CHRONIC POSTOPERATIVE PAIN

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edit Bank


Keys points

- Definition
- Significance
- Patophysiology
- Prevention

Intoduction

- Postoperative pain ---- Acute pain

ACUTE PAIN	CHRONIC PAIN
Immediate	Lasts longer than 3-6 months
Warning	Has no purpose
Easier to treat	Harder to identify the cause
Has its end	Harder for treatment

Acute pain

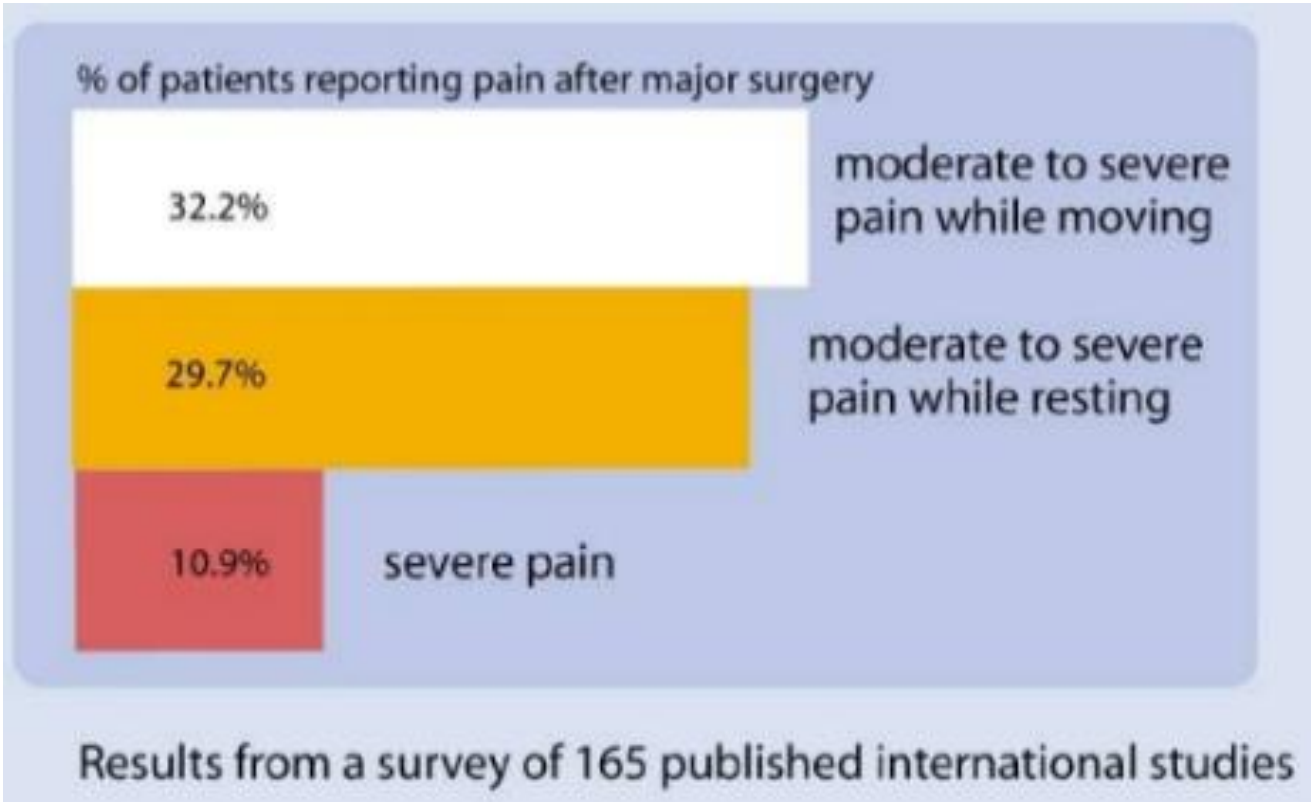
- It is the initial stage of a strong, permanent nociception cascade that, in a very short period of time, due to the development of central and peripheral sensitization, can develop into chronic pain.

- About 50% of patients experience moderate to severe pain after surgery

- Reasons for frequent poor pain management:
  - lack of knowledge
  - fear of respiratory depression
  - Fear of developing addiction

- More than 100 million people in the United States and Europe and 312 million worldwide undergo surgical procedures each year
- The number of surgical procedures increased 34% between 2004 and 2012
- These numbers are expected to grow

Postoperative pain



Dolin Sj et al. Br J Anaesth 2002, 89:409-423.

The intensity, quality and duration of postoperative pain are affected by

- the physical and mental state of the patient, including the patient's personal approach to pain
- preoperative psychological and pharmacological preparation
- type and duration of surgery
- the type and extent of incision and surgical trauma
- type of anesthesia
- treatment of pain before and after surgery
- frequency of surgical complications
- quality of postoperative health care

Why Treat Acute Pain?

- For ethical and humane reasons
- Decreasing of harmful physiological and psychological factors
- Decreasing the risk of chronic pain developing

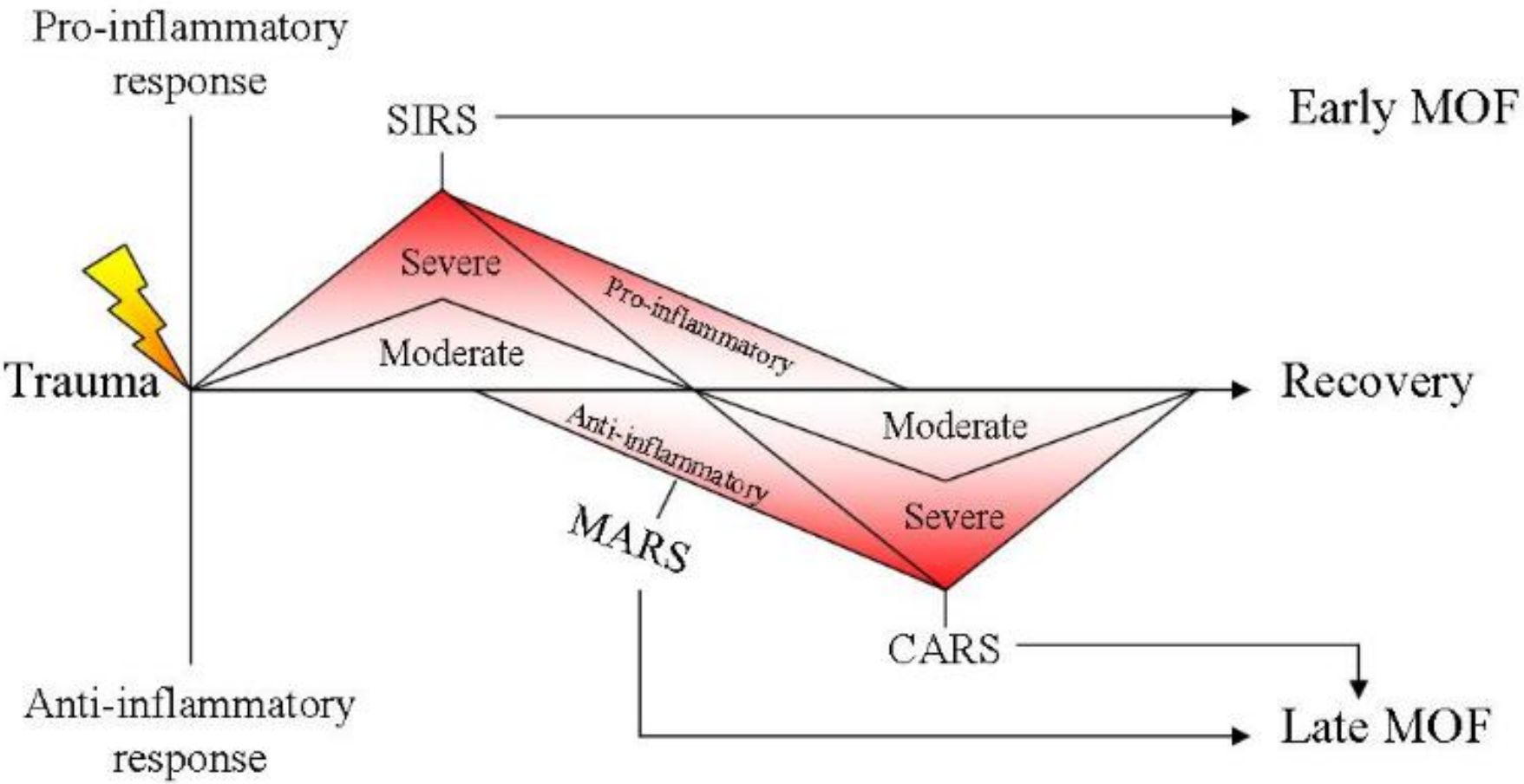
Why Treat Acute Pain?

Numerous clinical studies have shown that prolonged and increased sympathetic, neurohumoral, and immune responses to inadequately treated acute pain in daily clinical practice lead to:

- delayed slow healing of the operative wound
- insufficiency of surgical anastomoses
- increased incidence of pulmonary complications and thromboembolic incidents
- increased incidence of cardiovascular complications especially coronary incidents

Kehlet H. Effects of postoperative pain relief on outcome. 2005; An updated review: Refresher course syllabus. IASP Press. Seatle277-281

Immunoinflammatory changes after surgery



Why Treat Acute Pain?

To reduce the risk of Chronic postoperative Pain Syndrome (CPPS)

- Although pain decreases over time in most patients, some patients (~ 1 in 10 to 20) develop chronic pain after surgery or injury.
- Treatment is needed in about 50% of these patients.
- The risk of developing chronic pain is higher in patients who have experienced severe pain after surgery.
- Chronic pain is difficult to treat.
- Not to avoid strong opioids after surgery, the problem of developing addiction in these patients is negligible.

The incidence of HPBS after certain interventions

Surgery	Pain syndrome	Incidence
• Limb amputation	Phantom limb pain	30-81%
• Thoracotomy	Post-thoracotomy pain (PTPS)	> 50%
• Breast surgery	Post-mastectomy pain (PMPS)	scar 11-57% phantom 13-24% arm, shoulder 12-51%
• Gall bladder	Post-cholecystectomy (PCS)	3-56%
• Inguinal hernia	Groin pain	overall 11.5% (0-37%)

Perkin FM, Kehlet H. Anesthesiology 2000. 93:1123-1133.

Definition

- ***Chronic (or persistent) postoperative pain (CPOP) is a potentially devastating outcome from an otherwise successful surgical procedure.***

successful surgical procedure. Patients experience pain (2–10% of the time of severe intensity [1]) long after they have healed from the surgical insult. Chronic pain leads to increased direct medical costs by additional resource utilization and increased indirect costs through job absenteeism and loss of productivity. There is also a significant impact on individuals and their families, affecting their physical functioning, psychological state, and quality of life [2]. The first publication that identified prior surgery as a cause of chronic pain came from a pain clinic in Northern England in 1998 where Crombie *et al.* found that almost one in four patients attributed their pain to an operation [3]. Since that time, it has been shown that depending on the type of surgery, the incidence of CPOP is anywhere between 5 and 85% [4]

- ***different pain characteristics than preoperative pain and is a continuum of acute postoperative pain that may develop after an asymptomatic period*** (According to the International Classification of Diseases)

The criteria to establish a diagnosis of CPOP

1) the pain must have developed after surgery,
2) the pain is of at least 2 months in duration,
3) other causes for the pain have been excluded,
4) the possibility that the pain is continuing from a pre-existing problem must be explored and exclusion attempted

MacraeWA, Davies HTO: Chronic postsurgical pain.In Epidemiology of pain.Edited by Crombie IK, Linton S, Croft P,Von Korff M, LeResche L. Seattle: IASP Press;1999;125–42.

Chronic post-surgical pain: 10 years on

W.A. Macrae
Ninewells Hospital and Medical School, Dundee DD1 9SY and The Bute Medical School, University of St Andrews, St Andrews, KY16 9TS, Scotland

Conclusions

Chronic pain after surgery is common. The standard of research has improved markedly in recent years, but much work remains to be done, particularly in the fields of mechanisms and risk factors. Improving the management of acute postoperative pain is one strategy which may prevent CPSP, but there are many technical, organizational, and cultural barriers to be overcome in order to achieve that improvement.

Mastectomy	20–50%	18 000	131 000
Caesarean section	6%	139 000	858 000
Amputation	50–85%	15 000	132 000
Cardiac surgery	30–55%	29 000	501 000
Hernia repair	5–35%	75 000	689 000
Cholecystectomy	5–50%	51 000	667 000
Hip replacement	12%	61 000	
Thoracotomy	5–65%		660 000

The newly proposed criteria

1) the pain develops after a surgical procedure or increases in intensity after the surgical procedure,

2) the pain is of at least 3–6 months' duration and significantly affects quality of life,

3) the pain is a continuation of acute post-surgery pain or develops after an asymptomatic period,

4) the pain is localized to the surgical field, projected to the innervation territory of a nerve situated in the surgical field, or referred to a dermatome,

5) other causes of the pain should be excluded

Werner MU, Kongsgaard UE. Defining persistent post-surgical pain: is an update required? Br J Anaesth. 2014 Jul; 113(1):1-4.

Risk factors for the development of CPOP

- having preoperative pain,
- psychological factors (e.g. anxiety, depression, and catastrophizing),
- demographics (e.g. female gender and younger age),
- surgical factors (e.g. open approach and length >3 hours),
- the intensity of pain in the immediate postoperative period (i.e. first few days).

Eur J Anaesthesiol. 2015 Oct;32(10):725-34. doi: 10.1097/EJA.0000000000000319.

Chronic postsurgical pain in Europe: An observational study.

Fletcher D[1], Stamer UM, Pogatzki-Zahn E, Zaslansky R, Tanase NV, Perruchoud C, Kranke P, Komann M, Lehman T, Meissner W; euCPSP group for the Clinical Trial Network group of the European Society of Anaesthesiology.

⊕ Collaborators (24)

⊖ Author information

In 2015, Fletcher *et al*. conducted a survey of CPOP at 21 hospitals across 11 European countries and found, at 6 months, the overall incidence of mild pain (score = 1–2/10) to be 24% and of moderate-to-severe pain (score ≥ 3/10) to be 16%; at 12 months, the incidence of mild pain was 23% and of moderate-to-severe pain was 12% [2]. Acknowledging a very low follow-up response rate (≈30%) in this study, the authors identified a novel risk factor that deserved further investigation. The duration of severe pain in the initial 24 hours postoperatively, as opposed to the intensity of pain, predicted the chance of developing CPOP [2]. For every 10% increase in time spent in severe pain, the risk of developing CPOP went up by 30%

BACKGROUND: Chronic postsurgical pain (CPSP) is an important clinical problem. Prospective studies of the incidence, characteristics and risk factors of CPSP are needed.

OBJECTIVES: The objective of this study is to evaluate the incidence and risk factors of CPSP.

DESIGN: A multicentre, prospective, observational trial.

SETTING: Twenty-one hospitals in 11 European countries.

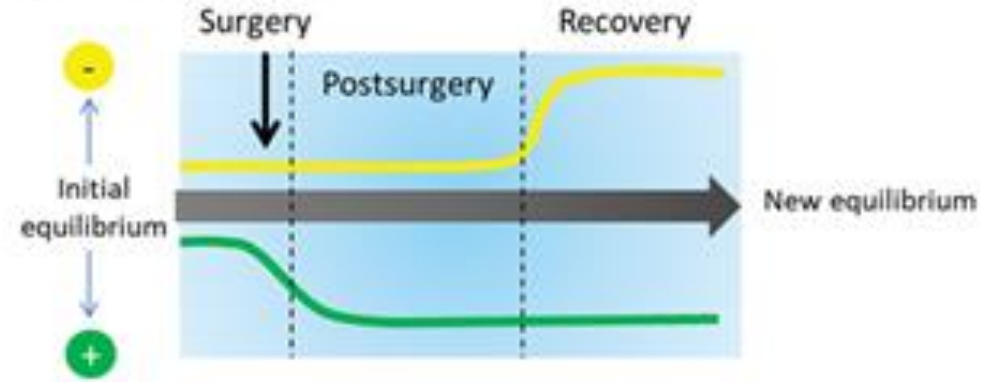
PATIENTS: Three thousand one hundred and twenty patients undergoing surgery and enrolled in the European registry PAIN OUT.

MAIN OUTCOME MEASURES: Pain-related outcome was evaluated on the first postoperative day (D1) using a standardised pain outcome questionnaire. Review at 6 and 12 months via e-mail or telephonic interview used the Brief Pain Inventory (BPI) and the DN4 (Douleur Neuropathique four questions). Primary endpoint was the incidence of moderate to severe CPSP (numeric rating scale, NRS ≥3/10) at 12 months.

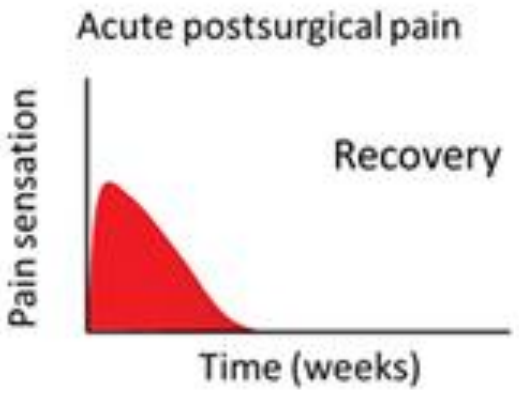
Neural-based mechanisms

Dynamic interaction between inhibition and facilitation

1. Normal response



Pain response



Antinociceptive systems

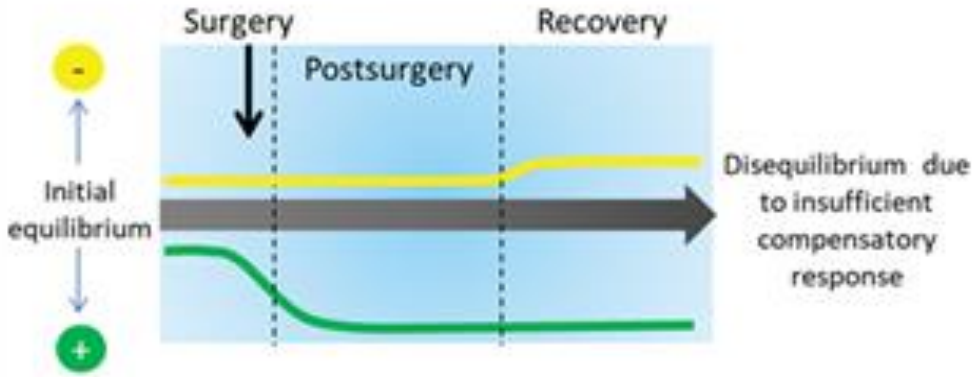
Pronociceptive systems

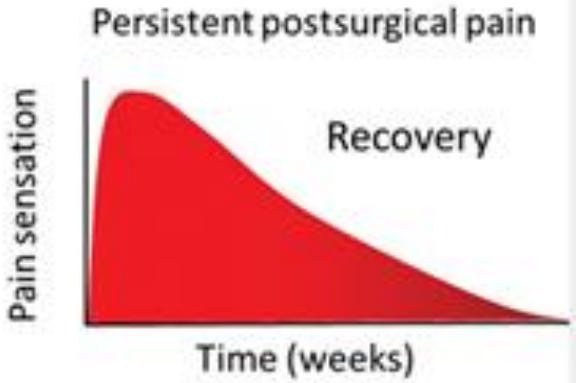
Neural-based mechanisms

Dynamic interaction between inhibition and facilitation

Pain response

2. Default in inhibition





Antinociceptive systems

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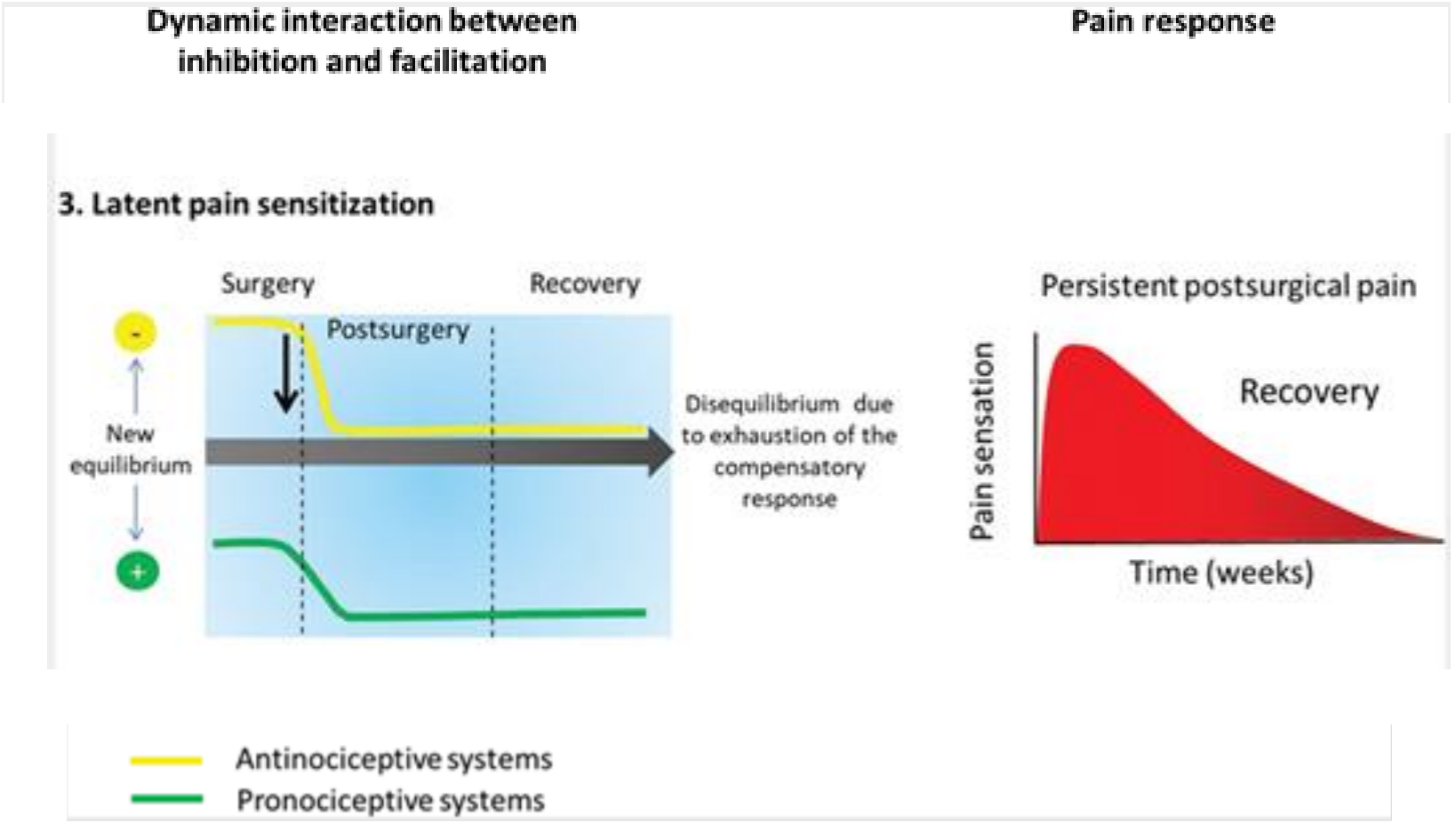
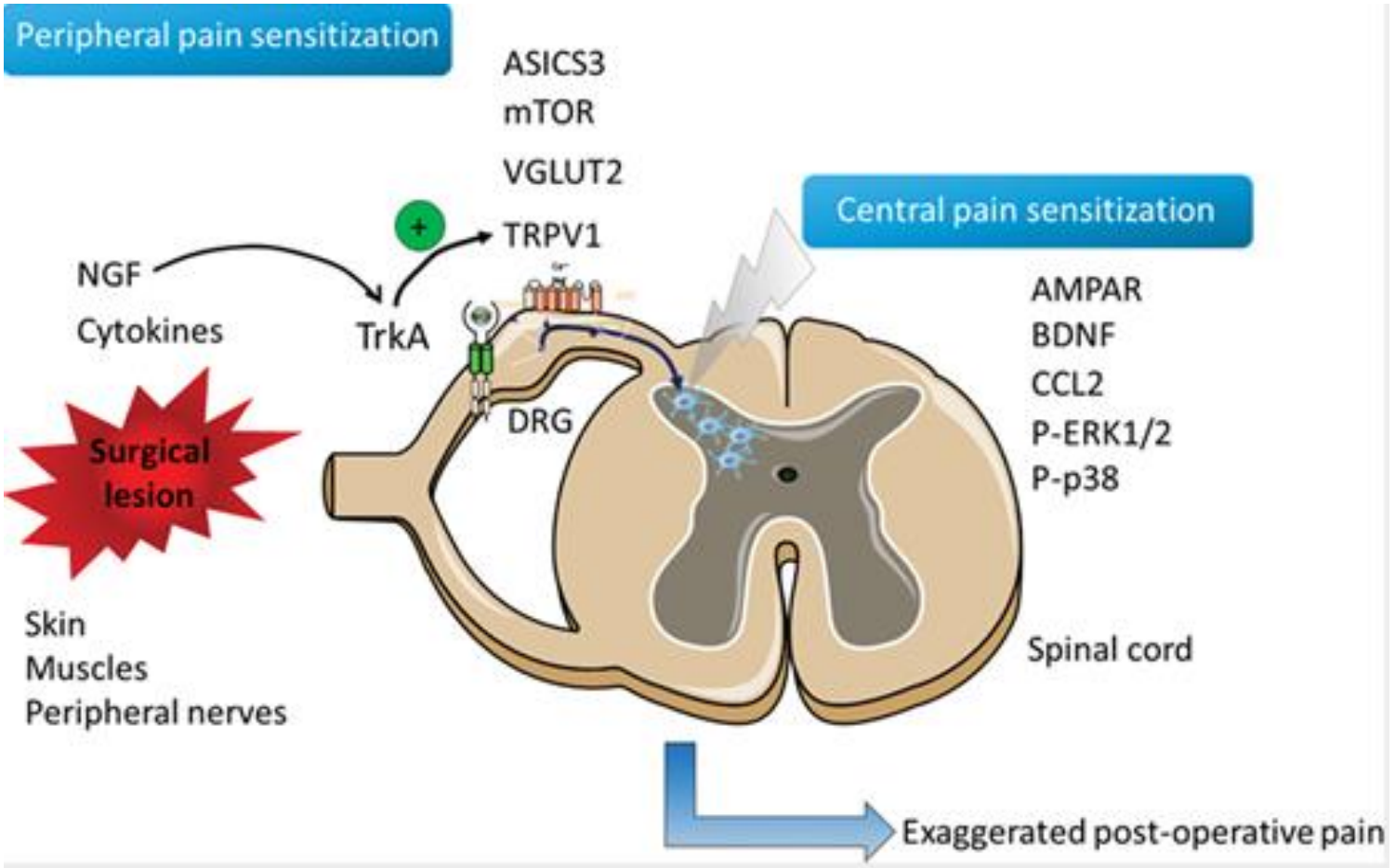
Neural-based mechanisms



Neural-based mechanisms



Prevention

- Crucial
- Identifying the risk factors in each patient
- Applying a timely preventive strategy
- ***Choice of agents must include those that prevent sensitization (e.g. gabapentinoids or N-methyl-D-aspartate receptor antagonists) and not just treatment of somatic pain (opioids)***

Prevention

- Multimodal analgesia during the perioperative period - better for acute postoperative pain management

- MMA example - *gabapentin, NSAIDs, acetaminophen, and regional anesthesia with the conventional analgesia technique*

- *Multimodal regimens have focused on the use of opioids, α2-adrenergic agonists, COX antagonists, gabapentin, pregabalin, steroids, NMDA antagonists, and local anesthetics*

Some pharmacological agents in prevention

- *Gabapentin and pregabalin*

Anesth Analg. 2012 Aug;115(2):428-42. doi: 10.1213/ANE.0b013e318249d36e. Epub 2012 Mar 13.

The prevention of chronic postsurgical pain using gabapentin and pregabalin: a combined systematic review and meta-analysis.

Clarke H[1], Bonin RP, Orser BA, Englesakis M, Wijeysundera DN, Katz J.

Author information

1 Department of Anesthesia and Pain Management, Toronto General Hospital, 200 Elizabeth Street, Eaton North 3 EB 317, Pain Research Unit, Toronto, ON M5G 2C4, Canada. hance.clarke@utoronto.ca

Abstract

BACKGROUND: Many clinical trials have demonstrated the effectiveness of gabapentin and pregabalin administration in the perioperative period as an adjunct to reduce acute postoperative pain. However, very few clinical trials have examined the use of gabapentin and pregabalin for the prevention of chronic postsurgical pain (CPSP). We (1) systematically reviewed the published literature pertaining to the prevention of CPSP (≥ 2 months after surgery) after perioperative administration of gabapentin and pregabalin and (2) performed a meta-analysis using studies that report sufficient data. A search of electronic databases (Medline, Embase, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, IPA, and CINAHL) for relevant English-language trials to June 2011 was conducted.

CONCLUSIONS: The present review supports the view that perioperative administration of gabapentin and pregabalin are effective in reducing the incidence of CPSP. Better-designed and appropriately powered clinical trials are needed to confirm these early findings.

Some pharmacological agents in prevention

- Gabapentin and pregabalin

Br J Anaesth. 2015 Jan;114(1):10-31. doi: 10.1093/bja/aeu293. Epub 2014 Sep 10.

Impact of pregabalin on acute and persistent postoperative pain: a systematic review and meta-analysis.

Mishriky BM[1], Waldron NH[1], Habib AS[2].

Author information

1 Department of Anesthesiology, Duke University Medical Center, Box 3094, Durham, NC 27710, USA.
2 Department of Anesthesiology, Duke University Medical Center, Box 3094, Durham, NC 27710, USA habib001@dm.duke.edu.

Another systematic review and meta-analysis was conducted by Mishriky et al. to assess the analgesic efficacy of perioperative pregabalin. They found that pregabalin significantly reduced the incidence of pain at 6 months (4% vs 15%) and 12 months (9% vs 20%; RR [95% CI] = 0.31 [0.10, 0.92, I^2 = 15%] and 0.47 [0.23, 0.97, I^2 = 0%], respectively) [34].

Some pharmacological agents in prevention

- Antidepressants
- Reducing neuropathic pain and the common association of depression with chronic pain
- The limited data on the use of antidepressants presently precludes their use for the prevention of CPSP.

Some pharmacological agents in prevention

- NMDA antagonists (ketamine)
- Main analgesic activity occurs through antagonism in N-methyl-D-aspartate (NMDA) receptor, as it plays an important role in the

Ketamine can be used to prevent chronic persistent pain with good results by multimodal and balanced analgesic regimens. In a study of patients who underwent colon resection, the use of intravenous ketamine during surgery associated with epidural anesthesia significantly reduced pain levels by up to six months after the procedure.[45]

systemic opioids

- Ketamine can be used to prevent chronic persistent pain with good results by multimodal and balanced analgesic regimens.

M. De Kock, P. Lavand'homme, H. Waterloos
"Balanced analgesia" in the perioperative period: is there a place for ketamine?
Pain, 92 (2001), pp. 373-380

Some pharmacological agents in prevention

- ***Alpha-2 agonists (Clonidine)***

- Subarachnoid clonidine (300 mg) and bupivacaine, compared with bupivacaine alone, for colon surgery found that the incidence of chronic pain after after 6 and 12 months was significantly less (*F. Bonnet, V.B. Buisson, Y. Francois, et al.* ***Effects of oral and subarachnoid clonidine on spinal anesthesia with bupivacaine*** *Reg Anesth, 15 (1990), pp. 211-214)*

- ***Have in mind :*** **effects of sedation, hypotension, bradycardia, and prolonged nerve block**

Some pharmacological agents in prevention

- ***Lidocaine***
- for perineural injections
- perioperatively for the reduction of acute postoperative pain.
- Increasing for the management of chronic pain

An intraoperative, intravenous, lidocaine infusion has been found to be effective for the prevention of CPSP after breast cancer surgery in a study conducted by Grigoras et al. Their study used a 1.5 mg/kg bolus of intravenous lidocaine before induction of general anesthesia, which was then followed by lidocaine infusion at 1.5 mg/kg/hour; the control group used an equal volume of saline. They found a significant reduction in the incidence and severity of CPSP with lidocaine at 3 months postoperatively ($P = 0.031$) [41].

Grigoras A, Lee P, Sattar F, Shorten G. Perioperative intravenous lidocaine decreases the incidence of persistent pain after breast surgery. Clin J Pain. 2012;28:567–572.

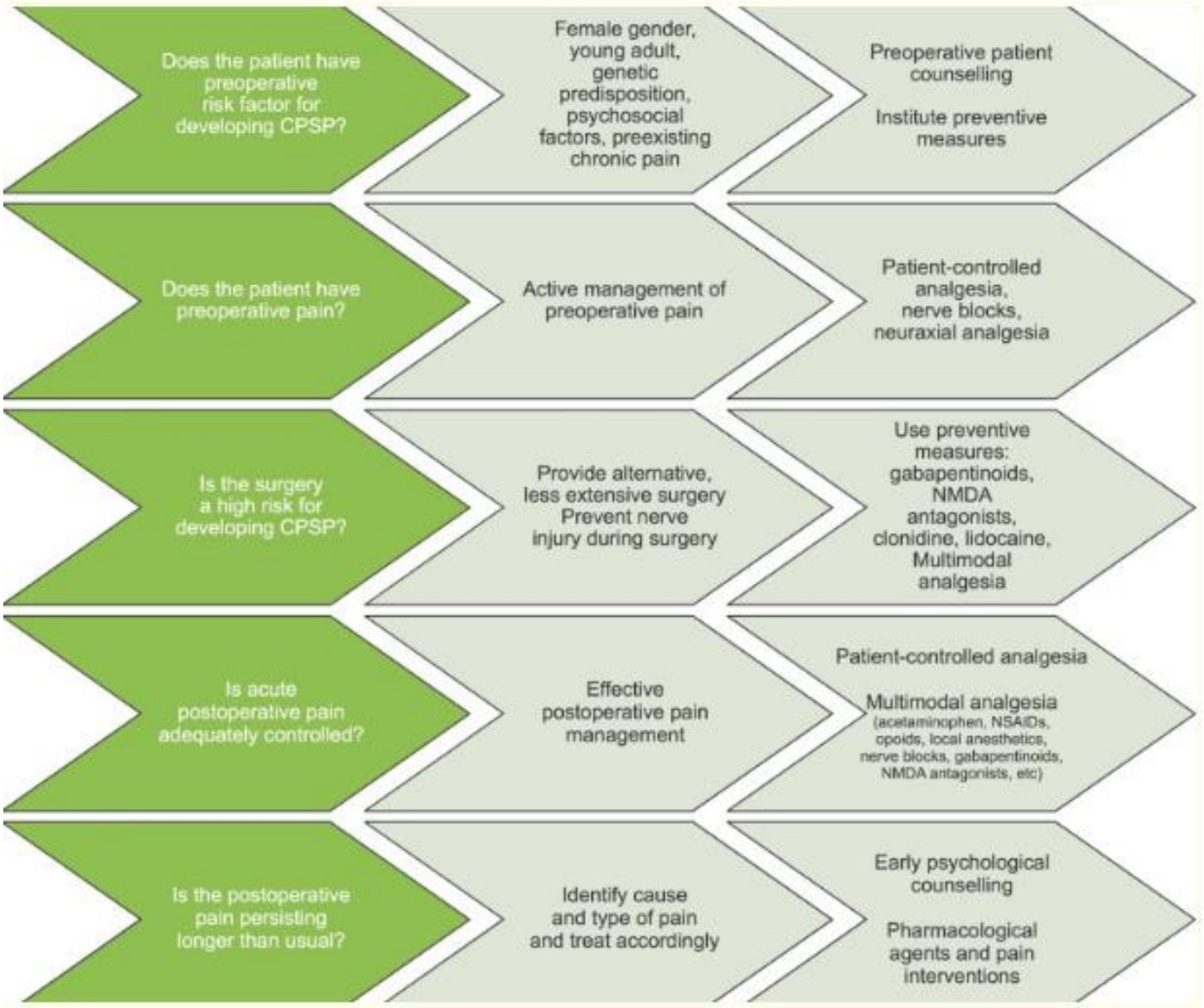
Some pharmacological agents in prevention

- ***NSAIDs and acetaminophen***
- *Steroids*
- Role in CPSP prevention has not yet been identified.

Some pharmacological agents in prevention

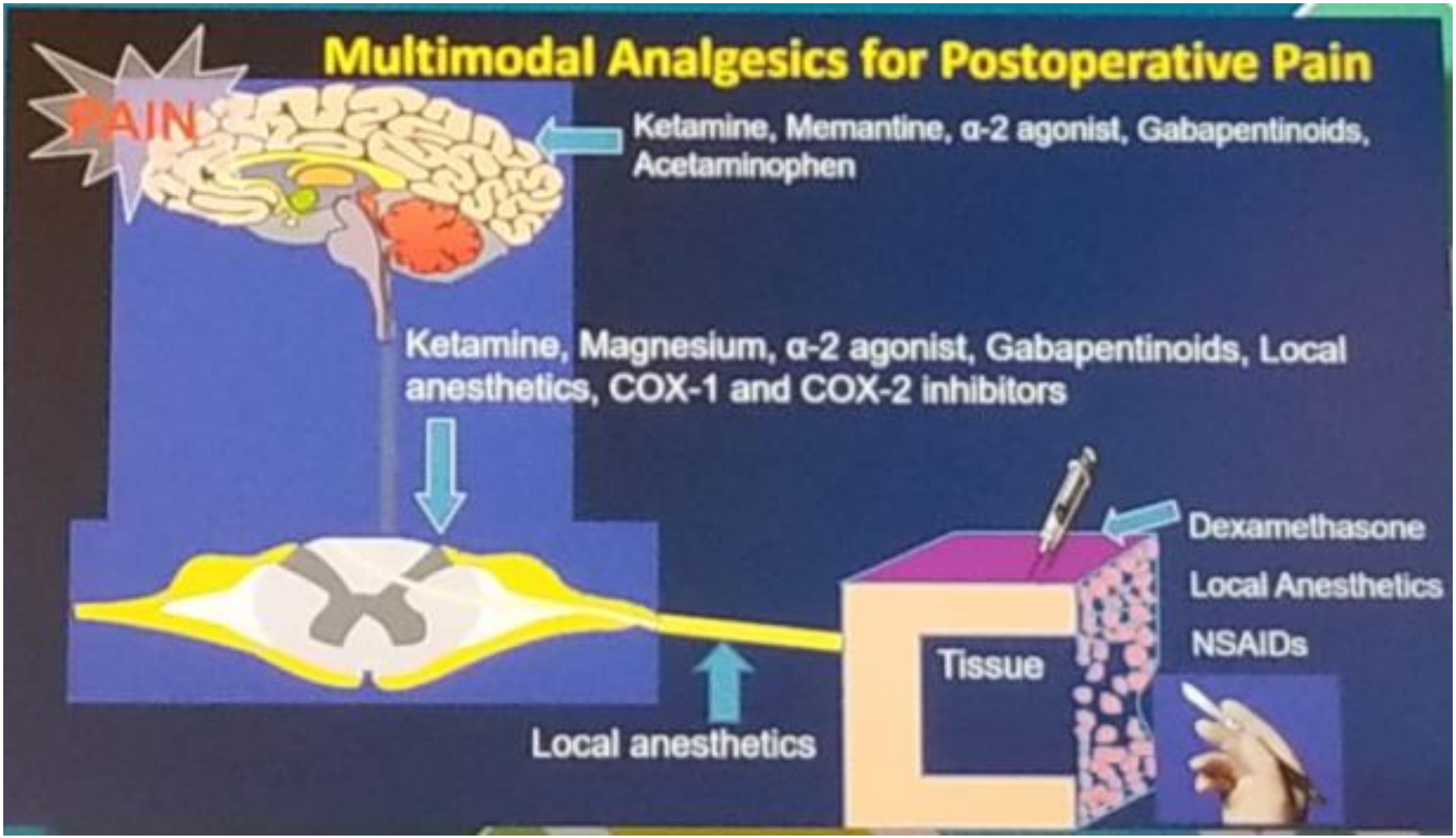
- ***Opioids***
- Analgesics of choice for intraoperative and postoperative analgesia for moderate to severe pain
- Opioids may help in preventing CPSP
- Strong opioids - opioid-induced hyperalgesia.
- ***Good pain control with opioids is important for CPSP prevention, despite their known hyperalgesia risk.***

Step-by-step approach to the prevention of chronic postsurgical pain



Conclusions

- CPSP is a common but overlooked complication of surgery
- Can cause functional limitation and psychological distress to patients
- Identify the risk factors in a patient undergoing surgery
- Appropriate perioperative analgesia is essential and techniques that avoid nerve damage are recommended and should be used whenever possible.


Multimodal Analgesics for Postoperative Pain
PAIN
Ketamine, Memantine, α-2 agonist, Gabapentinoids, Acetaminophen
Ketamine, Magnesium, α-2 agonist, Gabapentinoids, Local anesthetics, COX-1 and COX-2 inhibitors
Dexamethasone
Local Anesthetics
NSAIDs
Tissue
Local anesthetics

TOGETHER
EVERYONE
ACHIEVES
MORE