Acute Pain Management

For All the Right Reasons

MAJ Anthony Dragovich MD
Chief, Pain Medicine
Anesthesiology and Operative Service
Womack Army Medical Center

Objectives

- Define Pain and its relationship to trauma
- Discuss the 3 dimensional model of pain
- Review trauma pain treatment options

What is Pain?????

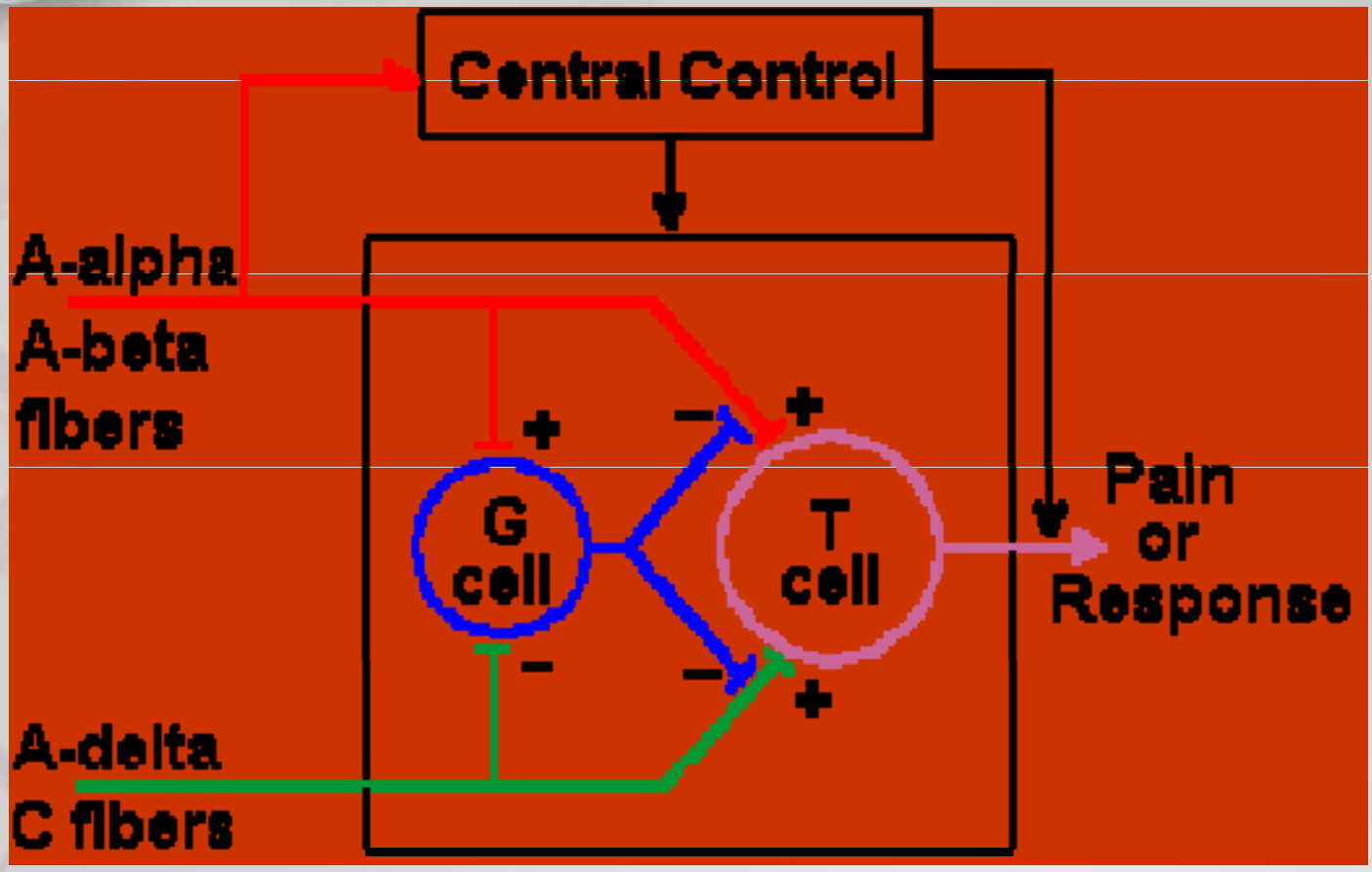
"An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."

International Association for the Study of Pain. Available at: http://www.iasp-pain.org/terms-p.html.

Descartes (1664)

Gate Control Theory

Melzack and Wall, 1965



Spinal Cord

Effects of uncontrolled pain *Stephens et al Rheumatology 2003*

- **Pulm-**splinting and decreased cough
- **CV-**Increased sympathetic tone
- **Endocrine-**Catabolic hormonal response
- **GI-**Increased sympathetic tone, decreased parasympathetic tone—prolongs ileus
- **GU-**Increased sympathetic tone, decreased parasympthetic tone—urinary retention
- **CNS-**Sleep disturbances, anxiety and more
- **Thromboembolic-**Increased inflammatory state increases blood viscosity, platelet aggregation and clot formation.
- **Immunologic-**depresses immune response

CNS effects of uncontrolled pain

- Sensory-Discriminative
  - Central sensitization occurs
  - Pain becomes imprinted
- Affective-Motivational
  - Mood is altered
  - Activity level is controlled by pain
- Cognitive-Evaluative
  - Fear of further injury is reinforced
  - Concentration/Memory are impaired--education is more difficult

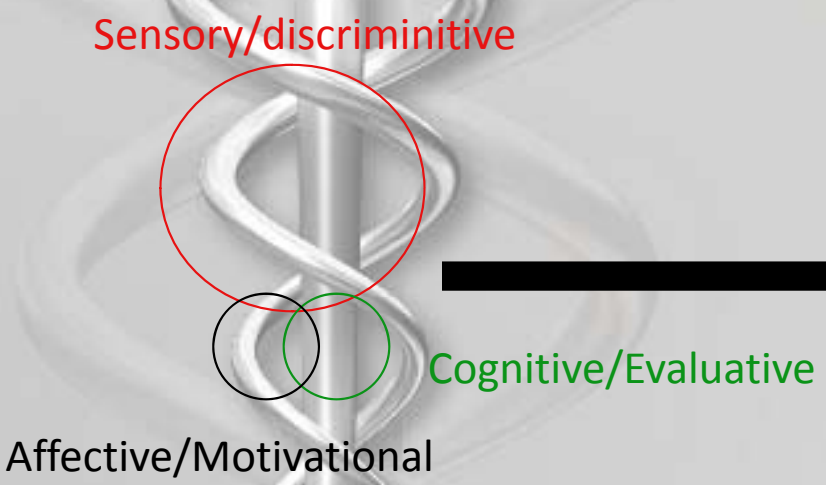
A Framework to Evaluate Pain through a multi-dimensional assessment

- Sensory-Discriminative
- Affective-Motivational
- Cognitive-Evaluative

As you move from acute pain to chronic pain the mutli-dimensional interactions become more complex

Acute Pain

What the pain feels like and its location predominate

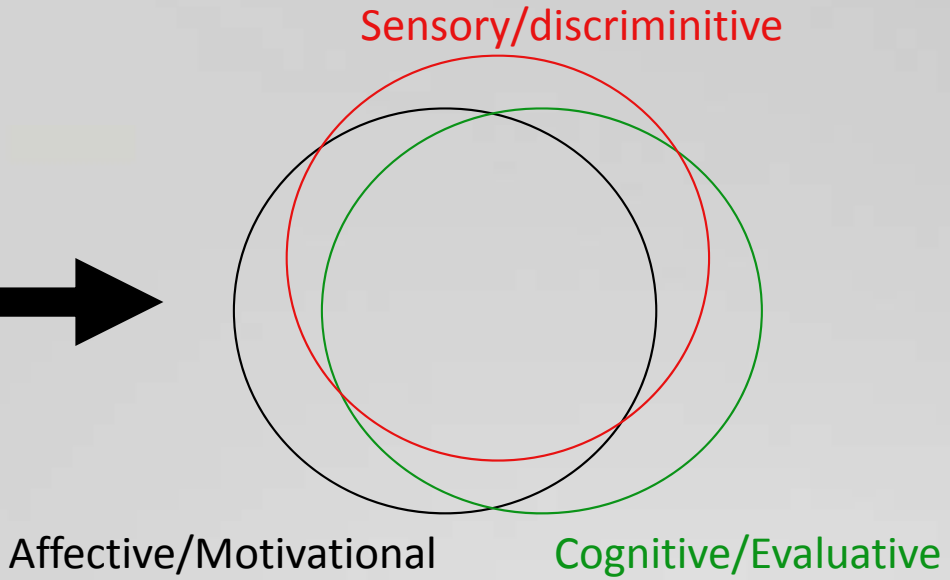


Chronic Pain

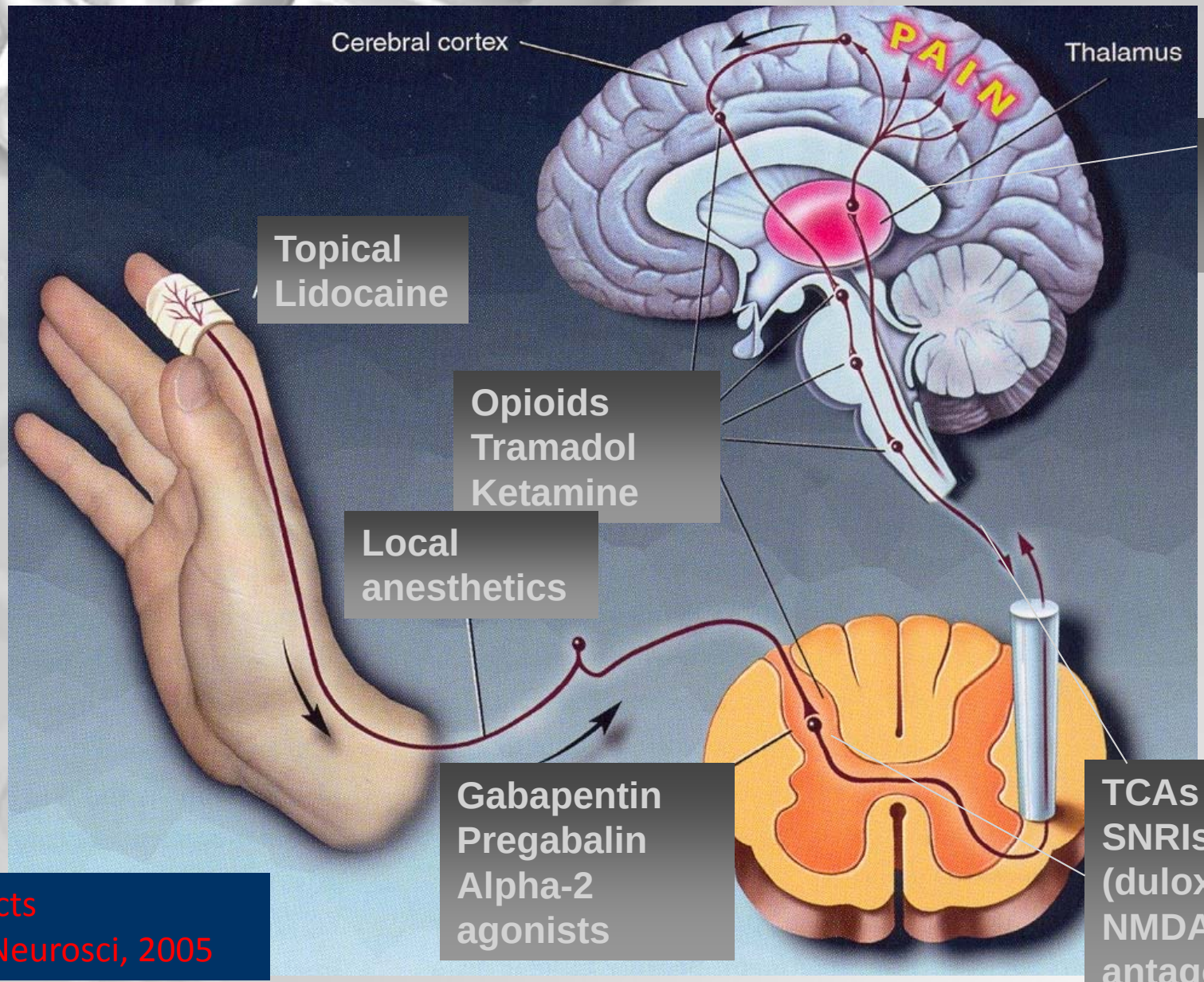
Sensory-discriminitive--the receptive field expands and pain is described in powerful terms, e.g."terrible, crushing, consuming"

Affective/Motivational--depressed mood becomes more common and proactivity is replaced with dependence and hopelessness, sleep is impaired

Cognitive/Evaluative--Fear of injury and future may predominate, long-term planning is difficult as is memory and concentration, education is hampered, Catastrophic thoughts are common



What Treatments are Available???



Ketamine
Alpha-2 agonists

Topical Lidocaine

Opioids
Tramadol
Ketamine

Local anesthetics

Gabapentin
Pregabalin
Alpha-2 agonists

TCAs
SNRIs (duloxetine)
NMDA antagonists

Brain Facts
Soc for Neurosci, 2005

Opioids

- History
- Addiction potential
- Immunosuppresion
- Hypogonadism
- Pharmacodynamics

History of Opioid Use

Booth. Opium: A History. London Simon and Schuster 1996

- Cultivated poppy seeds found in 4th millenium BC cave dwellings in Switzerland
- 2400 BC Sumerian writing refer to opium as the “joy plant”
- 1552 BC Ebers papyrus refers to the medicinal use of opium for multiple ailments
- 5th Century BC first recommendation to avoid use of opium to avoid the dire consequence of dependency

American Opioid History

Booth. Opium: A History. London Simon and Schuster 1996

- Widespread use of Morphine during and after US Civil War
- Harrison Act 1914-dramatic curtailing of opioid availability
- Gradual return of opioid availability during 20th Century
- Explosive rise in opioid use in the past 20 years--9.4 billion dosage units prescribed per year. Katz. Clin J Pain 2007

Risk of Addiction

- No one really knows
  - DSMIV criteria don't apply to prescription opioids
  - There is not an accepted definition of addiction for patients with chronic pain

Author,Journal, Year	Addiction Rate, article type
Ives et al. BMC Health Serv Res 2006	32%, prospective survey
Adams et. al. J Pain Symp Manag 2006	4.9%, prospective registry
Fishbain et. al. Clin J Pain 1992	18.9%, systematic review
Portenoy and Foley Pain 1986	5%, case series

Immunosuppression

- Inhibits IL2 production Borner C, et al. J Immunology 2009
- Inhibits Lymphoprolferation, NK-lymphocyte activity, cytokine production, and lymphocyte number Sacerdote P. Palliat Med 2006
- Not all opioids are equal…no effect with buprenorphine

Opioid induced Hypogonadism

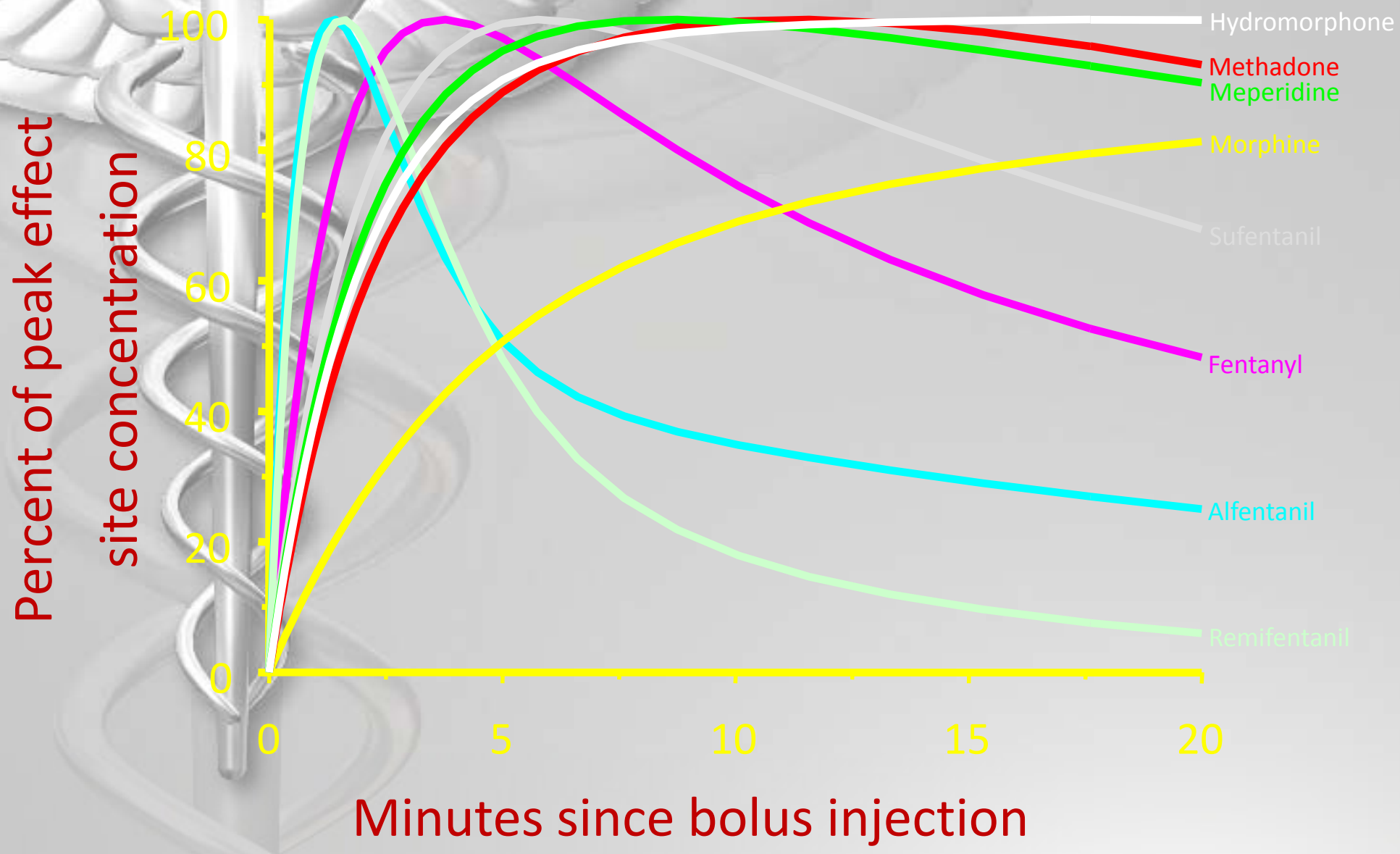
Author, Year	Route, Incidence	Comments
Abs et al. 2000	Intrathecal, >86%	Decreased libido in 96% of men
Daniell 2002	Oral, 89%	87% reported sexual dysfunc
Finch et al. 2000	Intrathecal, 90%	Decreased libido 60% men
Rajagopal et al. 2003	Oral, 90%	Decreased libido
Roberts et al. 2002	Intrathecal 74%	Decreased libido

Why should we care about hypogonadism?

- Male veterans over 40 years old with low testosterone levels had a 57% (20.1% vs. 34.9%)increase in mortality compared to men with normal testosterone levels over 8 years Shores. Arch Intern Med 2006
- Male veterans with low testosterone levels have a 4X risk of depression within 2 years. Shores. J Clin Psych 2005

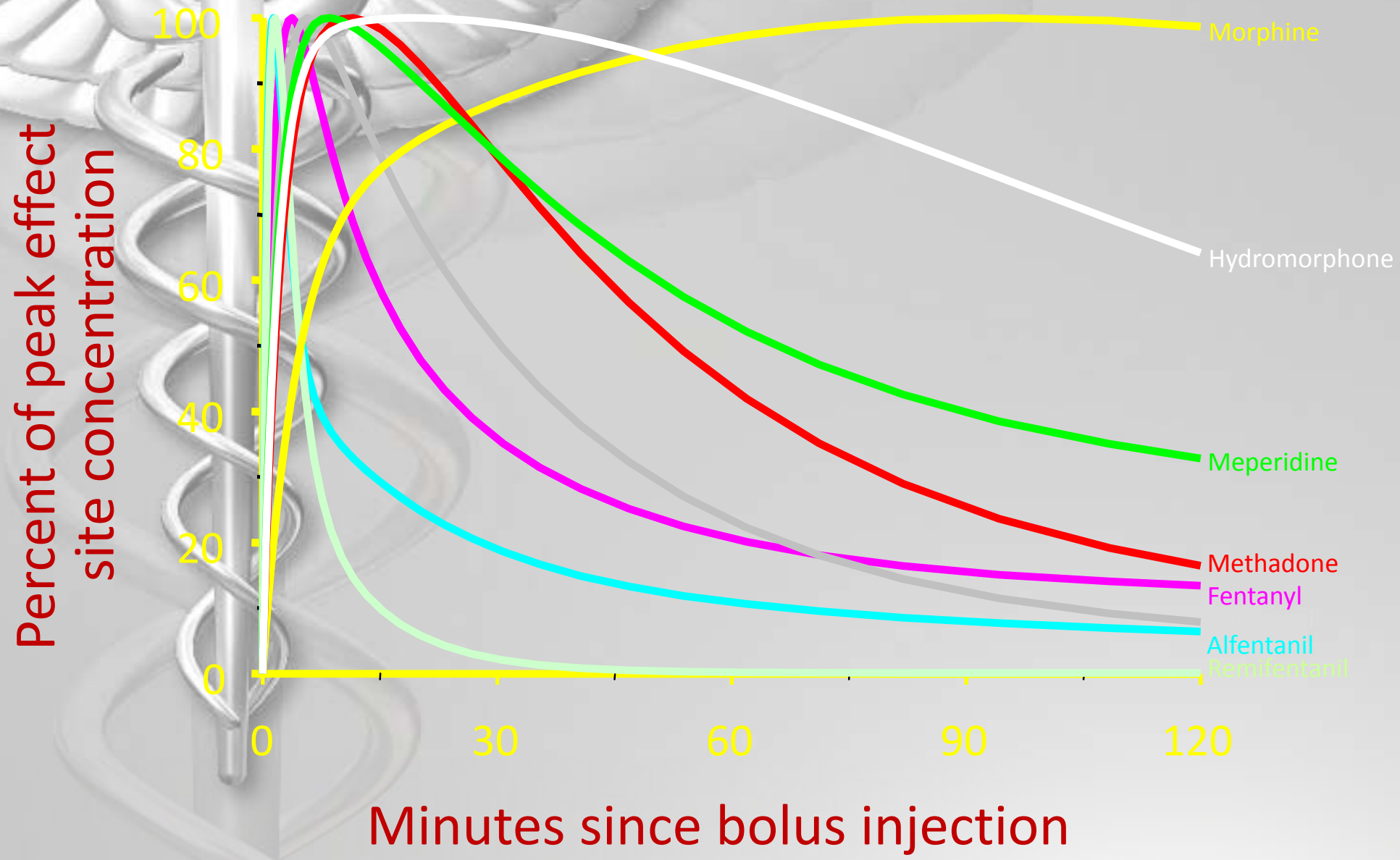
Opioid Onset

Steven Shafer, Pharmacodynamics lecture



Opioid Onset

Dr. Steven Shafer, Pharmacodynamics lecture

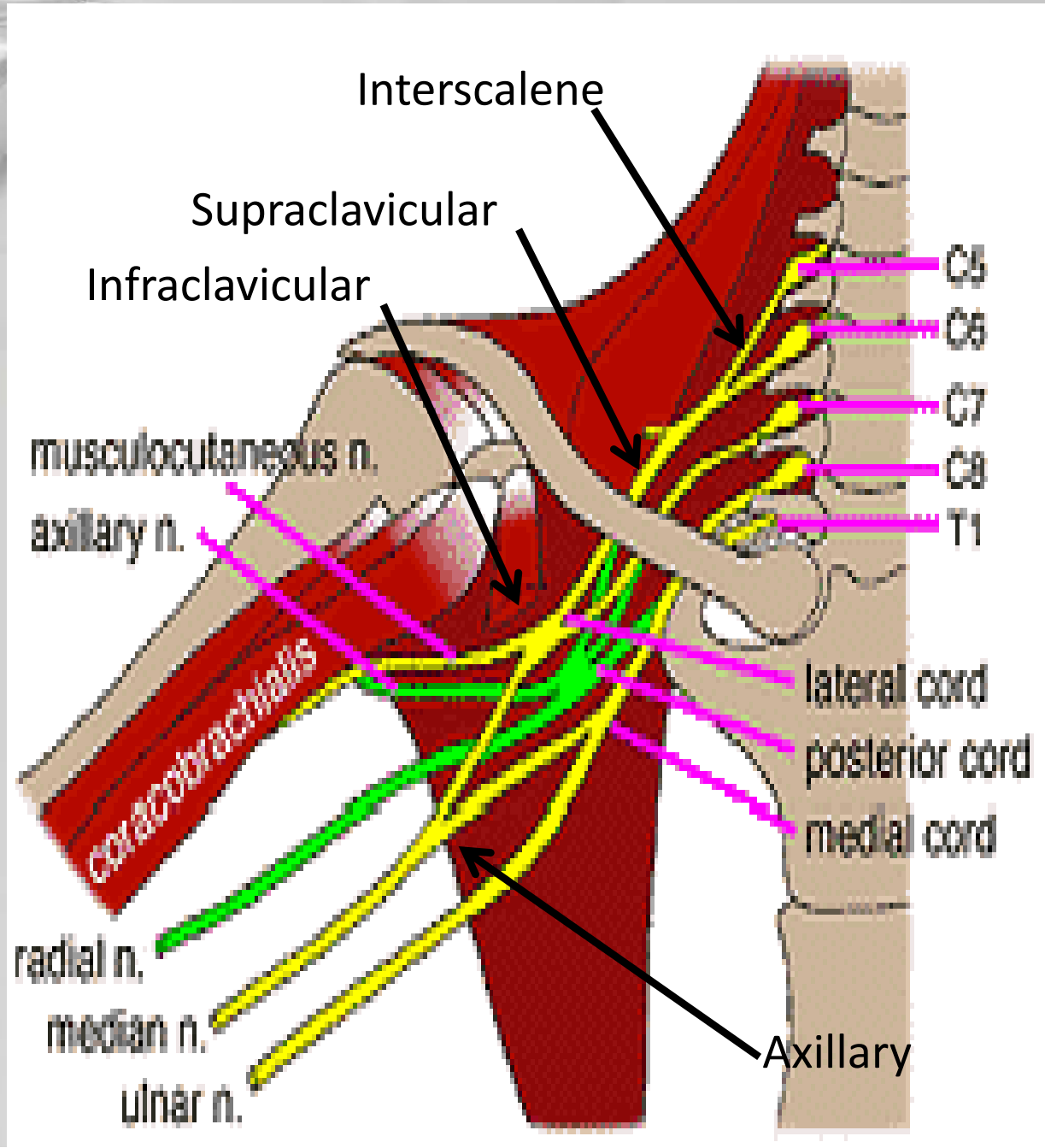


The Big Three

- Psychological Effects- Development of Chronic Pain
- Hormonal Inhibition- Inhibition of healing
- Immunosuppresion- Increased risk of infection

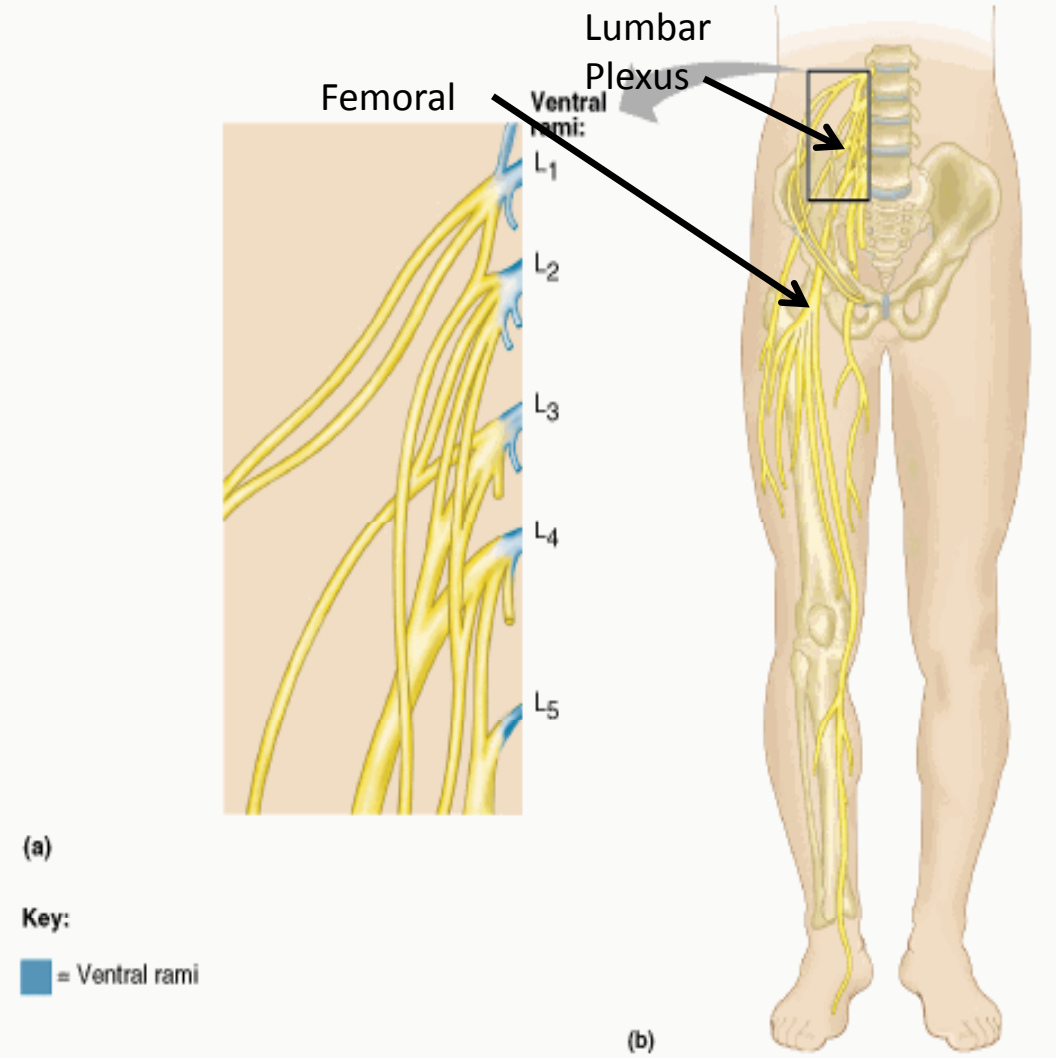
Brachial Plexus Blocks *Richman Anesth & Analg 2006*

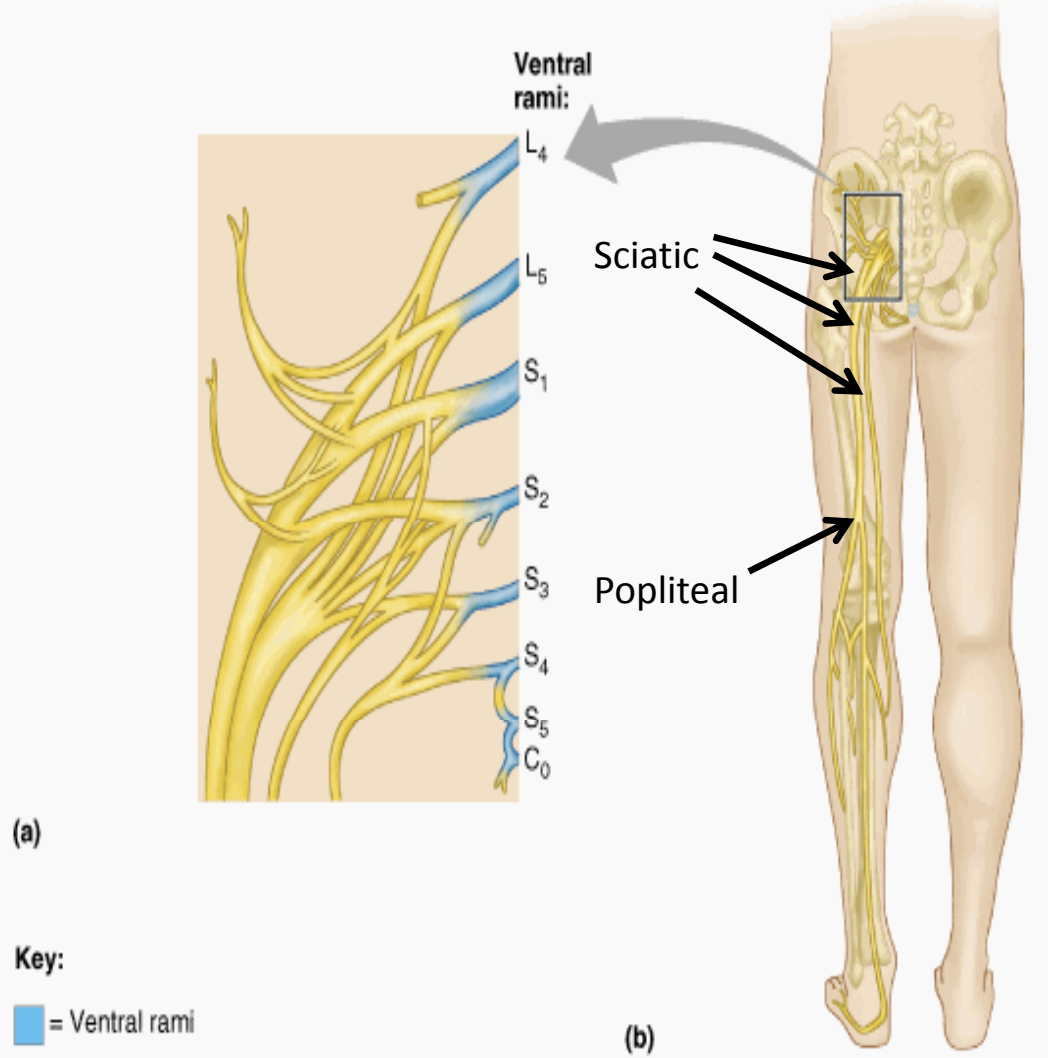
- Improved analgesia compared to opioids at 24, 48, and 72 hours post-operatively
- Decreased N/V, sedation, pruritis
- Decreased opioid use when a perineural catheter was used



Lumbar and Sacral Plexus blocks

Richman Anesth & Analg 2006



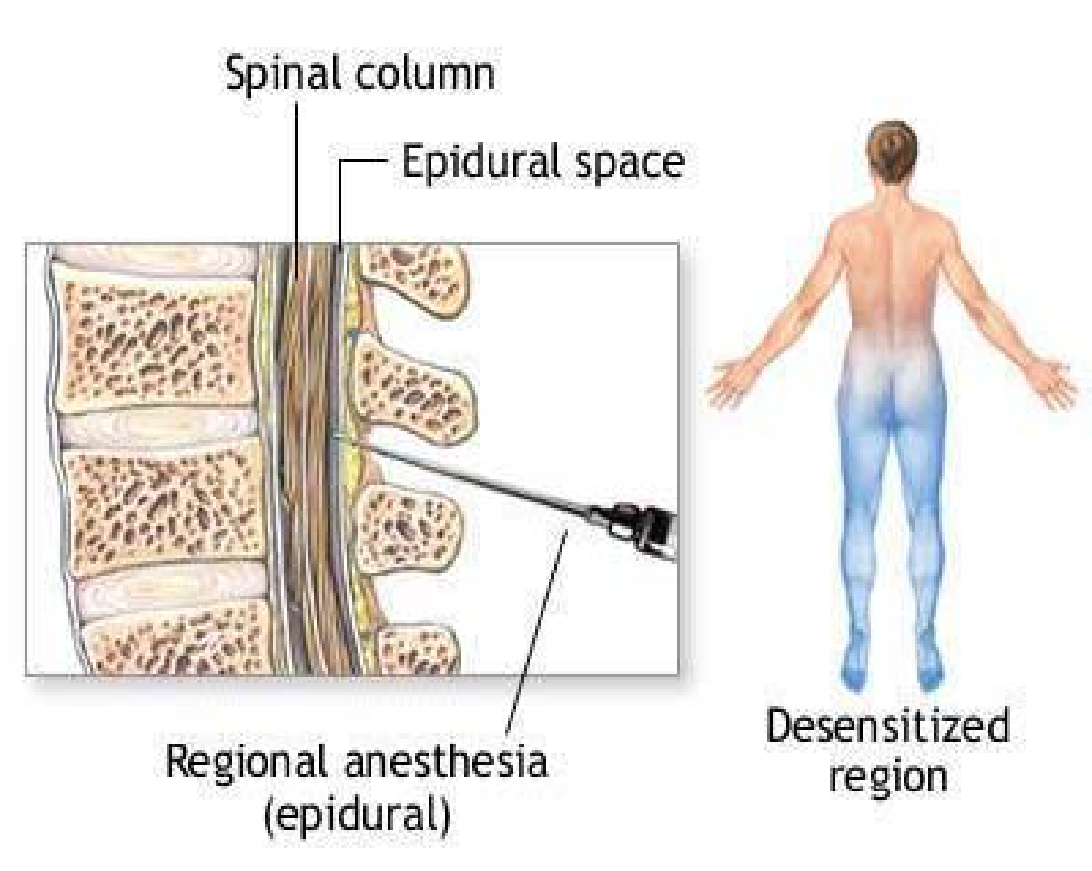


Spinal and Epidural Blocks

Liu Pain Medicine 2007
Ahlers Br J Anaesth 2008

Meta-analyses, epidural analgesia (compared with systemic opioids including IV PCA) provided statistically superior analgesia at rest and with activity for all types of surgery through postoperative day (POD) 4 ***with clinically appreciable superiority only with activity and only through POD 1***

Intra-operative epidurals reduce the stress response and lymphocyte dysfunction associated with surgery



Cadilac PCA

Lin, et al. BJA 2009 with a Dragovich Modification

- PCA mixture
  - Hydormorphone 0.2mg/ml
  - Ketamine 0.5mg/ml
  - Dexmedetomidine 5 mcg/ml

Dose 1 ml Q 6 Minutes--Max dose 3ml's per hour elderly, 6 ml's per hour young healthy adults

Improved pain control

Decreased Nausea 34% vs 56% s/p hysterectomy

Decreased opioid use

Decreased sedation

Improved hemodynamics

Summary
Pain Treatment in Acute Trauma

- Block the pain if at all possible with local anesthetic
- Develop an analgesic plan AND TELL THE PATIENT
- Use opioids
- Think Multimodal Analgesia
  - NSAIDS
  - Ketamine
  - Anti-convulsants
  - Alpha-2 agonists

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