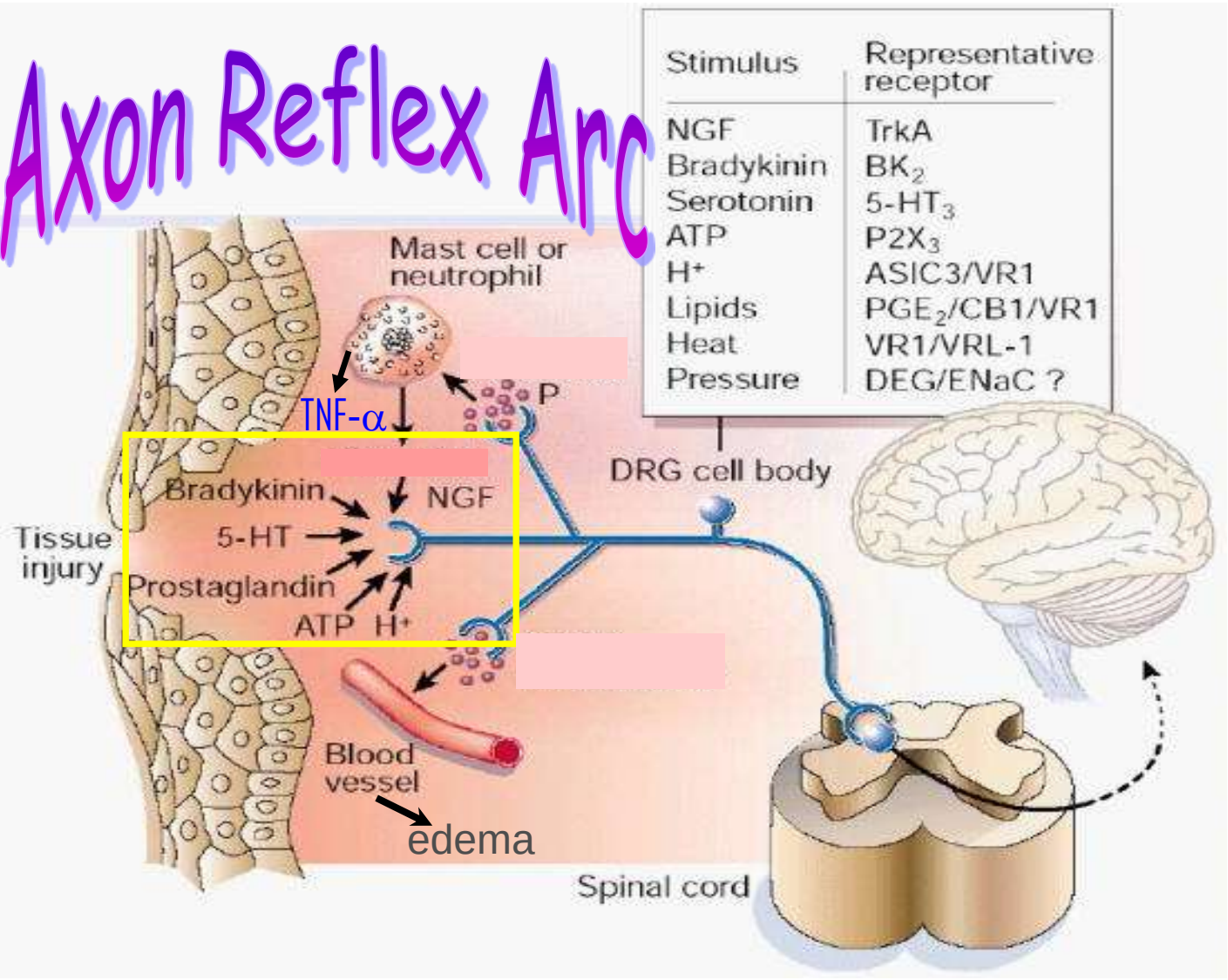
Acute Postoprative pain Management

M. Mokaram MD

Fellowship of pain medicine

- PAIN?
- CENTERAL SENSITIZATION?
- STRESS RESPONSE?

Neurogenic Inflammation → Peripheral Sensitization



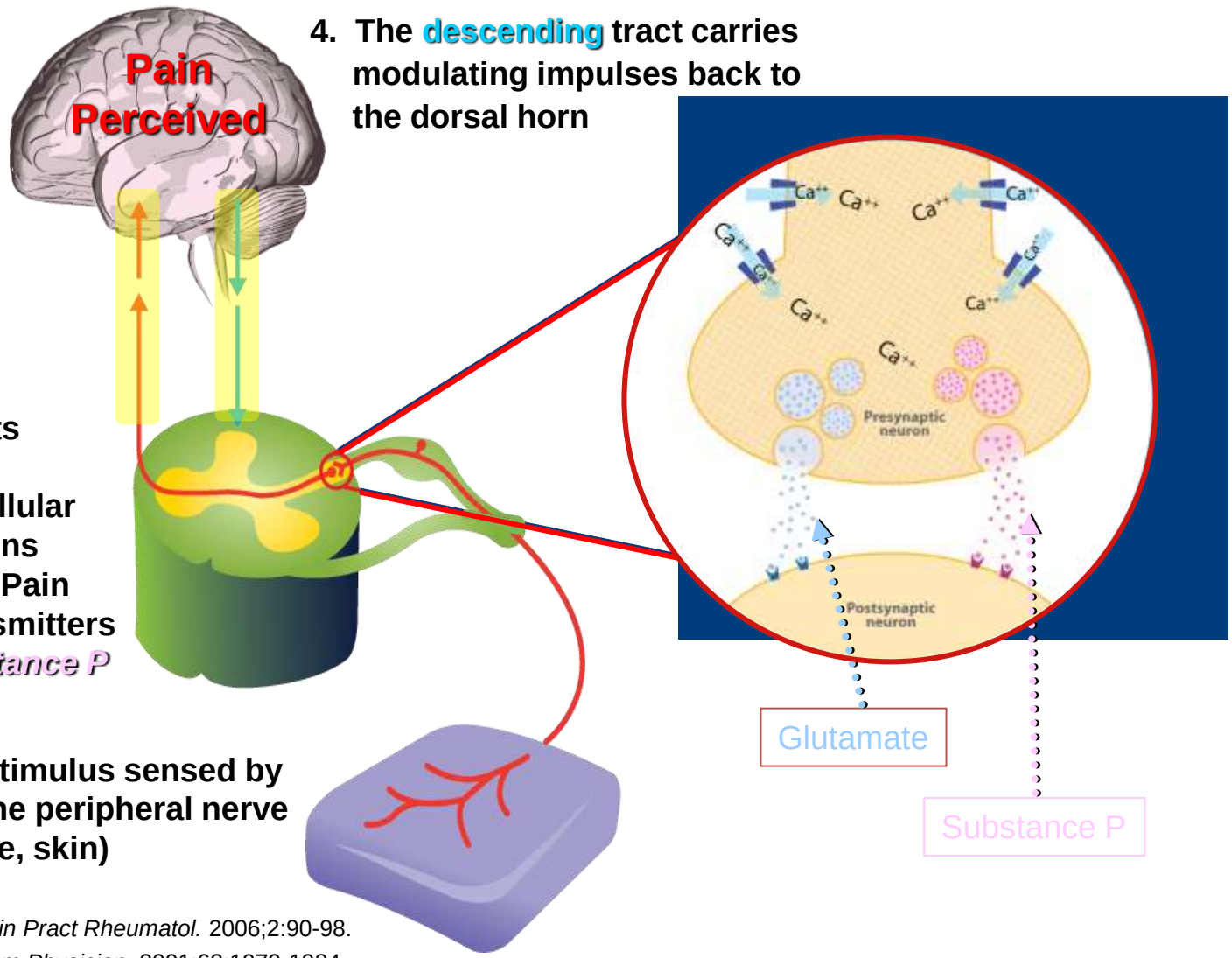
- Inflammation:
  - Heat
  - Redness
  - swelling
- Can be produced by application of Substance P
- Antagonists of Substance P block neurogenic inflammation

Julius D, Basbaum AI, Nature. 2001 Sep 13;413(6852):203-10

The Normal Pain Processing Pathway

3. **A signal is sent via the ascending tract to the brain, and perceived as pain**

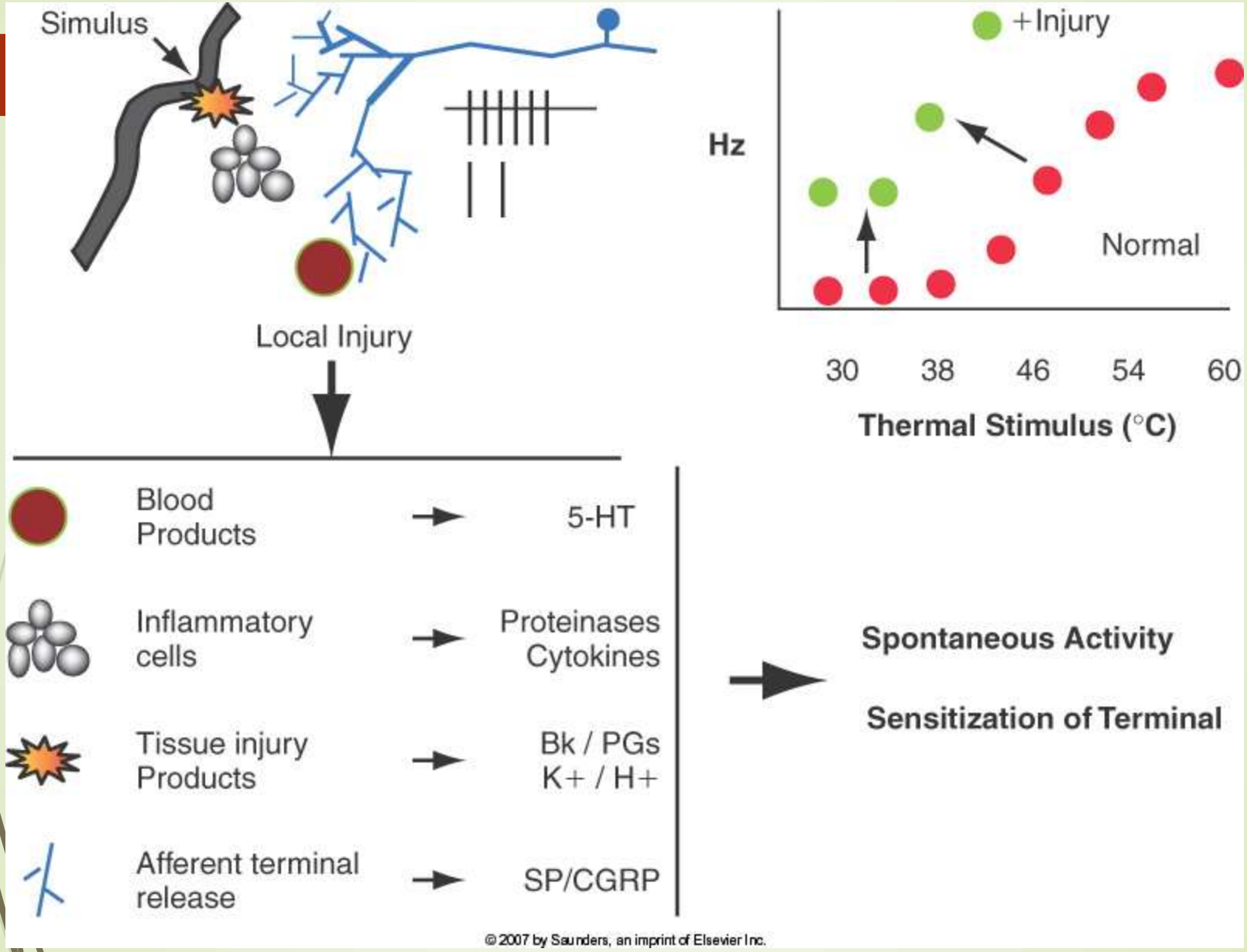
4. **The descending tract carries modulating impulses back to the dorsal horn**



2. **Impulses from afferents depolarize dorsal horn neurons, then, extracellular Ca^{2+} diffuse into neurons causing the release of Pain Associated Neurotransmitters – *Glutamate* and *Substance P***

1. **Stimulus sensed by the peripheral nerve (ie, skin)**

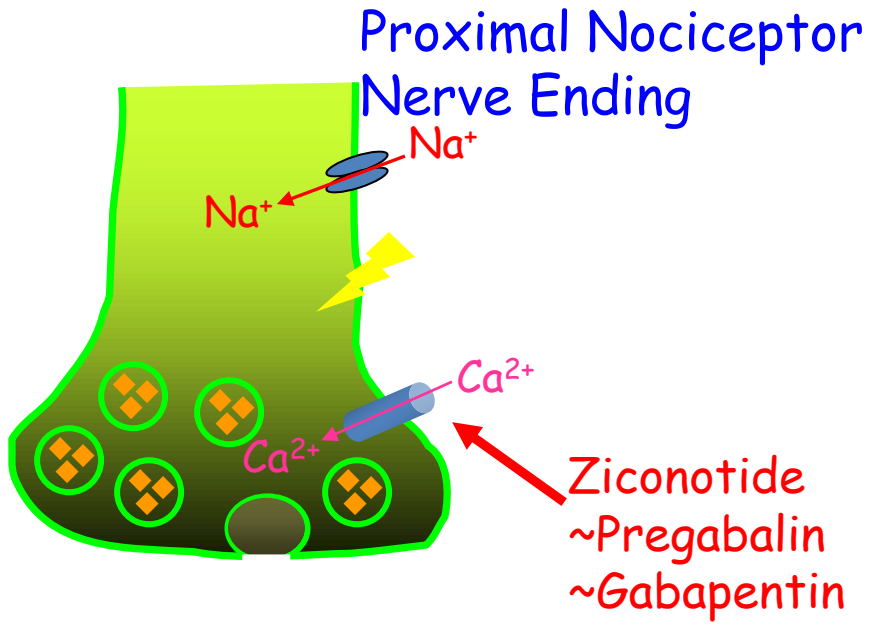
1. Staud R and Rodriguez ME. *Nat Clin Pract Rheumatol.* 2006;2:90-98.
2. Gottschalk A and Smith DS. *Am Fam Physician*. 2001;63:1979-1984.



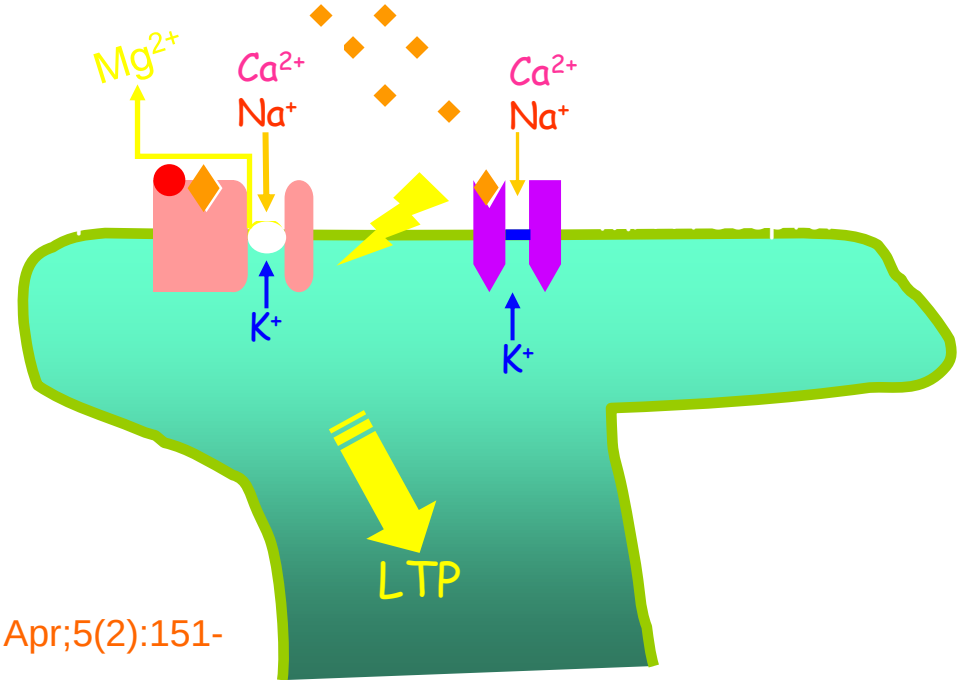
Central Sensitization

(major excitatory neurotransmitter)

- Glutamate
- Glycine



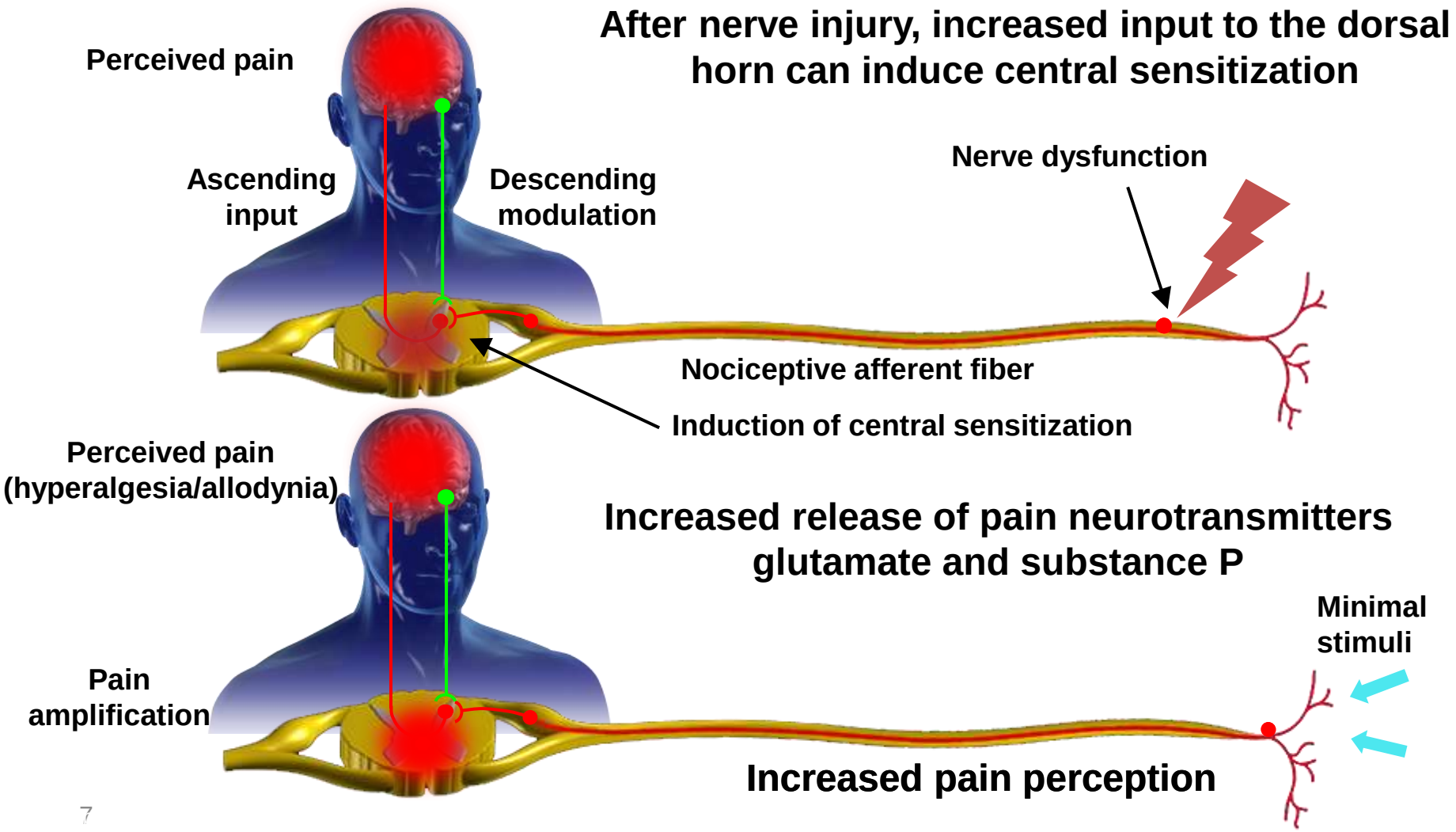
Nociceptor synapse in dorsal horn



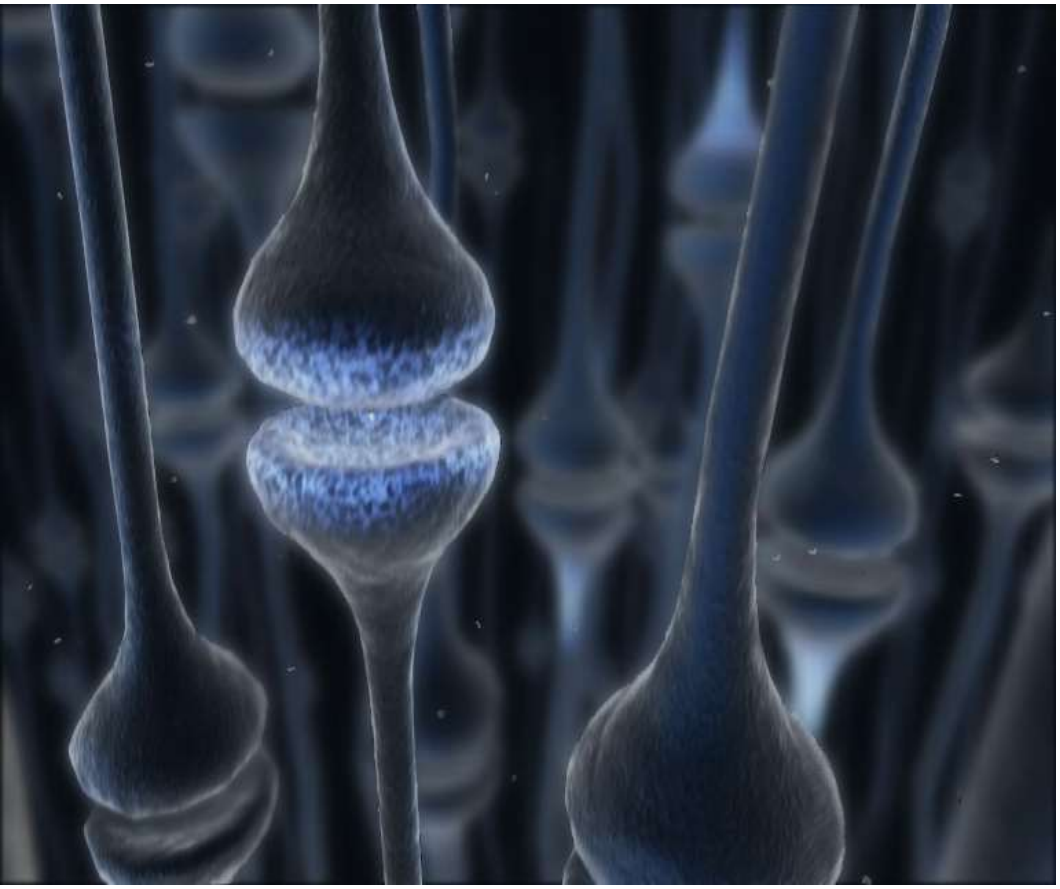
Dorsal Horn Neuron

Taylor BK, Curr Pain Headache Rep. 2001 Apr;5(2):151-61

Central Sensitization Produces Abnormal Pain Signaling



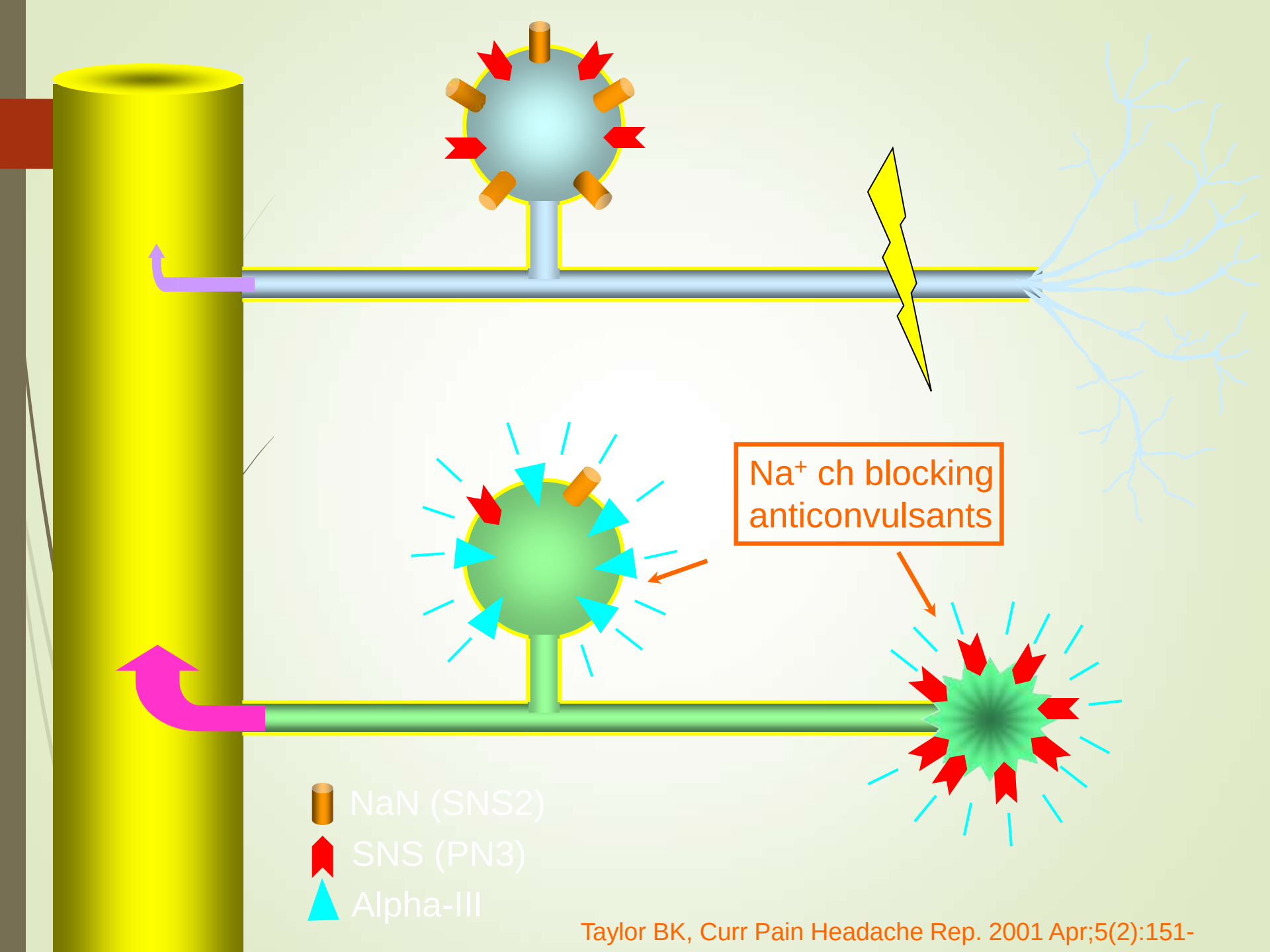
Hyperexcitation



- At the synapse level, sensitized primary afferent sensory fibers decrease the threshold for activation of nociceptor neurons which become hyperexcitable and transmit frequent action potentials

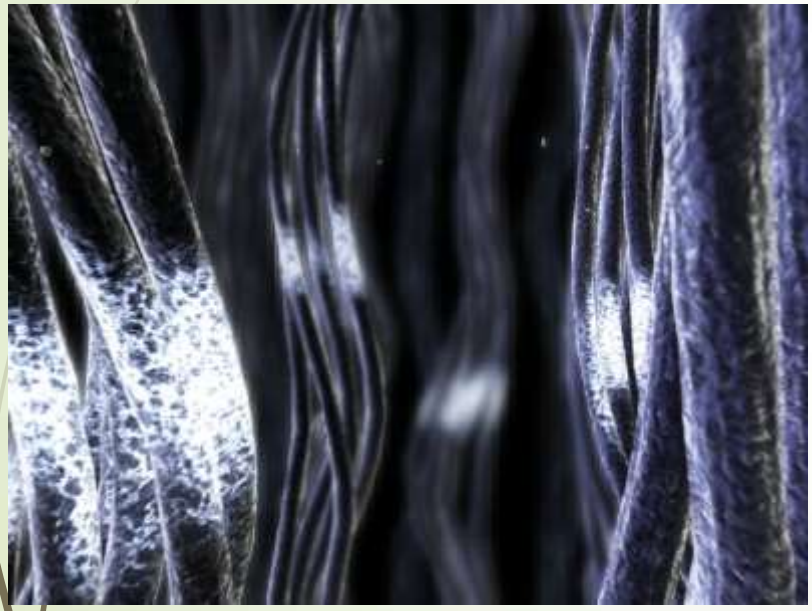
Kandel ER, Schwartz JH, Jessell TM, editors. *Principles of Neural Science* (Fourth Edition). New York: McGraw Hill. 2000;472–491.
Millan MJ. *Progress in Neurobiology* 1999;57:1–164

- Opioids phenyl pypridines (M,P,T)
- NSAID
- Ketamine
- Acetaminophen
- TCA
- Anticonvulsants



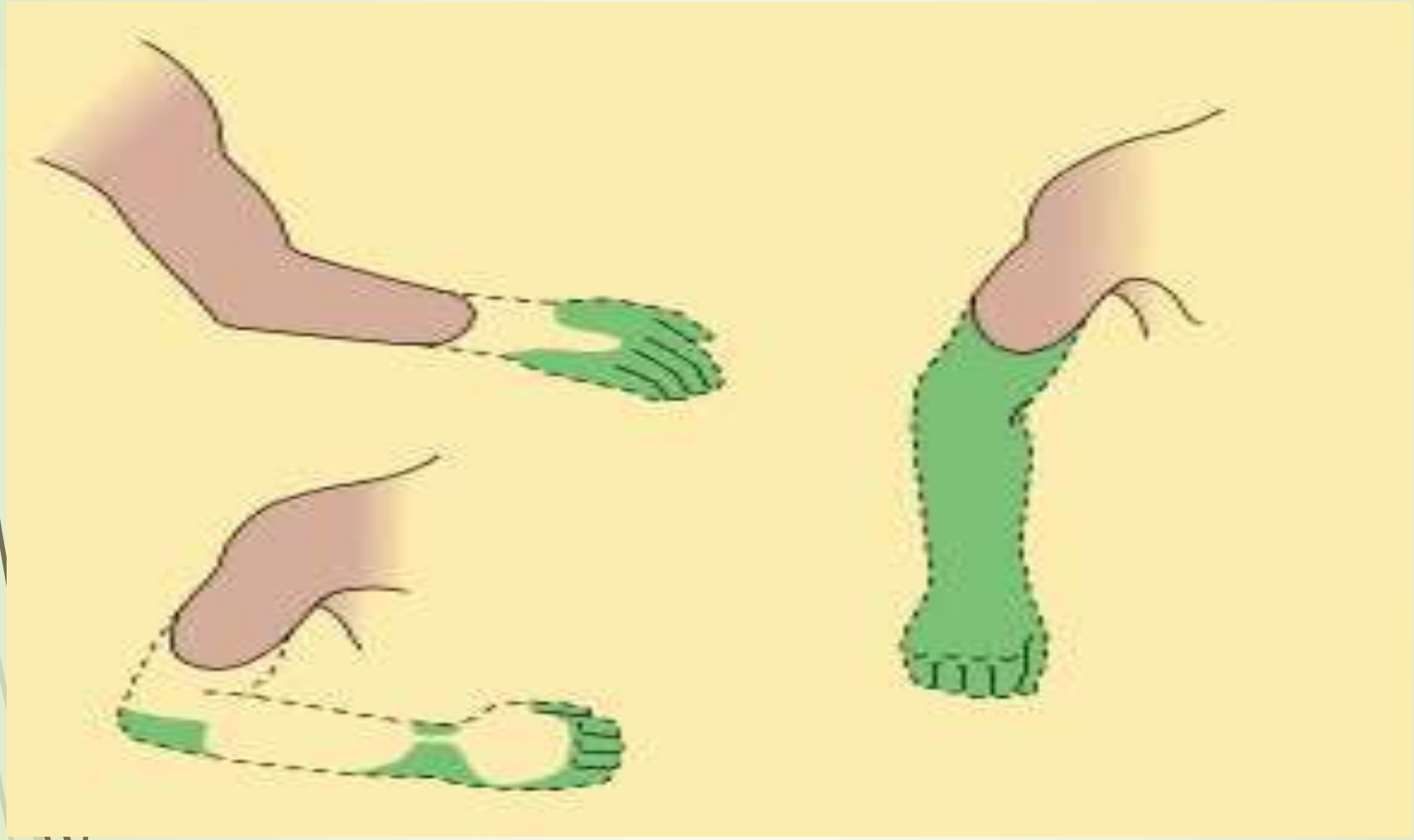
Taylor BK, Curr Pain Headache Rep. 2001 Apr;5(2):151-

Hyperexcitability

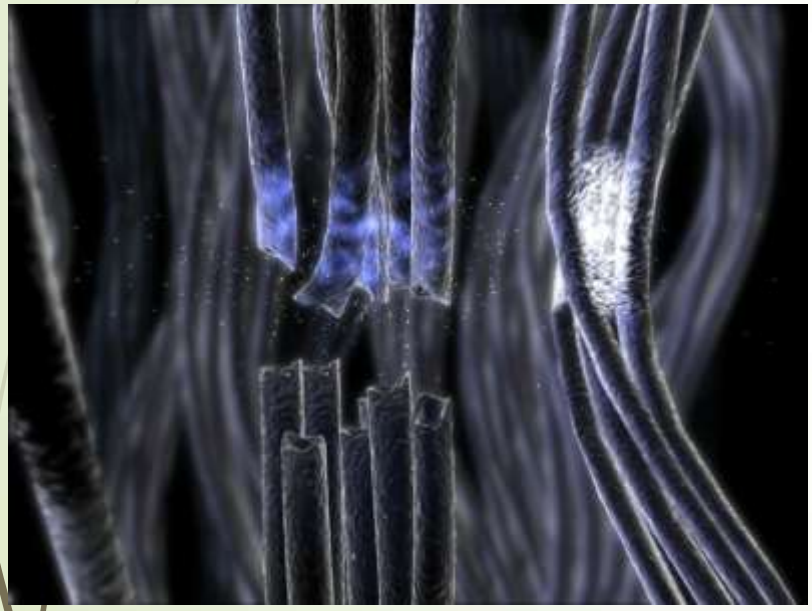


- The focus of **excitability in the damaged sensory fibers** causes
- the stimulation of the higher centers to perceive **spontaneous pain** (e.g. phantom pain, sciatica)

Millan MJ. *Progress in Neurobiology* 1999;57:1–164.
Suzuki R and Dickenson AH. *Neuroreport* 2000;11:R17–21.
Waxman S. *Pain* 1999;6:S133–140.



Cross Talk



- ***Ephaptic (non synaptic) transmission:***
- Complete severance of peripheral afferent sensory fibers results in hyperexcitability of damaged nerves and transmission of action potentials along adjacent, undamaged unstimulated sensory fibers, or cross talk

Suzuki R and Dickenson AH. *Neuroreport* 2000;11:R17–21.

Acute effects of post operative Pain

- Noxious stimuli → neuronal sensitization → of **new genes expression** within 1 h

REFLEX Response

- Increased skeletal **muscle tone**
- Inhibition of **phrenic nerve** function
- Decreased **GI motility**

DCREASE PHERENIC ACTIVITY

- **upper abdomen** and **thoracic surgery**

→ **Deep breathing and cough**

Neuroendocrine Stress Response

- **hypothalamic – pituitary-adrenocortical**
- Increase sympathetic tone

- **Cortisol Adrenocorticotropic Antiduretic Glucagon**

  Aldosteron Renin-angiotensin

- Decreased secretion of anabolic hormones

The effects

- Na and water retention
- Blood Glucose
- FFA
- Ketone bodies
- Lactate

→Catabolic state

- stress response is proportional to:

  surgical trauma

  type of anesthesia

postoperative hypercoagulability

- SR →

Increase: Procoagulants , platelet reactivity , plasma viscosity

Decrease: Natural anticoagulant, fibrinolysis

- **DVT** **Graft failure** **Ischemia**

SR

- Immunosuppression
- Hyperglycemia (wound healing)
- Sym: myocardial ischemia
- Delay in GI motility and ileus

Treatment
Traditional approaches

Reactive pain management

- Ineffective:
- **nurses**
- **treatment after pain**
- **under medicated**

- Healthcare providers : **underestimate** the amount of pain
- **Misunderstanding**
- Patients may be reluctant to complain or voluntary ask for analgesics

Proactive pain management

- **treatment before pain occurs**
- **continuous peripheral or epidural infusion**
  Very effective
- **High tech / Equipment dependent**

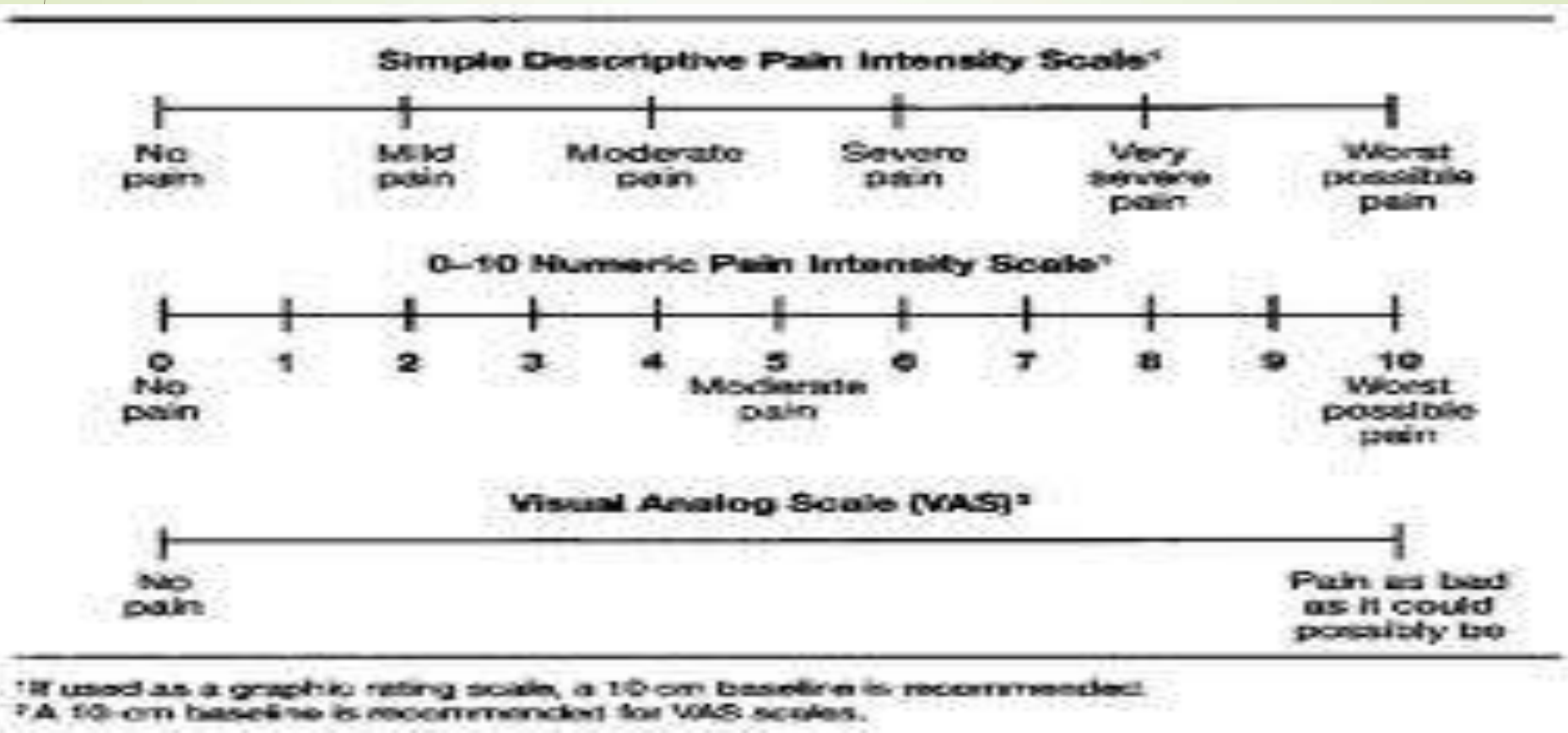
Intravenous analgesia

- Continues infusion
- Intermittent IV bolus
- Continues + demand dose
- PCA

High thoracic Epidural Analgesia

- Provide analgesia superior to that with systemic analgesic
- Early extubation
- Reduced dose of other analgesics and their complications
- Attenuating the stress response and hypercoagulability

- Favorable redistribution of coronary blood flow



[1] If used as a graphic rating scale, a 10-cm baseline is recommended.
[2] A 10-cm baseline is recommended for VAS scales.


Search | Cochrane Library
Pregabalin for neuropathic pain
cochranelibrary.com/cdsr/doi/10.1002/14651858.CD007076.pub3/full?highlightAbstract=treatment%7Cacute%7Cpain%7Cacut
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Pregabalin for neuropathic pain in adults
Sheena Derry, Rae Frances Bell, Sebastian Straube, Philip J Wiffen, Dominic Aldington, R Andrew Moore
Authors' declarations of interest
Version published: 23 January 2019 Version history
https://doi.org/10.1002/14651858.CD007076.pub3
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Abstract
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Background
This review updates part of an earlier Cochrane Review titled "Pregabalin for acute and chronic pain in adults", and considers only neuropathic pain (pain from damage to nervous tissue). Antiepileptic drugs have long been used in pain management. Pregabalin
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Plain language summary
Authors' conclusions
Summary of findings
Background
Objectives
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- Daily oral doses of 300-600mg
- For painful diabetic neuropathy and PHN
- Evidence for other type of neuropathic pain is very limited
- Appears not to be effective for HIV associated painful peripheral neuropathy
- Important benefit effects on sleep deprivation, fatigue and depression

Cochrane Database of Systematic Reviews | Review - Intervention

New search | Conclusions changed

Oral non-steroidal anti-inflammatory drugs versus other oral analgesic agents for acute soft tissue injury

Peter Jones, Rain Lamdin, Stuart R Dalziel Authors' declarations of interest

Version published: 12 August 2020 Version history

https://doi.org/10.1002/14651858.CD007789.pub3

Collapse all Expand all

Abstract

Available in English | Español | فارسی | Français | 한국어 | Português | ภาษาไทย

Background

Acute soft tissue injuries are common and costly. The best drug treatment for such injuries is not certain, although non-steroidal

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Content

Abstract

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Summary

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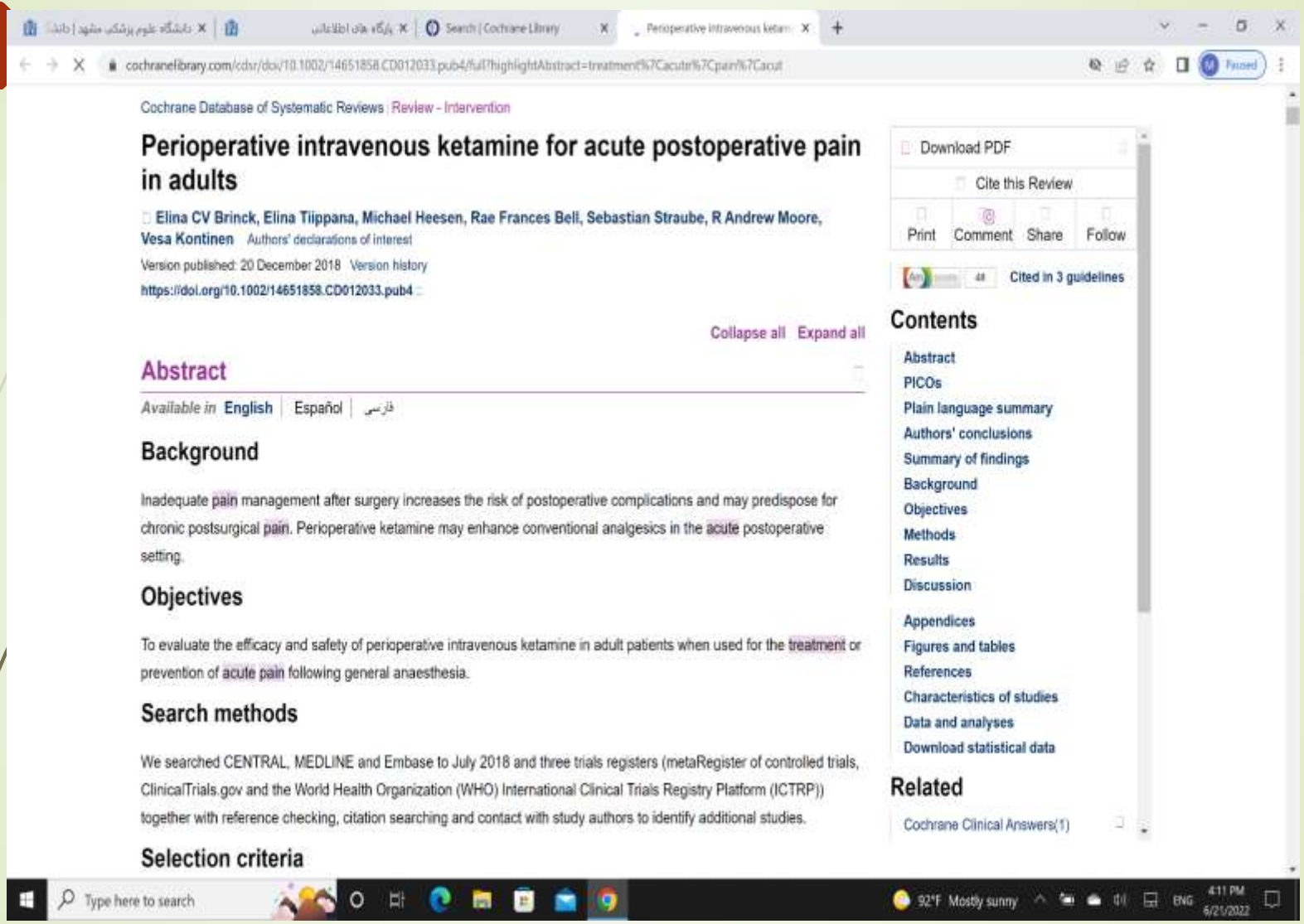
- **NSAIDS and paracetamol** : no difference in analgesia
- **NSAIDS** : small increase in GI adverse events

- **NSAIDS and opioids:** no difference in analgesia
- **NSAIDS :** fewer GI and neurologic adverse effects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Cochrane Database of Systematic Reviews : Review - Intervention
Perioperative intravenous ketamine for acute postoperative pain in adults
Elina CV Brinck, Elina Tiippana, Michael Heesen, Rae Frances Bell, Sebastian Straube, R Andrew Moore, Vesa Kontinen Authors' declarations of interest
Version published: 20 December 2018 Version history
https://doi.org/10.1002/14651858.CD012033.pub4
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Abstract
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Background
Inadequate pain management after surgery increases the risk of postoperative complications and may predispose for chronic postsurgical pain. Perioperative ketamine may enhance conventional analgesics in the acute postoperative setting.
Objectives
To evaluate the efficacy and safety of perioperative intravenous ketamine in adult patients when used for the treatment or prevention of acute pain following general anaesthesia.
Search methods
We searched CENTRAL, MEDLINE and Embase to July 2018 and three trials registers (metaRegister of controlled trials, ClinicalTrials.gov and the World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP)) together with reference checking, citation searching and contact with study authors to identify additional studies.
Selection criteria
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- Racemic ketamine bolus doses were predominantly **0.25 mg to 1 mg/kg**, and infusions 2 to 5 µg/kg/minute (**0.12-0.3 mg/ kg /h)**
- Perioperative intravenous ketamine reduced postoperative opioid consumption over 24 hours by 8 mg morphine equivalents
- Overall, 187/3614 (5%) participants receiving ketamine and 122/2924 (4%) receiving control treatment experienced an adverse event

- reduces postoperative analgesic consumption and pain intensity.
- Results were consistent in different operation types or timing of ketamine administration

TEHRAN UNIVERSITY OF MEDICAL SCIENCES

Archives of Anesthesiology and Critical Care (Winter 2022); 0(0): 00-00.

Available online at http://aacc.tums.ac.ir

TUMS

Section Article

The effect of analgesia induced by continuous IV administration of ketamine and morphine and paracetamol in hospitalized patients in north-eastern Iran

Mokarram Mehrdad[1], Sedaghat Alireza[2], Lotfalizadeh Nasibeh[3], Ziaee Maliheh*[4], Morrovatdar Negar[5], Bicheranloee Soheila[6]

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2: Anesthesia department, Mashhad University of medical science

3: Anesthesia department, Mashhad University of medical science

4: corresponding author:*

MD. Community Medicine Specialist, Assistant Professor of Community Medicine, Department of Community Medicine, School of Medicine, Social Determinants of Health Research Center, Gonabad University of Medical Sciences, Gonabad, Iran

- The primary dose of morphine was **0.01 mg/kg/h** history of opioid consumption and physical dependence: **0.02 mg/kg/h**. The starting dose for the prevention of opioid tolerance increased by 30% every week.
- Paracetamol: **15 mg/kg every 6 h**, this dose was reduced to 30% after **three days** of initiation of the treatment to prevent liver toxicity and was discontinued after one week
- Continuous IV infusion for Ketamine was **0.15 mg/kg/hr**. Continuous IV infusion of ketamine and morphine was performed by 100cc silicone pump.

- Continuous IV infusion for Ketamine was **0.15 mg/kg/hr**. Continuous IV infusion of ketamine and morphine was performed by 100cc silicone pump.

- **Results:** The mean NRS was significantly reduced in the first visit after the intervention (three hours later) (8.5 ± 1.04 vs.3.9 ± 1.74; p <0.001) and this decrease was observed in NRS in continuous observations (P> 0.001)