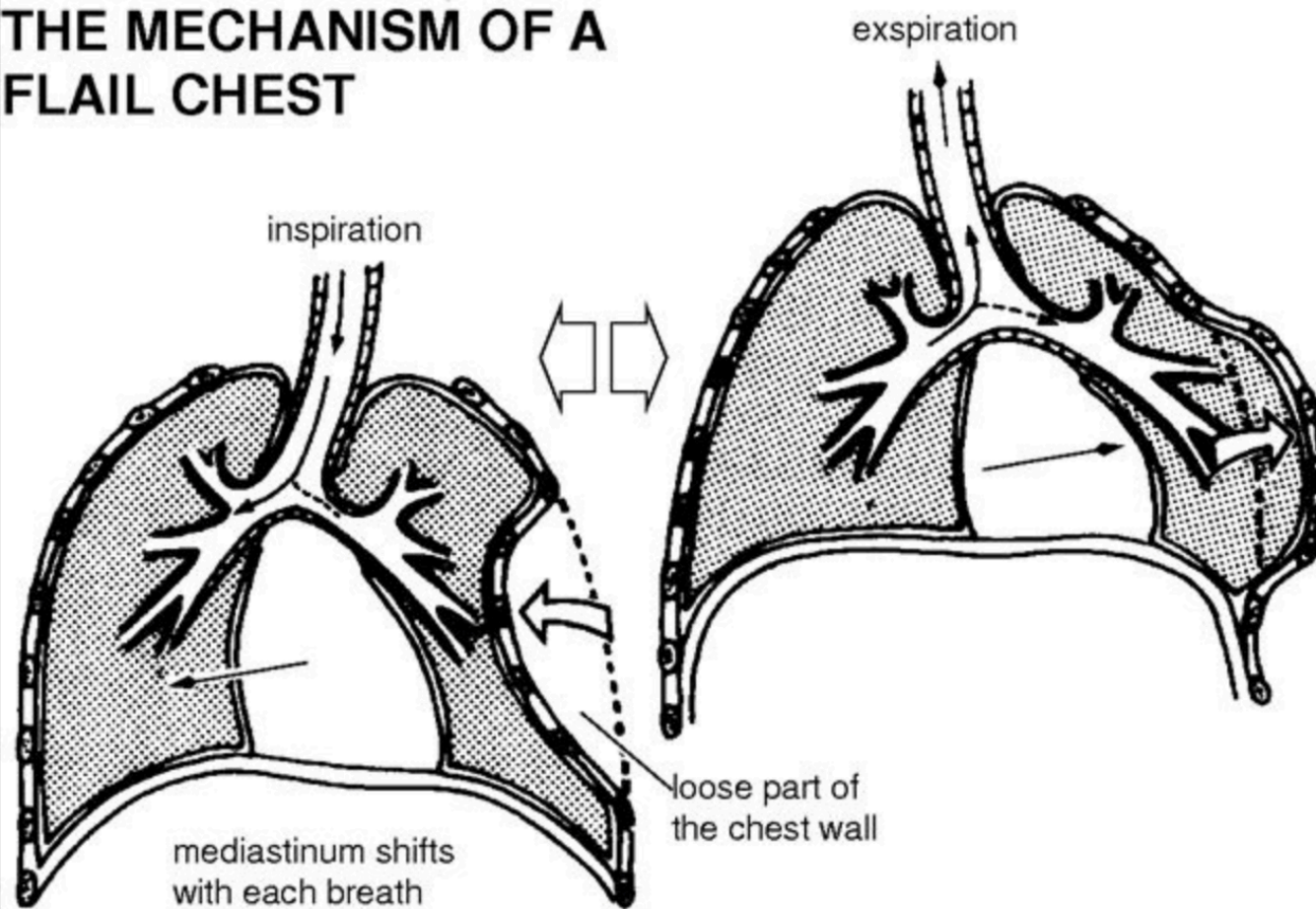
- Continue monitoring
 - At least 4-6 hours after a cardiovascular event
 - Or, at least 2 hours after a limited CNS event
- Do not exceed 12 mL/kg lipid emulsion (particularly important in the small adult or child)
 - Much smaller doses are typically needed for LAST treatment

CASUSSEN

- Vrouw 27 jaar
- Val van paard, kort bewustzijnsverlies
- Voorgeschiedenis: sectio
- Analgesie?



THE MECHANISM OF A FLAIL CHEST



GESIE VOOR
FRACTUREN

CASUSSEN

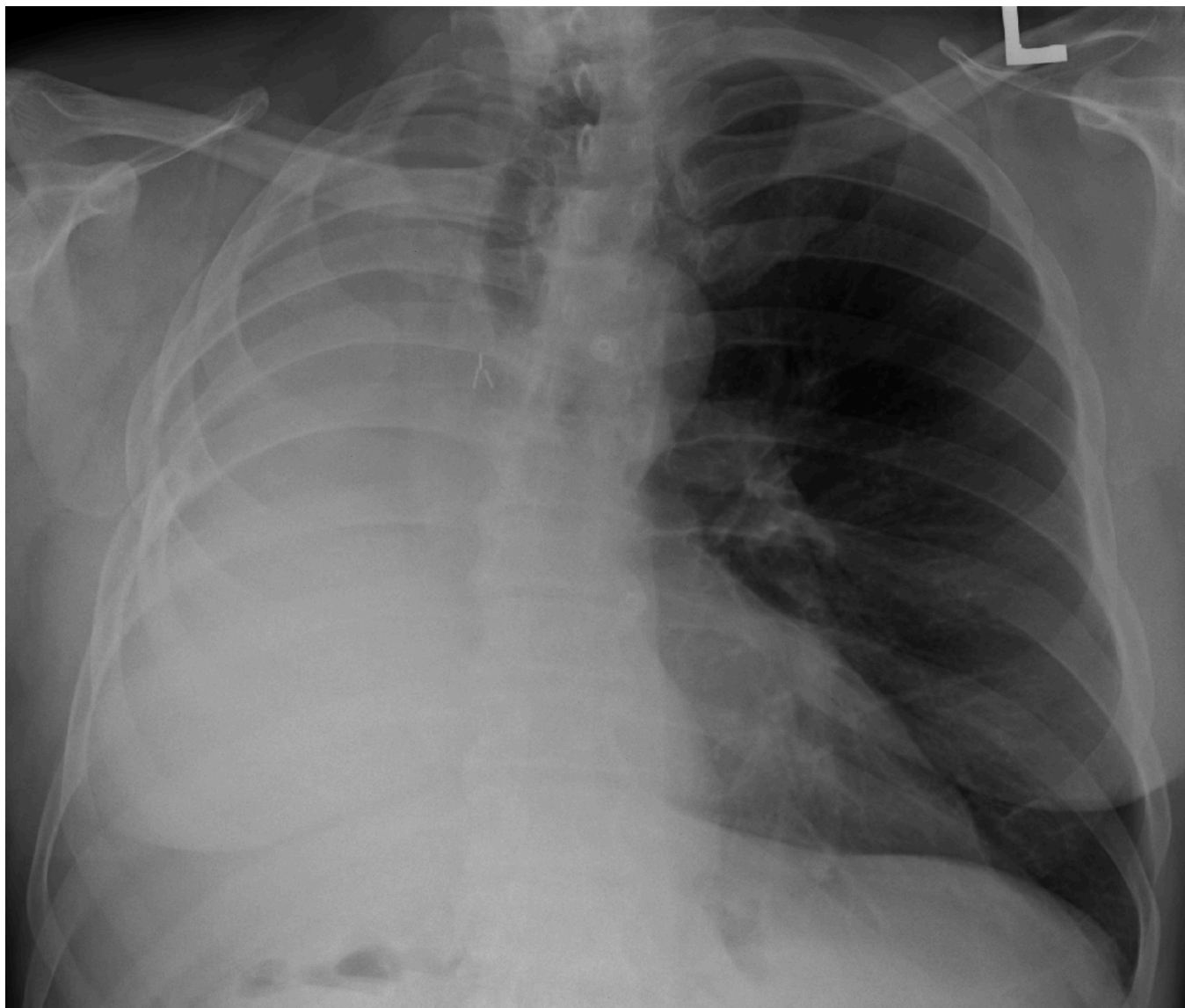
- Man 45 jaar
- Motor ongeval
- Voorgeschiedenis: AHT
- Analgesie?



CASUSSEN

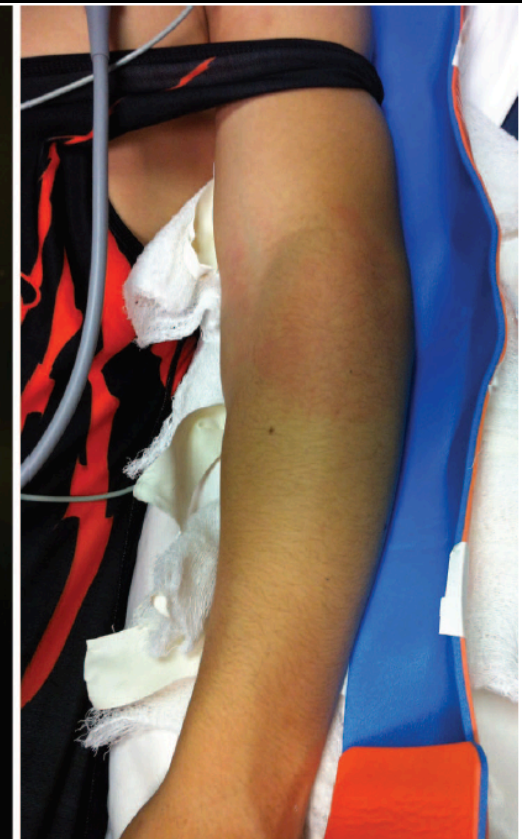
- Vrouw 85 jaar
- Val
- Voorgeschiedenis: AHT, diabetes, Hypercholesterolemie, AMI.
- Analgesie?





CASUSSEN

- Jongen, 16 jaar
- Val met fiets
- Voorgeschiedenis: blanco
- Analgesie?



CASUSSEN

- Kind 10 jaar
- Gevallen met een glas in de hand
- Voorgeschiedenis: blanco
- Analgesie?



CASUSSEN

- Man 65 jaar
- Plotse hevige rugpijn
- Bleek en misselijk van de pijn
- Analgesie?





"We can't make your pain go away, but we can do some procedures and create enough other pain that you won't notice the pain you have now nearly as much. And we can give you enough drugs so that you just don't care."

VRAGEN?