

Understanding Pain and Its Management

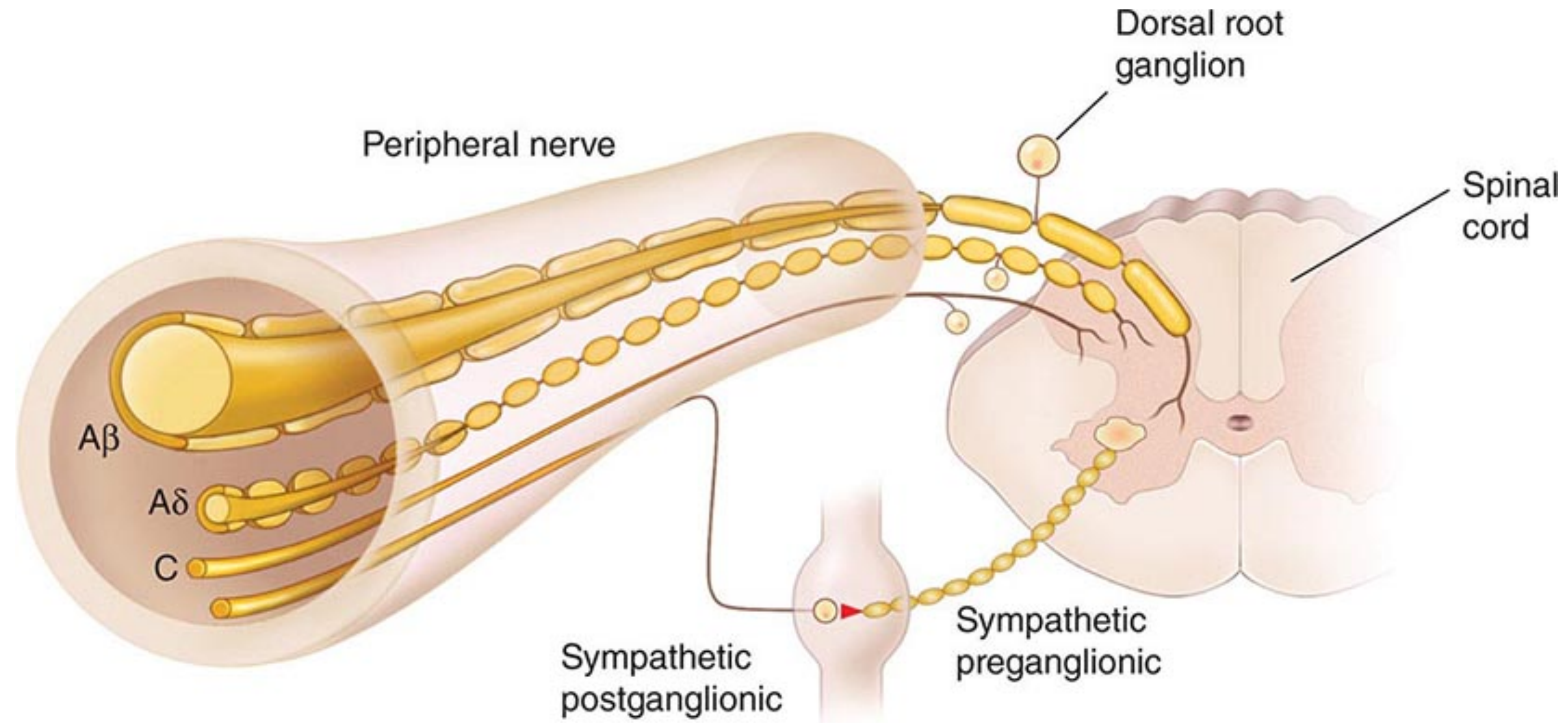
C. Scott Anthony, DO

Objectives:

- Better understand the mechanism of chronic pain and its pathophysiology
- When to refer for pain management
- Understand the work-up of chronic pain and pitfalls that can occur
- Discussion of common pain problems and treatments
- Emphasis on anatomical aspects of common chronic pain procedures



The Pathway of Pain



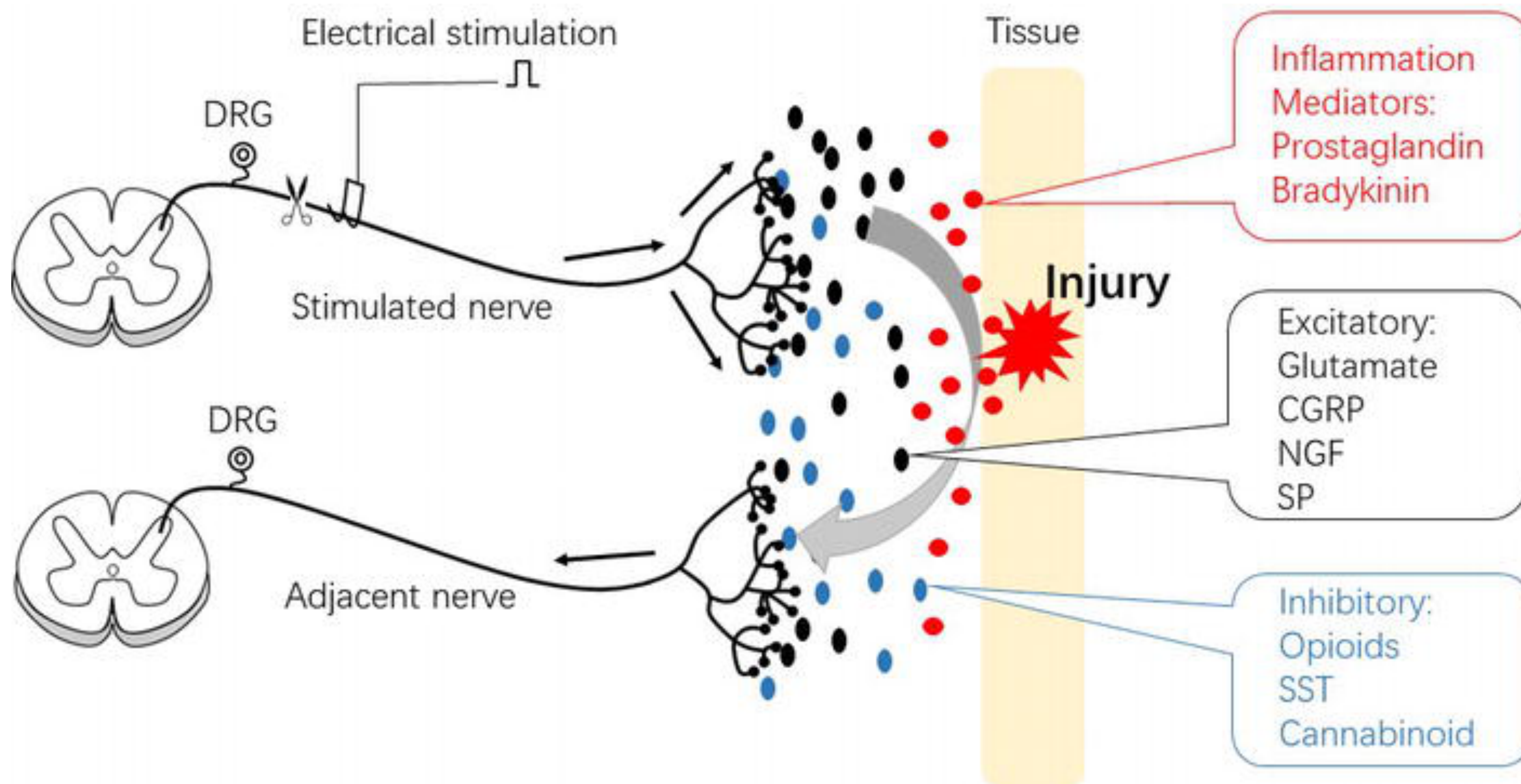
Nociceptive Pain



- Nociceptive stimulation results in cascade of information transmitted to higher CNS centers where it is processed
- Typically self limited but occasional persistence occurs
- Inflammatory pain secondary to chemical sensitization
- Dull, aching throbbing pain
- Both visceral and somatic components can be involved

Nociceptive Pain

Mechanism of Stimulation



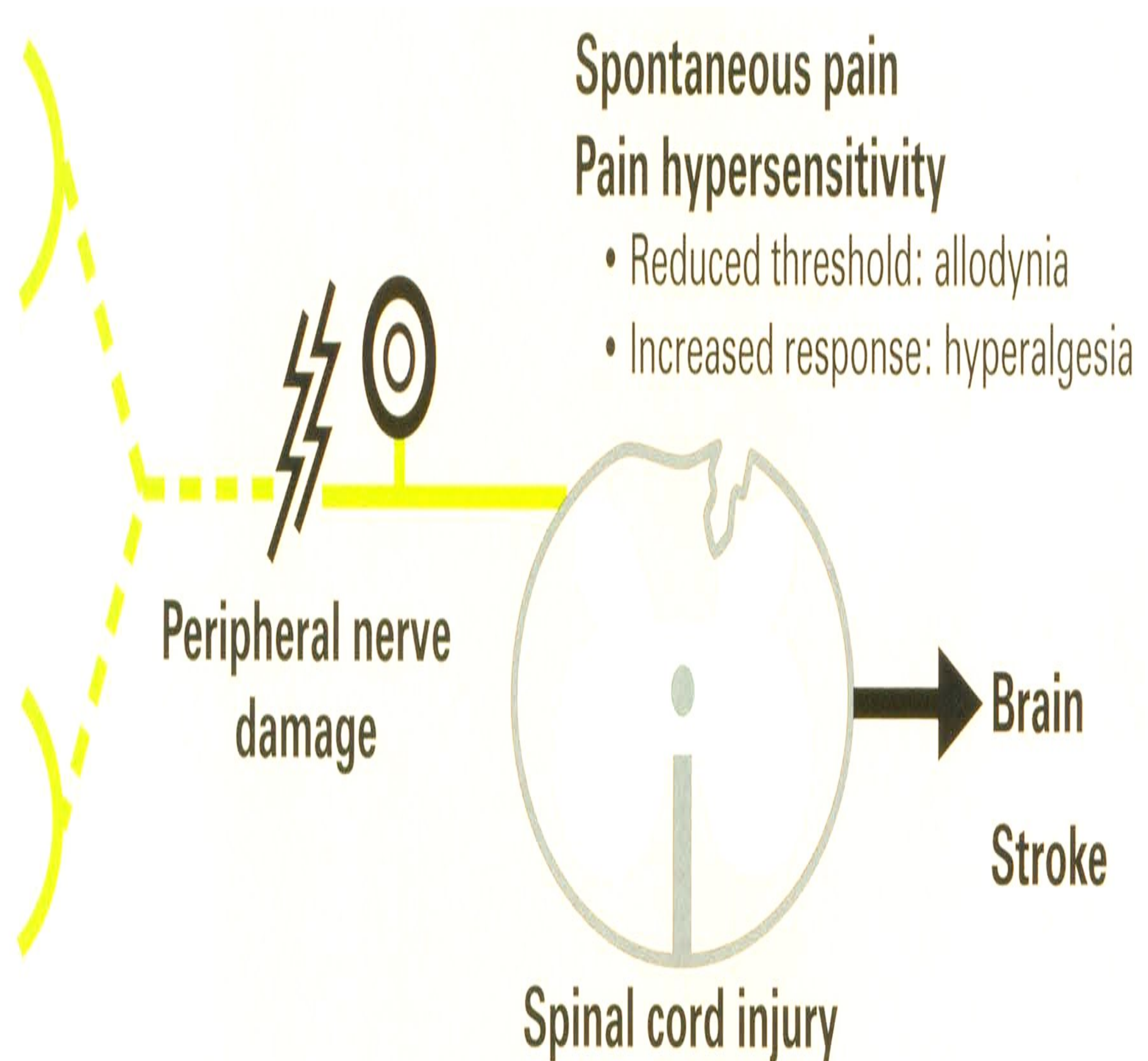
Neuropathic Pain



- Aberrant processing of sensory signals due to neural injury
- Burning, lancinating and electrical sensations
- Most often due to ectopic firing of the sensory nerves due to injury
- Often linked with the sympathetic nervous system
- Commonly presents with hyperalgesia and allodynia

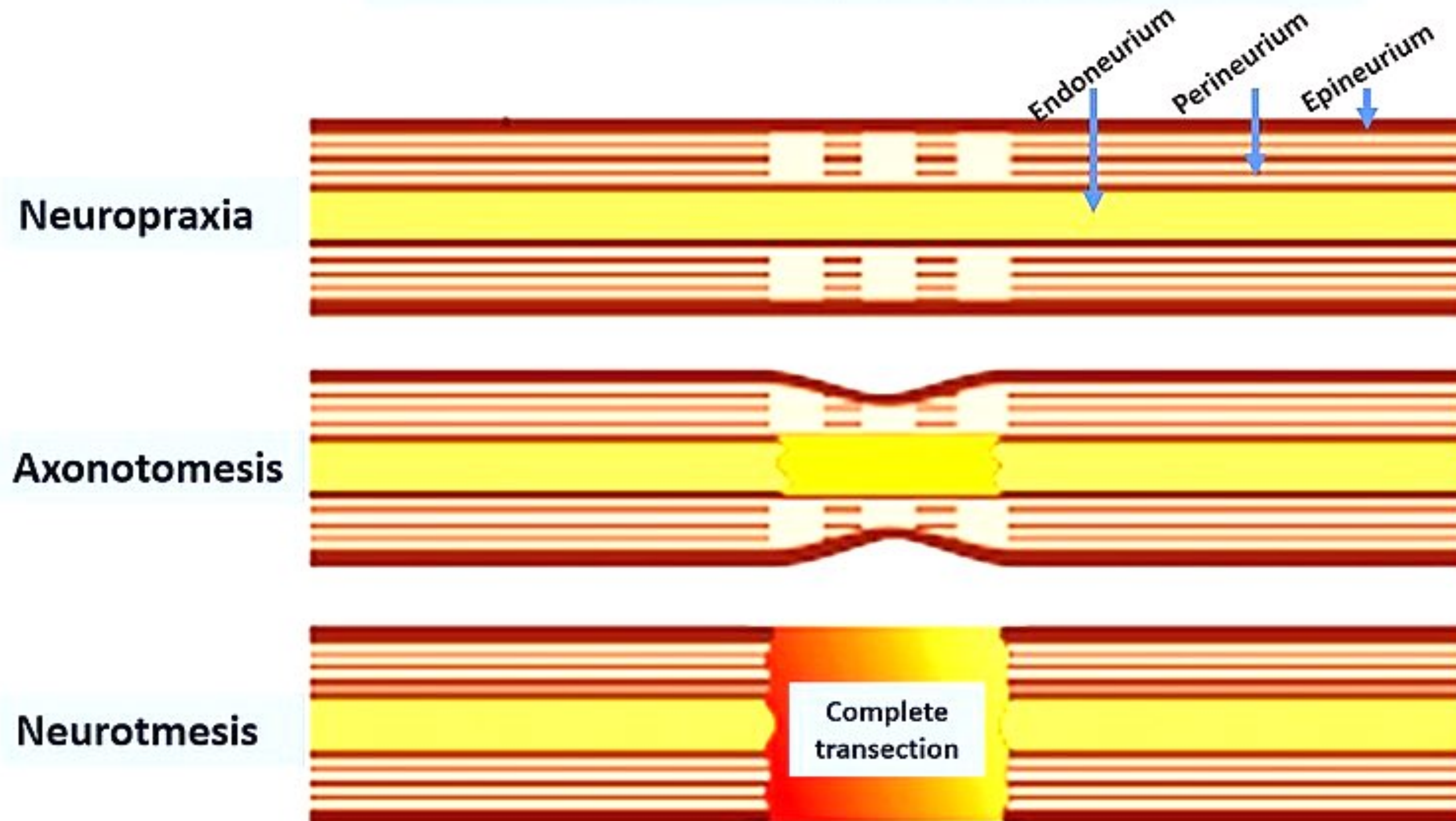
Neuropathic Pain Mechanism:

Neuropathic pain
(Examples: *DPNP, PHN*)



Anatomy of a Nerve Injury:

SEDDON'S CLASSIFICATION OF NERVE INJURIES



Peripheral Axonal Injury: Neuropraxia

- Temporary interruption of conduction without loss of axonal continuity
- Sensory and some motor problems distal to the nerve injury
- Endoneurium, perineurium and epineurium are intact
- No Wallerian degeneration
- Full recovery is to be expected after days to weeks

Peripheral Axonal Injury: Axonotmesis



- Loss of continuity of the axon and its myelin covering
- Wallerian degeneration of the distal nerve occurs
- Motor and sensory deficits occur
- Axonal regeneration occurs and recovery is possible
- Neuroma in situ can occur
- Responds well to adjunctive medications

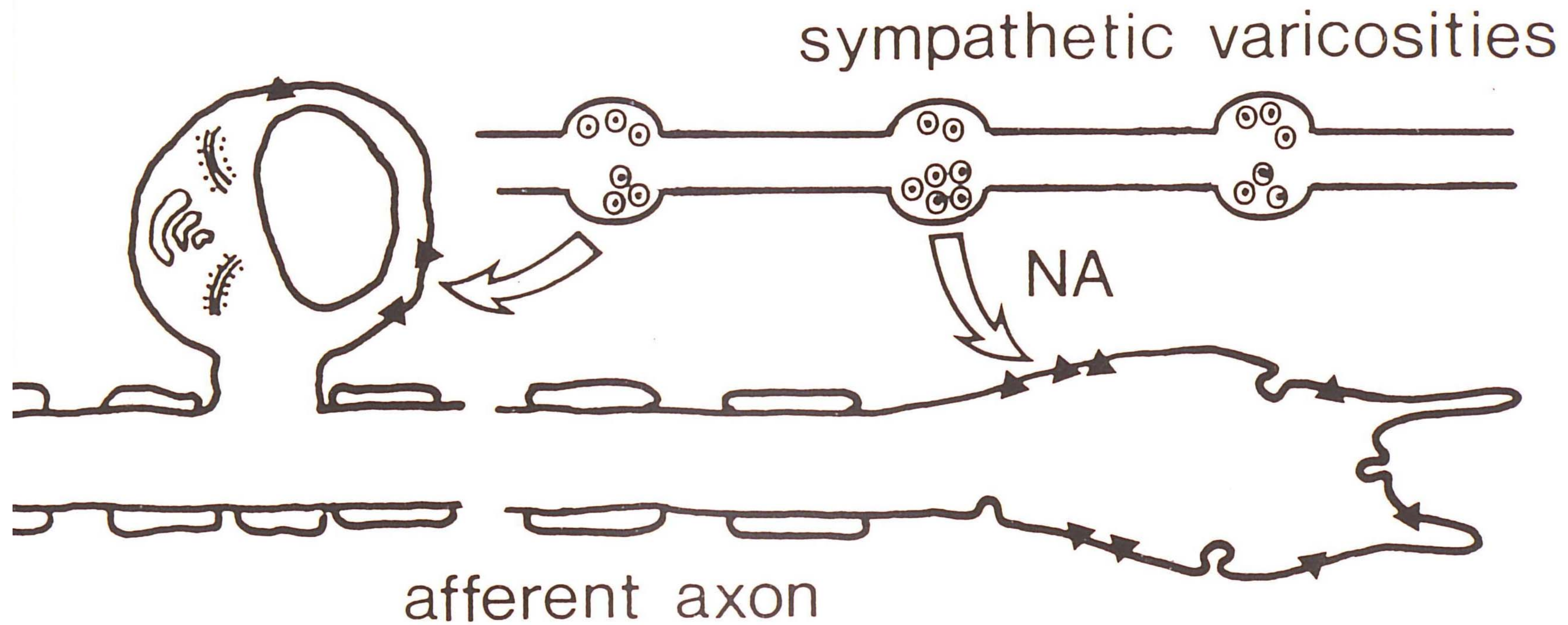
Peripheral Axonal Injury: Neurotmesis

- Severance and disruption of the entire nerve fiber whether partial or complete
- Severe sensory and motor deficit with autonomic function defect
- Wallerian degeneration distal
- Neuroma formation with ectopic discharge and hyper excitation
- Norepinephrine receptor up-regulation
- No nerve conduction distal to the site on EMG

Role of the Sympathetic Nervous System:

- A role is played by both sympathetic efferents and afferents
- Typically C-fiber mediated
- Key role of norepinephrine
- Up-regulation of NE receptors
- No longer termed RSD but rather CRPS I and II
- CRPS may or may not have a sympathetic component

Sympathetic Nervous System Involvement:



Peripheral Sensitization



- Occurs at the level of the nociceptor and nerve
- Tissue damage causes resulting inflammatory response due to mechanical, thermal and chemical causes
- “Sensitizing soup” of inflammatory mediators
- Results in nociceptor hypersensitivity
- Peripheral nerve injury results in hyper excitation of nerve and ectopic discharge
- Can trigger central sensitization (especially with neuropathic pain)

Peripheral to Central

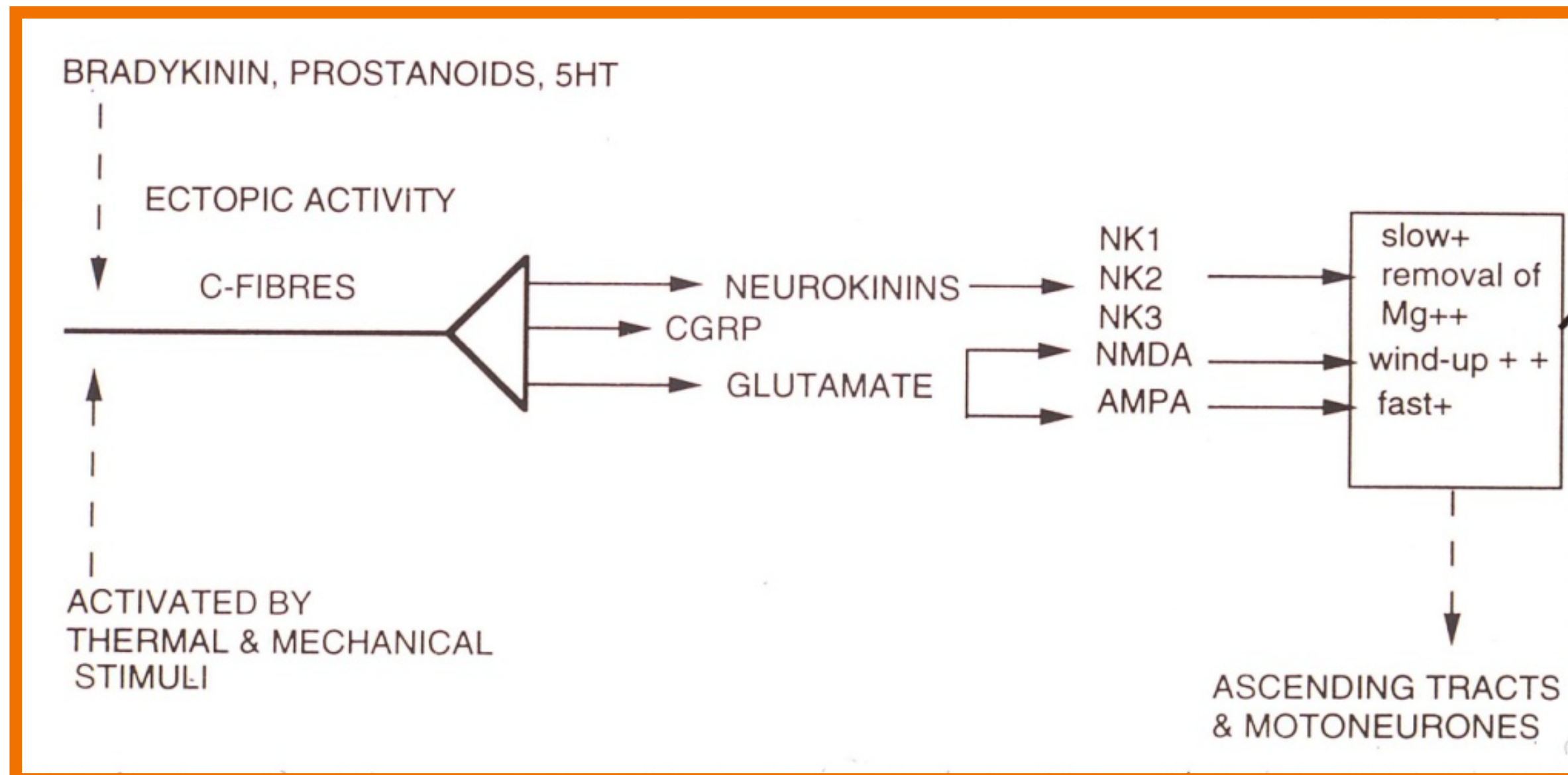
- Does not always occur
- Persistent and unrelenting
- Various levels of severity
- Neuropathic common trigger
- Usually self limited
- But....



Central Sensitization:

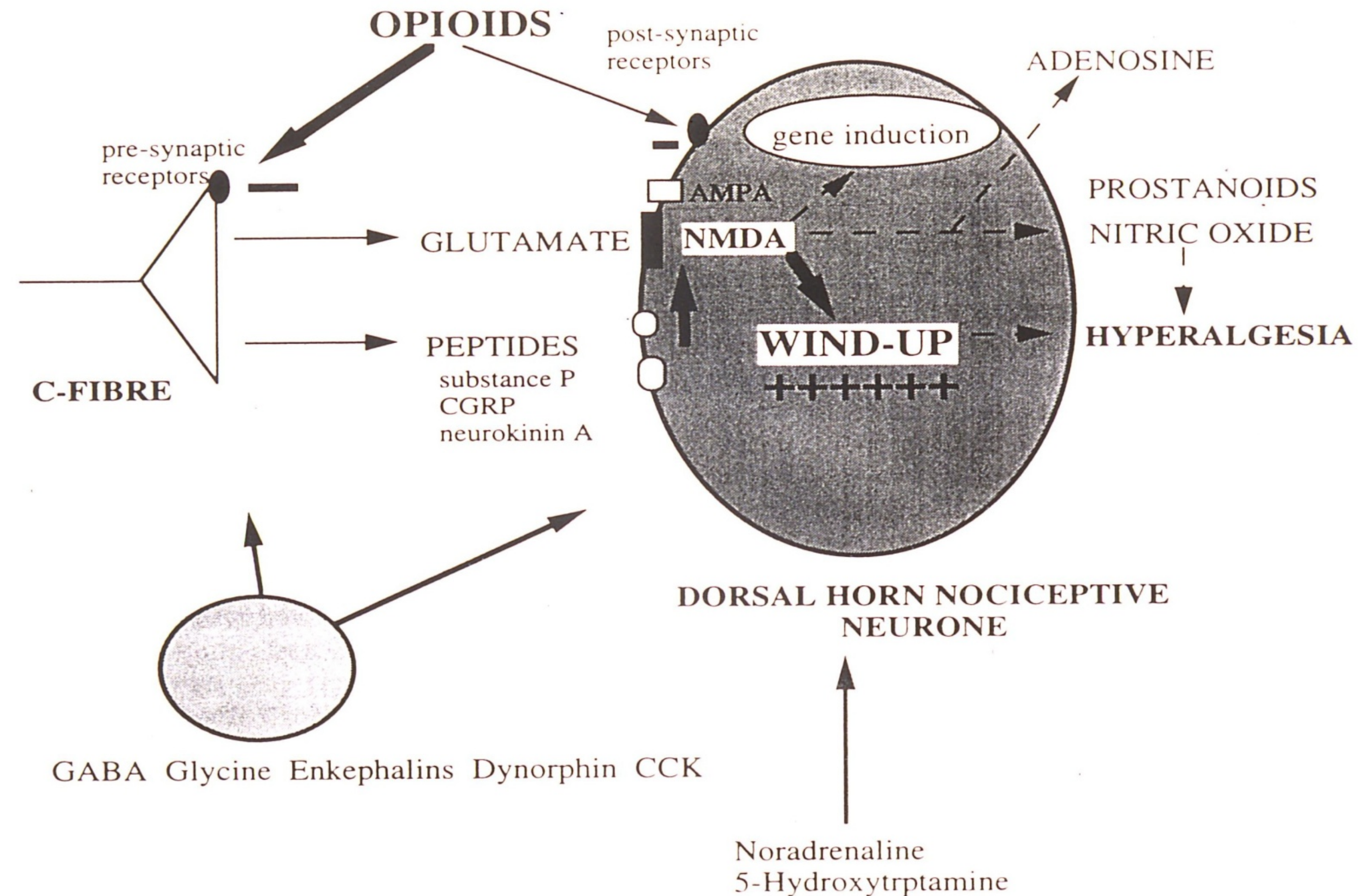
Lightning Storm

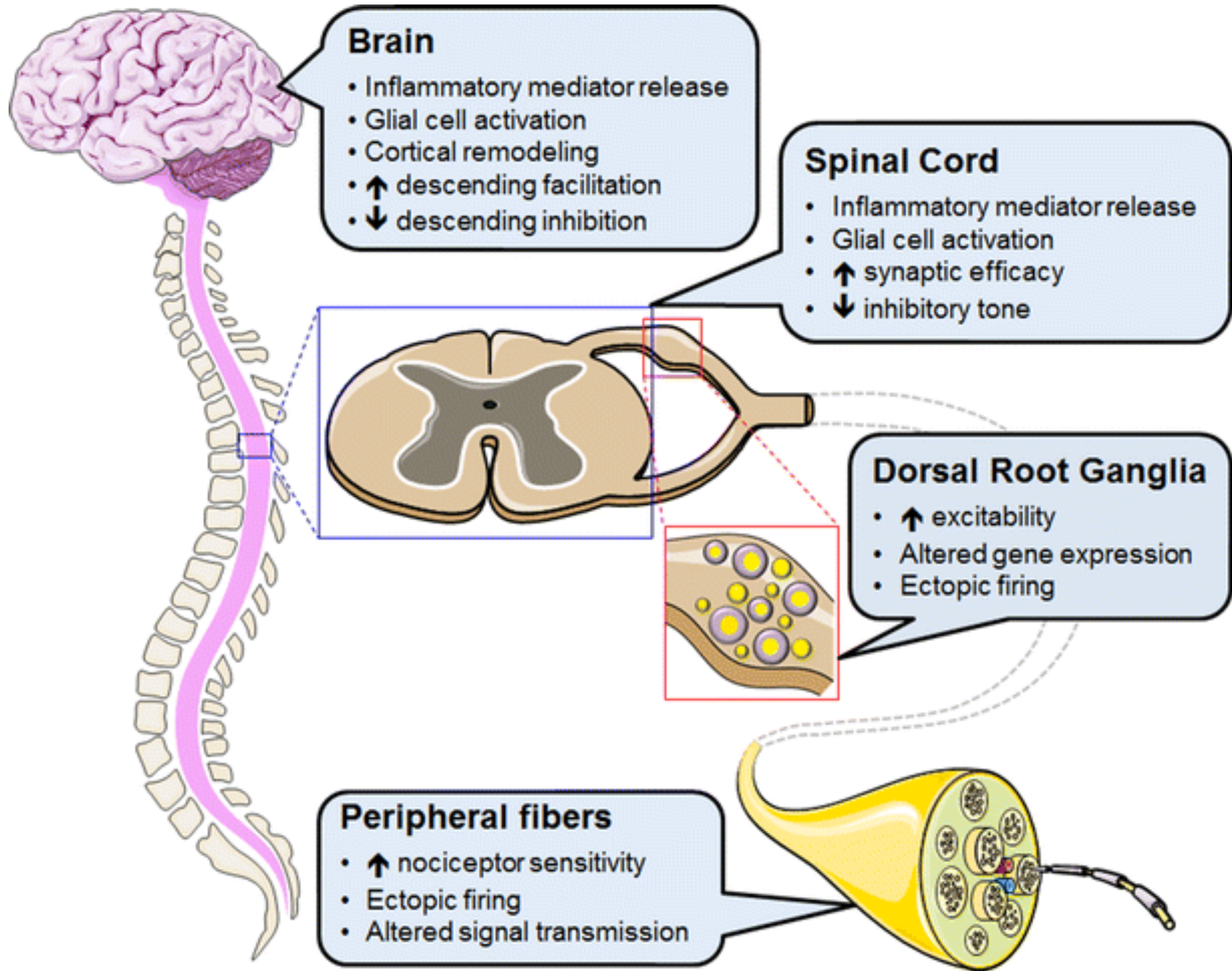
- Sustained stimuli result in amplified and pathologic pain
- Peripheral stimuli “beat down the door” of the posterior horn of spinal cord
- NMDA receptor is normally closed but opens when exposed to these stimuli
- Glial cell inflammation



Results of Central Sensitization

- Wind up: Requires NMDA activation
- Increase in receptive fields for the sensitized dorsal horn neurons
- Hyper-responsiveness
- Increase in the duration of the response
- Reduction in response threshold
- Inflammation of glial cells with activation





Spinal Cord Injury

- Good example of central neuropathic pain
- Neurotmesis and axonotmesis
- Can have neuropathic arm or leg pain
- Glial cell inflammation
- Spasticity common



When to Refer:

- Timely
- Disability
- Options
- Opinions
- Diagnosis
- Procedures
- Better understanding



Physical Examination of the Pain Patient



- History and physical examination
- Focused exam on the pain complaint
- Attention to the musculoskeletal and neurological findings
- Laboratory findings
- Medication review including supplements
- Evaluate for imaging that may be useful
- Screen for “red flags”

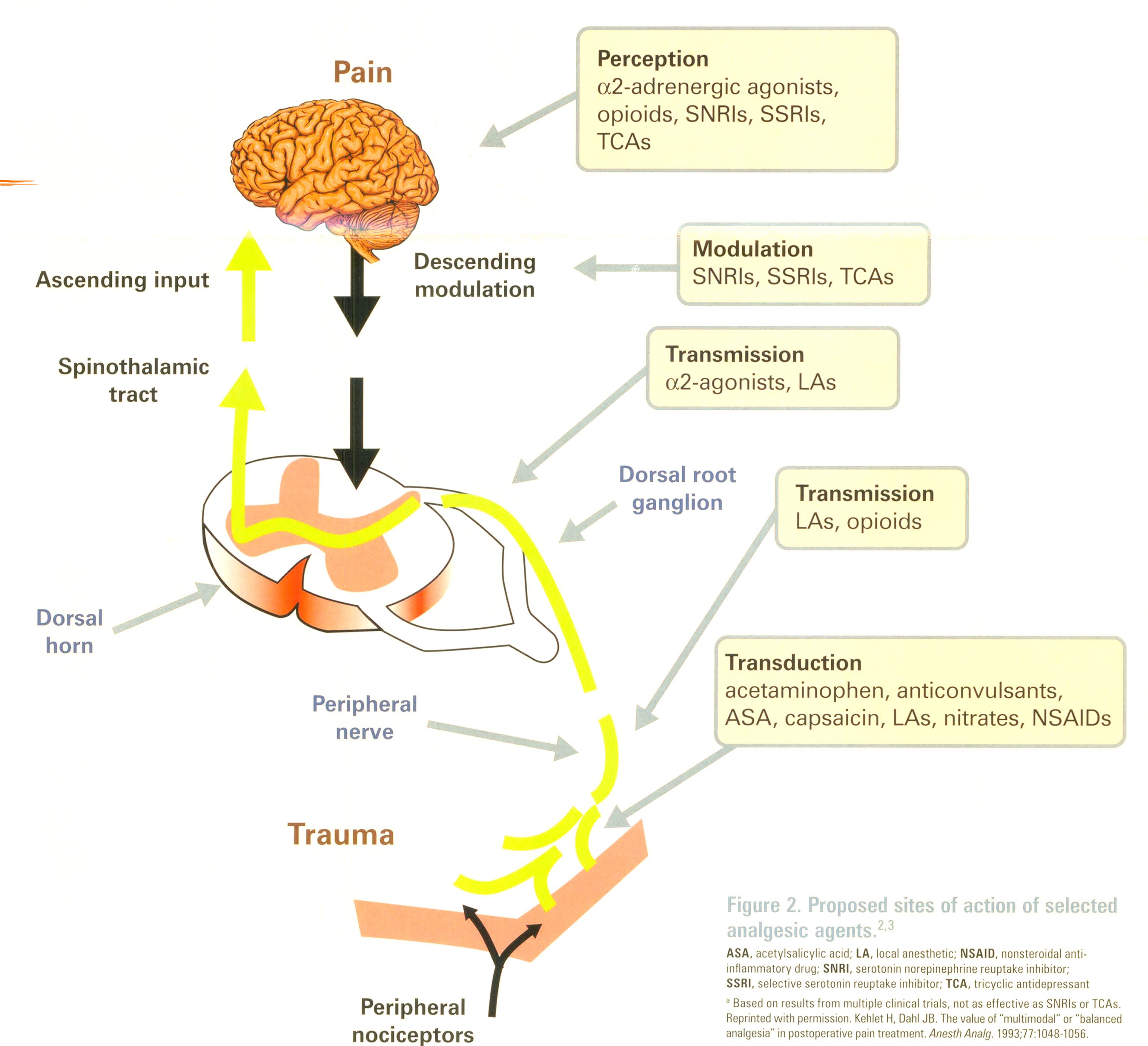
Psychological Assessment



- Screen all patients for anxiety and depression
- Identify complex patients with bipolar disorders and certain personality disorders
- Social stressors
- Higher risk of abuse with those on disability and out of work
- Consider ongoing psychological assessment and possible treatment in those deemed to be higher risk

Adjuvant Medications

- Anticonvulsants
- Antidepressants
- Muscle relaxants
- Clonidine
- NSAIDS/acetaminophen
- Topical agents



Opioids For Chronic Pain:



- Chronic pain is highly complex
- Opioids *alone* are often inadequate (mild-moderate)
 - 25-50% improvement in pain scales
- Opioid therapy can be beneficial in *select* patients who demonstrate compliance and function
- Often the only remaining option for some patients
- Best outcomes are in a multi-modal setting

Central Augmentation: A Mechanism for Opioid Induced Hyperalgesia?

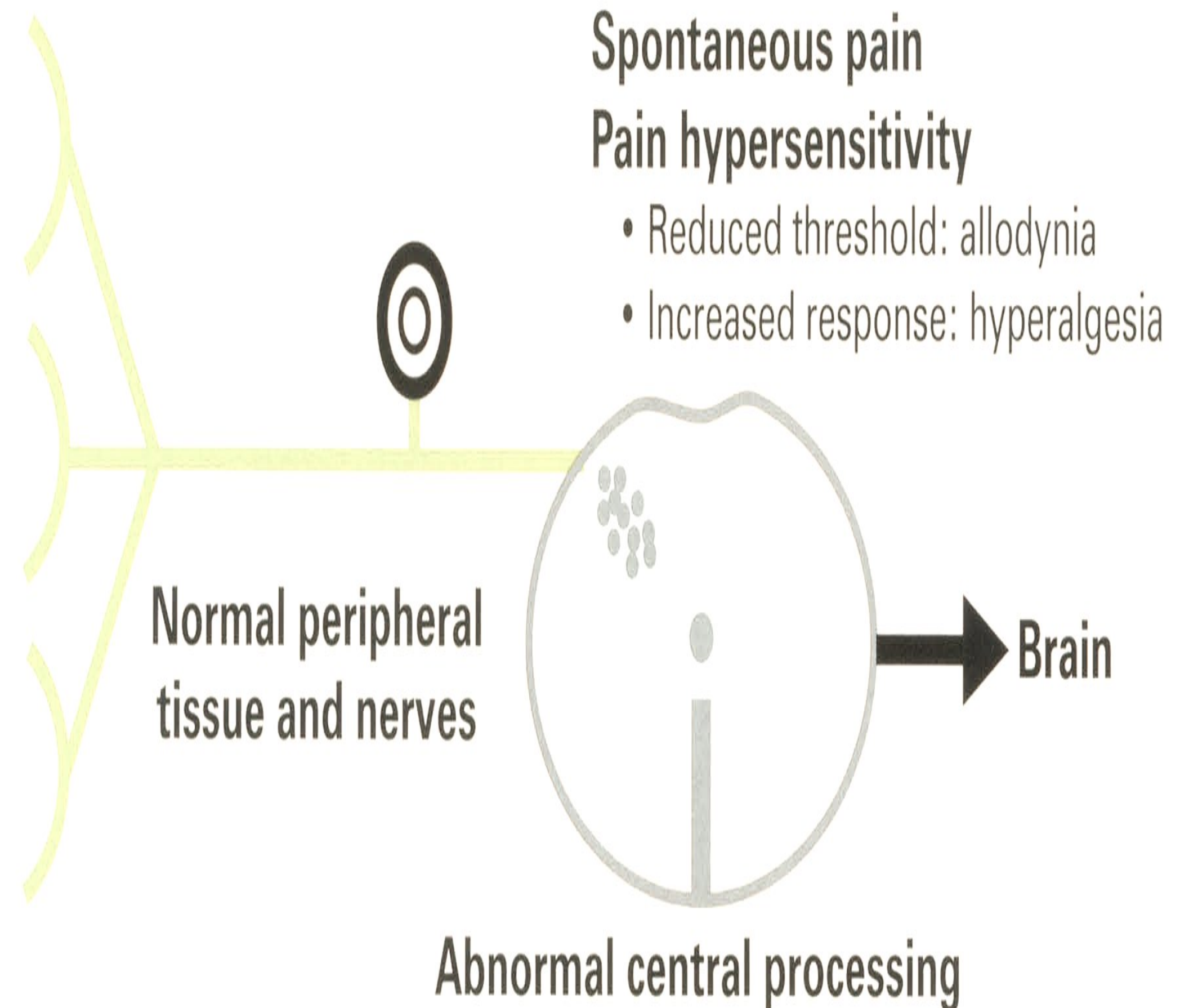
Pain associated with central augmentation (Example: fibromyalgia)

Figure 1. Pain types^a and their proposed mechanisms.¹

DPNP, diabetic peripheral neuropathic pain; OA, osteoarthritis;
PHN, postherpetic neuralgia; RA, rheumatoid arthritis

^a Increasingly, many chronic pain conditions such as low back pain and OA are viewed as having features of more than one of these pain types.

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Opioid Induced Hyperalgesia



- Increased sensitivity to non-noxious and noxious stimuli
- Sensitization of pro-nociceptive mechanisms
- Glial cell inflammation at the mu-receptor
- Activity at the NMDA receptor
- Caused by rapid dose escalation and high dose therapy?
- Treatment is dose reduction

Low Dose Naltrexone



- Novel CNS anti-inflammatory
- Success with pain due to central augmentation
- Fibromyalgia, RA and inflammatory arthritis, multiple sclerosis, CRPS
- Modulates glial cells
- Typically 1.5 - 6.0 mg a day
- Careful with opioid therapy

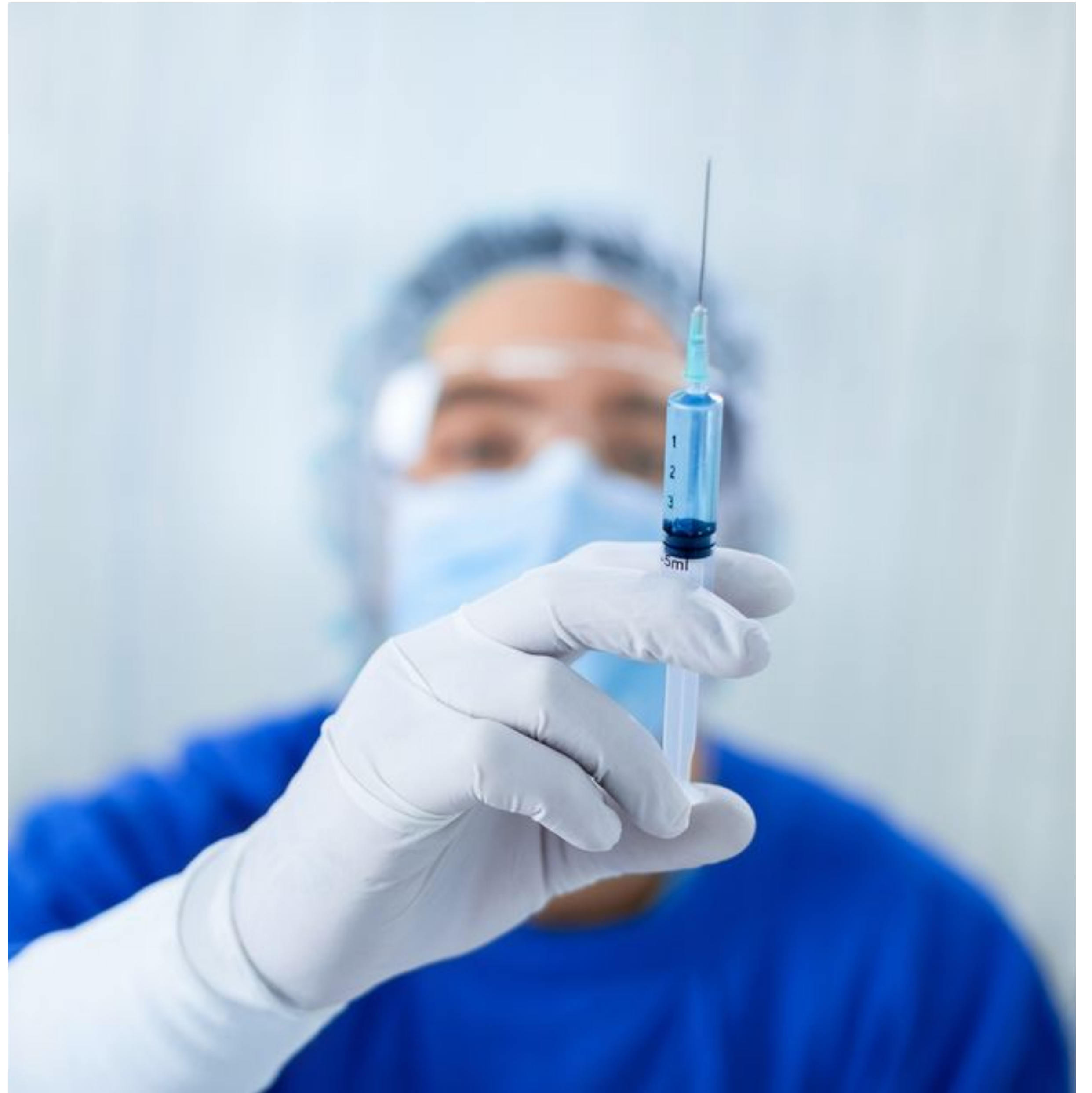
PT and Rehabilitation

- Goal is to return functional lifestyle
- Improve ADL's
- Significant deconditioning and atrophy
- Mechanical and postural derangement
- Significant muscular imbalance
- Incorporate aerobic function



Injection Therapy

- Diagnostic
- Therapeutic
- Prognostic
- Neuro ablation



CRPS:

Clinical Findings per Budapest Criteria

- Continuing pain with mechanical and in some case thermal allodynia
- Trophic changes involving skin, hair and nails
- Vascular changes with temperature changes
- Sudomotor changes
- Motor changes



CRPS Management

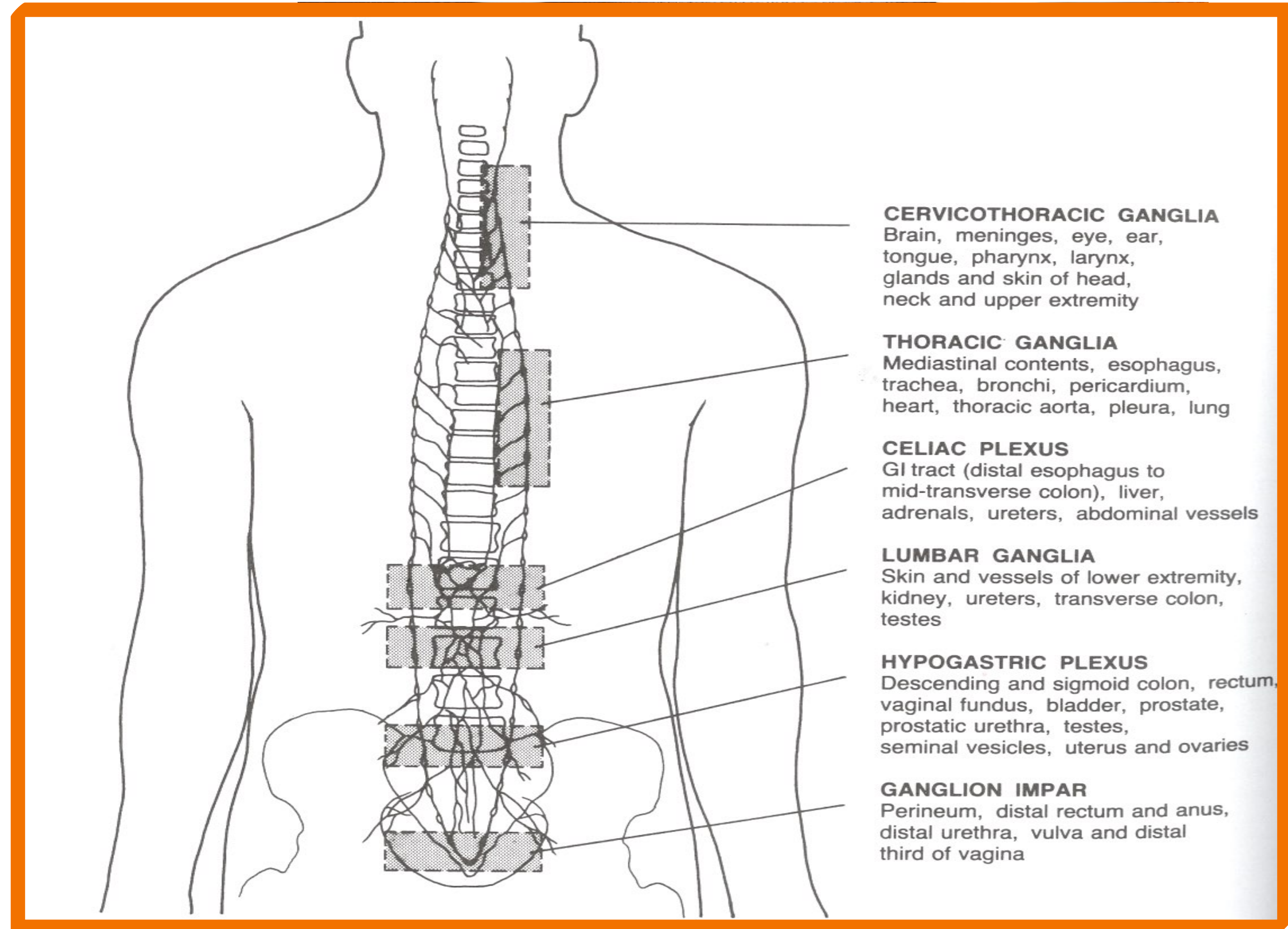
- Extremity Surgery
- Immobilization
- Diagnosis
- Physical therapy
- Injection therapy
- Treatments



Ganglia

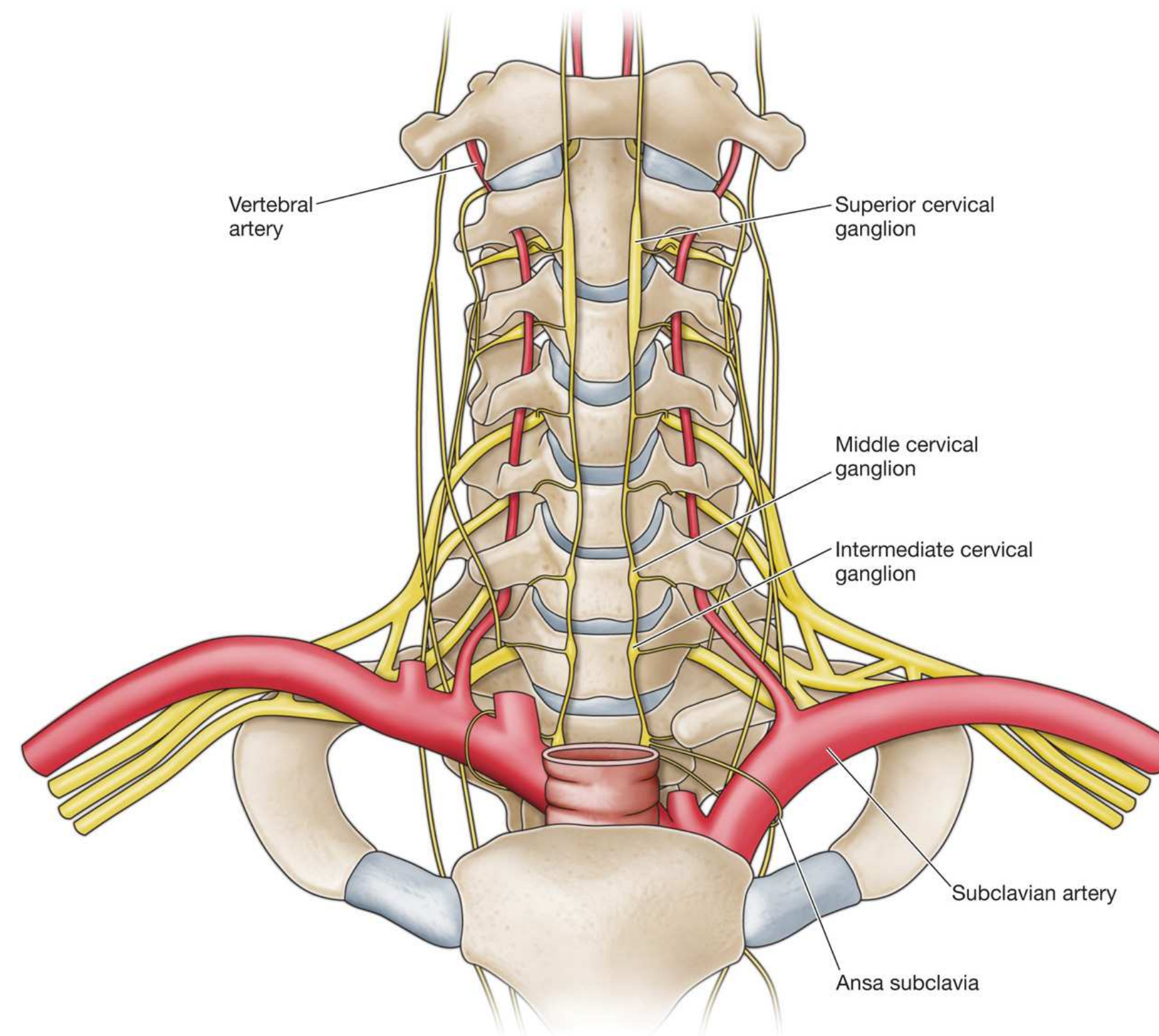
Common Sites

- Cervical
- Celiac
- Lumbar
- Hypogastric
- Impar



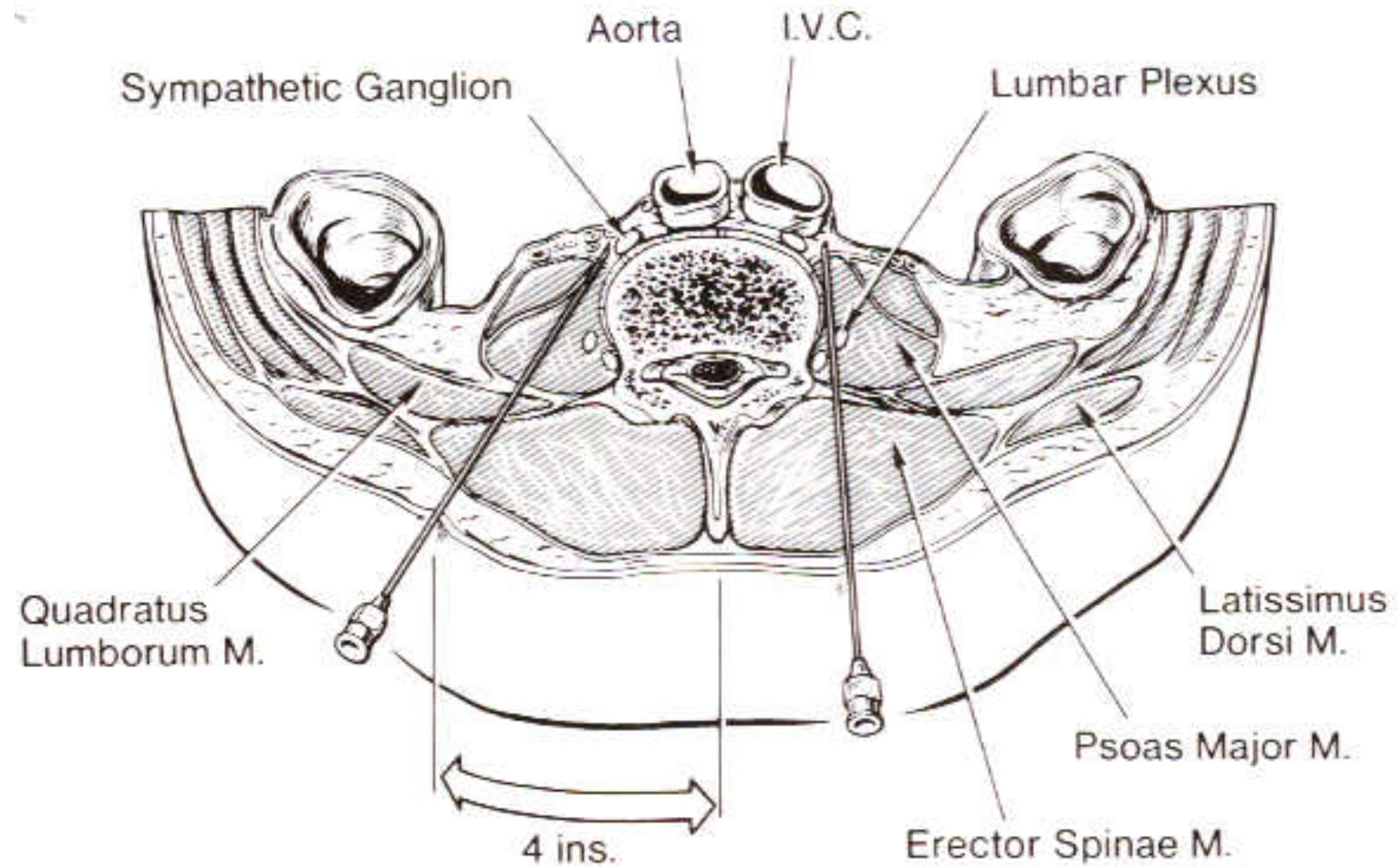
Stellate Ganglion Block:

- Vasodilation with warming
- Horner's Syndrome
- Pain relief?
- Hoarseness
- Headache
- Risks



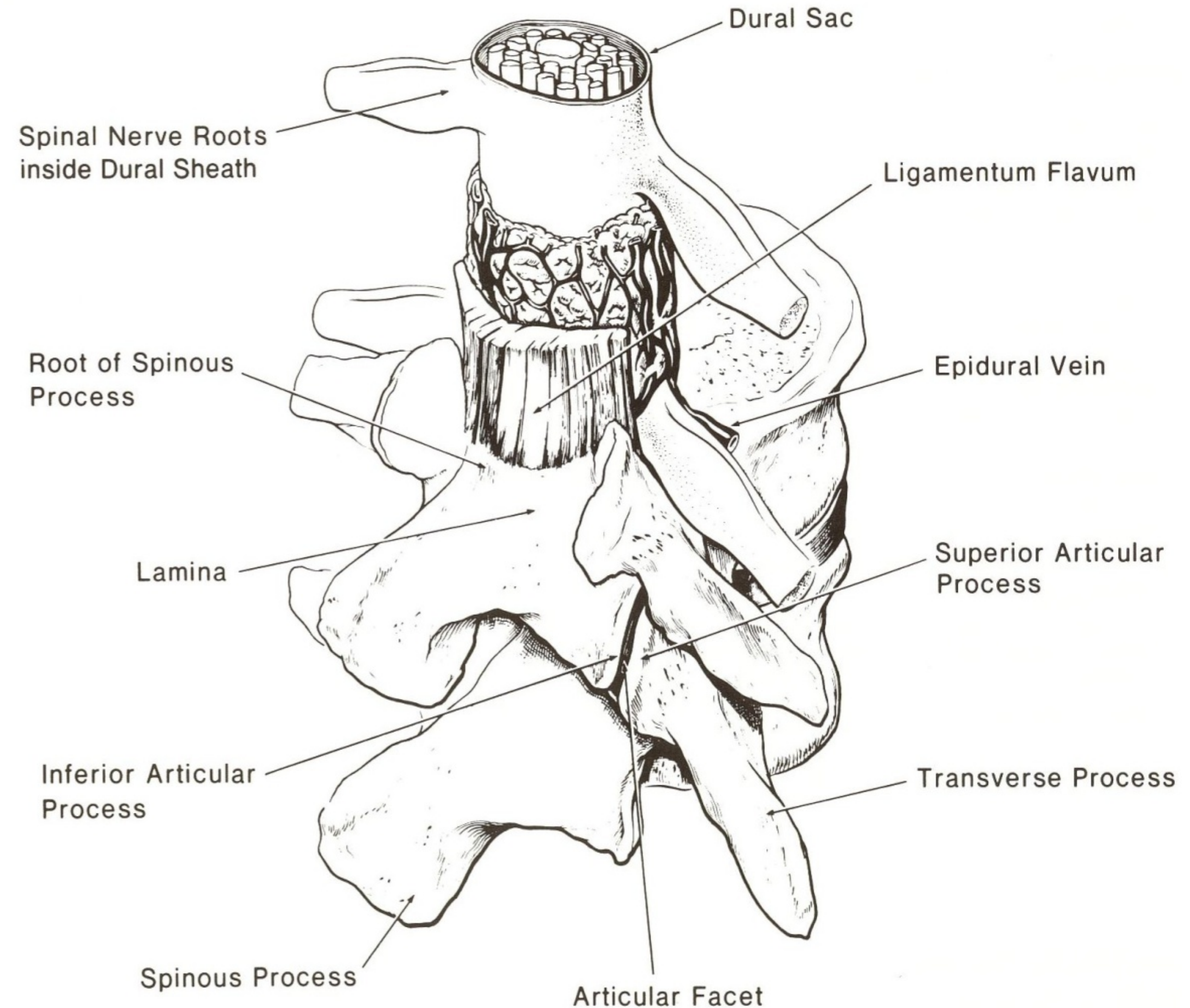
Lumbar Sympathetic Block

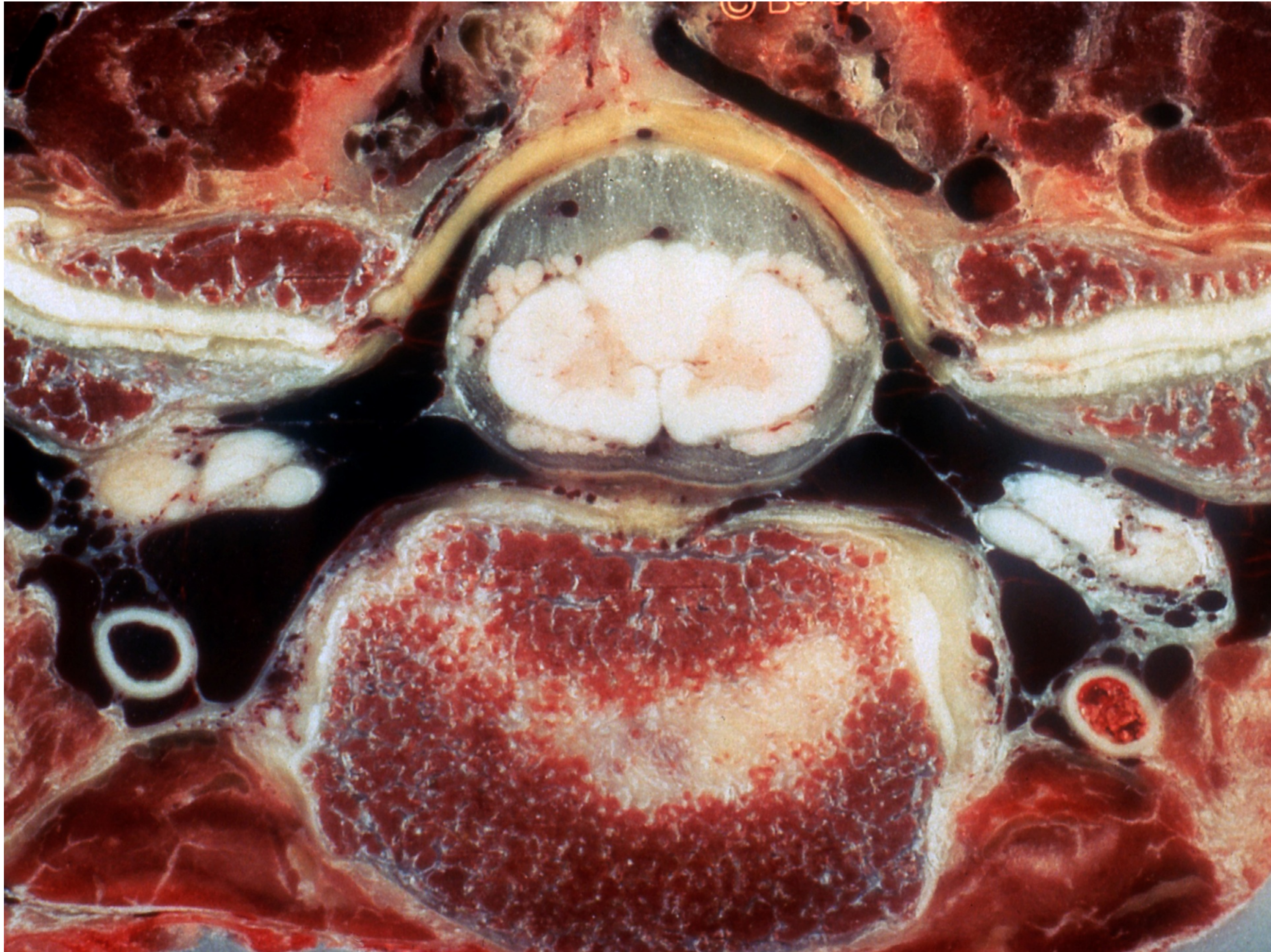
- Pain of lower extremity and vascular disease
- Pain of kidneys and testicles
- Vasodilation and warming
- Complications



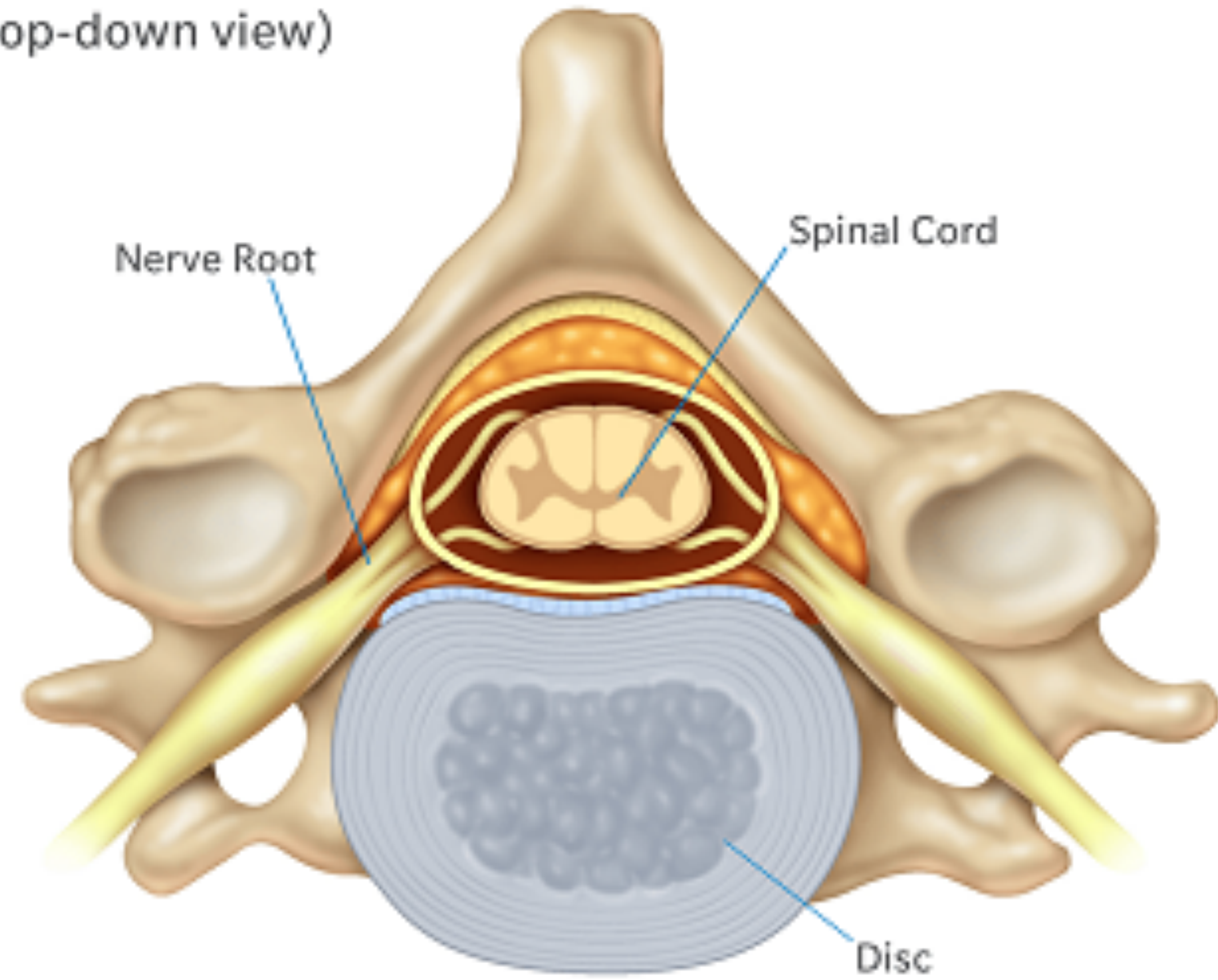
Neuraxial Anatomy

- Epidural space contains veins and fat
- Epidural space is a potential space
- Central and foramina stenosis
- Attention to the facet joints especially in relation to nerves
- Posterior, medial and anterior columns



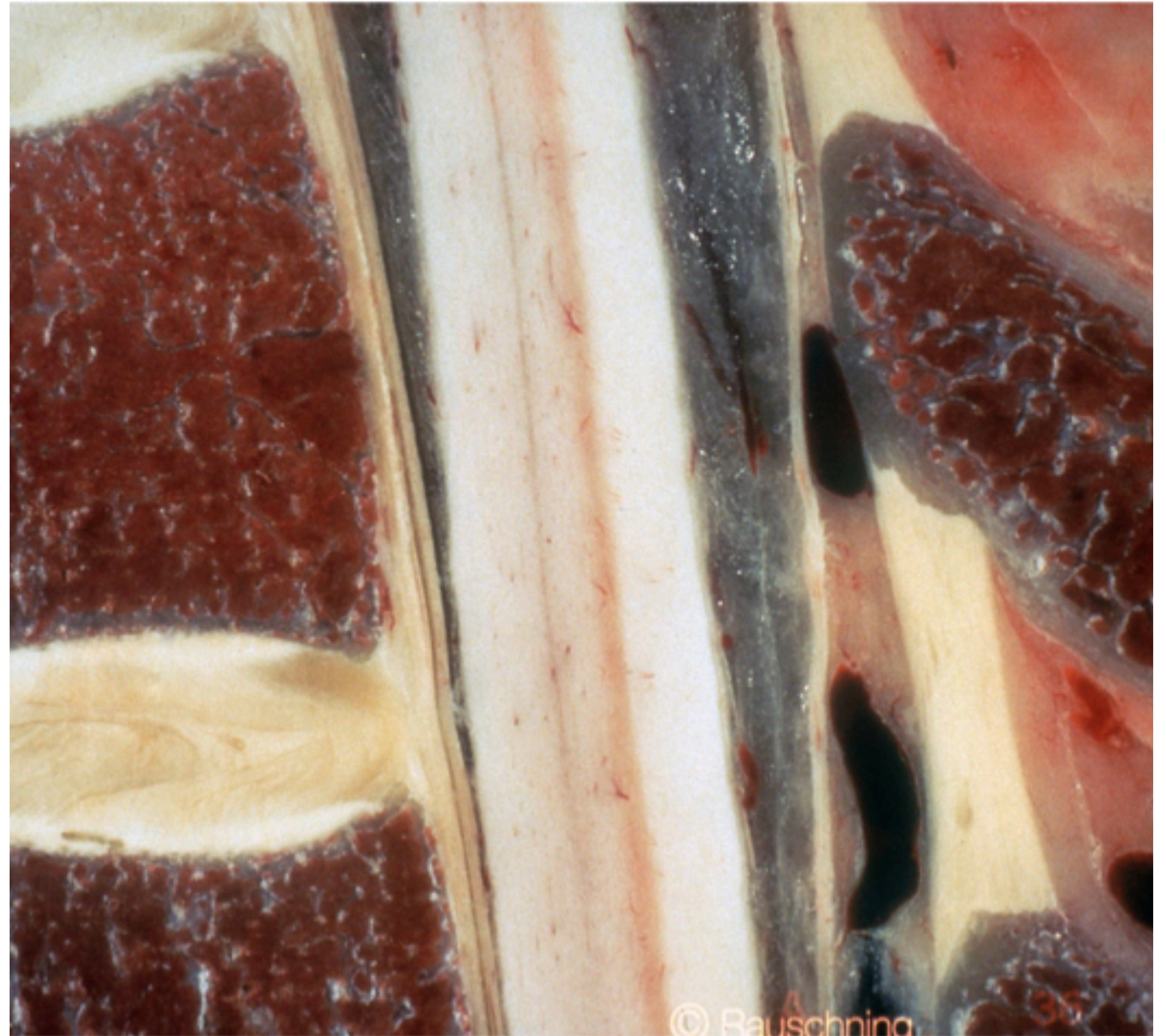


Healthy Cervical Disc
(top-down view)

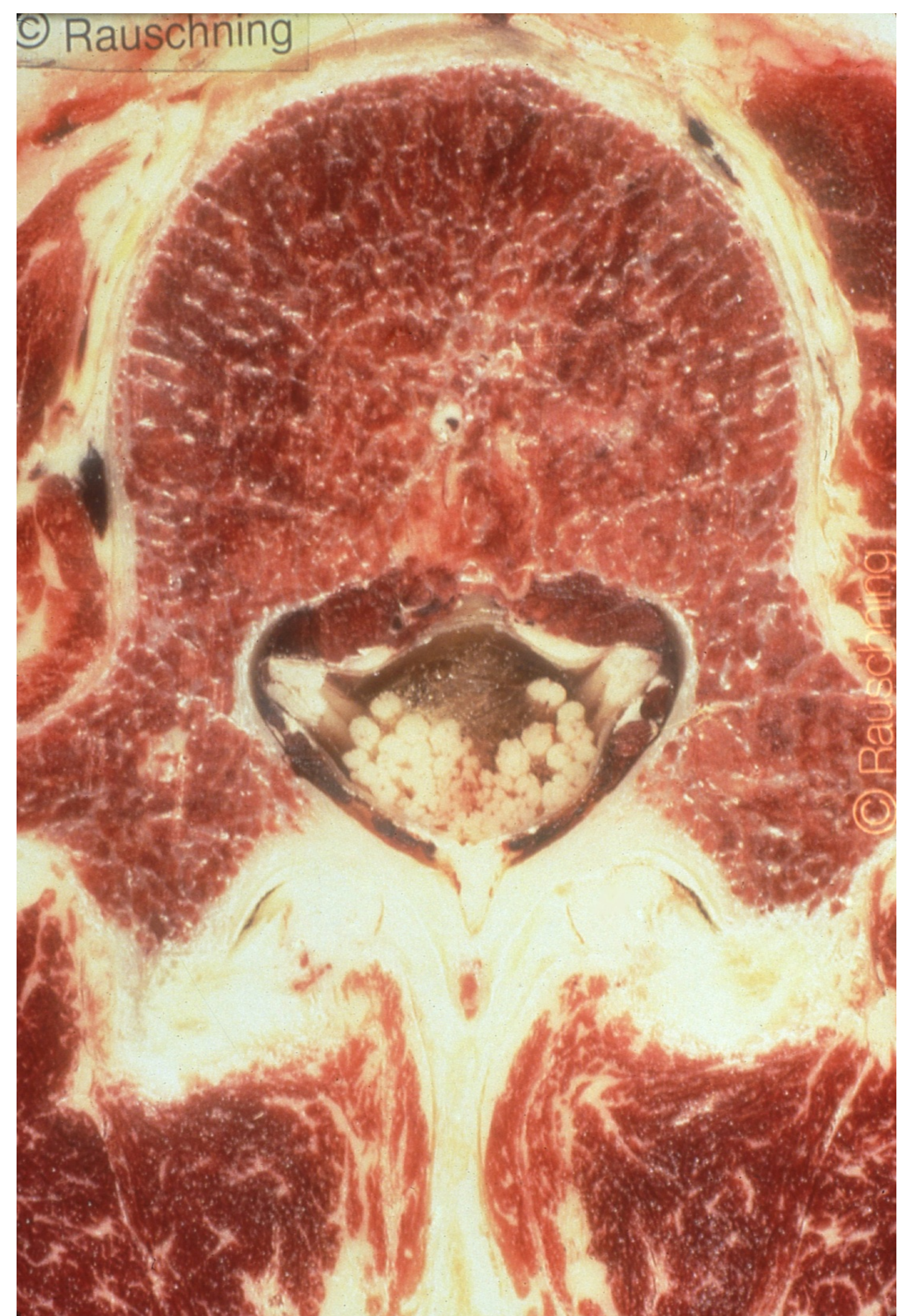
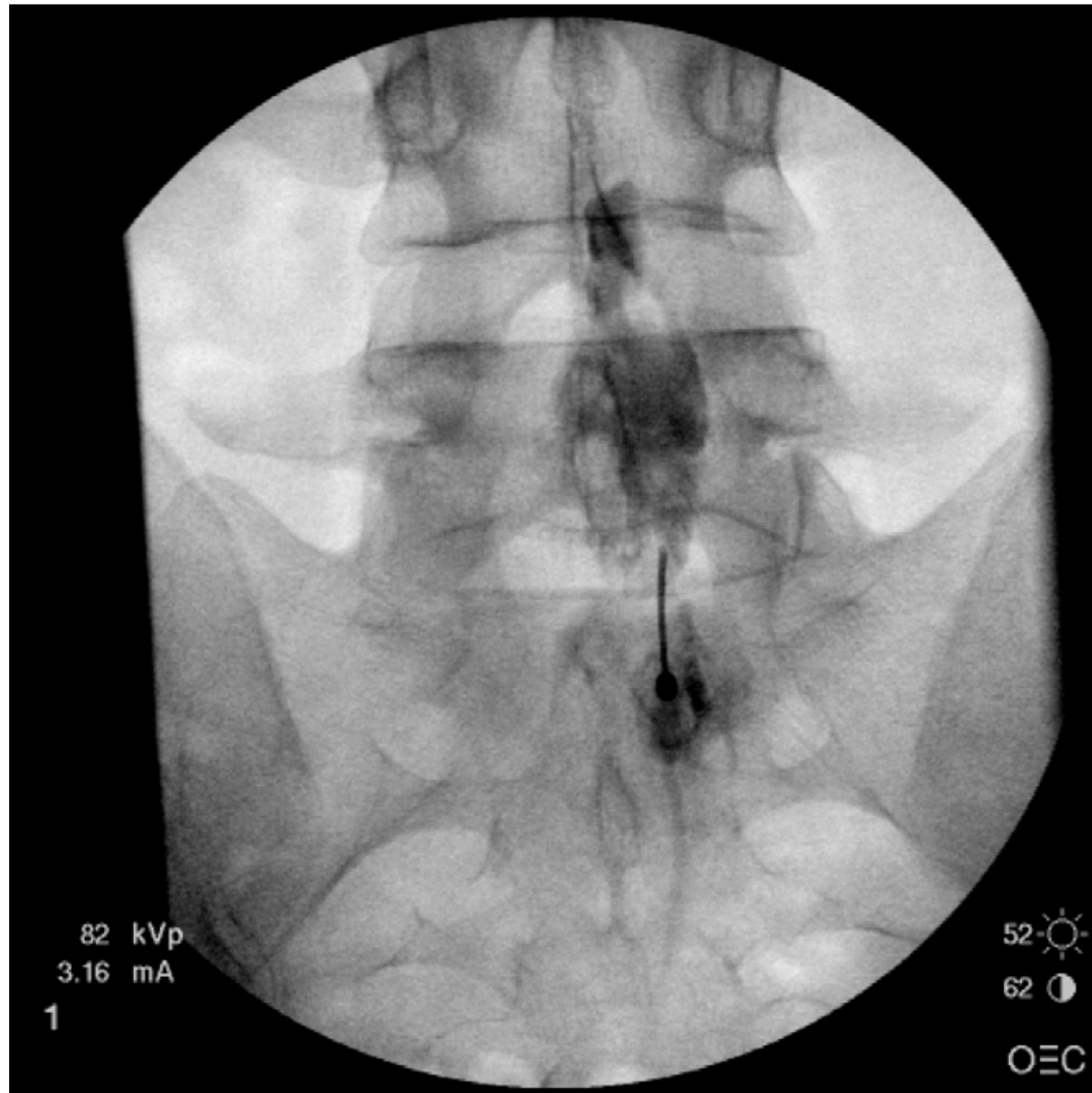


Epidural Steroids

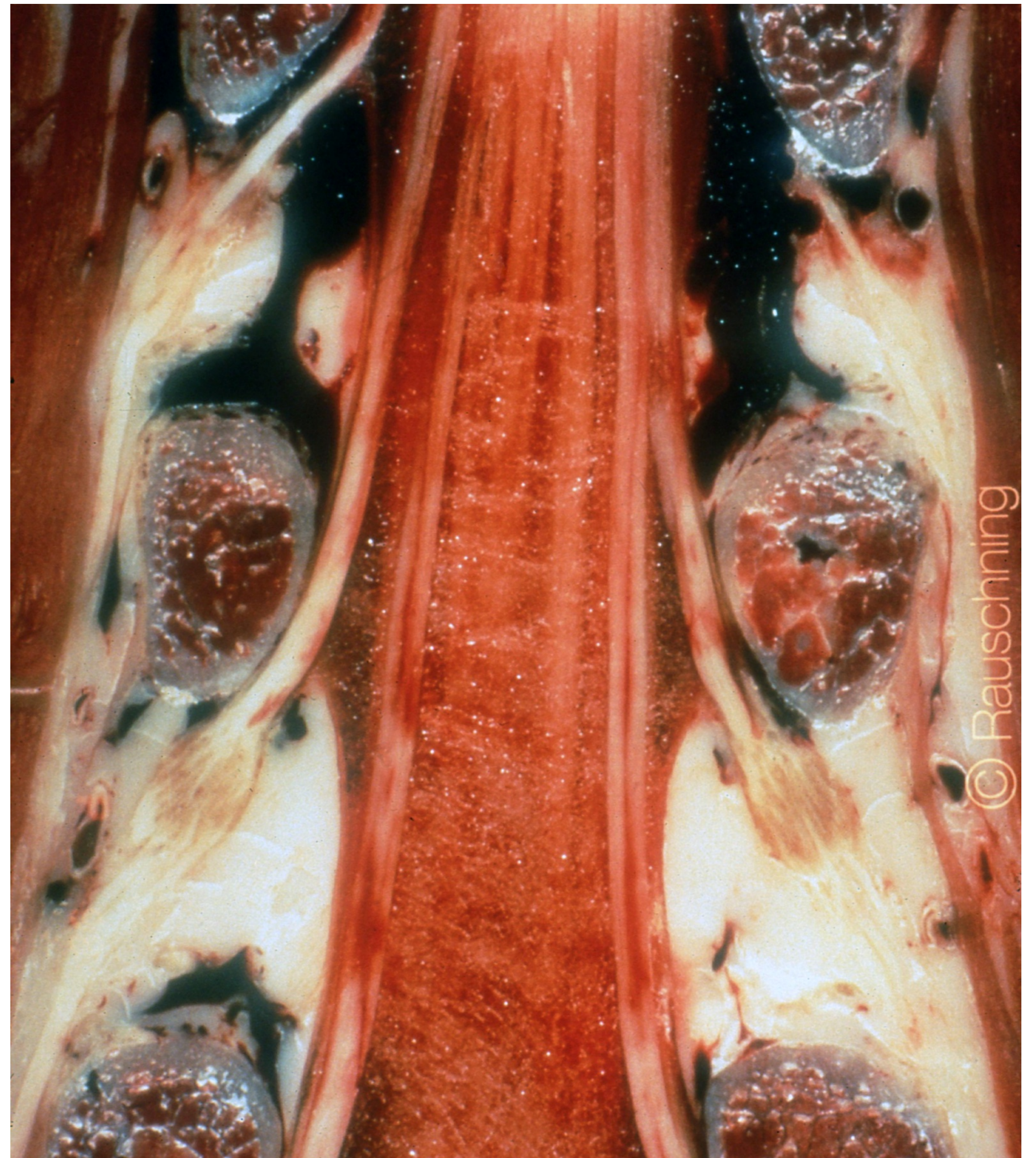
- Indications for initial injection
- PT is used in conjunction
- Indications for follow-up injection
- No longer “series of three”
- Must utilize fluoroscopy or CT
- Approach and concerns
- Complications/Contraindications



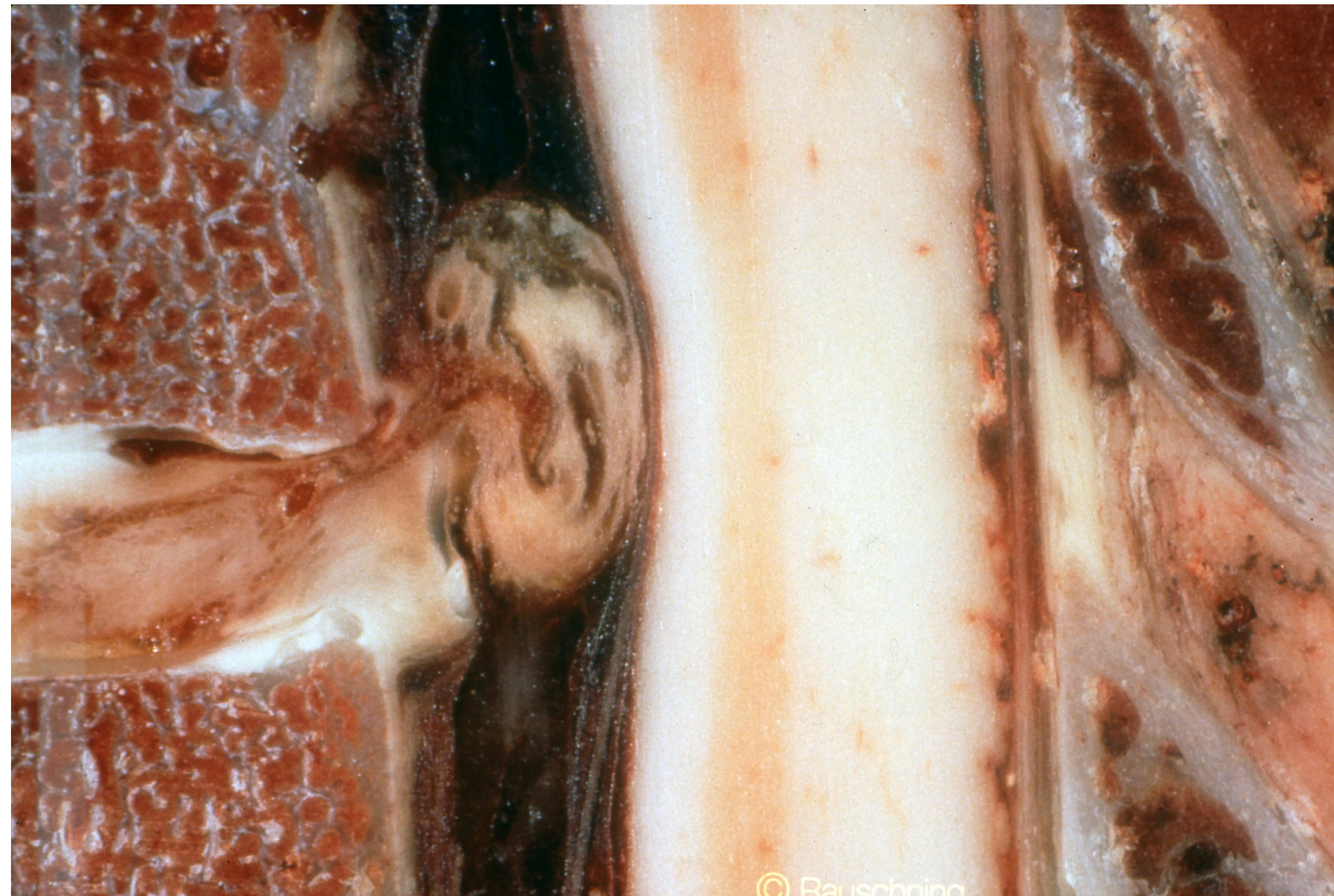
Interlaminar Approach



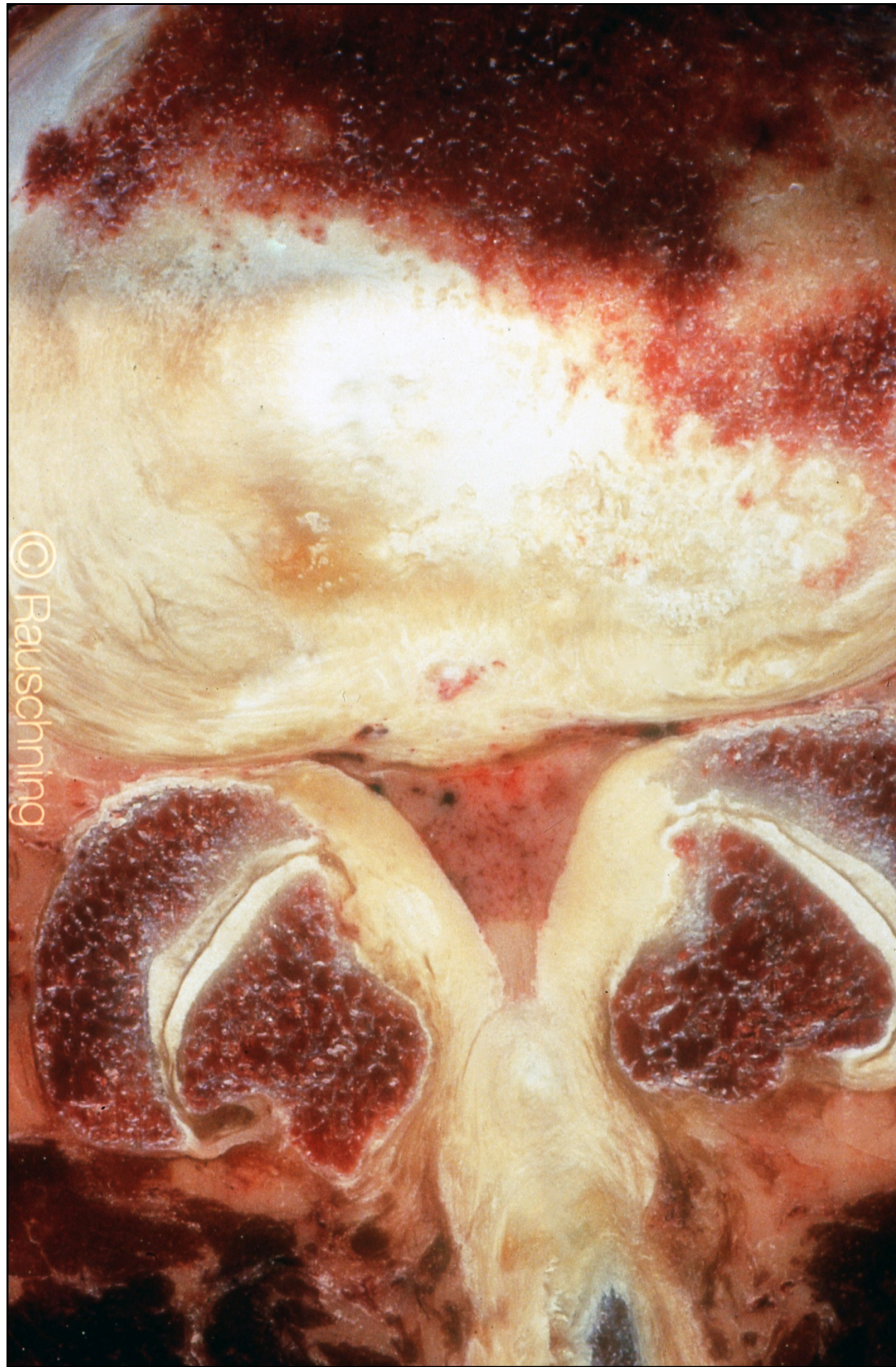
Selective Approach



Herniated Disc and Annular Tear

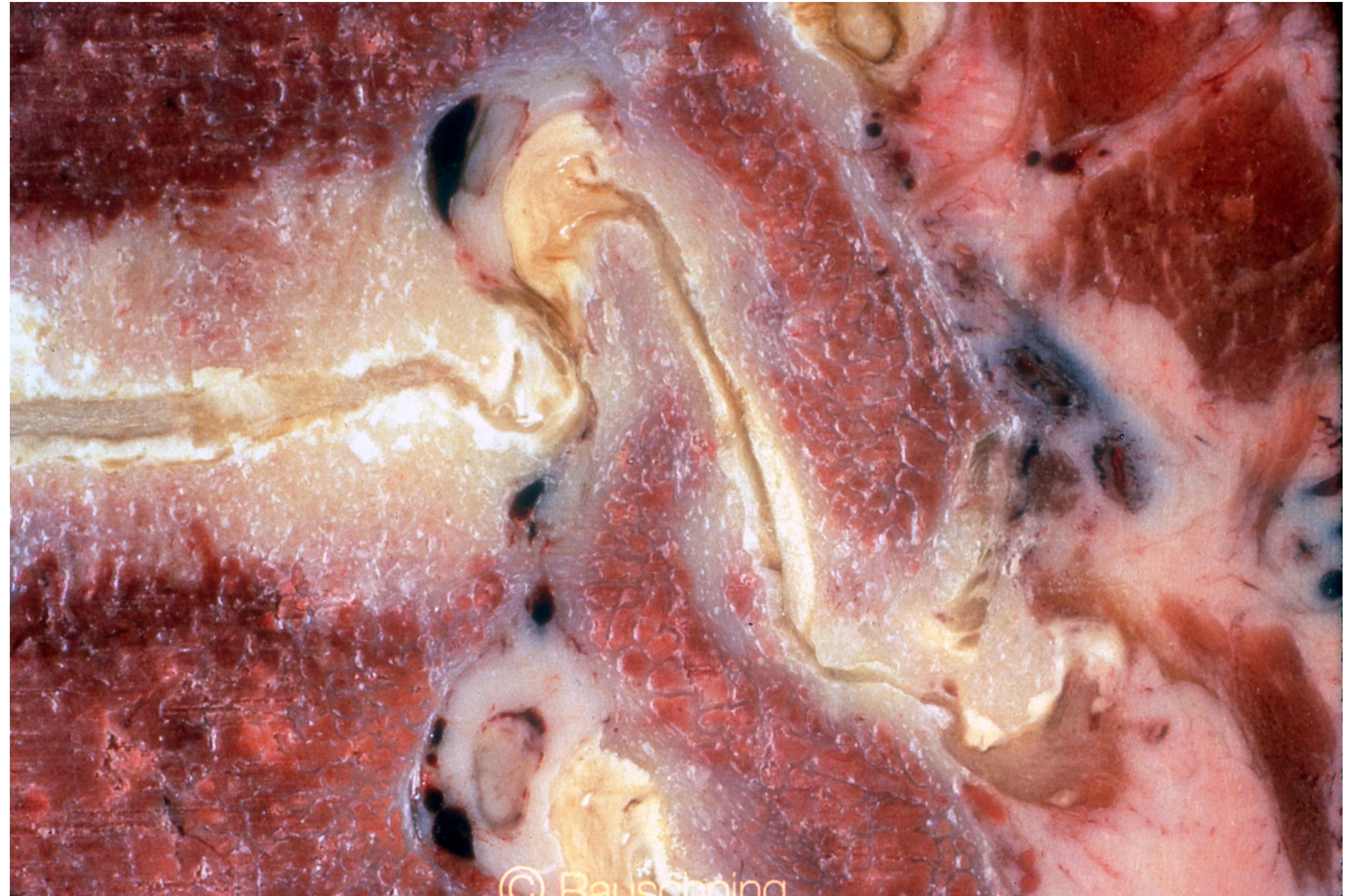


Spinal Stenosis Images



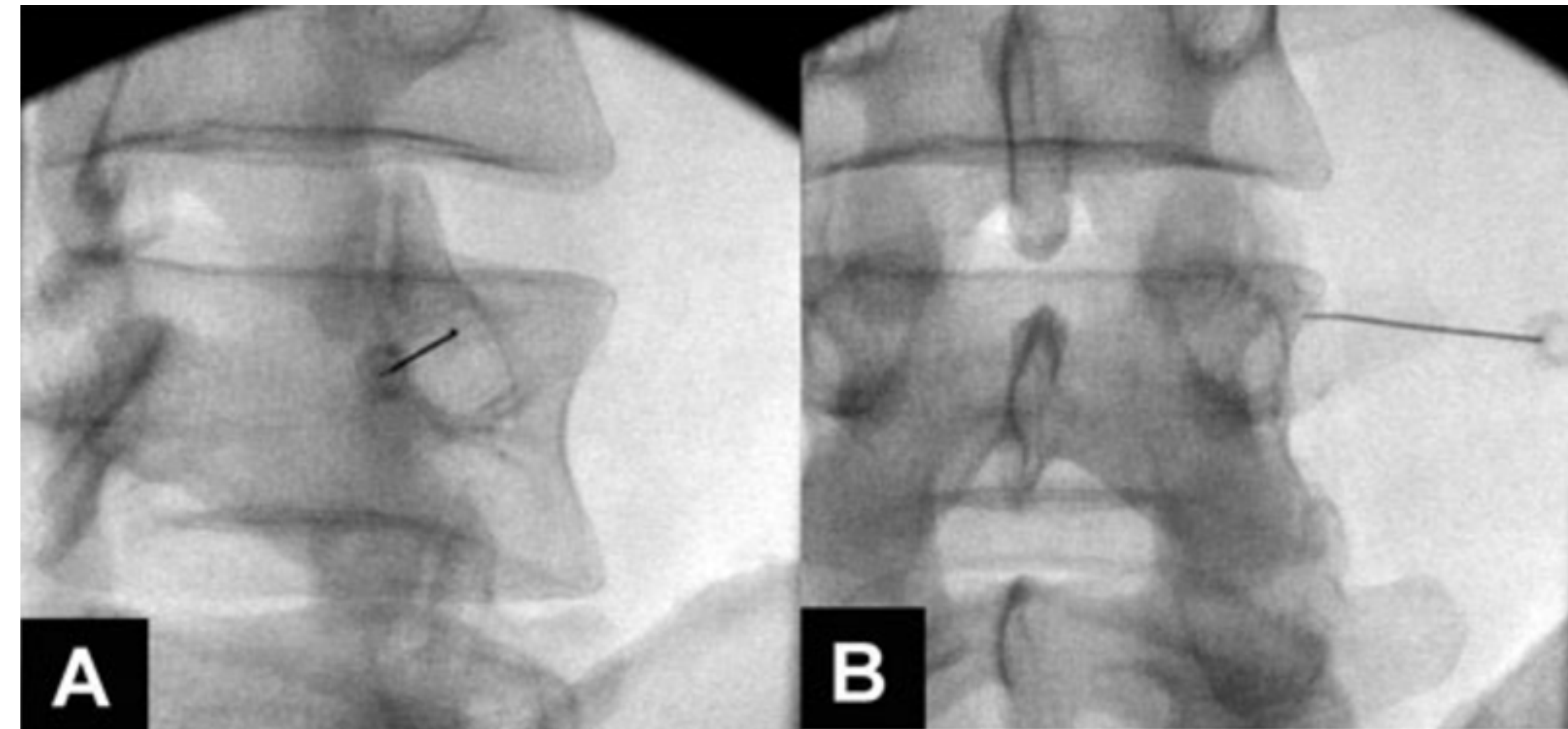
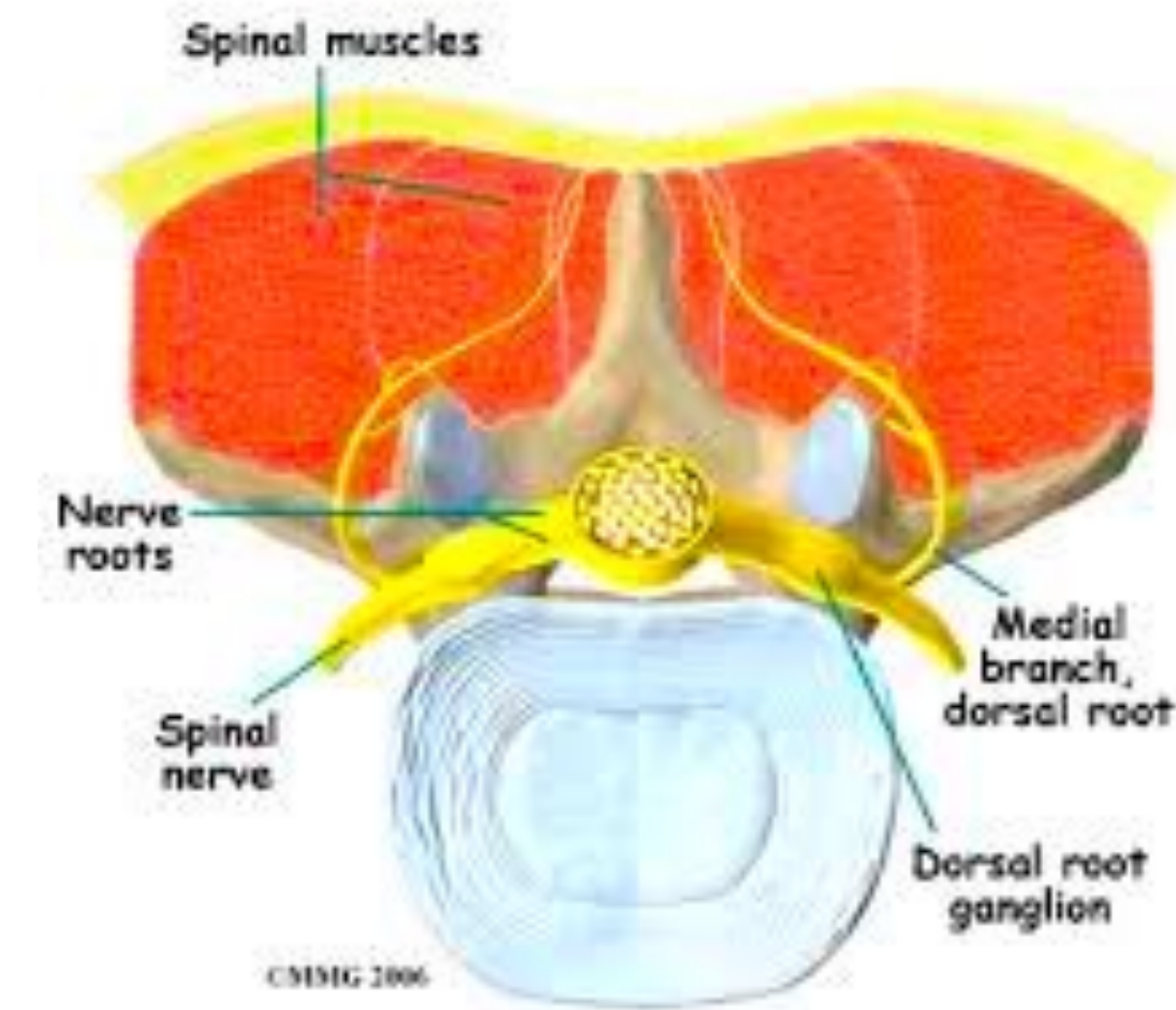
Facet Arthropathy

- Axial pain worsened with loading
- Indications for initial injection
- Indications for follow-up injection
- Combined with PT important
- Medial branch block or joint
- Can result in radiculopathy
- Complications



Medial Branch Blocks

- Specific indications for procedure
- Often local anesthetic only
- Facet *joint* injections rarely authorized
- Medial branch innervates the joint and multifidi muscles
- Each facet innervated by two medial branches



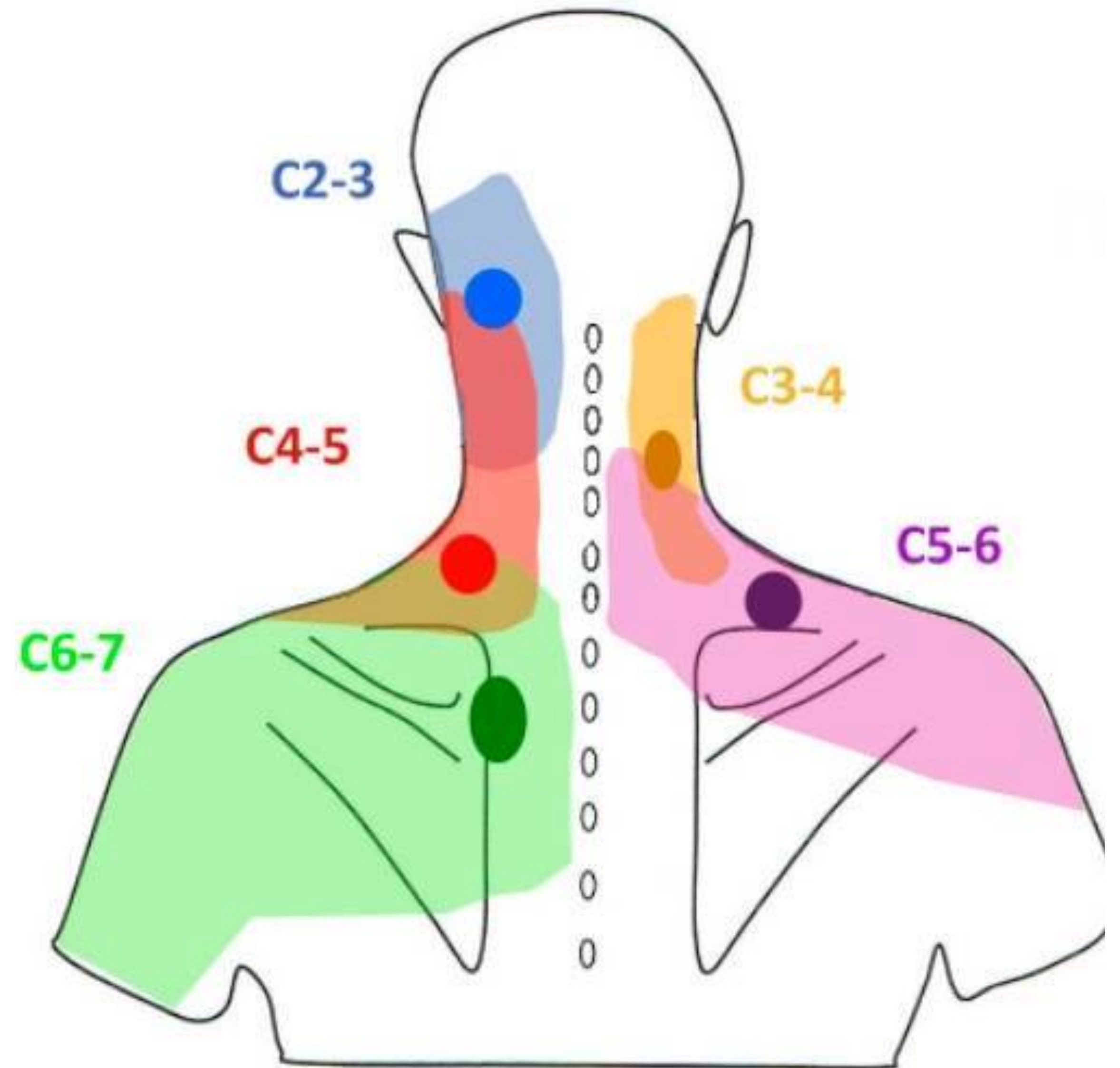
Cervical Facet

- Rotational and flexion/extension type injuries
- Limited extension and rotation
- Common to cause headaches
- Distinct referral pattern of the cervical facets
- Overlying myofascial pain common

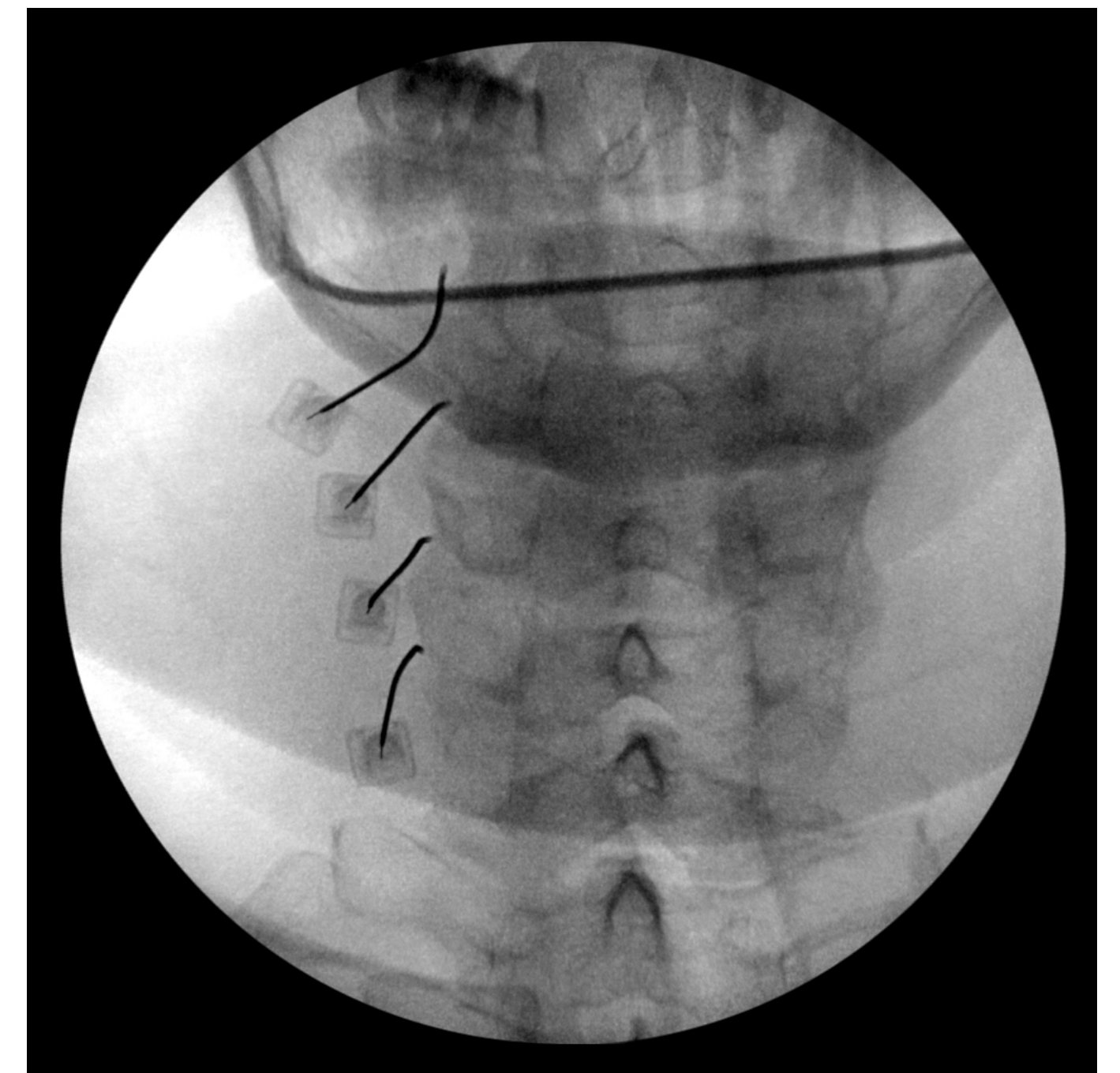
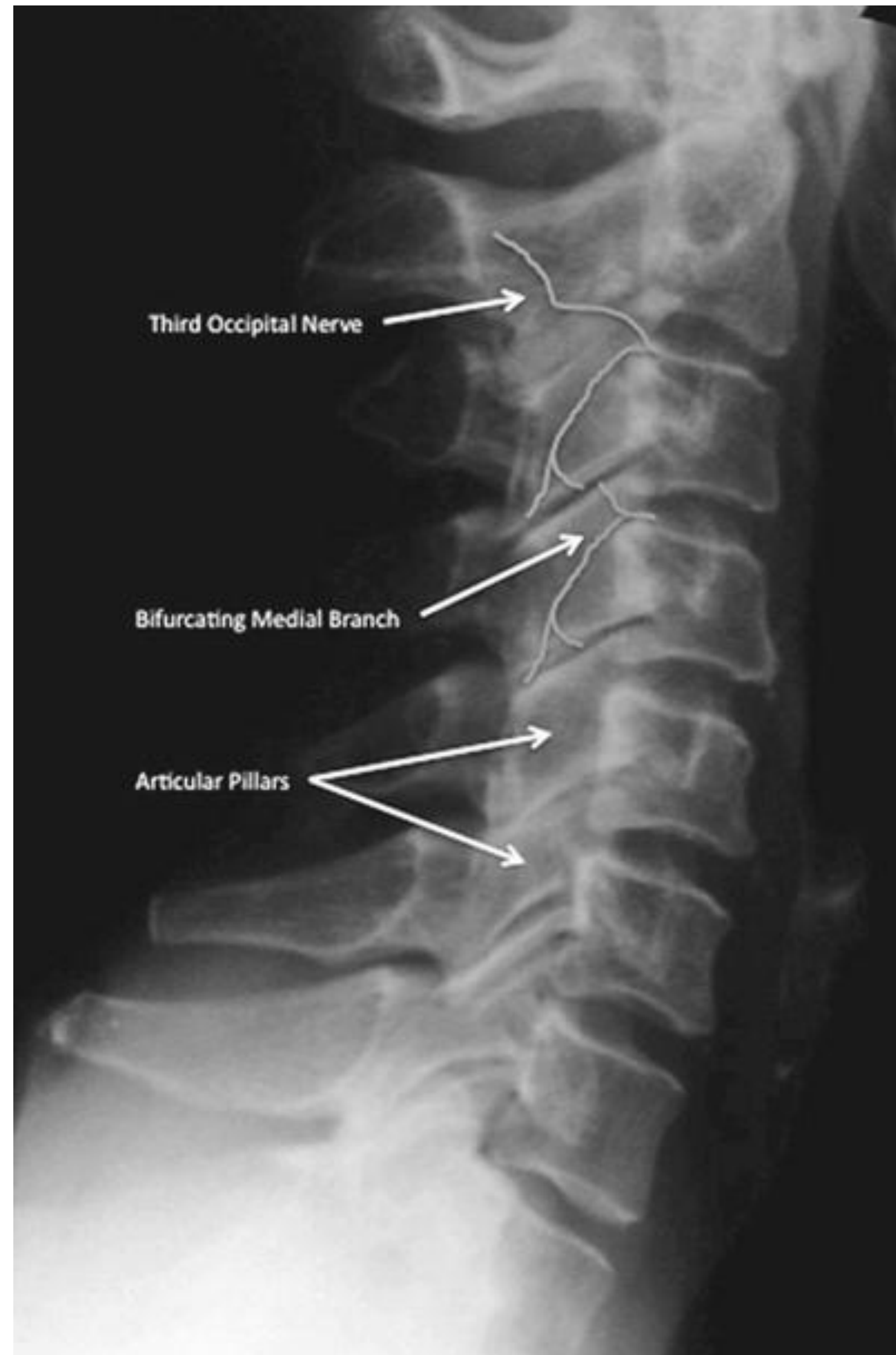


Cervical Facet Pain Referral Pattern

- Involvement of splenius, trapezius, levator scapulae and rhomboids common
- Posterior shoulder pain involving supra and infraspinatus and teres minor
- Thoracic pain common with lower facets
- Headaches with upper facets
- C1-2 primarily exhibits rotational deficit and sub occipital pain



Cervical Medial Branch Blocks



Radiofrequency Ablation

- Heat with 80-85 degree Celsius
- Lesion applied 60-90 seconds
- Parasthesia or motor response monitored
- Two diagnostic blocks with 80% improvement
- Improvement equal or greater than 50%
- Can repeat every 6 months
- Complications

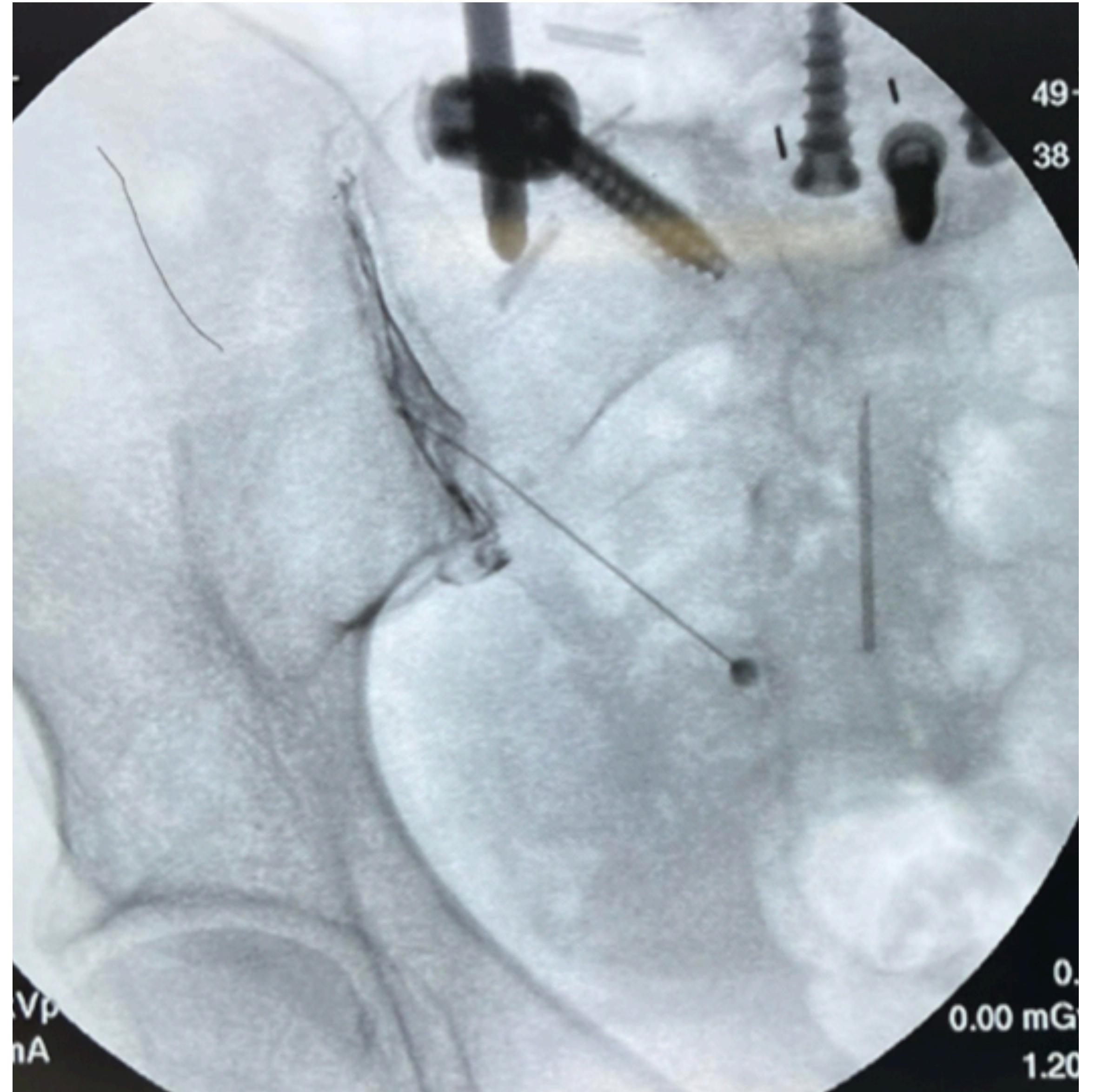
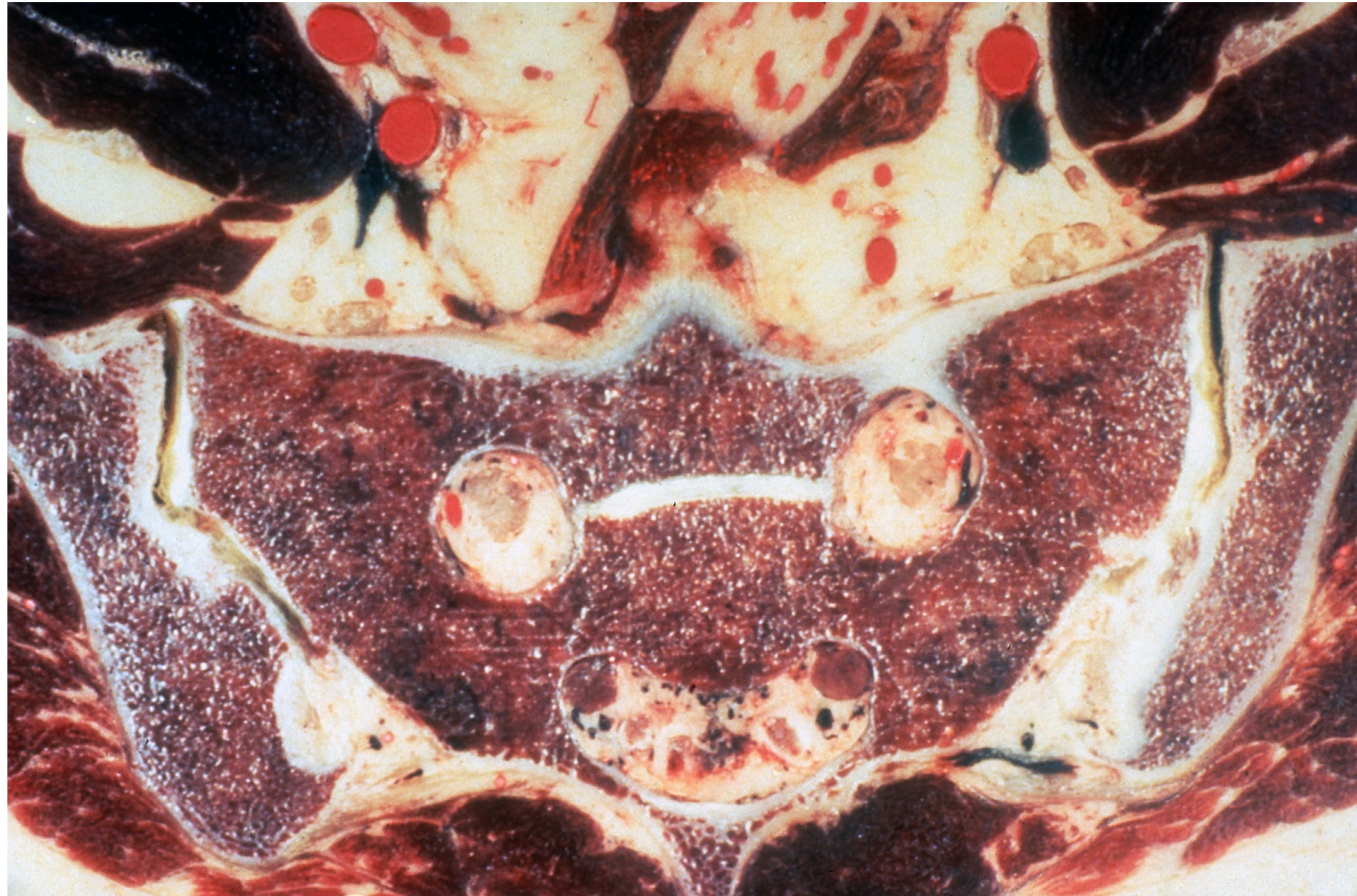


Sacroiliac Joint:



- Common and not often appreciated as a pain source
- Physical examination consists of SI joint provocative testing
- Responds well to manual therapies such as OMT and PT
- The great “mimicker” of other problems
- Pseudo-radiculopathy with involvement of piriformis and gluteus medius
- Common after lumbar fusion
- Common to use diagnostic blocks in work up

Sacroiliac Joint



The Goals of Appropriate Pain Management

- Poor management of pain is a significant problem leading to poor outcomes
- Essential to find the pain generator
- Timely treatment can avoid long term ramifications
- Physician and patient barriers
- Determine a diagnosis through effective history, examination and diagnostic work-up
- Always remember the role of the patient in the treatment plan

