

# Non-Opioid Pain Management

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# Multimodal Analgesia

1. Acetaminophen
2. NSAIDS
3. Neuroleptics
4. Tricyclic Antidepressants (TCA's)
5. Selective Serotonin Reuptake Inhibitor (SSRI)
6. Selective Norepinephrine Reuptake Inhibitor (SNRI)
7. Muscle Relaxants
8. Interventional Pain Management

# Acetaminophen

## Indications

- Fever
- Joint pain or Osteoarthritis
- Myofascial Pain
- Headaches

Mechanism of Action-Unknown but may be due to inhibitor of COX-2

# Acetaminophen

## Dosage

- Oral: 650mg po q 4-6 hours as needed
- IV: Ofirmev 1g IV q 6 hours

## Adverse Effects

- Nausea, Constipation, pruritus, Stevens-Johnson syndrome, hepatotoxic at more than 3-4 grams/day

# NSAIDS

## Indications

- Joint pain or Osteoarthritis
- Lumbar Disc herniation
- Myofascial Pain
- Headaches

Mechanism of Action-inhibitor of COX-1 and COX-2

# NSAIDS

Equianalgesic dosage NSAIDS equivalent conversion table

DRUG	DOSE	MAX 24hr DOSE
ASA	325-650mg po q4-6hrs	4000mg
Ibuprofen	400mg po q4-6hrs	3200mg Acute, 2400mg Chronic
Naproxen	250mg po q8hrs	1250mg Acute, 1000mg Chronic
Ketoprofen	25-50mg po q 6-8hrs	300mg
Diclofenac	50mg po q 8hrs	150mg
Meloxicam	7.5-15mg po q day	15mg
Celecoxib	200mg po q 12hrs	400mg

reference: Up-to-date

# NSAIDS

## Adverse Effects

- FDA warning on all NSAIDS
  - “potential serious adverse cardiovascular events and the serious and potentially life-threatening GI adverse events associated with the use of this class of drugs.”
- GI Bleeding or perforation
- Renal Failure
- Cardiac Prothrombotic events

# Anticonvulsants/Neuroleptics

## Indications

- Neuropathic pain (DM, Chemo, HIV etc)
- CRPS
- Peripheral neuropathy
- Postherpetic neuralgia

## Mechanism of Action

- Gabapentin/Pregabalin-alpha-2-delta subunit of voltage-gated  $\text{Ca}^{++}$  channel
- Topiramate-potentiate GABA inhibition



# Anticonvulsants/Neuroleptics

## Gabapentin (Neurotin)

- Start at 100mg po qhs
- Can increase to 300mg TID (max 2g/day)

## Pregabalin (Lyrica)

- Start at 50mg po a day
- Can increase to bid (max 300mg/day)

## Topiramate (Topamax)

- Start at 25mg po q day
- Can increase to 50mg po bid  
(max 200-400mg/day)

# Anticonvulsants/Neuroleptics

## Adverse Effects

- sedation
- dizziness
- ataxia
- weight gain

# Antidepressants

- Tricyclic Antidepressants (TCA's)
- Selective Serotonin Reuptake Inhibitors (SSRI's)
- Selective Norepinephrine Reuptake Inhibitors (SNRI's)

# TCA

## Indications

- diabetic neuropathy pain
- CRPS
- chronic headache
- post-stroke pain
- radicular pain

Mechanism of Actions-lengthens the time serotonin and norepinephrine remain in the synaptic cleft

# TCA

## Amitriptyline (Elavil)

- 10-25mg po q day
- Increase to 75-150mg po q day (Max 300mg/day)

## Nortriptyline (Pamelor)

- 10-25mg po q day
- Increase to 75-150mg po q day (Max 200mg/day)

# TCA Side Effects

## Anticholinergic side effects

- **Hot as a hare:** increased body temperature
- **Blind as a bat:** mydriasis (dilated pupils), blurred vision
- **Dry as a bone:** dry mouth, dry eyes, decreased sweat
- **Red as a beet:** flushed face
- **Mad as a hatter:** confusion or delirium
- constipation
- urinary retention
- sexual side effects
- confusion or delirium

Decrease the seizure threshold

# SSRI

## Indications

- Depression
- Chronic Pain
- diabetic neuropathic pain

Mechanism of Actions-presynaptic serotonin reuptake pump

# SSRI Dosing

## Citalopram (Celexa)

- 10mg po q day
- Increase to 20-40mg po q day (Max 60mg/day)

## Fluoxetine (Prozac)

- 10mg po q day
- Increase to 20-40mg po q day (Max 80mg/day)

## Sertaline (Zoloft)

- 25mg po q day
- Increase to 50-150mg po q day (Max 200mg/day)



# SSRI Side Effects

- Decreased libido
- Impotence
- Dystonia
- Akathisia
- Palpitations
- Lowered seizure threshold
- Serotonin syndrome
- syndrome of inappropriate antidiuretic hormone (SIADH)

# SNRI

## Indications

- neuropathic pain
- Fibromyalgia
- major depression
- generalized anxiety disorder

Mechanism of Actions-inhibiting serotonin and norepinephrine reuptake

# SNRI Dosing

## Bupropion (Wellbutrin)

- 75mg po BID
- Increase to 100–150 mg bid (Max 600mg/day)

## Duloxetine (Cymbalta)

- 30mg po q day
- Increase to 60mg po q day (Max 120mg/day)

# SNRI Side Effects

- Nausea
- Vomiting
- Constipation
- Dizziness
- Stevens-Johnson Syndrome
- Withdrawal symptoms
- serotonin syndrome

# Muscle Relaxants

## Indications

- Skeletal muscle spasms
- Fibromyalgia

## Mechanism of Actions

- Tizanidine-alpha 2-adrenergic receptor agonist
- Cyclobenzaprine-central acting causing reduced tonic motor activity
- Baclofen-GABA<sub>B</sub> receptor

# Muscle Relaxants

Cyclobenzaprine (Flexeril®)

- 5mg po QHS

Tizanidine (Zanaflex®)

- 2mg po BID

Baclofen

- 5mg po BID to TID

# Muscle Relaxants

## Adverse Effects

- Constipation
- Nausea
- Dizziness
- Neuroleptic malignant syndrome  
(cyclobenzaprine)
- Hypotension
- Withdrawal symptoms (baclofen)

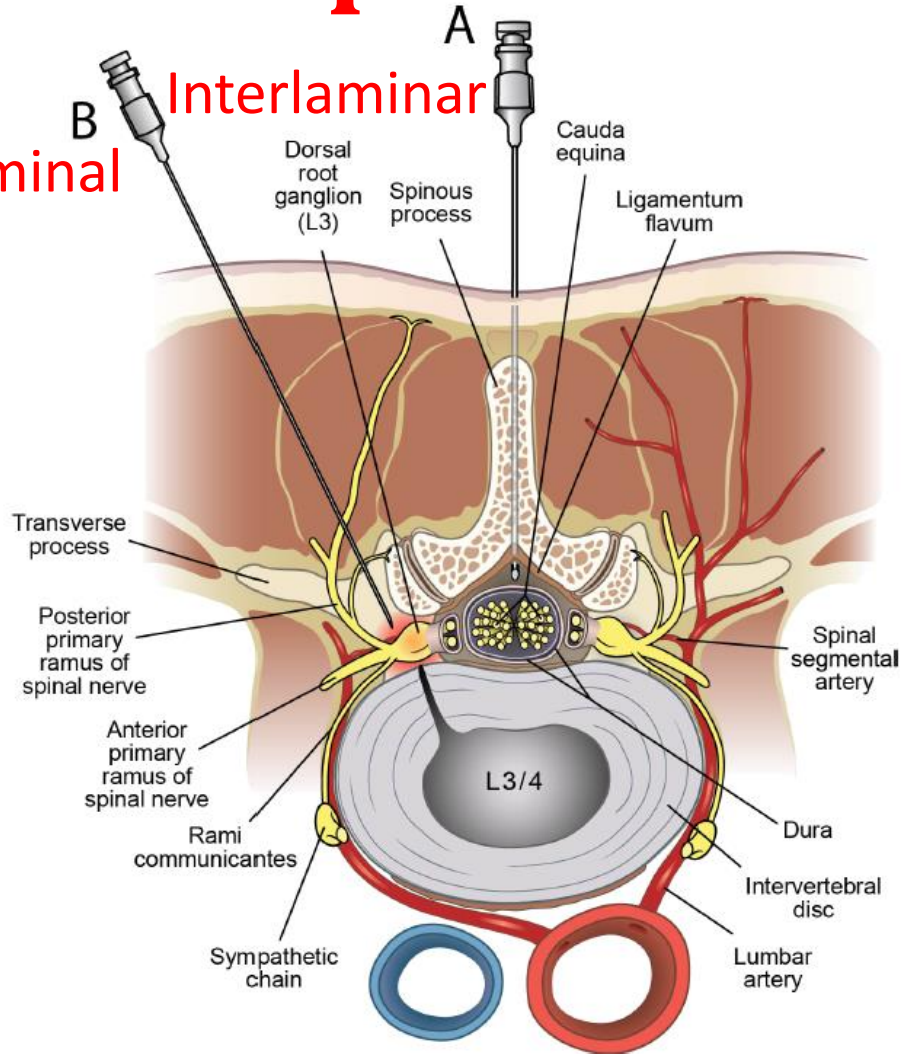
# Interventional Pain Management

- Epidurals (neck and low back)
- Facet injections (neck and low back)
- Radiofrequency ablation
- Joint Injections
  - ✓ Shoulders
  - ✓ Hips
  - ✓ Knees
- Trigger point injections
- Spinal Cord Stimulators
- IT Pumps



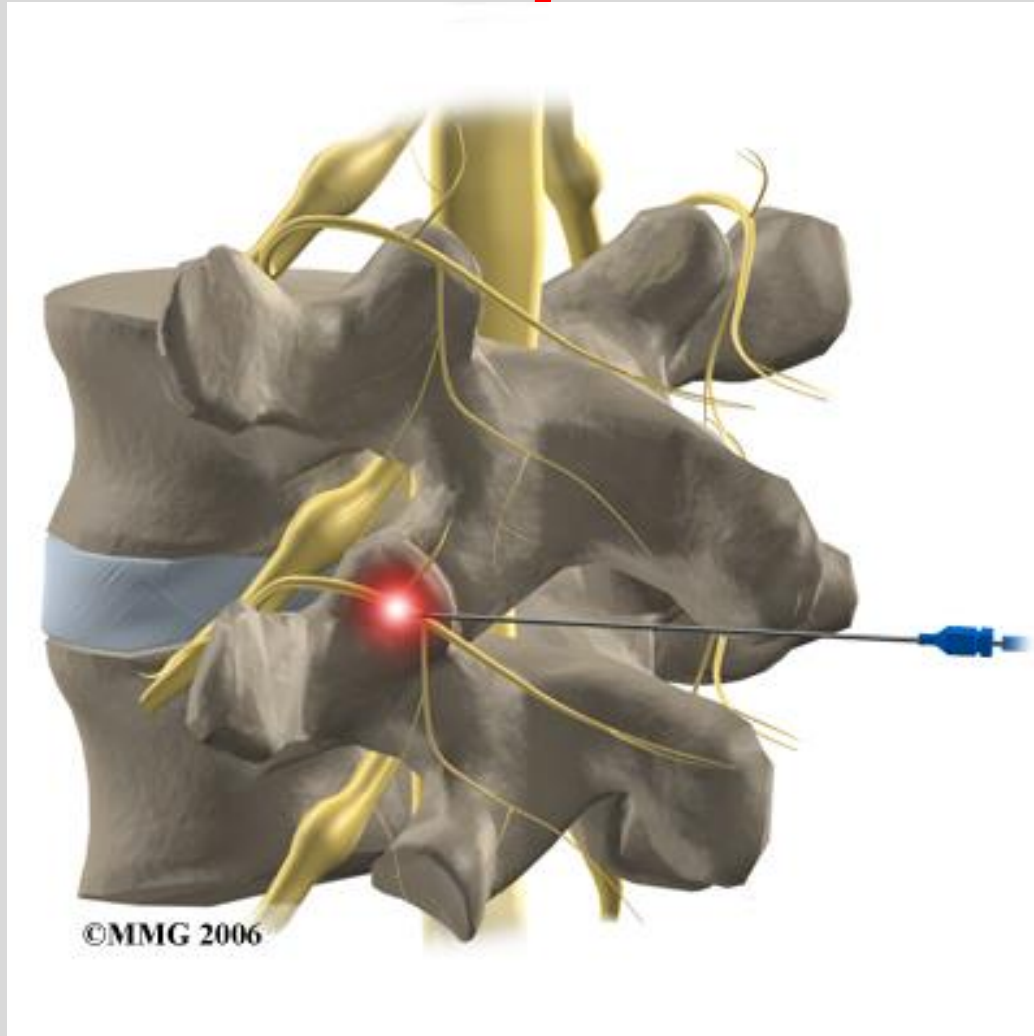
# Epidural

Transforaminal



Cohen SP, Bicket MC, Jamison D, Wilkinson I, Rathmell JP. Epidural steroids: a comprehensive, evidence-based review. Reg Anesth Pain Med. 2013 May-Jun;38(3):175-200.

# Facet Injections

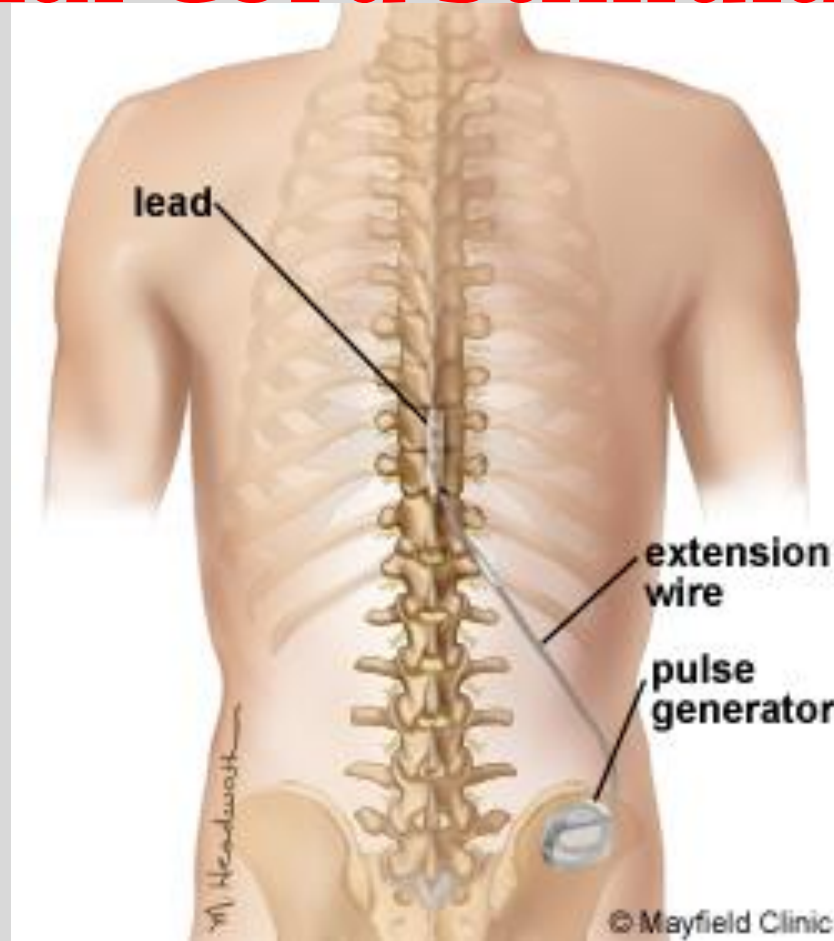


# Interventional Pain Management

## Spinal Cord Stimulators

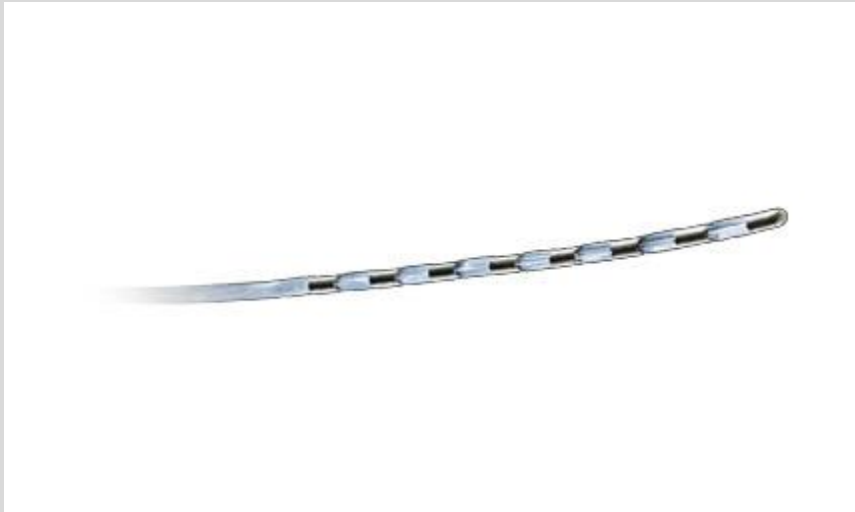
- Post-laminectomy pain syndrome
- Complex Regional Pain Syndrome (CRPS)
- Peripheral Neuropathy (PVD, HIV, DM)

# Spinal Cord Stimulators



<http://www.mayfieldclinic.com/PE-STIM.htm>

# Spinal Cord Stimulators



# Spinal Cord Stimulators



**The End**