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Multimodal perioperative pain management protocols

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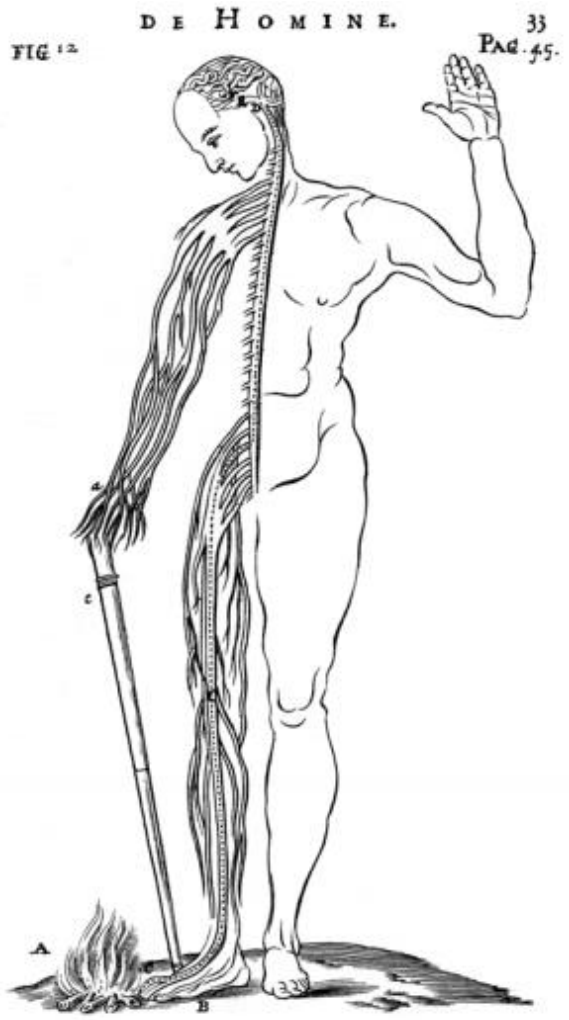
Neurological Institute | معهد الأعصاب

January 2016

title slide explained

- sensory response would “tug” on the tube, which would then open a gate between the tube and the brain
- opening of this gate would allow “animal spirits” to flow through these tubes & elicit a motor response
- pattern & rate of firing (intensity of tugging) of a fiber provided the adequate information to the brain about the stimulus intensity and quality



Descartes R, Clerselier C, La Forge L, Schuyl F. *L'homme et un Traitté de la Formation du Foetus du Mesme Autheur.* Paris: Charles Angot, 1664
https://www.rcpe.ac.uk/sites/default/files/ex-libris_6.pdf

objectives

- pain, pathways & central sensitization
- traditional analgesia
- opioids
- multimodal approach to analgesia
- multimodal perioperative pain protocol (MP3)

what is pain?

- pain is an unpleasant sensory and **emotional** experience associated with actual or potential tissue damage
- acute postoperative pain is a direct result of **tissue trauma**, the severity of which reflects the degree of tissue damage
- controlled by **neural, cellular, humeral factors**

Reference: derived from a 1964 definition by Harold Merskey, and it was first published in 1979 by IASP in Pain, number 6, page 250.

adverse physiological effects of pain

- endocrine - stress hormone release
- cortical responses - anxiety and fear
- cardiovascular - sympathetic response
- respiratory - hypoventilation, basal atelectasis, chest infection
- mobilization delayed - DVT, decubitus
- persistent postoperative pain

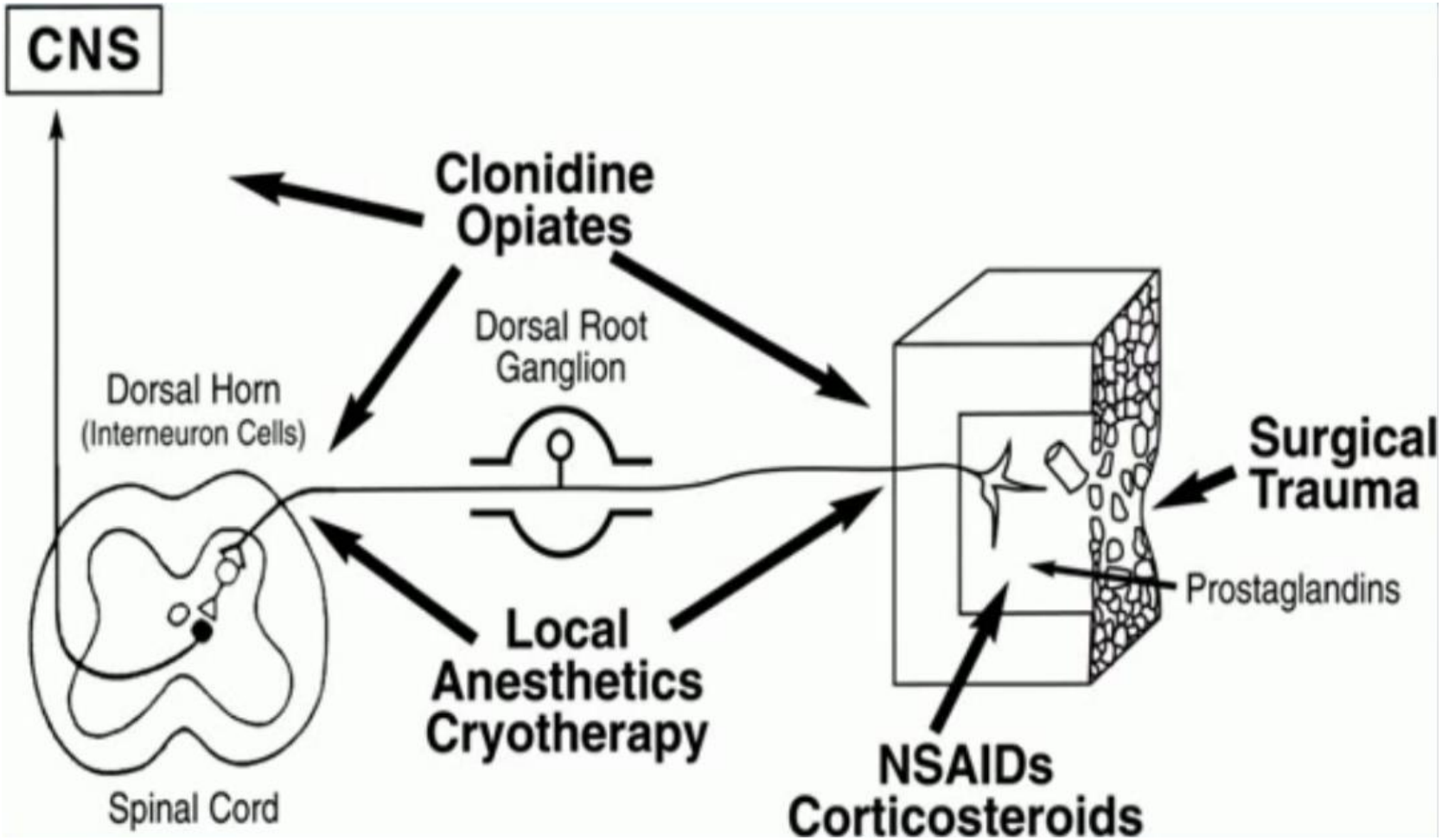
why treat pain?

- relieve suffering
- achieve early mobilization after surgery
- better functional recovery (physical & mental)
- improved patient experience
- compliant with JCAHO
- KPI

multimodal **preventative** pain management

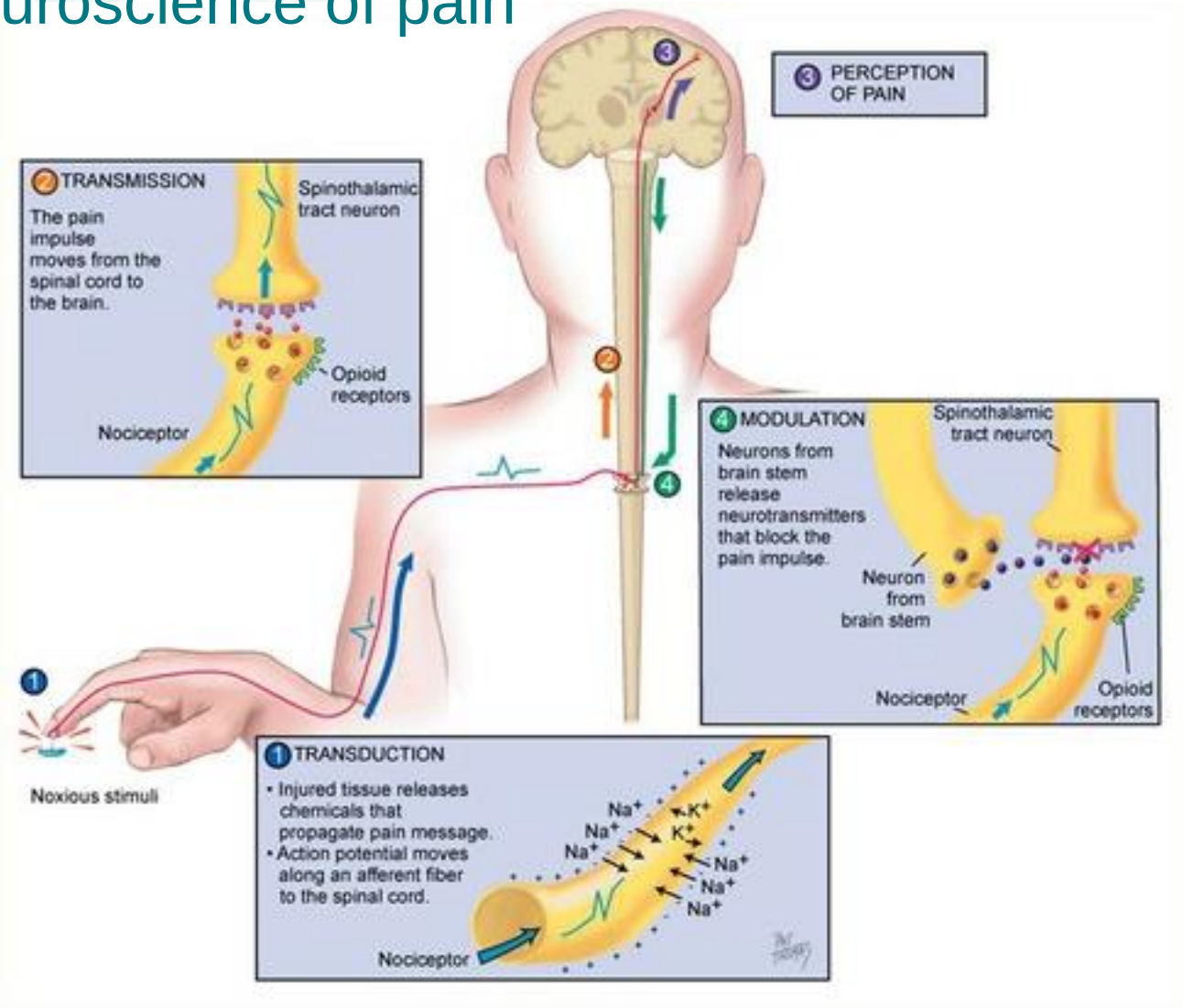
- minimize tissue **trauma**
- local anesthesia infiltration of surgical site
- non-opioid adjunct **medications**
- neuraxial/regional anesthesia
- medications that act at different points of pain pathway
- **education**: anticipate, don’t chase the pain

pain management pathway



https://www.vumedi.com/video/multimodal-pain-management-for-thr-without-routine-parenteral-narcotics/

neuroscience of pain



https://quizlet.com/14165290/assessment-10-pain-types-of-pain-flash-cards/

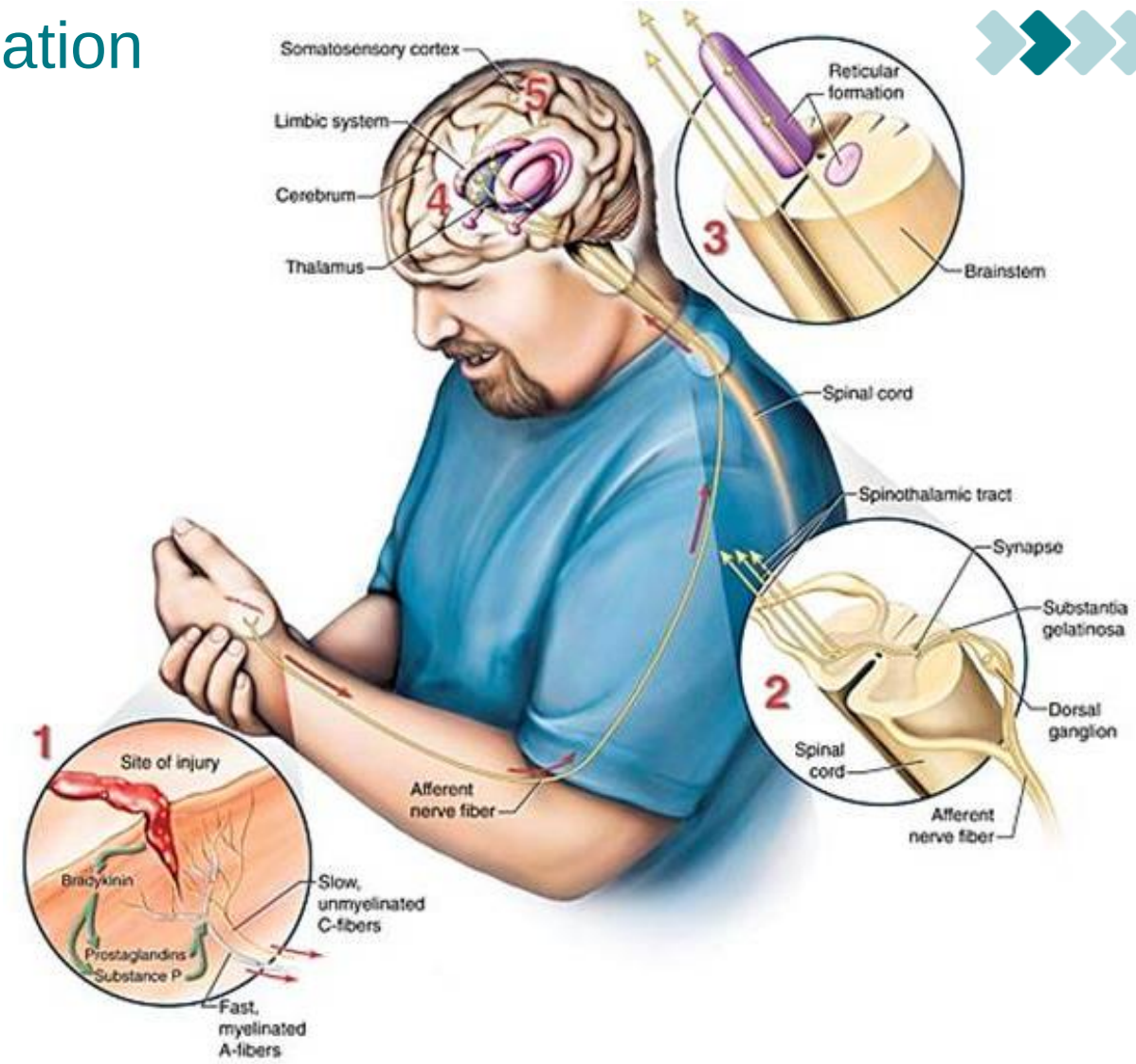
central sensitization

transduction

transmission

perception

modulation



Neurologic transmission of pain stimuli. (Source: Jason M. Alexander. © 2005, Wild Iris Medical Education.)

gate-control theory

- thin fiber activity *impedes the inhibitory cells* (tending to allow the transmission cell to fire)
- large diameter fiber activity *excites the inhibitory cells* (tending to inhibit transmission cell activity)
- the more large fiber (touch, pressure, vibration) activity relative to thin fiber activity at the inhibitory cell, the less pain is felt
- activation of nerves which do not transmit pain signals, called nonnociceptive fibers, can interfere with signals from pain fibers, thereby inhibiting pain
- rubbing your belly decreases pain caused by cutting your knee
- “pain is in the brain” & the importance of pre-operative education

Melzack R, Wall PD. *Pain mechanisms: a new theory.* Science. 1965;150(3699):971–9.

traditional pain management: CNS

- modify pain pathway at central nervous system
- opioids traditional medications of choice
- oral, injections, PCA, epidural, intrathecal

the opioid paradox

- good pain relief during and after surgery that improves surgical recovery
- good pain relief during and after surgery that also results in bad sedation, nausea, constipation, respiratory depression, cognitive impairment, disorientation

the opioid problem

July 2014

CDC Vitalsigns™

46

Each day, 46 people die from an overdose of prescription painkillers* in the US.

259 M

Health care providers wrote 259 million prescriptions for painkillers in 2012, enough for every American adult to have a bottle of pills.

10

10 of highest prescribing states for painkillers are in the South.

http://www.cdc.gov/vitalsigns/opioid-prescribing/index.html

adverse effects of narcotic pain medication

Table 1. Summary of Data Pre- and Post-Numerical Pain Treatment Algorithm Pain Standard

	Pre	Post
Hospital admissions	20,423	11,596
Hospital patient days	116,701	65,388
Mean Case-Mix Index (SD)	1.93 ± 0.12	2.06 ± 0.09*
Mean Patient satisfaction with pain control (SD)	4.13 ± 0.16	4.38 ± 0.08†
Patients with over sedation or respiratory failure	13	16
Patients with respiratory rate < 12 (%)	2 (15.4)	1 (6.25)
Patients with decreased consciousness (%)	12 (92.3)	15 (93.8)
Patients given naloxone (%)	6 (46.1)	11 (68.8)
Patients transferred to intensive care unit (%)	4 (30.8)	7 (43.8)
Mean Age (SD)	58.3 (16.2)	68.6 (13.8)
Gender (Males/Females)	5/8	7/9

* $P < 0.0002$; † $P < 0.001$.

Vila H, Smith RA, Augustyniak MJ, et al. *The efficacy and safety of pain management before and after implementation of hospital-wide pain management standards: Is patient safety compromised by treatment based solely on numerical pain ratings?* Anesth Analg. 2005;101:474-480.

the opioid problem here

TheNational | UAE
FRIDAY, JANUARY 22, 2016 | RABEA AL THANI 12, 1437

Tramadol is UAE abusers' drug of choice

Dana Moukhallati

June 12, 2015 *Updated: June 14, 2015 09:39 AM*

DUBAI // The prescription medication tramadol has emerged as the drug of choice for most recreational users in the UAE.

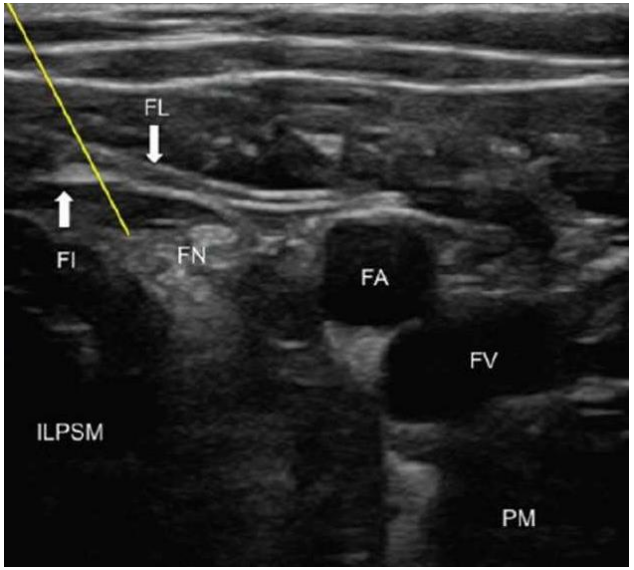
Experts estimate that between 2 per cent and 4 per cent of the population misuse prescription medication and users as young as 12 are reporting to rehabilitation centres with problems.

http://http://www.thenational.ae/uae/tramadol-is-uae-abusers-drug-of-choice

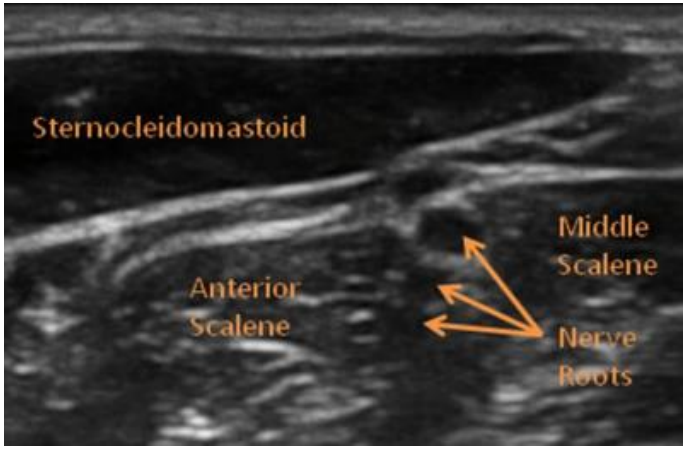
evolution of pain management: PNS

- peripheral nerve blocks
- plexus blocks
- in addition to CNS medications
- with or without narcotics

regional nerve blocks



- shoulder arthroplasty & arthroscopy (interscalene brachial plexus, suprascapular)
- total knee arthroplasty (femoral nerve)
- ankle replacements (popliteal)
- orthopaedic trauma

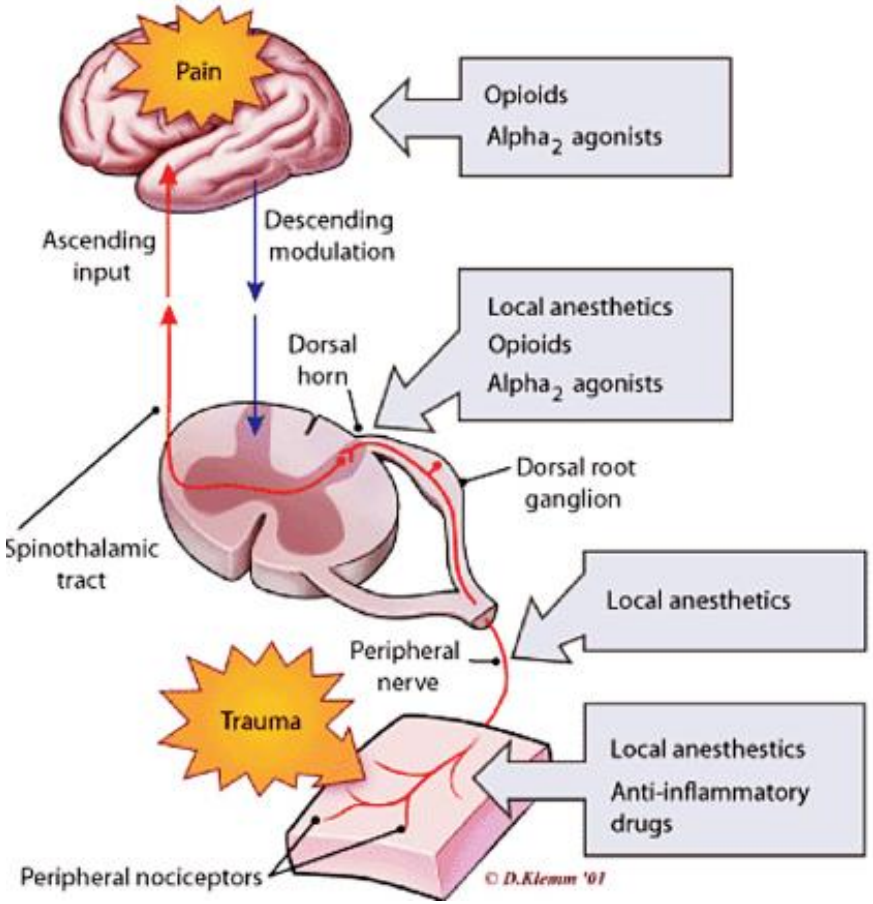


Chelly, Jacques E., et al. *Continuous femoral blocks improve recovery and outcome of patients undergoing total knee arthroplasty.* The Journal of arthroplasty 16.4 (2001): 436-445.

Hadzic, Admir, et al. *For outpatient rotator cuff surgery, nerve block anesthesia provides superior same-day recovery over general anesthesia.* The Journal of the American Society of Anesthesiologists 102.5 (2005): 1001-1007.

Gallardo, Jorge, et al. *Continuous popliteal block for postoperative analgesia in total ankle arthroplasty.* Foot & ankle international 33.3 (2012): 208-212.

multimodal preventative pain management



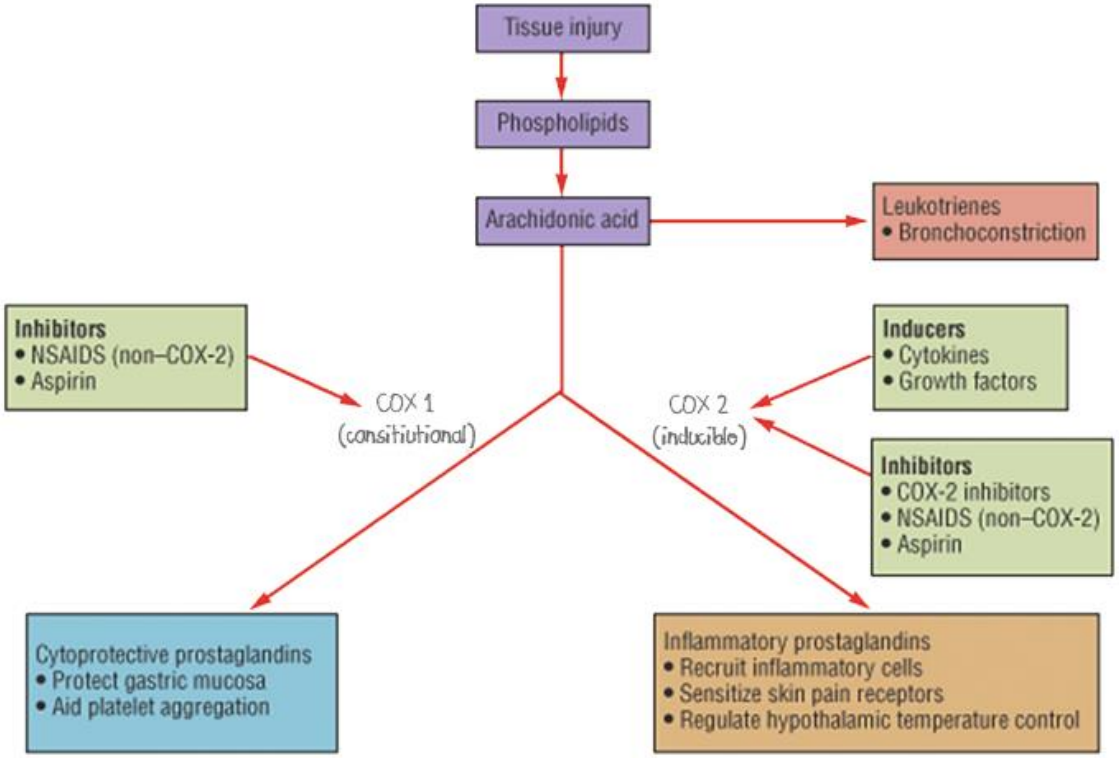
Parvataneni, Hari K., et al. *Controlling pain after total hip and knee arthroplasty using a multimodal protocol with local periarticular injections: a prospective randomized study.* The Journal of arthroplasty 22.6 (2007): 33-38.

phases of pain management

- office: education, spine school, joint school
- pre-operative: holding area
- intraoperative: OR
- acute post-operative
- home medications & education

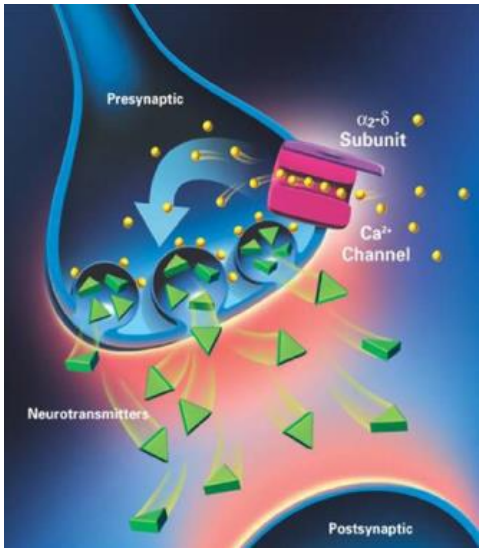
pre-operative NSAIDs & analgesics

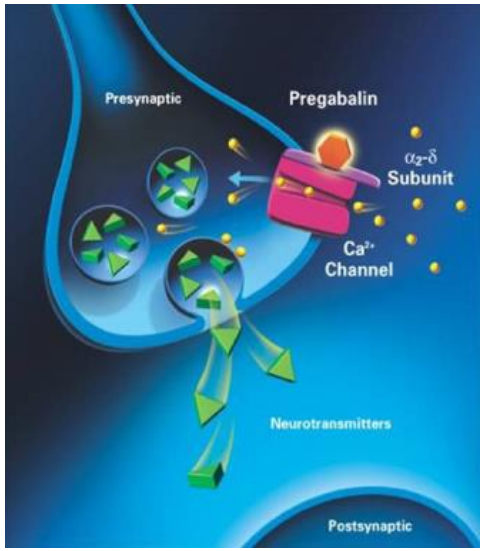
- ketorolac
- celecoxib
- paracetamol



pre-operative neuromodulators

- gabapentin & pregabalin
- modulate the subsequent release of excitatory neurotransmitters from activated nociceptors
- inhibit pain transmission
- inhibit central sensitization





Schmidt, Peter C., et al. *Perioperative gabapentinoids: choice of agent, dose, timing, and effects on chronic postsurgical pain.* Anesthesiology119.5 (2013): 1215-1221.

intraoperative spinal & epidural

- may facilitate early return of bowel function
- improves pain control
- effect on length of stay and outcomes are less consistent

Khan SA, Khokhar HA, Nasr AR, et al. *Effect of epidural analgesia on bowel function in laparoscopic colorectal surgery: a systematic review and meta-analysis.* Surg Endosc 2013; 27:2581.

intraoperative analgesia: lidocaine

- initial bolus (1.5 to 2 mg/kg) followed by infusion 1.5 to 3 mg/kg/hour
- continuous intravenous administration of lidocaine during and after abdominal surgery improves patient rehabilitation and shortens hospital stay

Marret E, Rolin M, Beaussier M, Bonnet F. *Meta-analysis of intravenous lidocaine and postoperative recovery after abdominal surgery*. Br J Surg 2008; 95:1331

intraoperative analgesia: α2 agonists

- clonidine & dexmetedomidine
- several useful perioperative benefits such as sedation, anxiolysis, analgesia, postoperative shivering, agitation, mitigation of stress response, anaesthetic-sparing effect
- enhances morphine analgesia after abdominal surgery

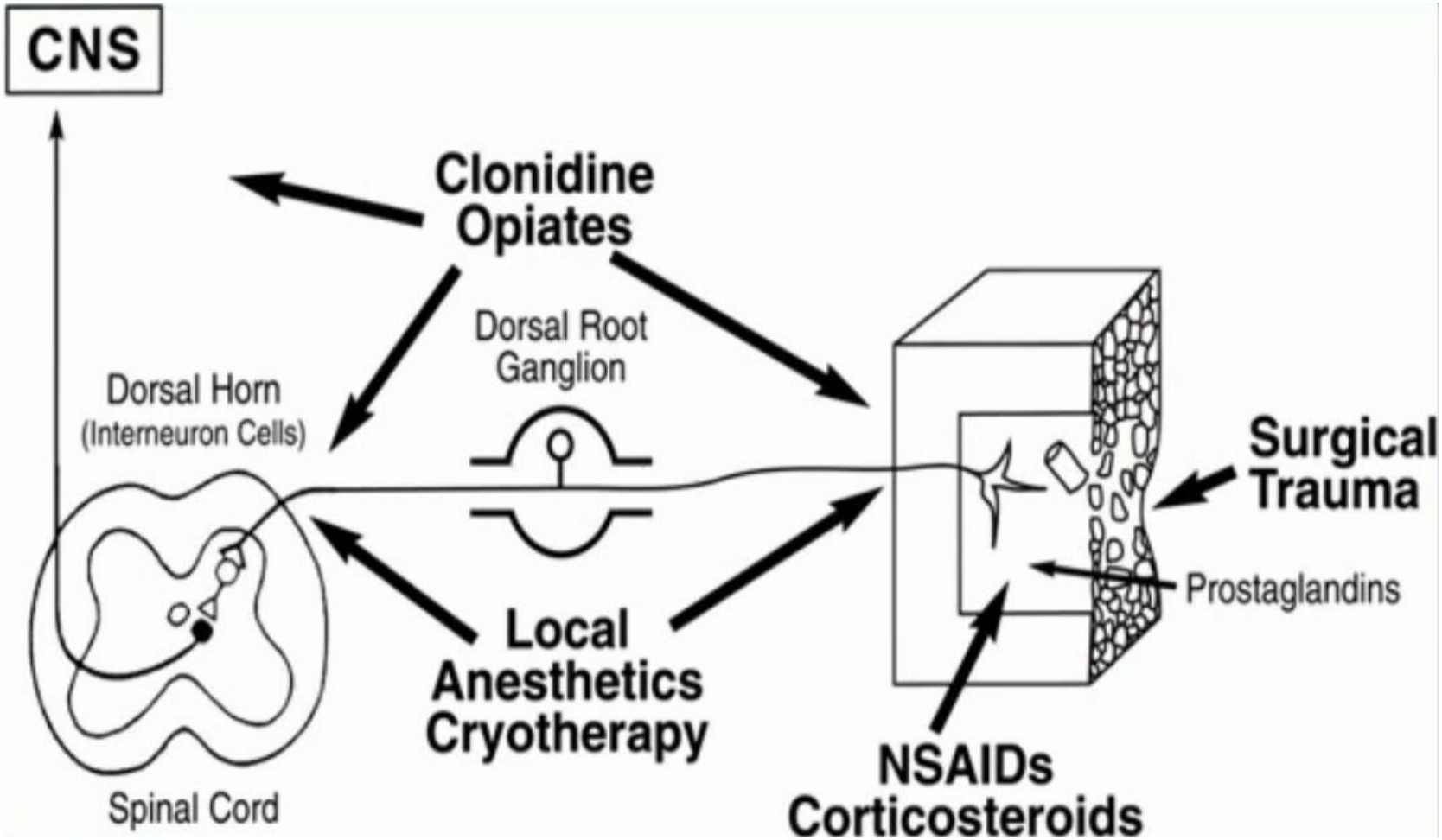
Gurbet, Alp, et al. *Intraoperative infusion of dexmedetomidine reduces perioperative analgesic requirements*. Canadian Journal of Anesthesia 53.7 (2006): 646-652.

surgical site analgesia: local infiltration

- bupivicaine-epinepherine
- ketorolac
- morphine
- dexamethasone

Vendittoli, Pascal-André, et al. *A multimodal analgesia protocol for total knee arthroplasty.* The Journal of Bone & Joint Surgery 88.2 (2006): 282-289.

pain management pathway



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Cleveland Clinic Abu Dhabi Spine Surgery Multimodal Perioperative Pain Protocol (MP3)

minimize tissue trauma

spine surgery: minimally invasive techniques

shoulder surgery: arthroscopy

Cleveland Clinic Abu Dhabi Spine Surgery Multimodal Perioperative Pain Protocol (MP3)

<u>pre-operative in holding area</u>

celecoxib 400 mg PO x 1 (hold if sulfa allergy or GFR < 65)
gabapentin 600 mg PO x 1
oxycodone SR 10 mg PO x 1
metoclopramide 10 mg IV x 1 (hold if age > 75)
pantoprazole 40 mg PO x1

Cleveland Clinic Abu Dhabi Spine Surgery
Multimodal Perioperative Pain Protocol (MP3)

<u>intra-operative injection</u>

total 100mL cocktail of:

bupivacaine-epinephrine (PF) 0.5%-1:200,000 injection 20 mL

ketorolac (30 mg/mL) 1 mL

morphine (10 mg/mL) 0.5 mL

normal saline solution 78.5 mL

Cleveland Clinic Abu Dhabi Spine Surgery Multimodal Perioperative Pain Protocol (MP3)

<u>intra-operative medication:</u>

clonidine 30 mcg IV x1 (beware sedation & hypotension)
desamethasone 8mg IV x 1 (No steroid in diabetics, immunocompromised, elderly (> 80 years)
lidocaine 1.5mg/kg bolus followed by 2mg/kg/hr
magnesium sulfate 40 mcg/kg IV x1
ondansetron 4 mg IV x 1 (hold if allergy)
paracetamol 1 gram IV x 1

Cleveland Clinic Abu Dhabi Spine Surgery Multimodal Perioperative Pain Protocol (MP3)

post-operative floor:

pain control standing orders:
celecoxib 200 mg PO BID
diazepam 5 mg Q8 hrs x 48 hours
gabapentin 300 mg PO BID
ketorolac 15 mg IV Q6 hrs x 48 hours
oxycodone 10 mg Q6 hrs x 48 hours
paracetamol 1 g Q6 hrs

pain control PRN:
diazepam 5 mg Q8 hrs PRN spasms starting POD #2
oxycodone 10 mg Q6 hrs PRN pain starting POD #2
morphine Sulfate 2mg IV Q2 hrs (NO PCA POST-OPERATIVELY) prn moderate pain (4-6) (hold if RR<12 or heavily sedated)

GI Rx:
ondansetron 4mg IV Q8hrs prn nausea
pantoprazole 40 mg PO daily
docusate 100 mg PO BID
senna 10 mg PO BID

Cleveland Clinic Abu Dhabi Spine Surgery Multimodal Perioperative Pain Protocol (MP3)

hospital discharge medications:

celecoxib 200 mg PO BID x 6 weeks (84 tabs)
gabapentin 300 mg PO TID x 2 weeks (42 tabs)
oxycodone 10 mg SR 1 tabs PO Q12 hrs prn pain x 30 days (60 tabs)
paracetamol 1000 mg PO TID x 1 week (21 tabs)
pantoprazole 40 mg PO daily x 6 weeks (42 tabs)

DVT prophylaxis:

enoxaparin 30 mg sc daily starting POD#2 (major risk factors) or #4 (minor risk factors)

Cleveland Clinic Abu Dhabi Spine Surgery Multimodal Perioperative Pain Protocol (MP3)

very preliminary data

30 spine surgeries (cervical & lumbar)

no use of opioid PCA

immediate post-operative VAS in PACU range 1-3

thank you
for your interest & attention