

# Multi-Modal Pain Management

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Todd Edmiston, MD

# Disclosures

- None
- Fellowship training in Sports and Adult Reconstruction
- Director of Orthopaedic Center, South Baldwin Regional Medical Center, Foley Alabama
- Chief of Staff, South Baldwin Regional Medical Center, Foley Alabama

# Multi-Modal Pain Management

- **Multi-Modal**

- adjective

adjective: **multi-modal**

1 characterized by several different modes of activity or occurrence.

# Multi-Modal Pain Management

- Goal
- **Prevent Pain**
  - Keep the patient comfortable

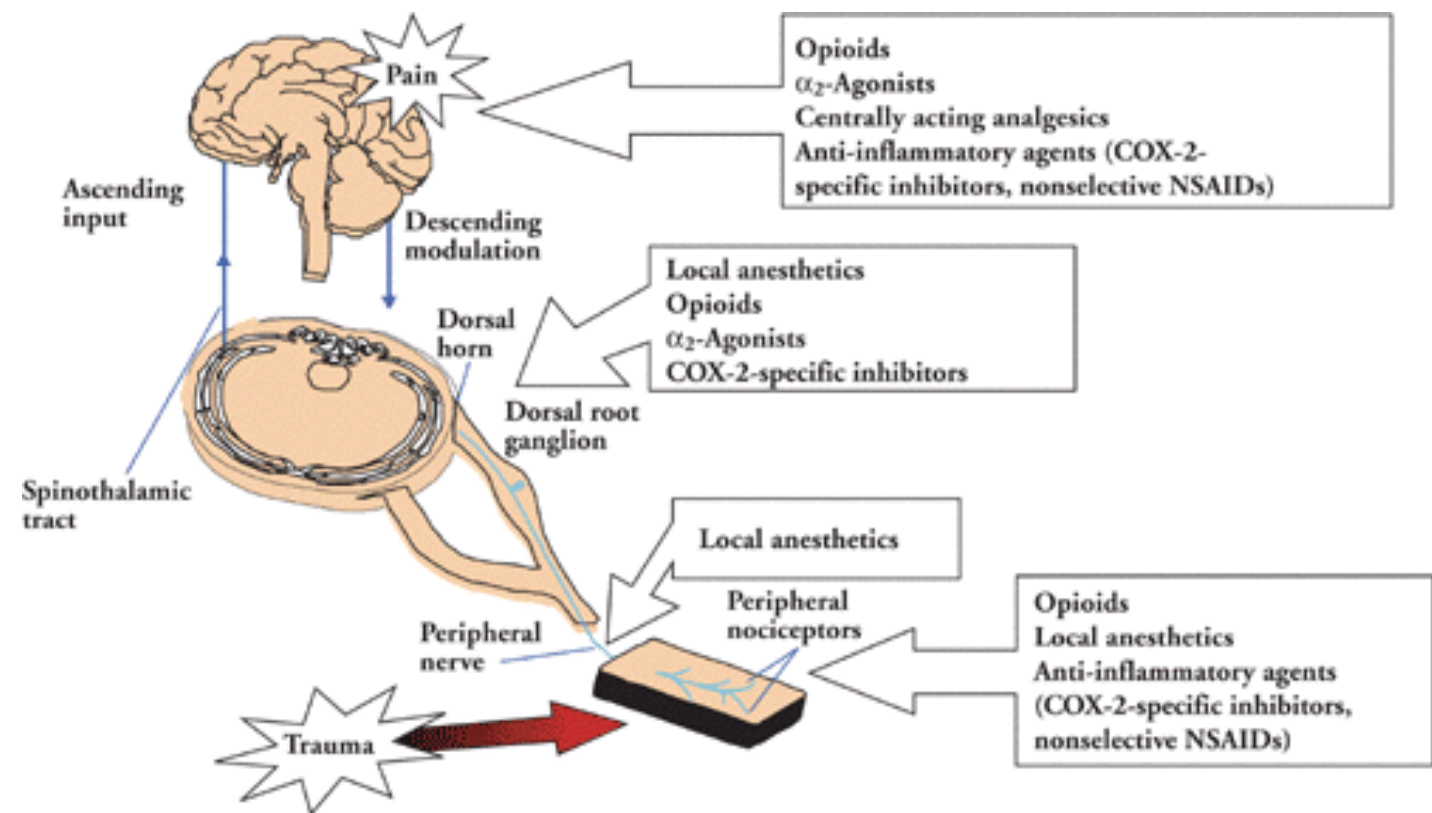
# Multi-Modal Pain Management

- Goal
- **Prevent Complications** (of Opiates)
  - Urinary Retention
  - Ileus
  - Respiratory Depression
  - **Nausea/Vomiting**

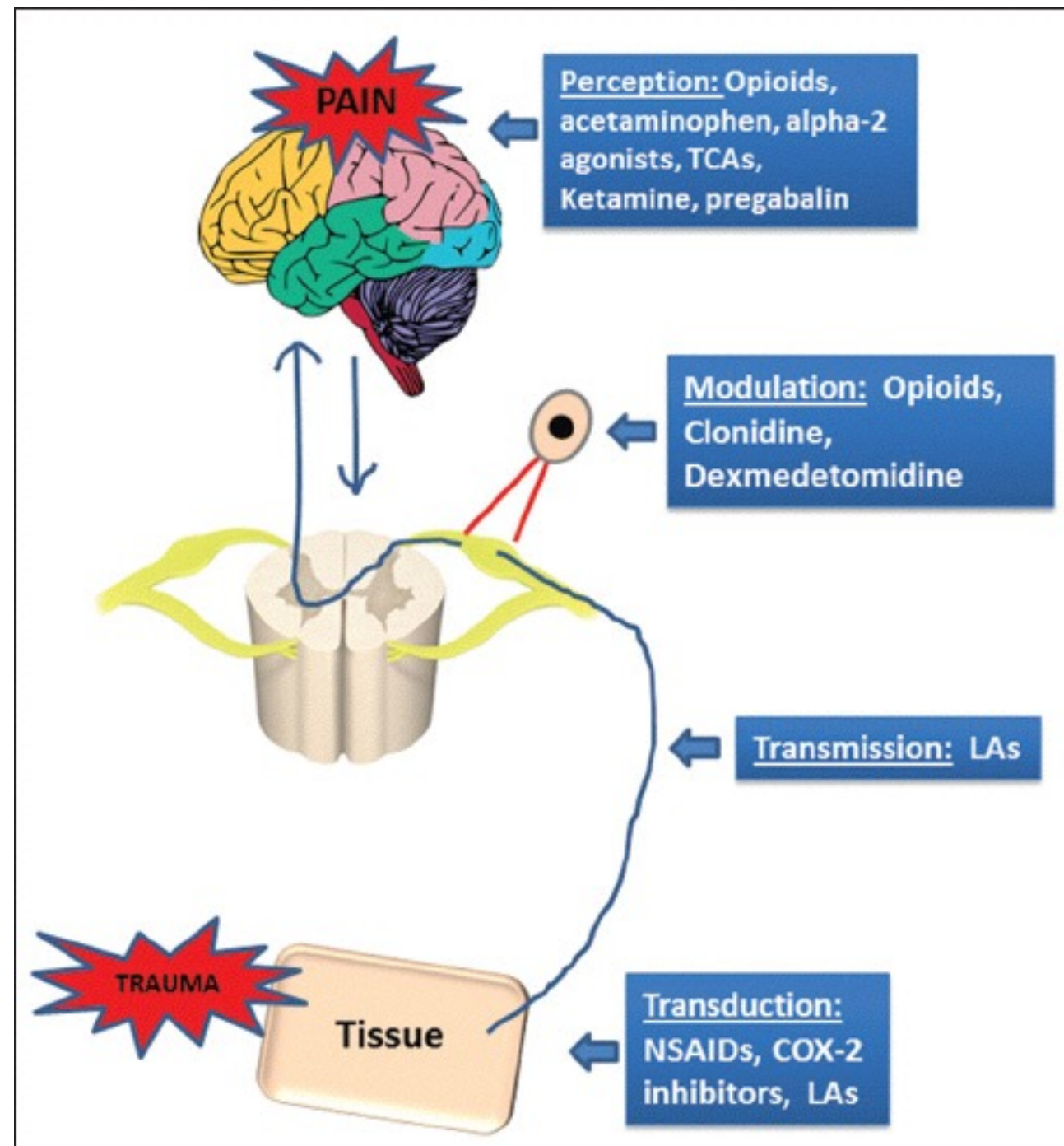
**Patient Satisfaction  
Outcomes**

# Multi-Modal Pain Management

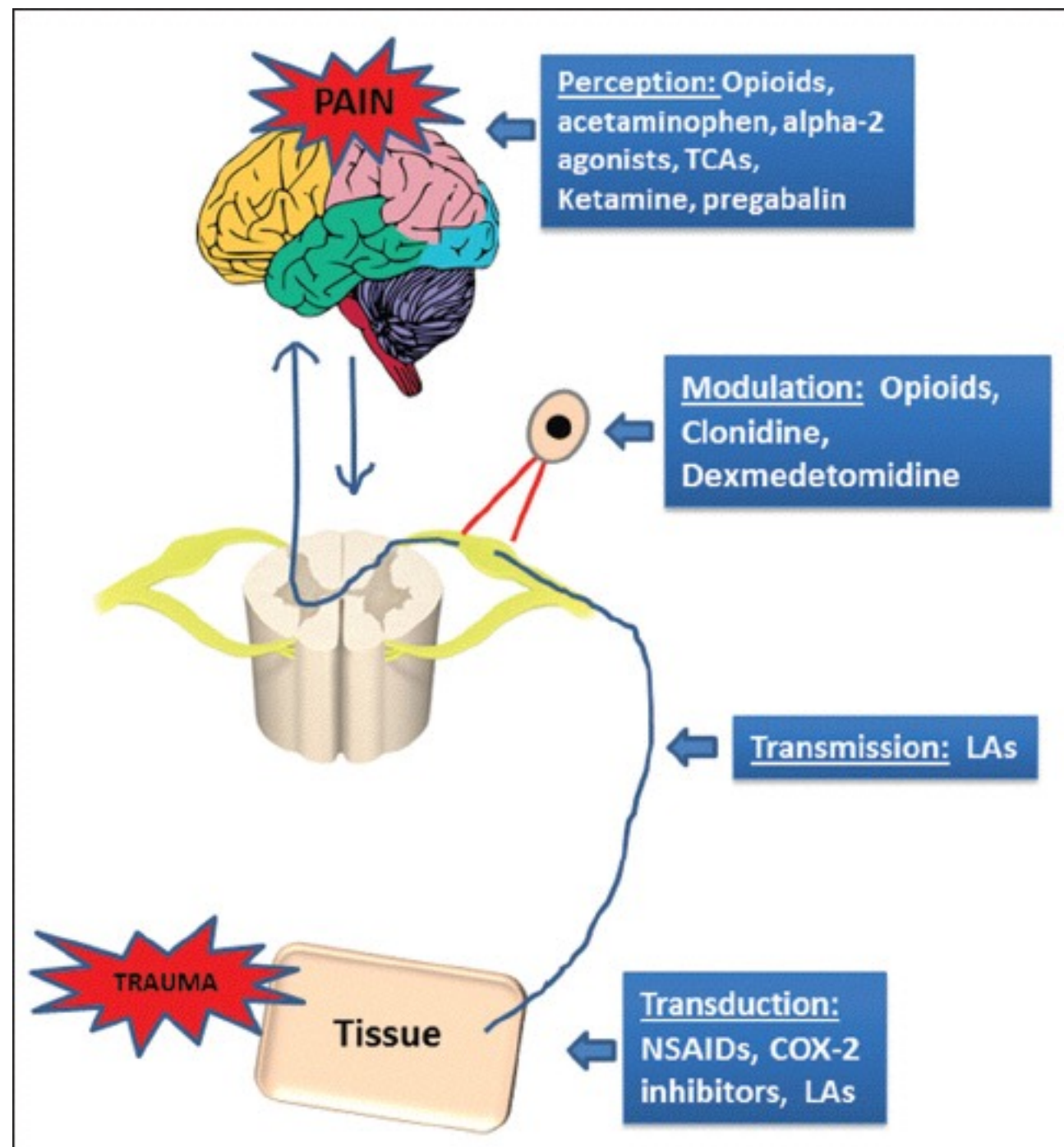
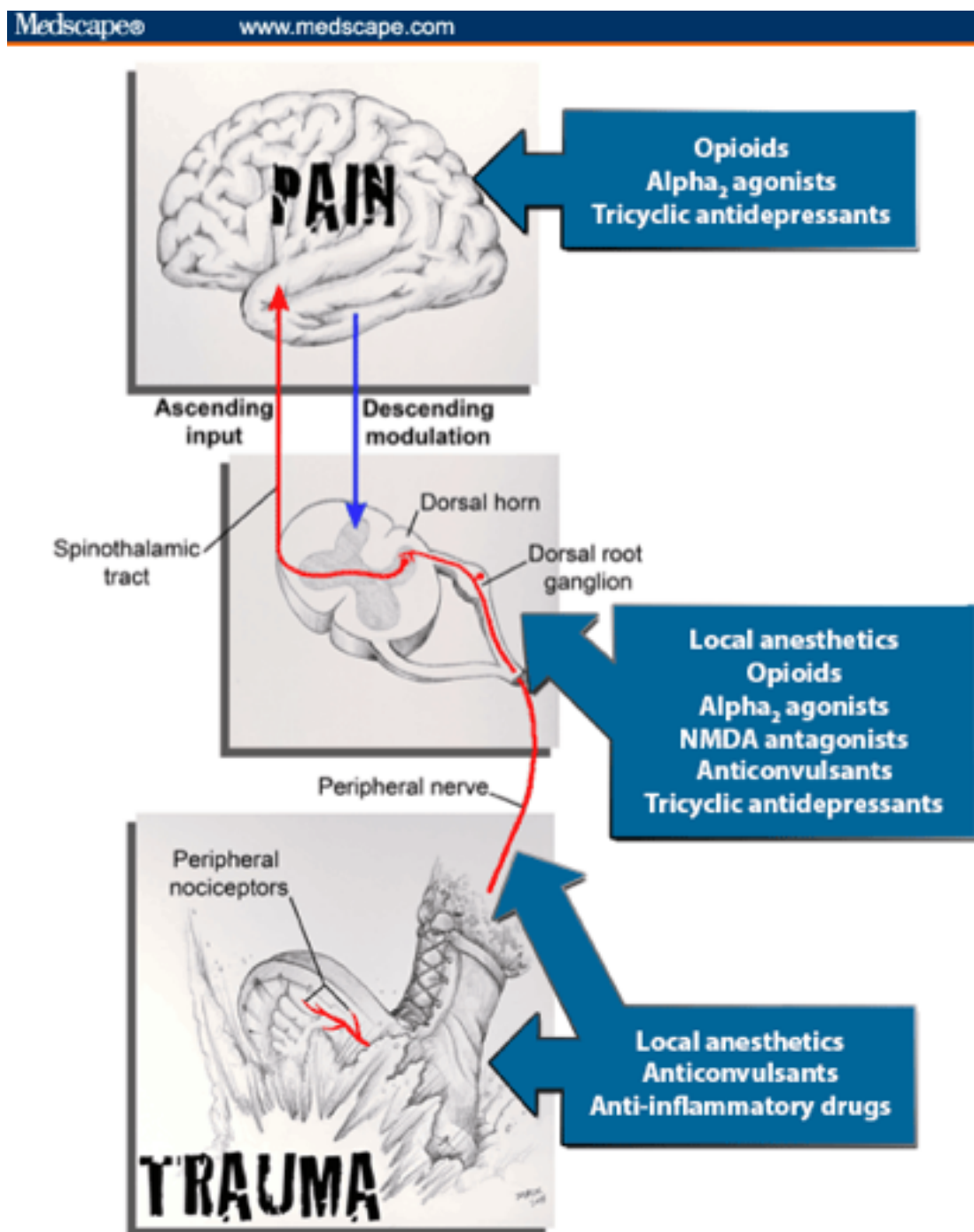
- **Definition:**
- Combination of 2 or more analgesic agents or techniques that act by different mechanisms



# Multi-Modal Pain Management



# Multi-Modal Pain Management





# Multi-Modal Surgical Pain Management

- **Pre-Op**

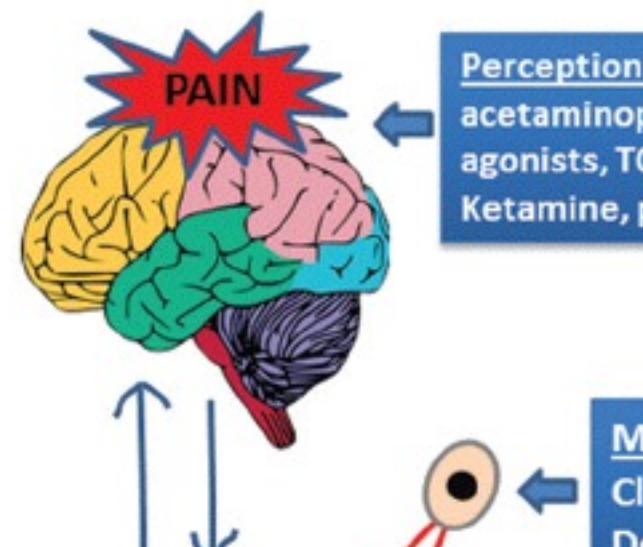
- “Pain Management and Best Outcomes Begin with Pre-Op Planning” *TBE*

- Brain, Cortex

- Education, Setting Expectations

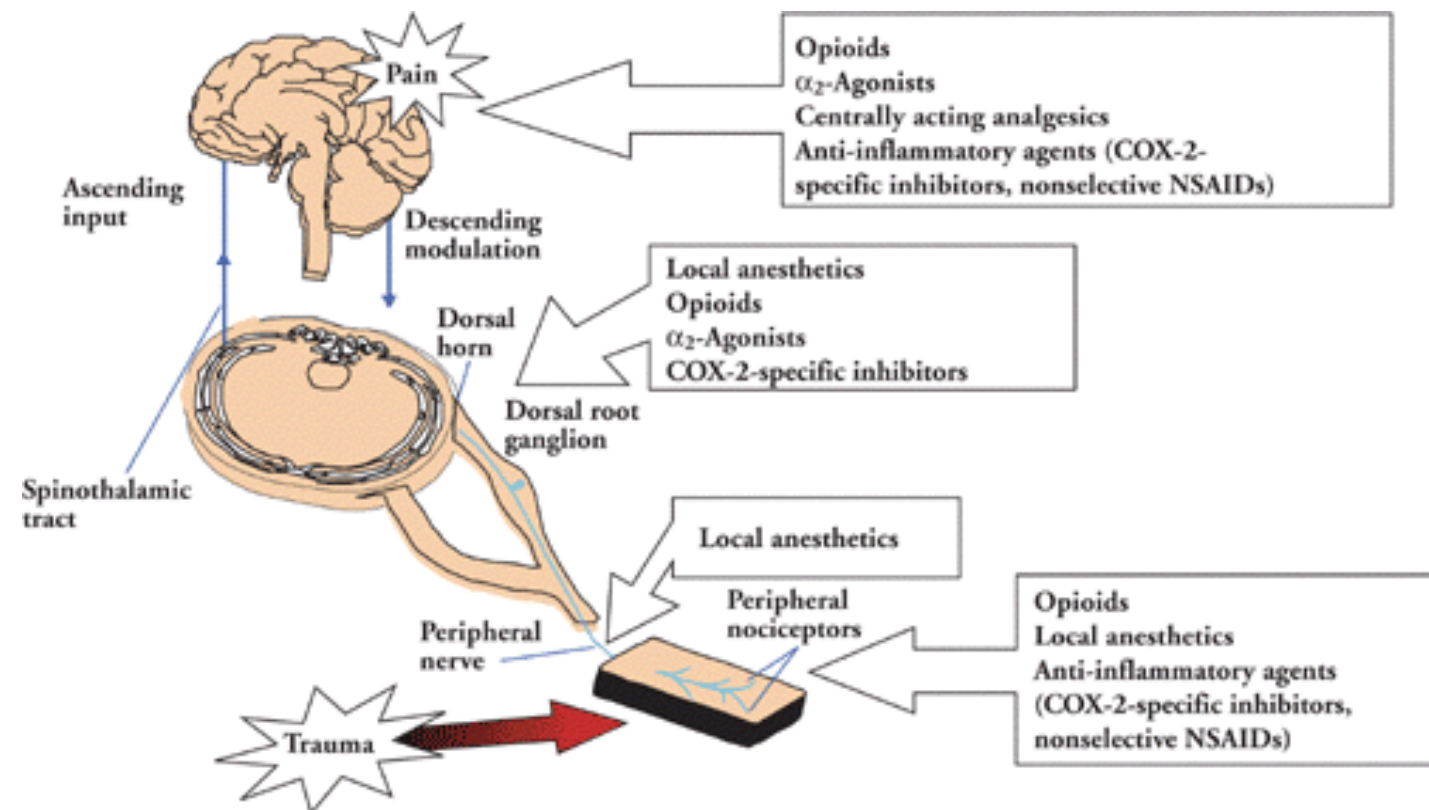
- Pre-Load

- Celebrex (Cox2) 200-400mg PO
    - Oxycontin 10-20mg PO
    - Acetaminophen 500mg PO
    - Reglan 10mg IV



# Multi-Modal Surgical Pain Management

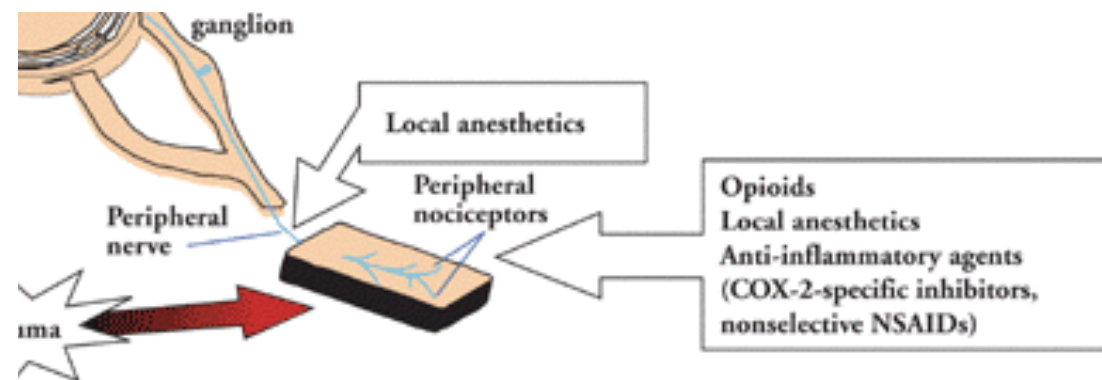
- Intra-Op
- Spinal Anesthetic
- Epidural Injection



- Cox2
  - Blocks Transmission

# Multi-Modal Surgical Pain Management

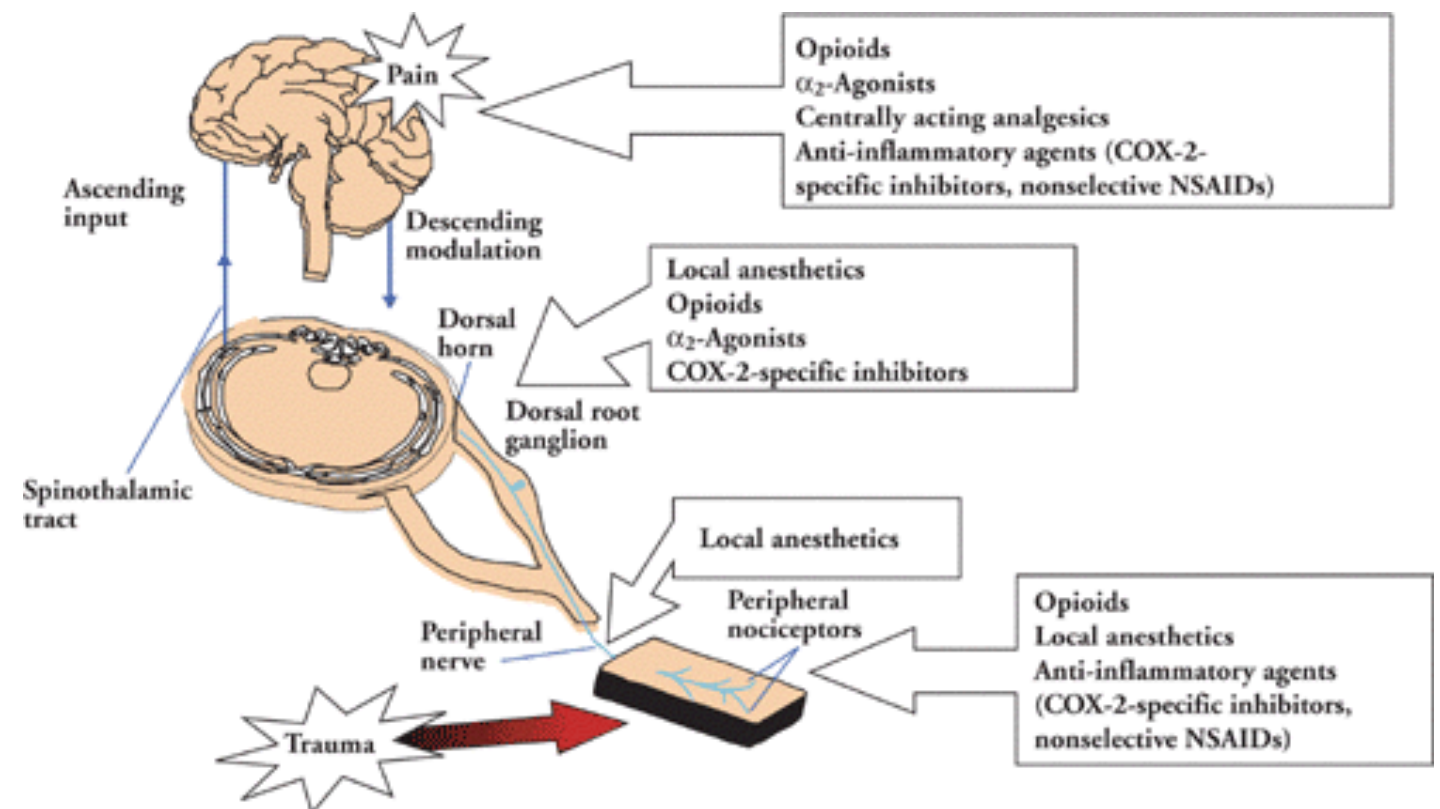
- **Intra-Op**
  - Inflammatory Cells
  - Sensory Neurons
- **Peri-Articular Injection (PAI)**
  - Cocktail
    - Ropivacaine
    - Morphine
    - Toradol
    - Epinephrine



# Multi-Modal Surgical Pain Management

- **Post-Op Recovery Room**
  - **Peripheral Nerve Block**
    - Adductor Canal

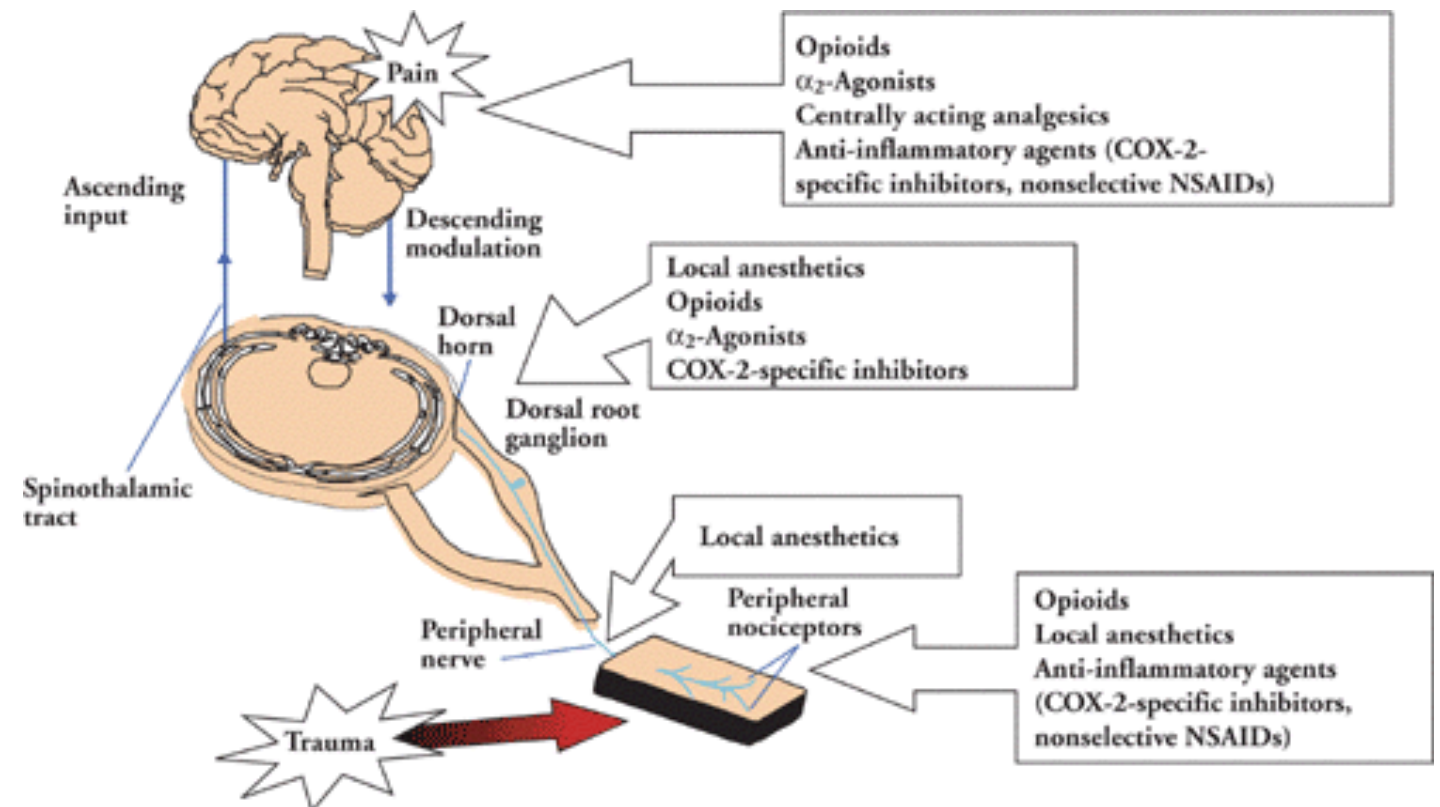
- ICE
- Toradol
- Opioid IV or PO
- DVT Prophylaxis



# Multi-Modal Surgical Pain Management

- **Post-Op Floor**

- ICE
- Toradol
- Opioid PO
- Opioid IV
- DVT Prophylaxis
- Therapy





# Post-Op Cryotherapy

- Cryotherapy
- Compression



- KISS
  - Easy
  - Cost Effective
  - Good Result



# Multi-Modal Surgical Pain Management

- History of Pain Management during Total Knee Arthroplasty
  - 1980s - IV Opiates
  - 1990s - IV Opiates and **PCA pump**
    - *Urinary Retention*
    - *Ileus*
    - *Respiratory Depression*
    - ***Nausea/Vomiting***
      - +15%



# Multi-Modal Surgical Pain Management

- History of Pain Management during Total Knee Arthroplasty
  - 1980s - IV Opiates
  - 1990s - IV Opiates and PCA pump
  - 2000s - Multi-Modal Pain Management
    - **Peripheral Nerve Block**



# Multi-Modal Surgical Pain Management

- 2000s - Multi-Modal Pain Management
  - **Peripheral Nerve Block**
- IV & PO Opioid vs MMPN with PNB

Hebl JR et al, Reg Anesth & Pain Med 33, 2008

  - Femoral Nerve Blocks and Sciatic Nerve Blocks
  - Reduced Opioid Requirements
  - Lower Pain Scores
  - Faster Time to Discharge

# Multi-Modal Surgical Pain Management

- History of Pain Management during Total Knee Arthroplasty
  - 1980s - IV Opiates
  - 1990s - IV Opiates and PCA pump
  - 2000s - MMPM with Peripheral Nerve Block
  - 2010s - MMPM with **Peri-Articular Injection**

# Multi-Modal Surgical Pain Management

- 2010s - MMPM with **Peri-Articular Injection**
- Total Knee Arthroplasty with MMPM and **PAI**

Gibbs et al, JBJS 94B, 2012

- Literature Review
- Lower Pain Scores
- Reduced Narcotic Requirements
- No change in Length of Stay

# Multi-Modal Surgical Pain Management

Spanghel, Clarke et al, CORR, 2015

- Prospective Randomized Trial **Comparing PNB and PAI** for pain management following Total Knee Arthroplasty.
  - Same surgery technique, Same implant, Same post op medications
  - PNB - Femoral NB and Sciatic NB
  - PAI - Ropivacaine, Morphine, Ketorolac (120ml)
- Pain Scores Equal in both groups
- Length of Stay was 1/2 day shorter in PAI group

# Multi-Modal Surgical Pain Management

Spanghel, Clarke et al, CORR, 2015

- Prospective Randomized Trial Comparing PNB and PAI for pain management following Total Knee Arthroplasty.
  - Length of Stay was 1/2 day shorter in PAI group
    - Earlier mobilization in PAI group
  - PNB group had 12% nerve injury rate at 6 weeks f/u

# Multi-Modal Surgical Pain Management

Spanghel, Clarke et al, CORR, 2015

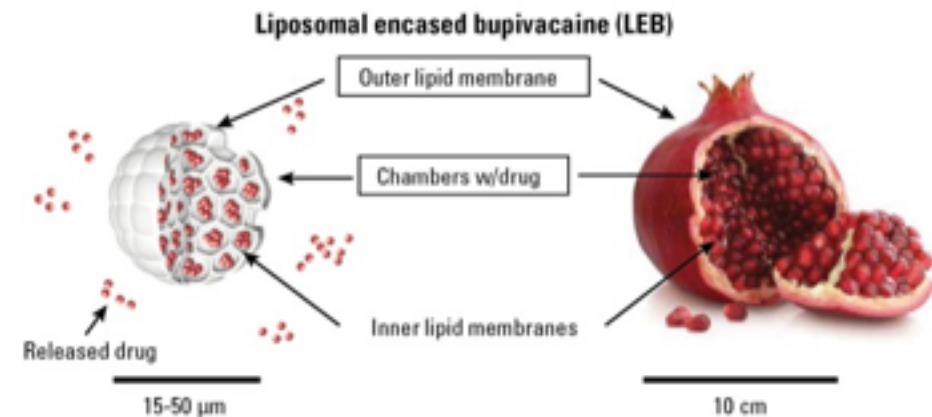
- Prospective Randomized Trial **Comparing PNB and PAI** for pain management following Total Knee Arthroplasty.
  - No statistical difference in complication rate
    - 3 Falls in PNB group
    - 0 Falls in PAI group

# Multi-Modal Surgical Pain Management

- Bupivacaine
  - Long acting local anesthetic
  - Half-Life = 3.5 hrs
  - Effects typically last up to 9 hrs

# Multi-Modal Surgical Pain Management

- Liposomal Bupivacaine
  - Up to 72 hours of pain relief
  - Does not disperse into the soft tissues as well
  - Limited data to show superiority





# Multi-Modal Surgical Pain Management

- Dosing Study Comparing Liposomal Bupivacaine vs Bupivacaine HCl  
Bramlett et al, The Knee, 2012
- Liposomal Bup - 133mg, 266mg, 399mg, 532mg
- Standard Bup - 150mg
- Only the 532mg of Liposomal showed a superior effect over 150mg Standard
  - 4x the dose

# Multi-Modal Surgical Pain Management

Meneghini et al, J Arthroplasty, 2014

- **PAI Study with single variable = Liposomal Bupivacaine**
  - 2 Groups each with PAI cocktail
  - Substituted Liposomal Bupivacaine with regular Bupivacaine in the Traditional PAI cocktail
- First 24 hrs = No Statistical Difference in Pain Scores
- After 24 hrs = Better pain scores in the regular cocktail group
  - Liposomal Bupivacaine had inferior pain management after 24 hours

# Multi-Modal Surgical Pain Management

- **PAI Study comparing Liposomal Bupivacaine with the traditional cocktail** Shroer et al, J Arthroplasty, 2015
  - No Difference in Narcotic Usage
  - No Benefit to use of Liposomal
    - Liposomal Bupivacaine ~\$300
    - Standard Bupivacaine ~\$5

# Multi-Modal Surgical Pain Management

Collis et al, J Arthroplasty, 2016

- **PAI Study comparing Liposomal Bupivacaine with the Ranawat cocktail**
  - Dr. Ranawat's cocktail is same as described with addition of Clonidine.
- No Difference in Narcotic Usage

# Multi-Modal Surgical Pain Management

Meneghini et al, J Knee Surg, 2016

- **Is PAI Technique dependant?**
  - Several different injection techniques compared
  - Infiltrate the tissues
  - Avoid filling the joint
- No Difference in outcome

# Multi-Modal Surgical Pain Management

- **Peri-Articular Multi-Modal Drug Injections**

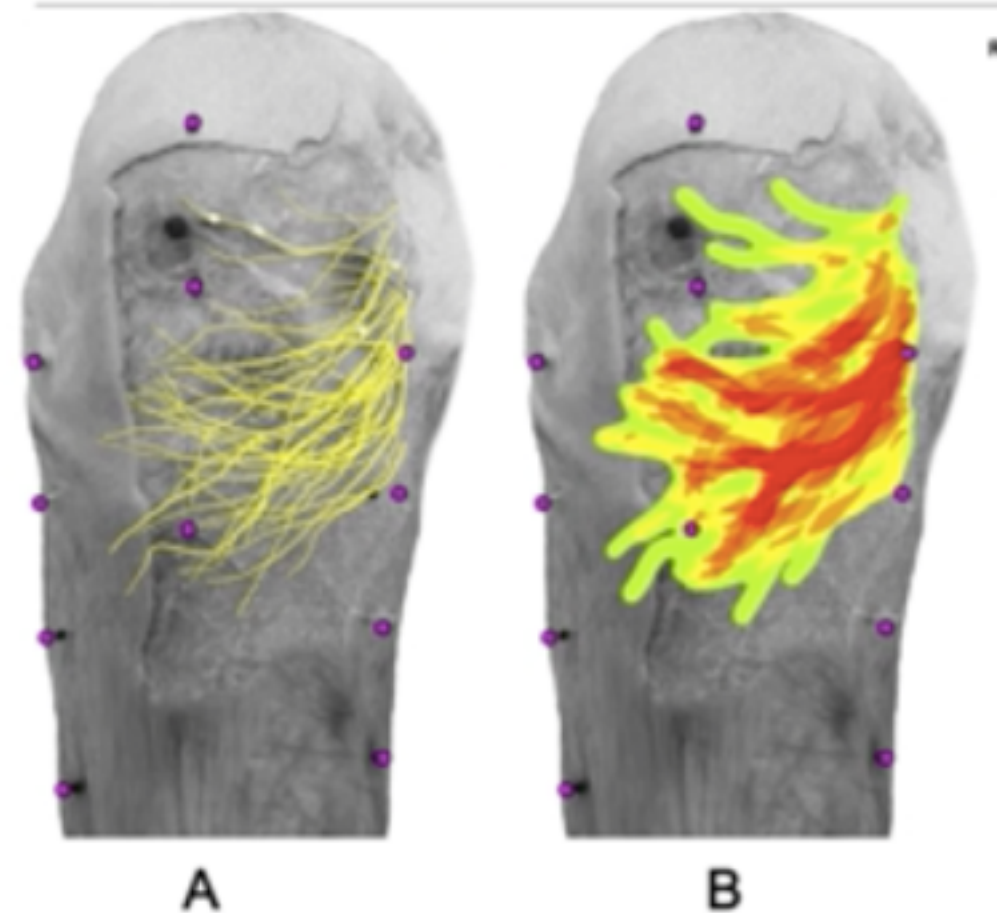
Martin Roche, 2015

- PA Injections offer better pain control over PCA alone or Epidural alone.
- Cocktail:
  - *Bupivacaine or Ropivacaine*
  - *Morphine 5-10mg*
  - *Ketorolac 30mg*
  - *Volume increased with NS up to 60-120ml*

# Multi-Modal Surgical Pain Management

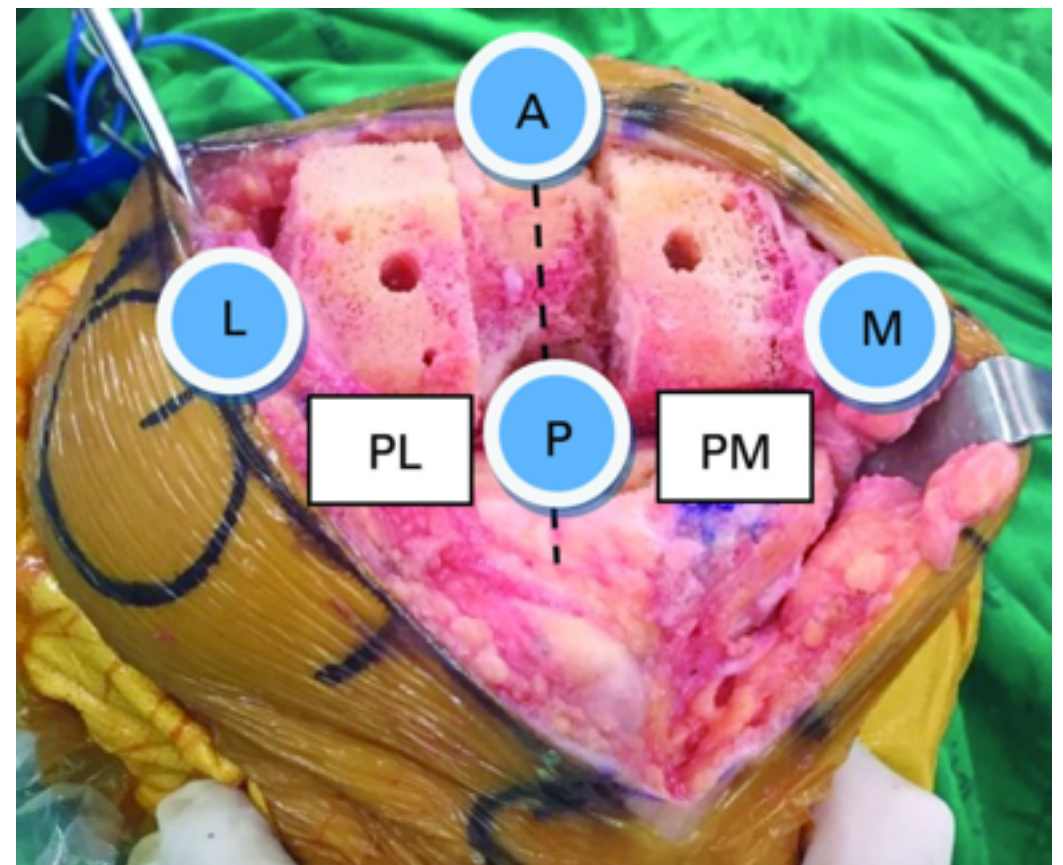
- **Technique**
  - **Peri-Articular Injections**
    - Multiple Branches
    - Multiple Injections
    - Liposomal Bupivacaine
      - Decreased Dispersement

## Saphenous Nerve



# Multi-Modal Surgical Pain Management

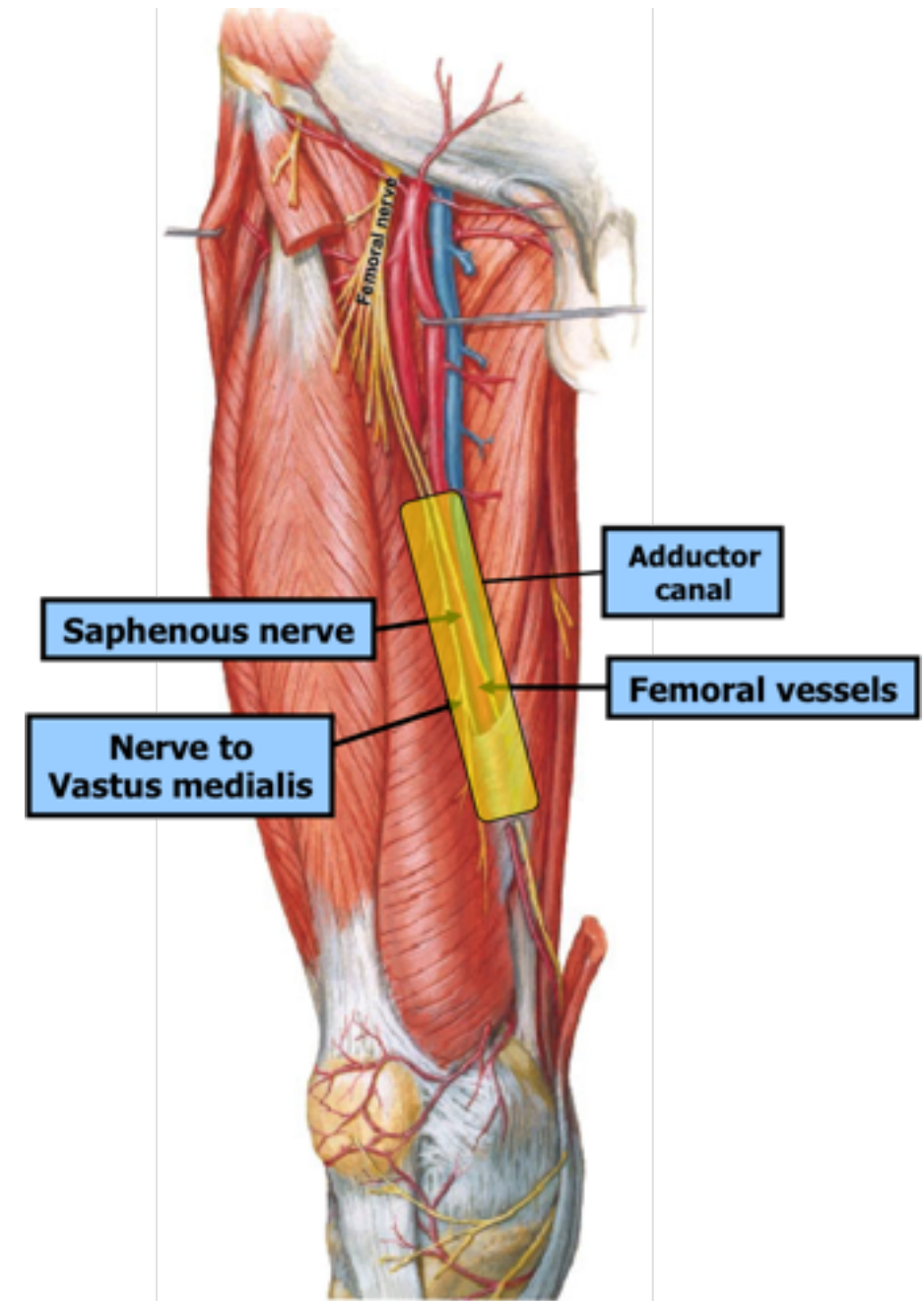
- **Technique**
  - **Peri-Articular Injections**
    - 60cc -120cc
    - Infiltrate into the tissues
    - Subperiosteal tissue
    - Posterior
    - Subcutaneous





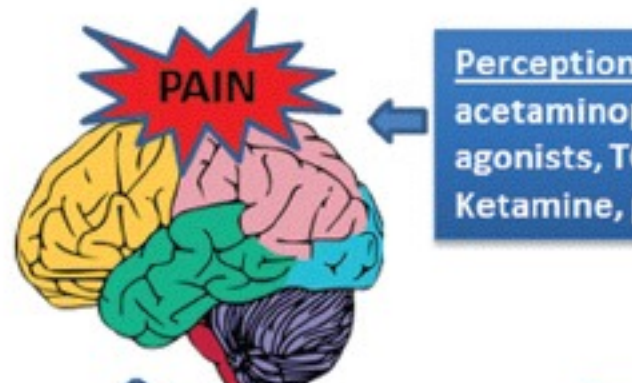
# Multi-Modal Surgical Pain Management

- **Technique**
  - **Adductor Canal Injections**
  - **Peripheral Nerve Block**
    - 30cc
    - 0.5% Bupivacaine
    - Infiltrate into the canal
    - Block sensory not motor fibers



# My Protocol

- Pre-Op
  - Education & Expectations
- Intra-Op
  - PAI
- Recovery Room
  - Lite Adductor Block (sensory)
- Floor
  - Cryotherapy
  - Compression
  - Elevation
  - Early Mobilization w Therapy
  - PO and IV Opioids



# Post-Op Cryotherapy

- Cryotherapy
- Compression



- KISS
  - Easy
  - Cost Effective
  - Good Result





# Post-Op Elevation

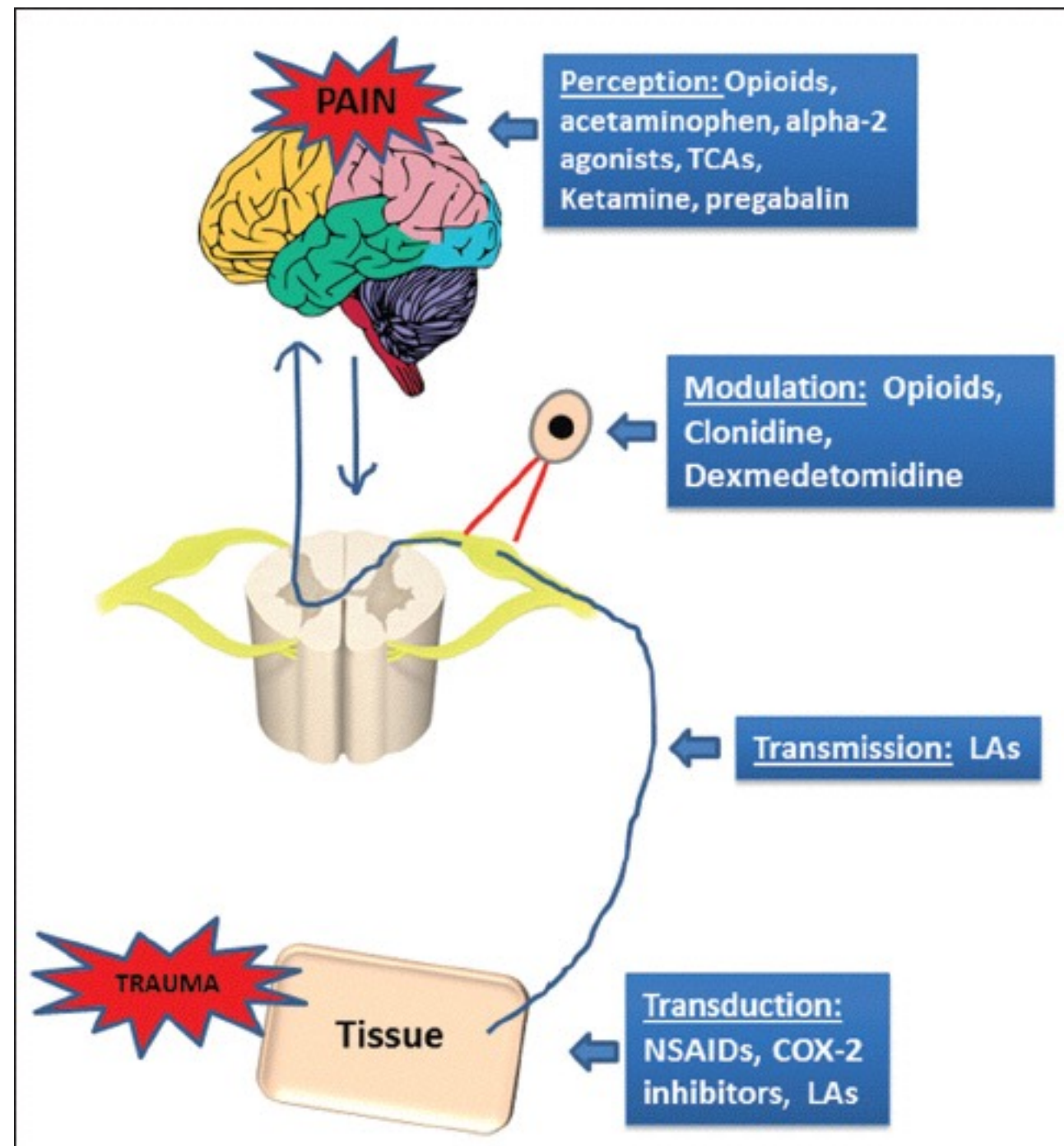
- Knee Extension Pillow
- KISS
  - Easy
  - Cost Effective
  - Good Result
- No CPMs !



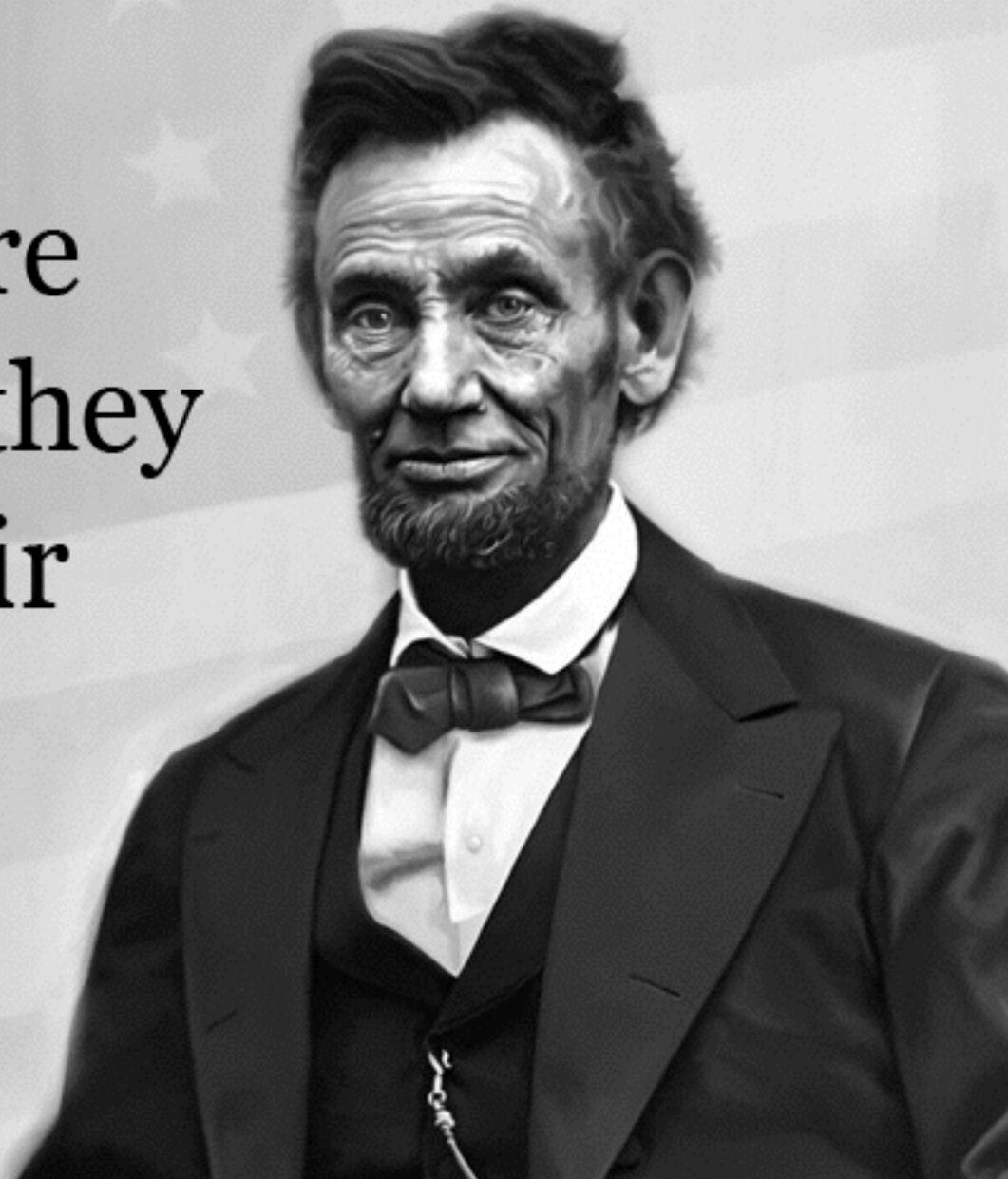
# Post-Op Mobilization

- **Early and Often!!**
  - *Up on Day of Surgery*
  - *Therapy BID*
- Standardized Protocols and Order sets
  - *Decrease Variability*
- Close Coordination with Hospital staff
  - Therapy unit on the ward. M|S

# Multi-Modal Pain Management



Most folks are  
as happy as they  
make up their  
minds to be.



- Abraham Lincoln

Thank You