PainWeek®

Osteoarthritic Joint Pain: Advances in Diagnosis & Treatment

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Title & Affiliation

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Disclosure

- None

Learning Objectives

- Summarize the different referral patterns associated with facet and peripheral joint pain.
- Describe the medications used to treat joint pain.
- Explain the role of radiofrequency ablation in the treatment of facet and peripheral joint pain, as well as persistent post-surgical pain syndromes.

Facet Arthropathy

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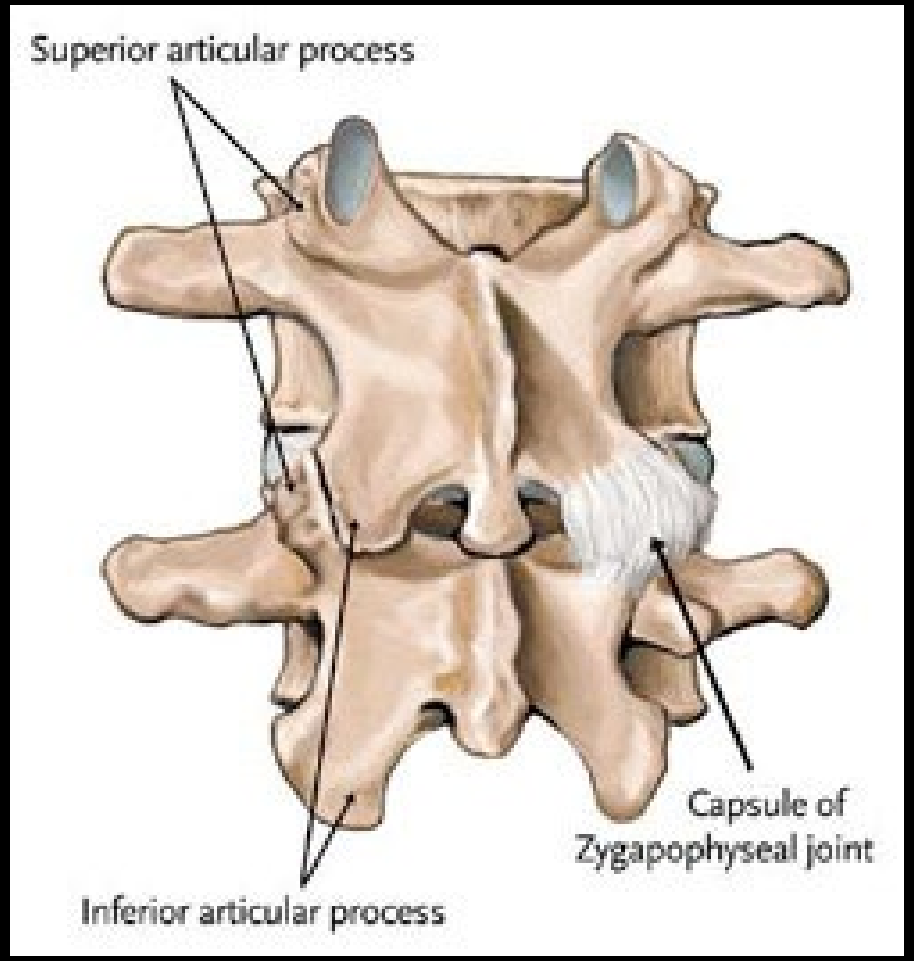
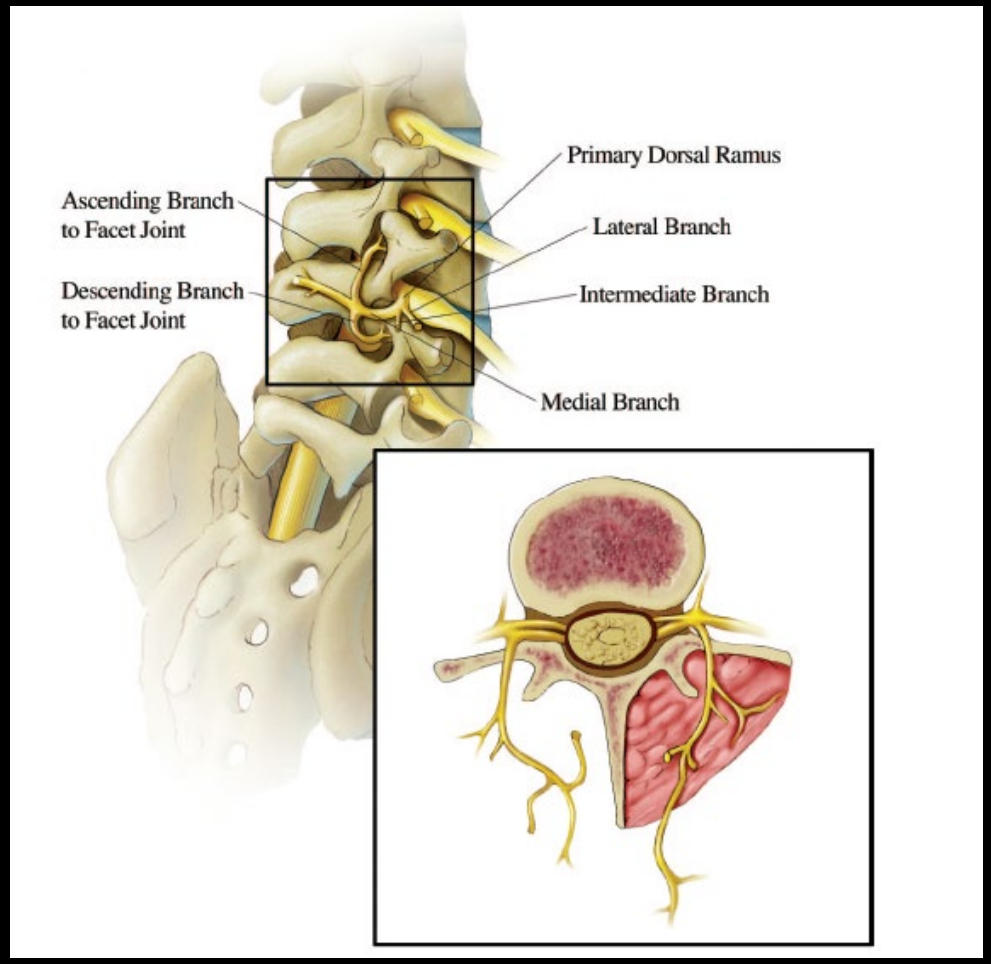
Facet Joints

- True synovial joints
- Innervation by 2 medial branches
- Protect against axial rotation, shearing forces (backward and forward sliding), and assist disc in resisting compressive forces in lordotic postures
- Load-bearing by z-joint varies between 3-25% of axial load

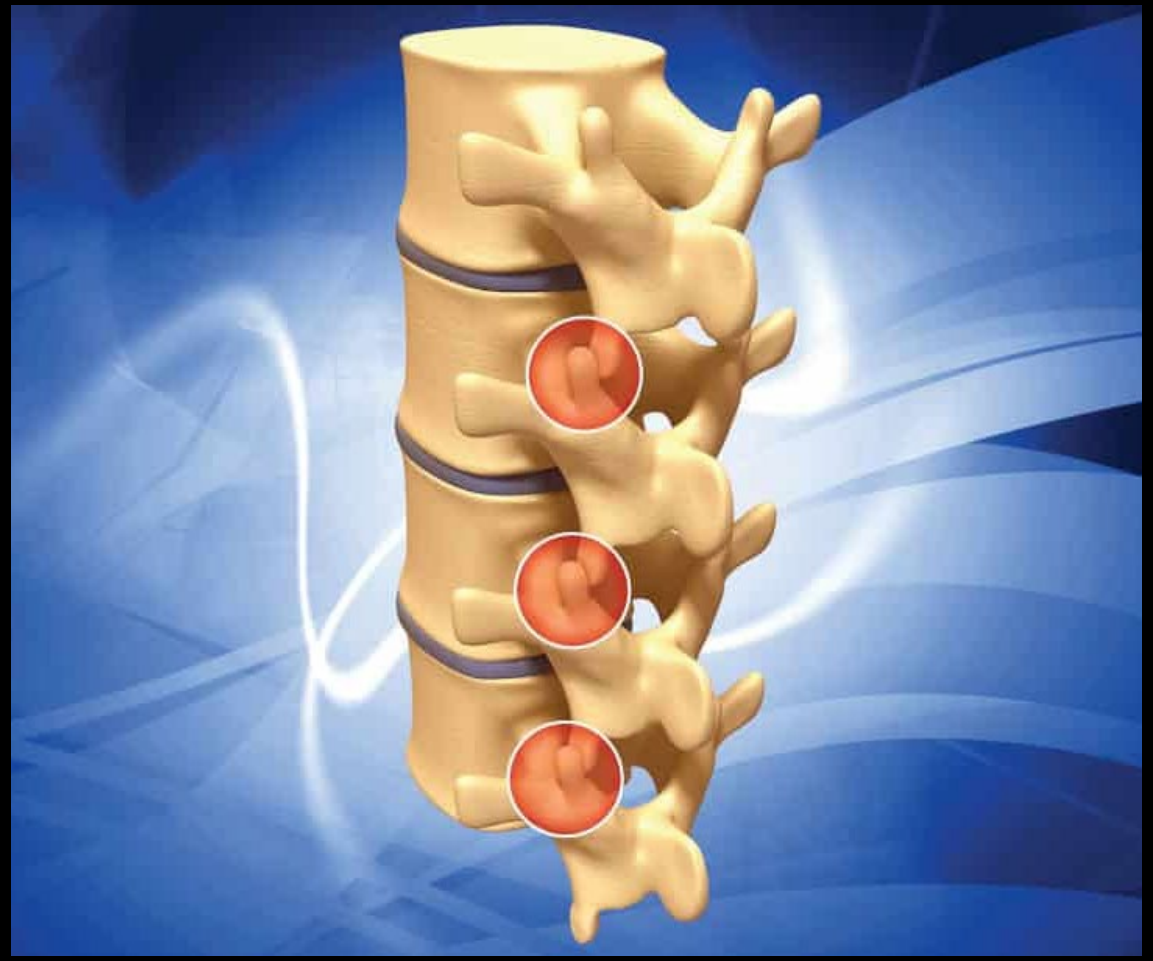


Medial Branches - Lumbar Dorsal Ramus



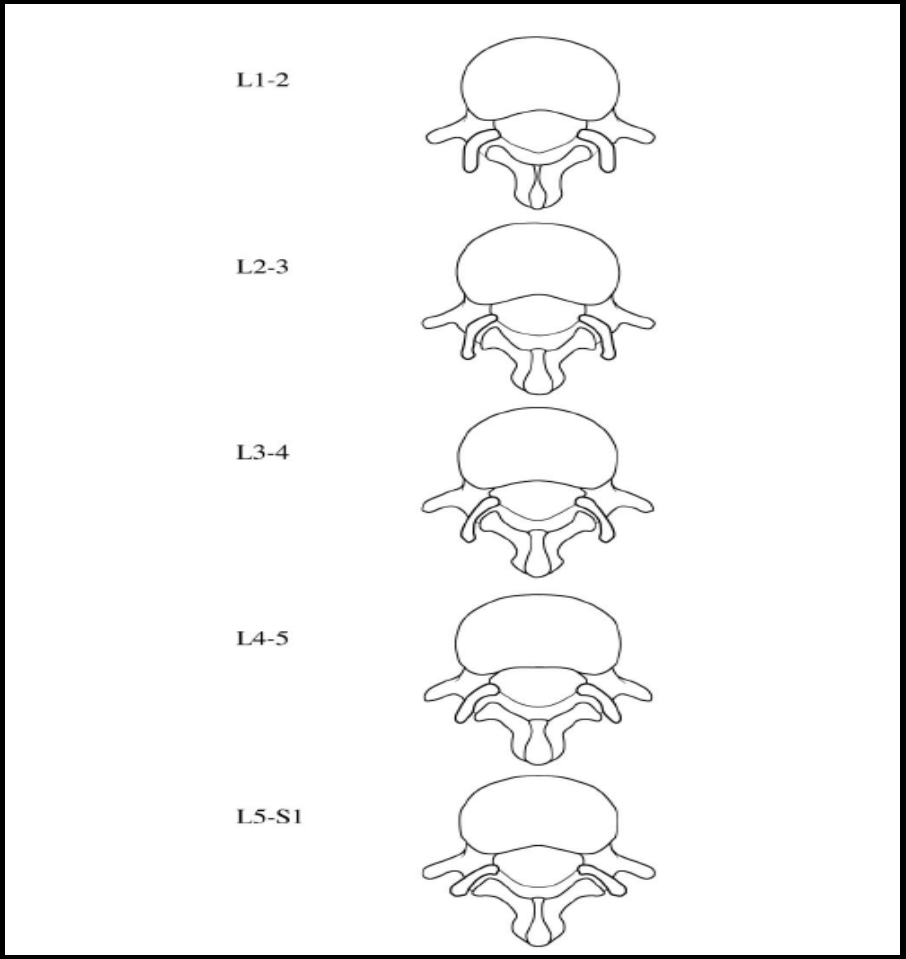
Cohen S P, Raja S N. Pathogenesis, diagnosis, and treatment of lumbar zygapophysial (facet) joint pain. Anesthesiology. 2007 Mar;106(3):591-614.

Facet Joint Arthropathy



- With aging, the lumbar facet joints become weaker and their orientation changes from coronal to sagittal positioning, predisposing them to injury from rotational stress.

Lumbar Facet Joint Orientation in the Transverse Plane



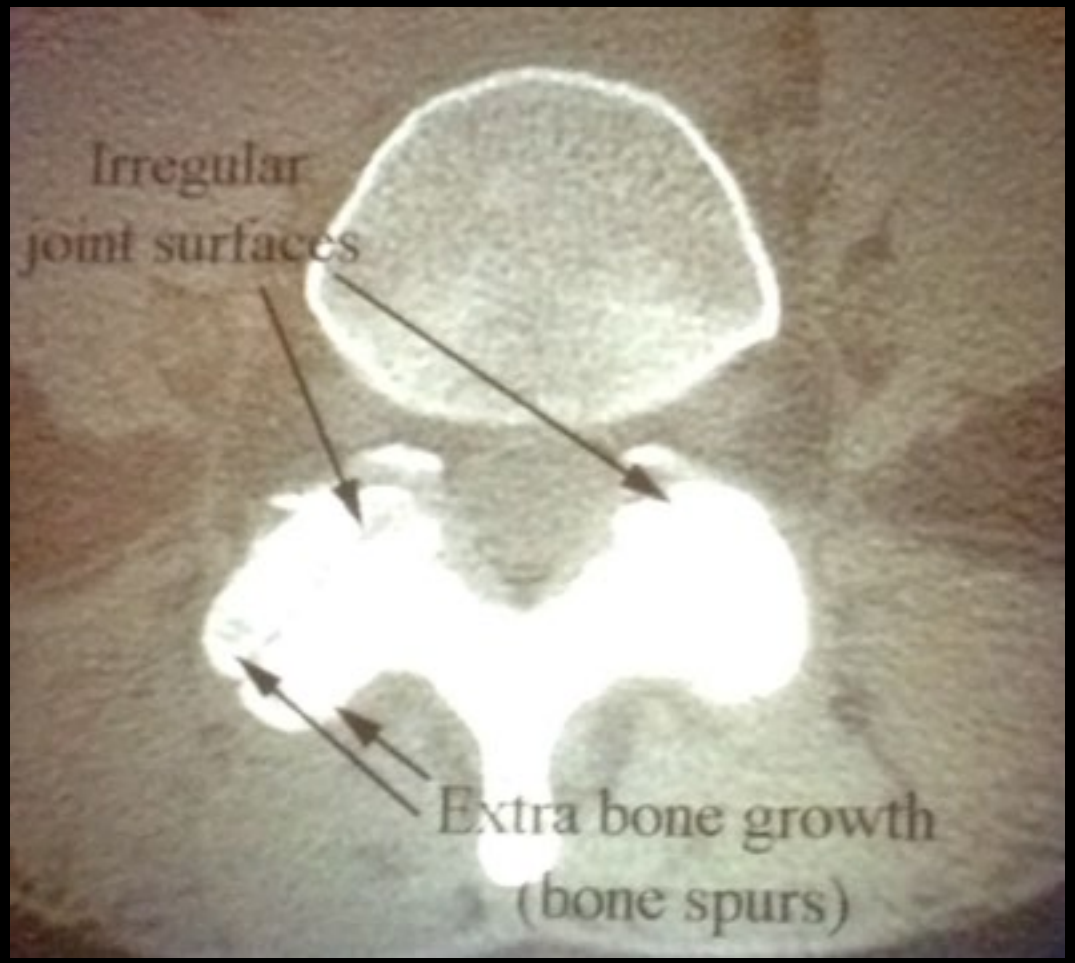
Cohen S P, Raja S N. Pathogenesis, diagnosis, and treatment of lumbar zygapophysial (facet) joint pain. Anesthesiology. 2007 Mar;106(3):591-614.

Facet Joint Arthropathy

- 15% - 45% of chronic low back pain (CLBP) is caused by facet arthropathy
- Prevalence varies between 6%-40%
- Prevalence increases with age
- Etiology includes:
- inflammatory arthritides, synovial cysts and synovitis, microtrauma, capsular tears and inflammation, splits in the articular cartilage, meniscoid entrapment and osteoarthritis

Almeer G, Azzopardi C, Kho J, Gupta H, James SL, Botchu R. Anatomy and pathology of facet joint. J Orthop. 2020 Apr 8;22:109-117.

Imaging



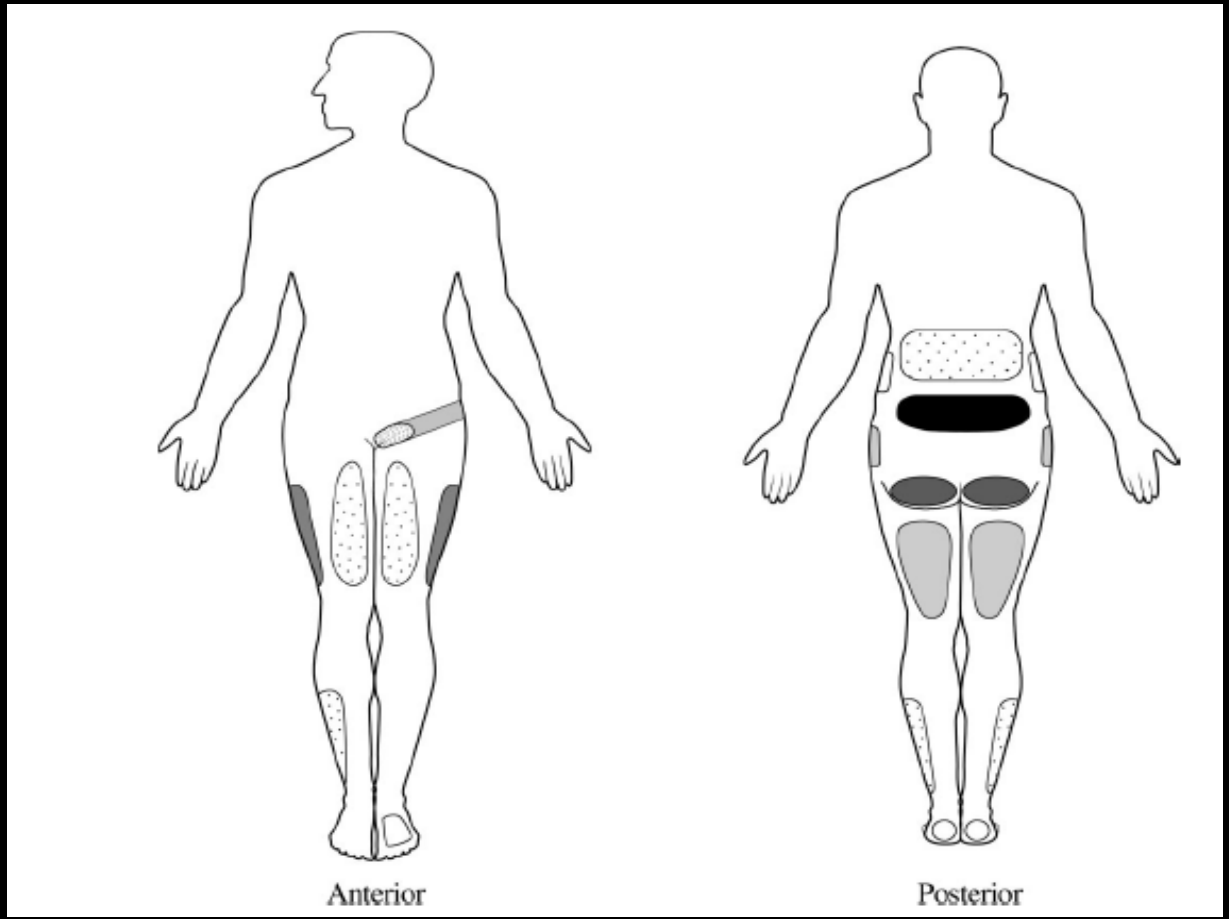
- The presence or absence of facet arthropathy on imaging does not correlate with clinical symptoms or outcomes.

Almeer G, Azzopardi C, Kho J, Gupta H, James SL, Botchu R. Anatomy and pathology of facet joint. J Orthop. 2020 Apr 8;22:109-117.

Patient History

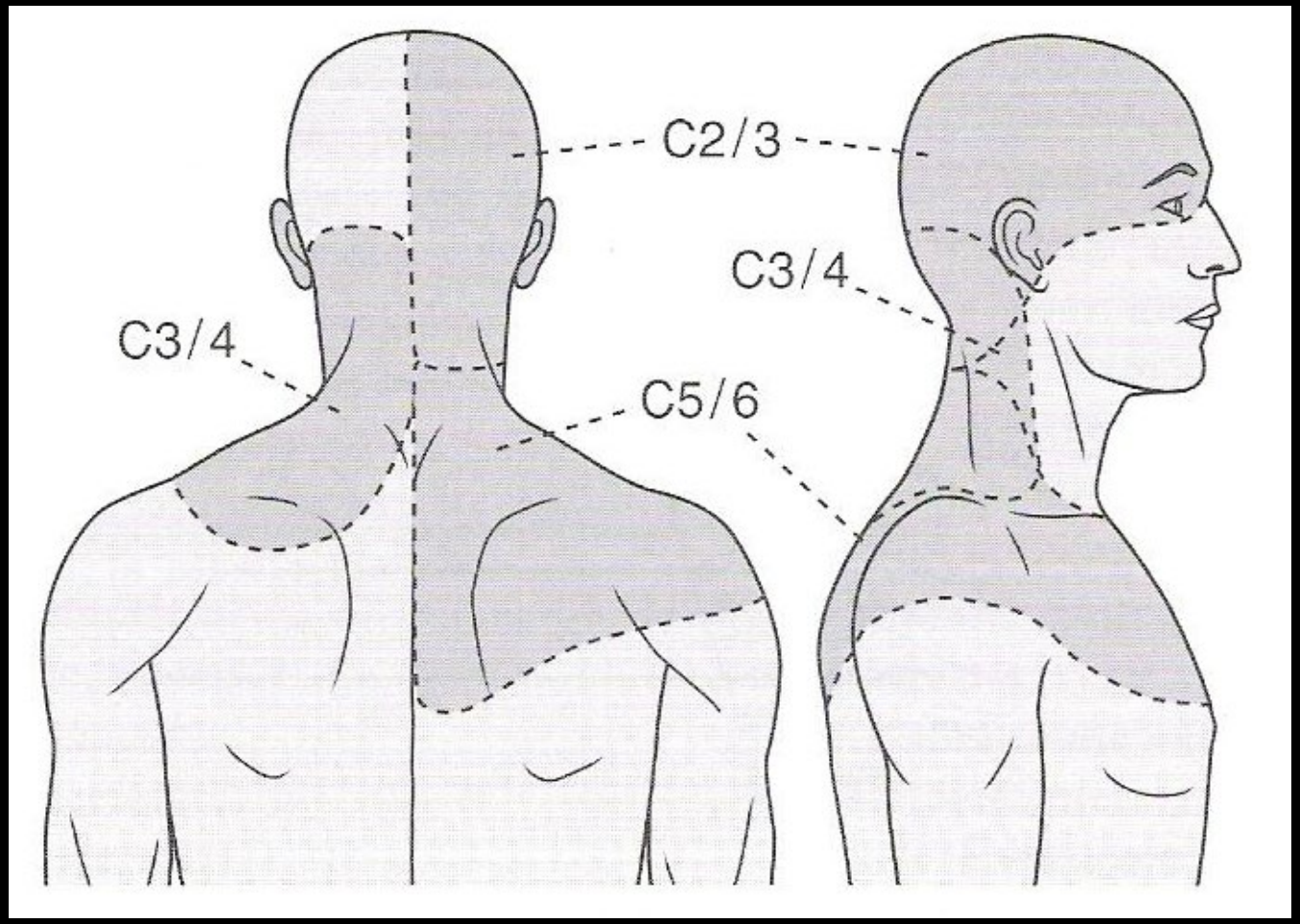
- Axial spine pain
- +/- Referred pain to extremities (typically to the knees)
- Non-radicular
- Older patients
- Whiplash can be an exception
- No clear cut factors that reproduce pain

Lumbar Facet Joint Pain Referral Patterns



Cohen S P, Raja S N. Pathogenesis, diagnosis, and treatment of lumbar zygapophysial (facet) joint pain. Anesthesiology. 2007 Mar;106(3):591-614.

Cervical Facet Joint Pain Patterns



Rathmell J P. (2011). Facet Injection: Intra-articular Injection, Medial Branch Block, and Radiofrequency Treatment. In Rathmell J P (ed). Atlas of Image-Guided Intervention. LWW; Second edition.

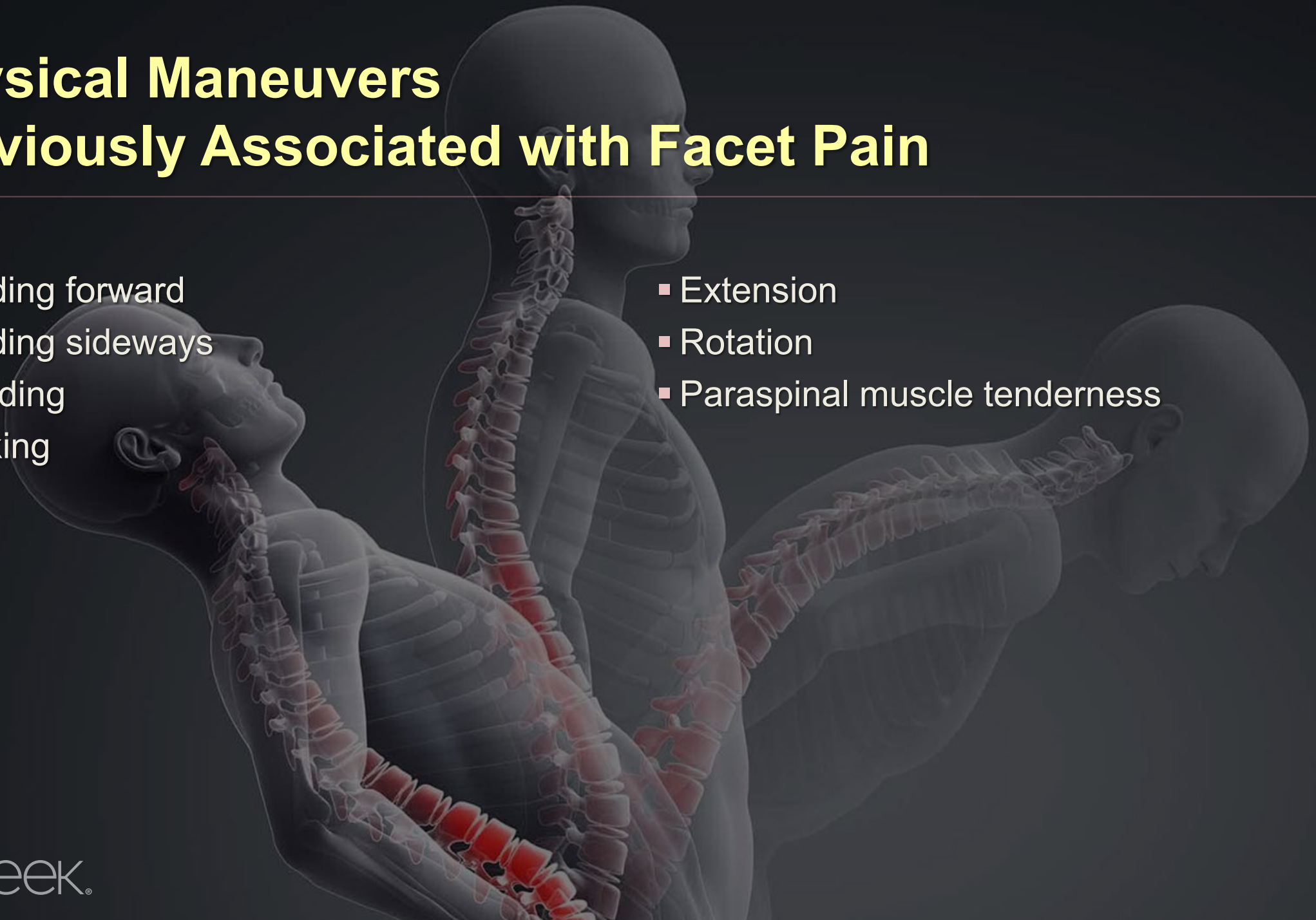
Challenges in Detecting Facetogenic Pain

- There is no gold standard for diagnosing facet pain
- Overlapping pain complaints with other problems
- Some patients have multiple pain generators
- False positive and negative rates after diagnostic (prognostic) MBBs are high

Cohen S P, et al. Facet joint pain--advances in patient selection and treatment. Nat Rev. Rheumatolog 2013. Feb;9(2):101-16.

Physical Maneuvers Previously Associated with Facet Pain

- Bending forward
- Bending sideways
- Standing
- Walking
- Extension
- Rotation
- Paraspinal muscle tenderness



Paraspinous Muscle Tenderness

- The best physical examination feature associated with facet outcomes.

Cohen S P, et al. Facet joint pain--advances in patient selection and treatment. Nat Rev. Rheumatolog 2013. Feb;9(2):101-16.

Treatment

- A multimodal approach is essential.
- No study has evaluated pharmacotherapy and/or physiotherapy specifically for facet-mediated pain.
- Osteopathic manipulation and acupuncture have shown benefit in nonspecific LBP.

Cohen S P, et al. Facet joint pain--advances in patient selection and treatment. Nat Rev. Rheumatolog 2013. Feb;9(2):101-16.

Multidisciplinary Biopsychosocial Rehabilitation for Chronic Low Back Pain

- 41 studies (with 6858 participants) that compared multidisciplinary treatment to other treatments.
- Moderate quality evidence: multidisciplinary treatment (MT) results in larger improvements in pain and daily function vs usual care or treatments aimed only at physical factors.
- Moderate evidence: MT doubled the likelihood that people were able to work in the next 6-12 months vs treatments aimed at physical factors.

Kamper SJ, et al. Multidisciplinary Biopsychosocial Rehabilitation for Chronic Low Back Pain. Cochrane Database Syst Rev. 2014 (9):CD000963.

Treatment: Oral Medications

- NSAIDs and acetaminophen are considered first-line drugs.
  - Little evidence to support one drug over another.
- Schnitzer published a comprehensive review of clinical trials evaluating pharmacotherapy for LBP:
  - Strong evidence for use of antidepressants in CLBP.
  - Strong evidence for use of muscle relaxants in ALBP.

Chou R, Deyo R, Friedly J, et al. Systemic Pharmacologic Therapies for Low Back Pain: A Systematic Review for an American College of Physicians Clinical Practice Guideline. Ann Intern Med. 2017 Apr 4;166(7):480-492.

Analgesics for Acute Postoperative Pain

- Oral analgesics for postop pain ~50,000 participants in ~460 high-quality studies

Analgesic(s)	Dose (mg)	NNT vs Placebo for at least 50% maximum pain relief over 4-6 hours
SINGLE AGENTS:		
Ibuprofen	600	2.7
Naproxen	500	2.7
Celecoxib	400	2.6
Acetaminophen (APAP)	1000	3.6
Oxycodone	15	4.6
Codeine	60	12.0
Gabapentin	250	11.0
COMBINATIONS:		
Ibuprofen + APAP	400+1000	1.5
Ibuprofen + oxycodone	400+5	2.3
APAP + oxycodone	325+5	5.4
APAP + codeine	300+30	6.9

Moore, R. Andrew, et al. *The Cochrane Library* (2015)

Moore RA, et al. Single dose oral analgesics for acute postoperative pain in adults - an overview of Cochrane reviews. Cochrane Database Syst Rev. 2015 Sep 28;2015(9):CD008659.

Diagnosis of Facet Arthropathy with Medial Branch Blocks

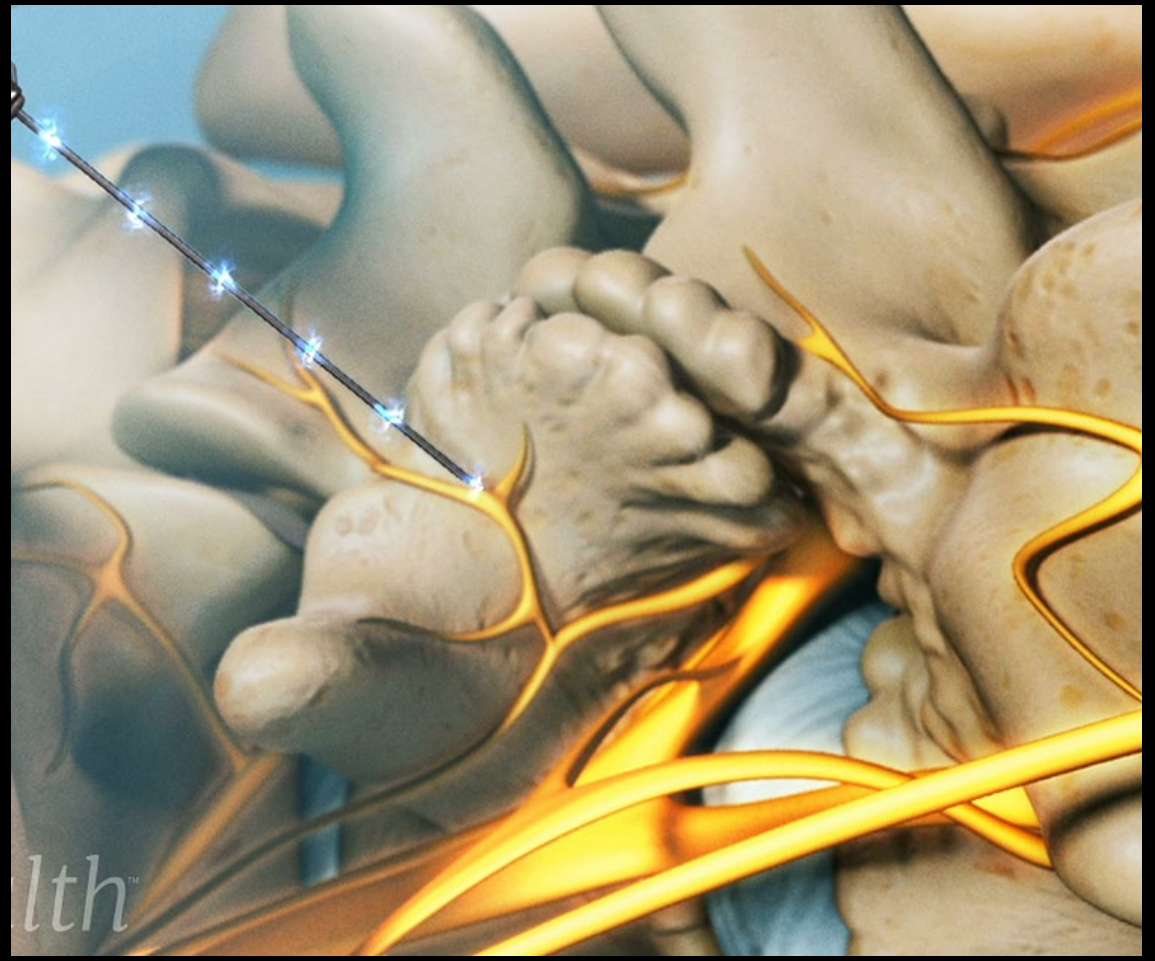
- Sensitivity and specificity comparable to intra-articular injections
- Criteria for success varies between 50-90% pain relief
- False-positive rate varies between 25-38%
- Controversy exists regarding use of placebo controls, confirmatory blocks, and even the utility of performing diagnostic blocks prior to proceeding to RF denervation

Cohen S P, et al. Facet joint pain--advances in patient selection and treatment. Nat Rev. Rheumatolog 2013. Feb;9(2):101-16.

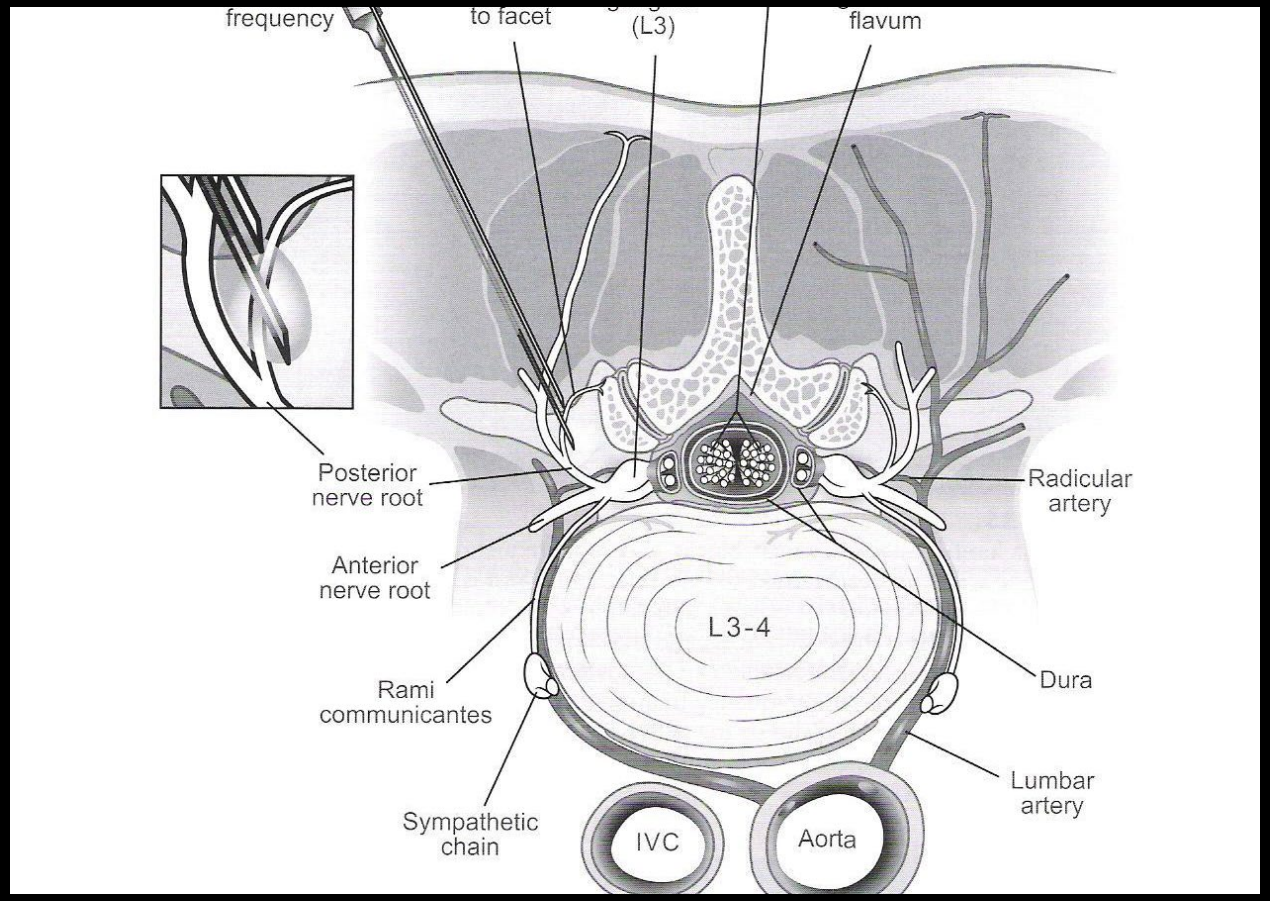
Lumbar Medial Branch Block

Radiofrequency Denervation

- Radiofrequency energy channeled through a small diameter needle to create a controlled burn that severs the zygapophaseal joint nerve supply



Axial View of Lumbar Lesion



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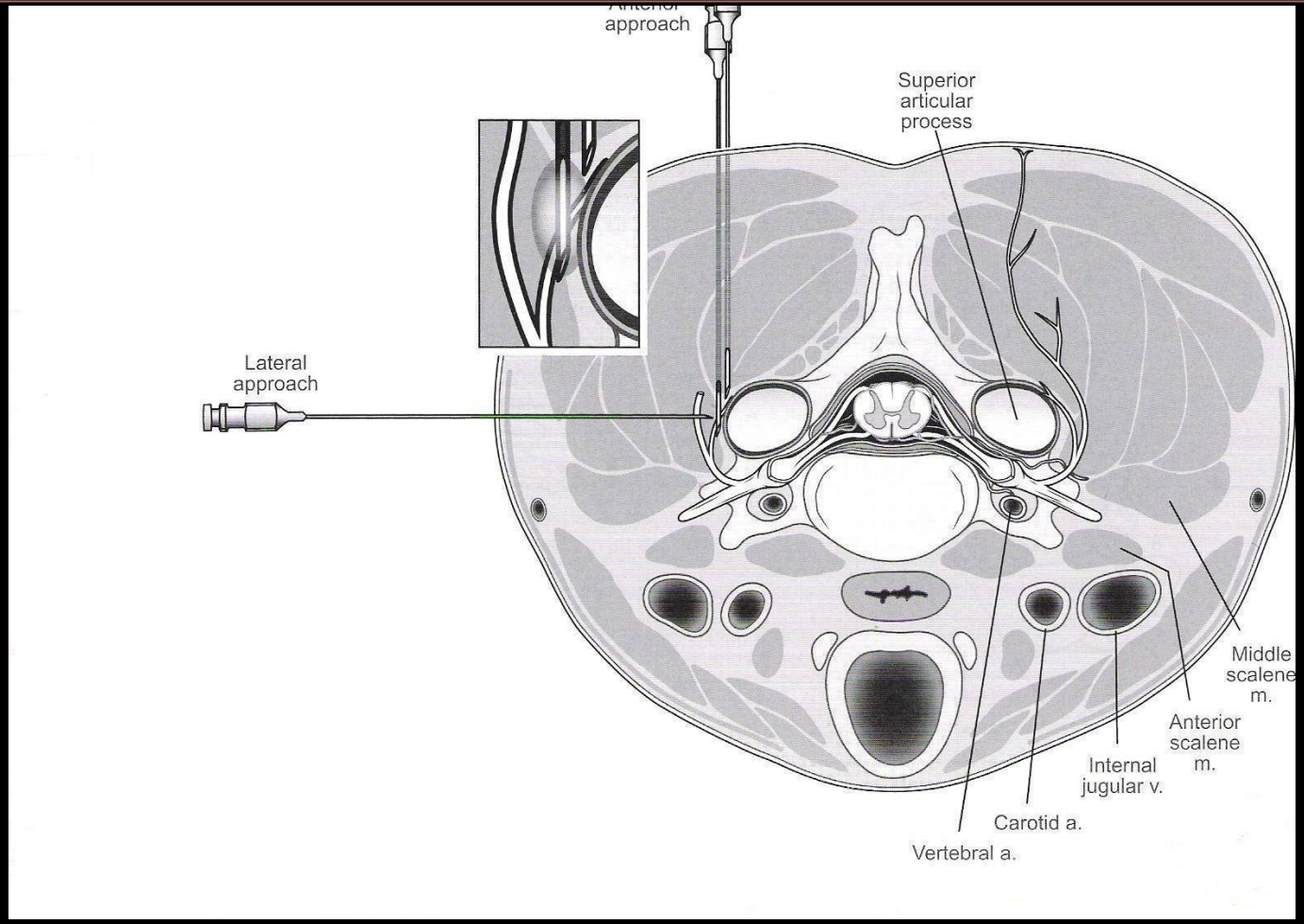
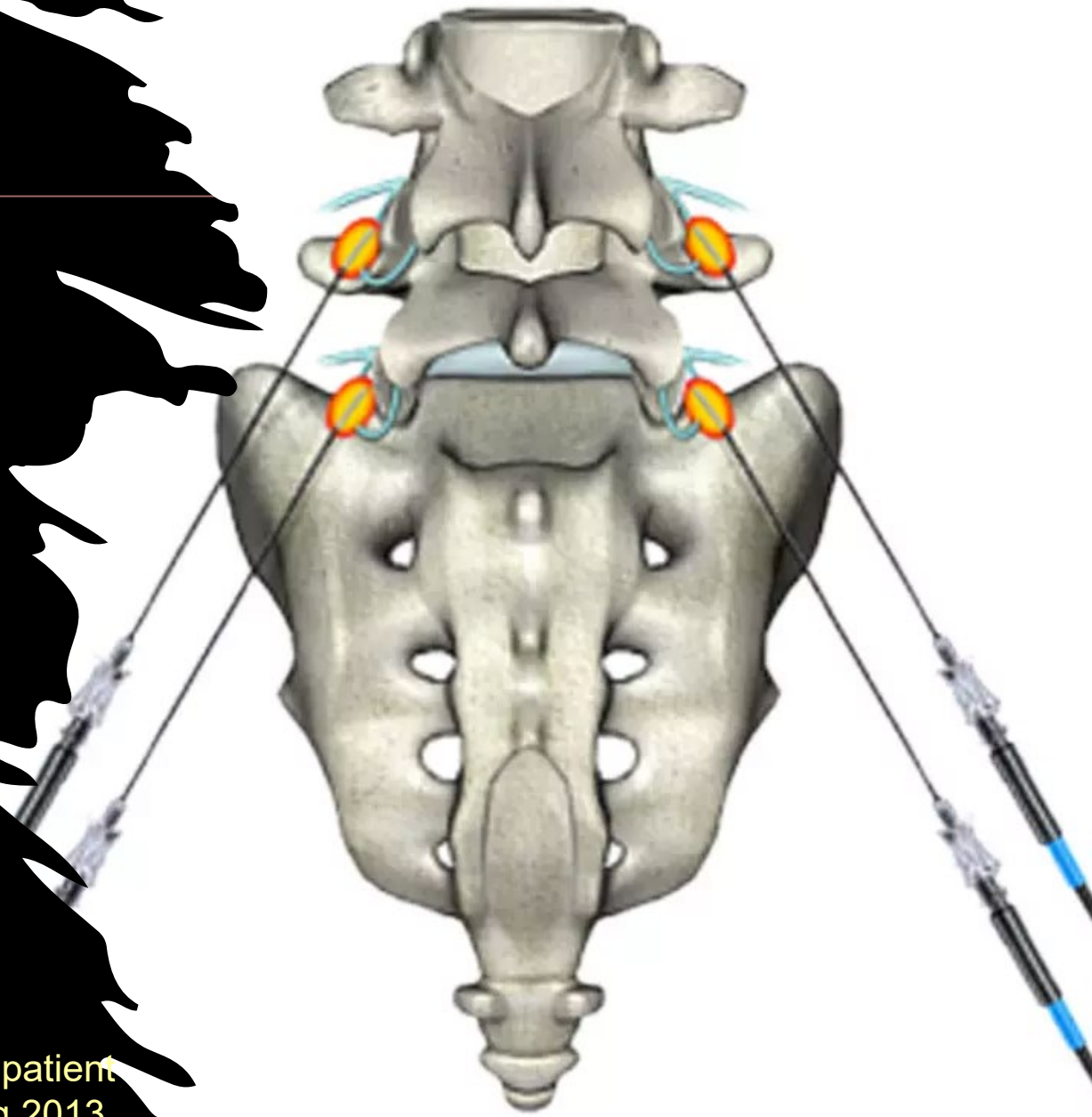
Axial View of Cervical Lesion



Rathmell J P. (2011). Facet Injection: Intra-articular Injection, Medial Branch Block, and Radiofrequency Treatment. In Rathmell J P (ed). Atlas of Image-Guided Intervention. LWW; Second edition.

Repeat Neurotomy

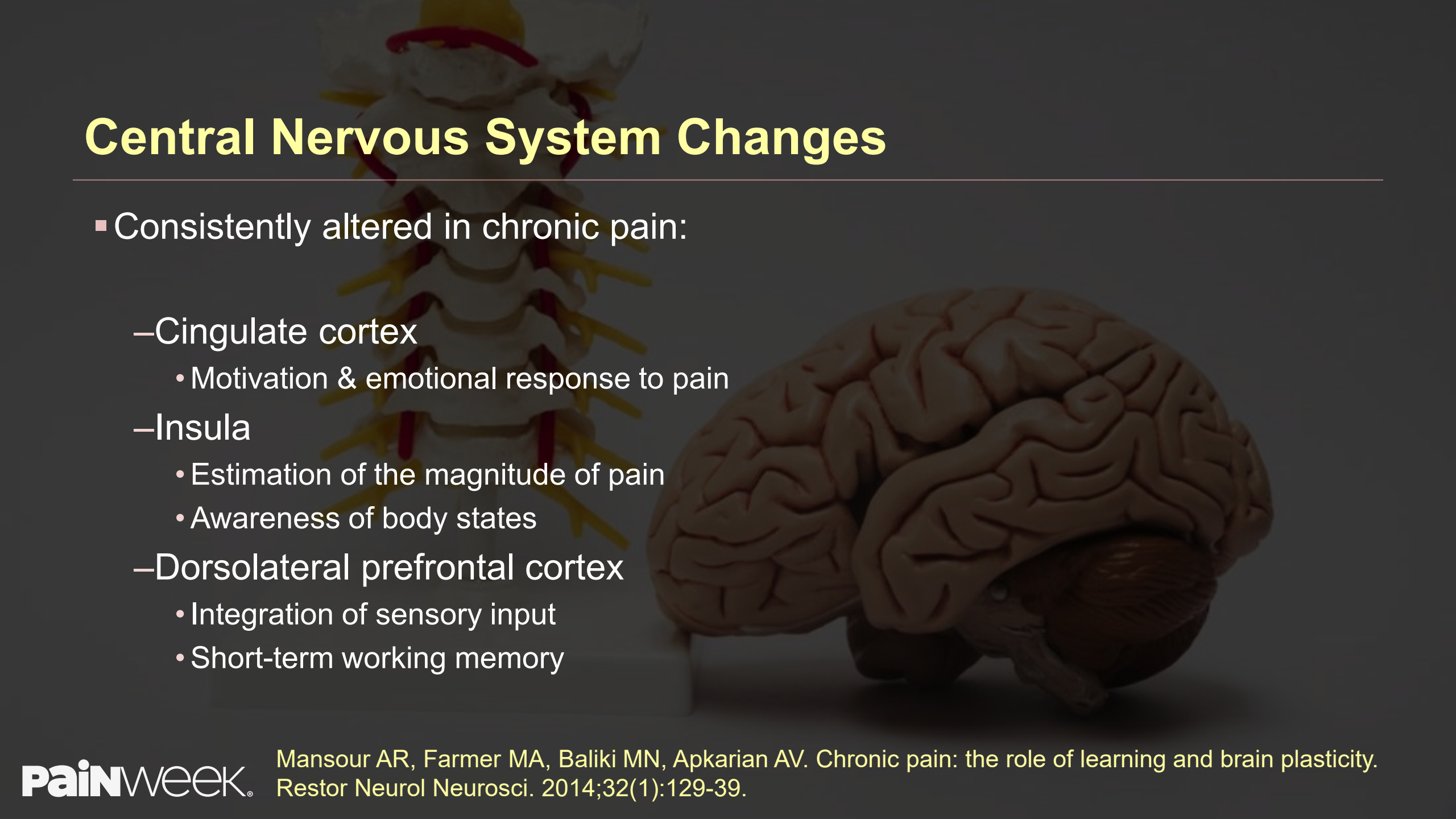
- Pain returns after RF denervation between 6 months and 1 year
  - Repeated RF ablation of the medial branches can be performed with no decrease in efficacy.



Cohen S P, et al. Facet joint pain--advances in patient selection and treatment. Nat Rev. Rheumatolog 2013. Feb;9(2):101-16.

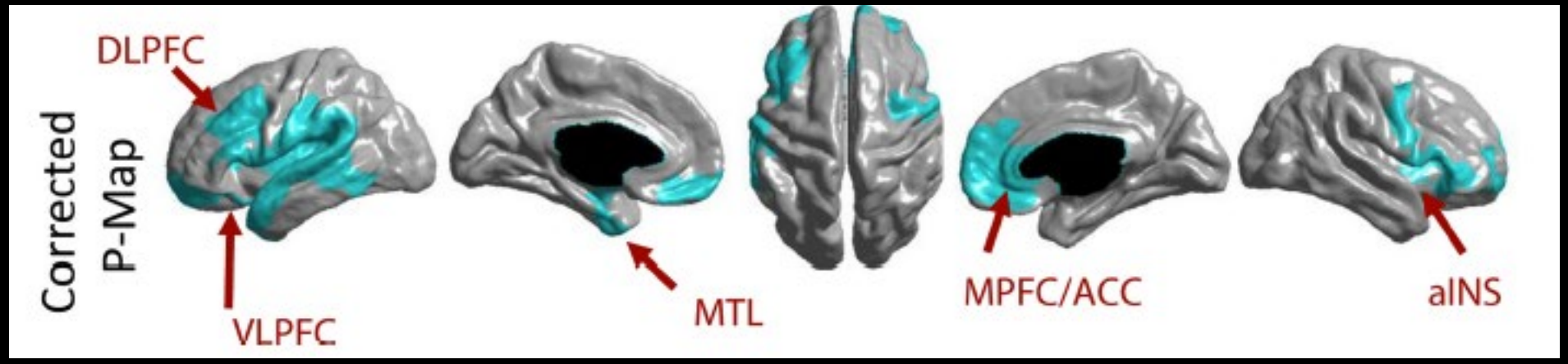
Central Nervous System Changes

- Consistently altered in chronic pain:
  - –Cingulate cortex
    - Motivation & emotional response to pain
  - –Insula
    - Estimation of the magnitude of pain
    - Awareness of body states
  - –Dorsolateral prefrontal cortex
    - Integration of sensory input
    - Short-term working memory

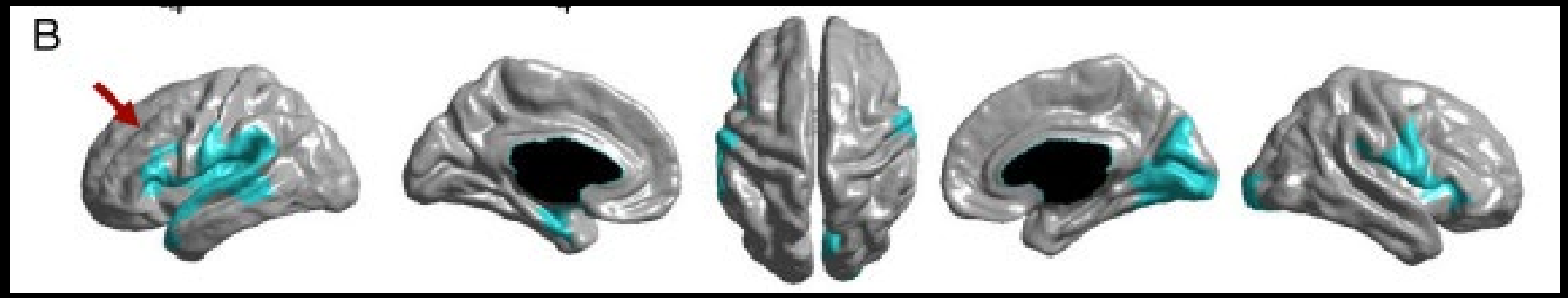


Mansour AR, Farmer MA, Baliki MN, Apkarian AV. Chronic pain: the role of learning and brain plasticity. Restor Neurol Neurosci. 2014;32(1):129-39.

Cortical thinning in CLBP compared to controls

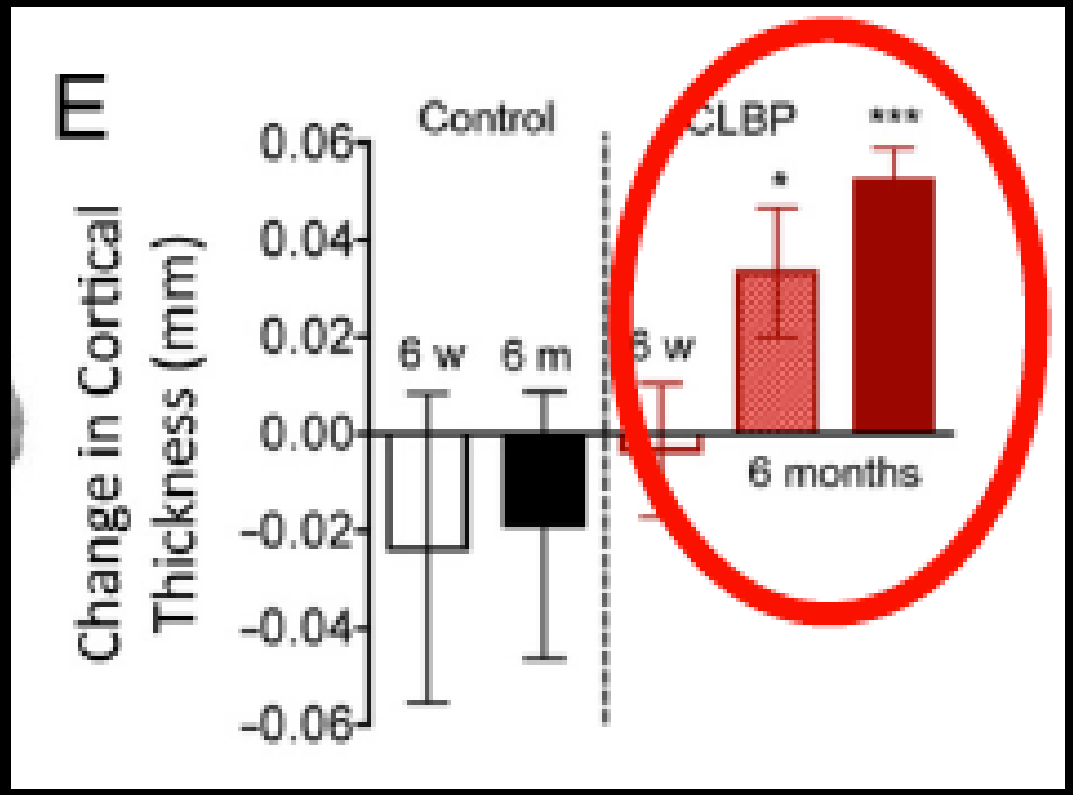


Reversal of cortical thinning with treatment of pain



Seminowicz DA, et al. Effective treatment of chronic low back pain in humans reverses abnormal brain anatomy and function. J Neurosci. 2011 May 18;31(20):7540-50.

Reversal of cortical thinning with treatment of pain



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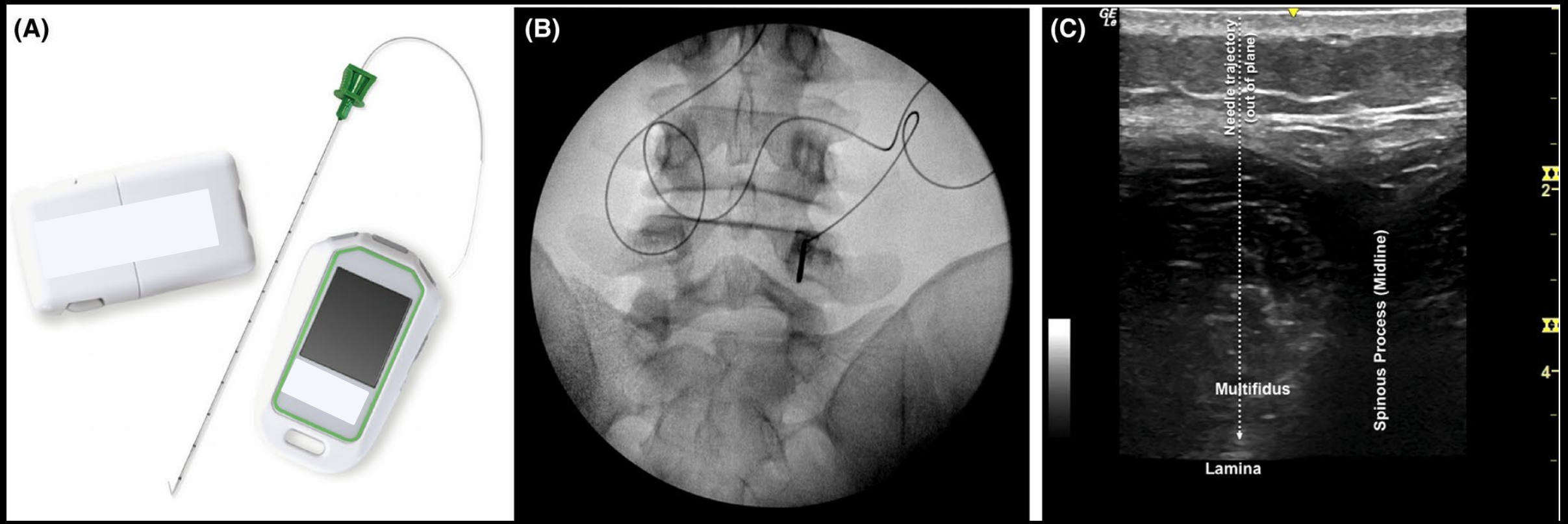
Treatment of chronic axial back pain with 60-day percutaneous medial branch PNS



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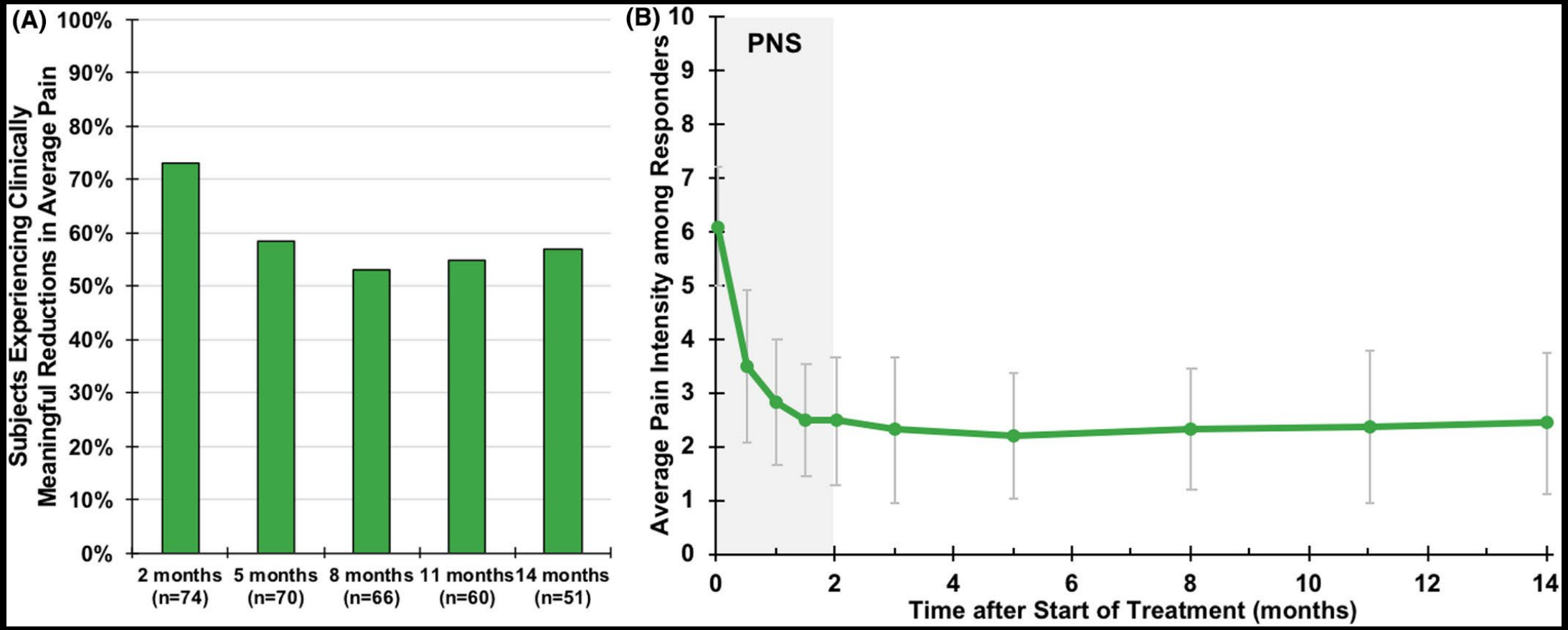

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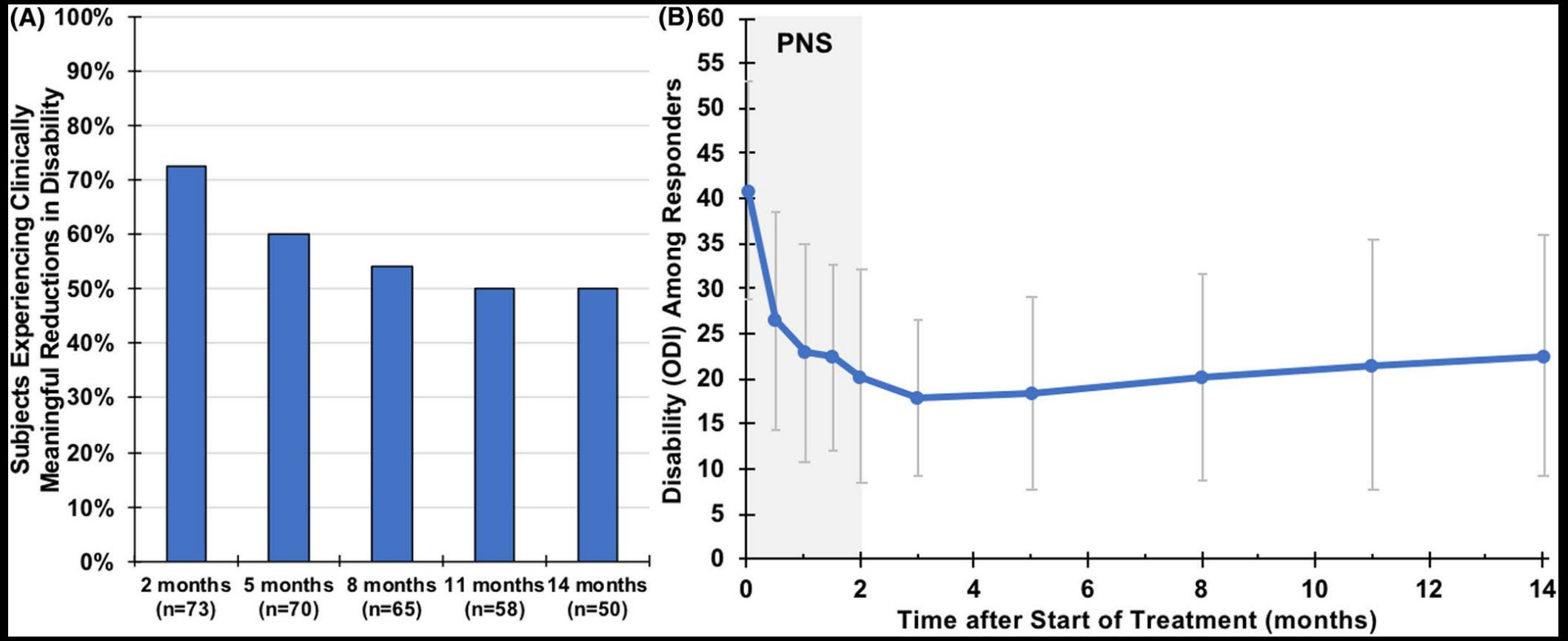
Treatment of chronic axial back pain with 60-day percutaneous medial branch PNS



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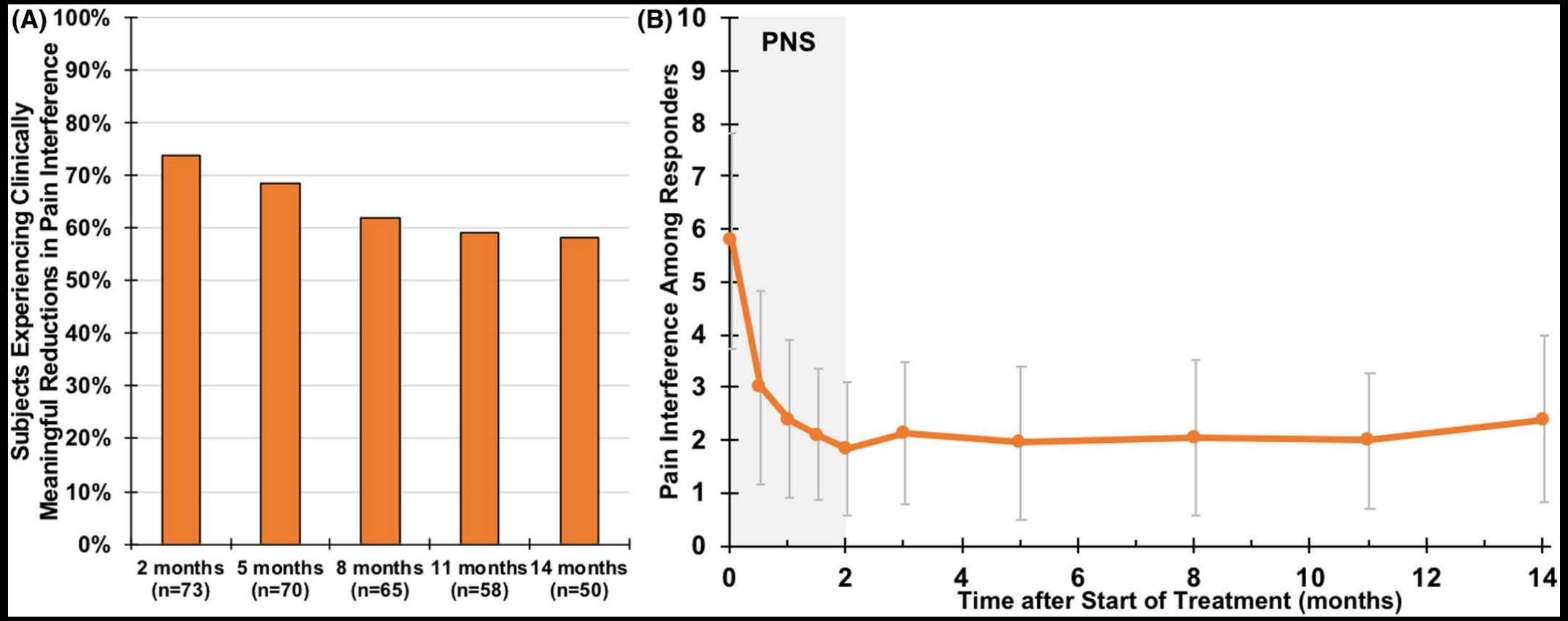

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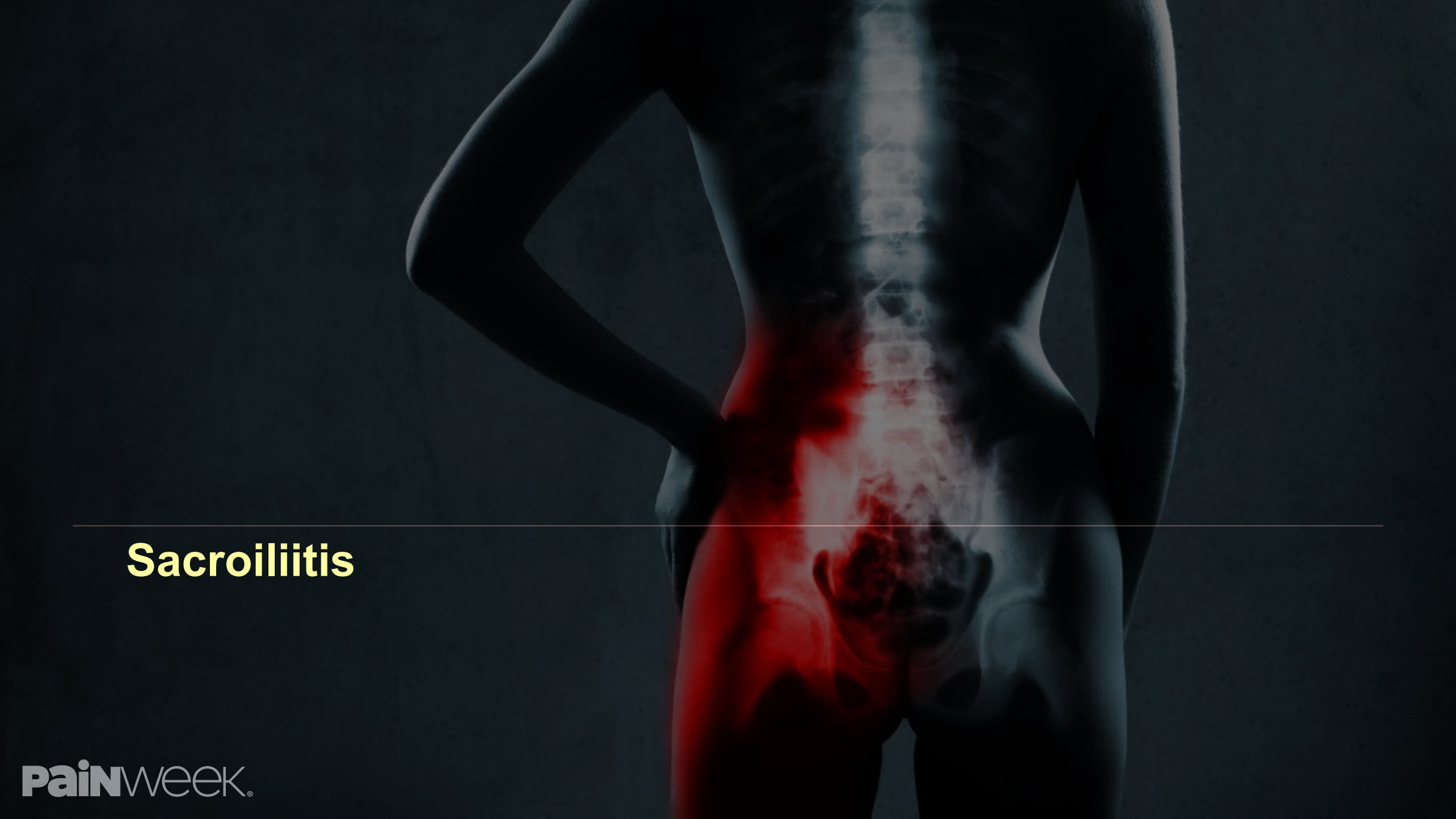
Treatment of chronic axial back pain with 60-day percutaneous medial branch PNS

- Proposed Mechanism:
  - modulation of the underlying central sensitization through peripherally induced reconditioning of the central nervous system
  - believed to produce robust neural signals in sensory (afferent) fibers focal to the region of back pain that engage the gate mechanism and decrease central pain signals
  - thought to help normalize or reverse membrane hyperexcitability of circuits in nociceptive and neuropathic pathways

Gilmore CA et al. Treatment of chronic axial back pain with 60-day percutaneous medial branch PNS: Primary end point results from a prospective, multicenter study. Pain Pract. 2021 Jul 3. doi: 10.1111/papr.13055. Online ahead of print.



Sacroiliitis

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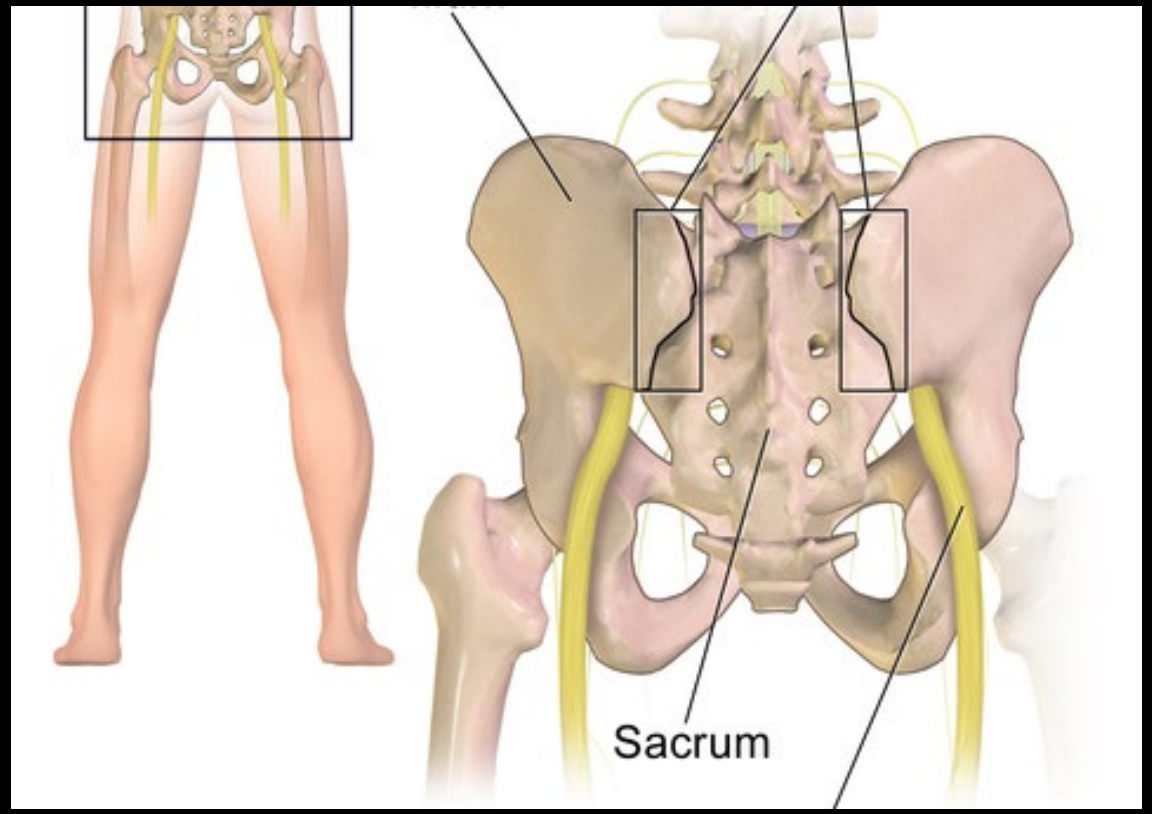
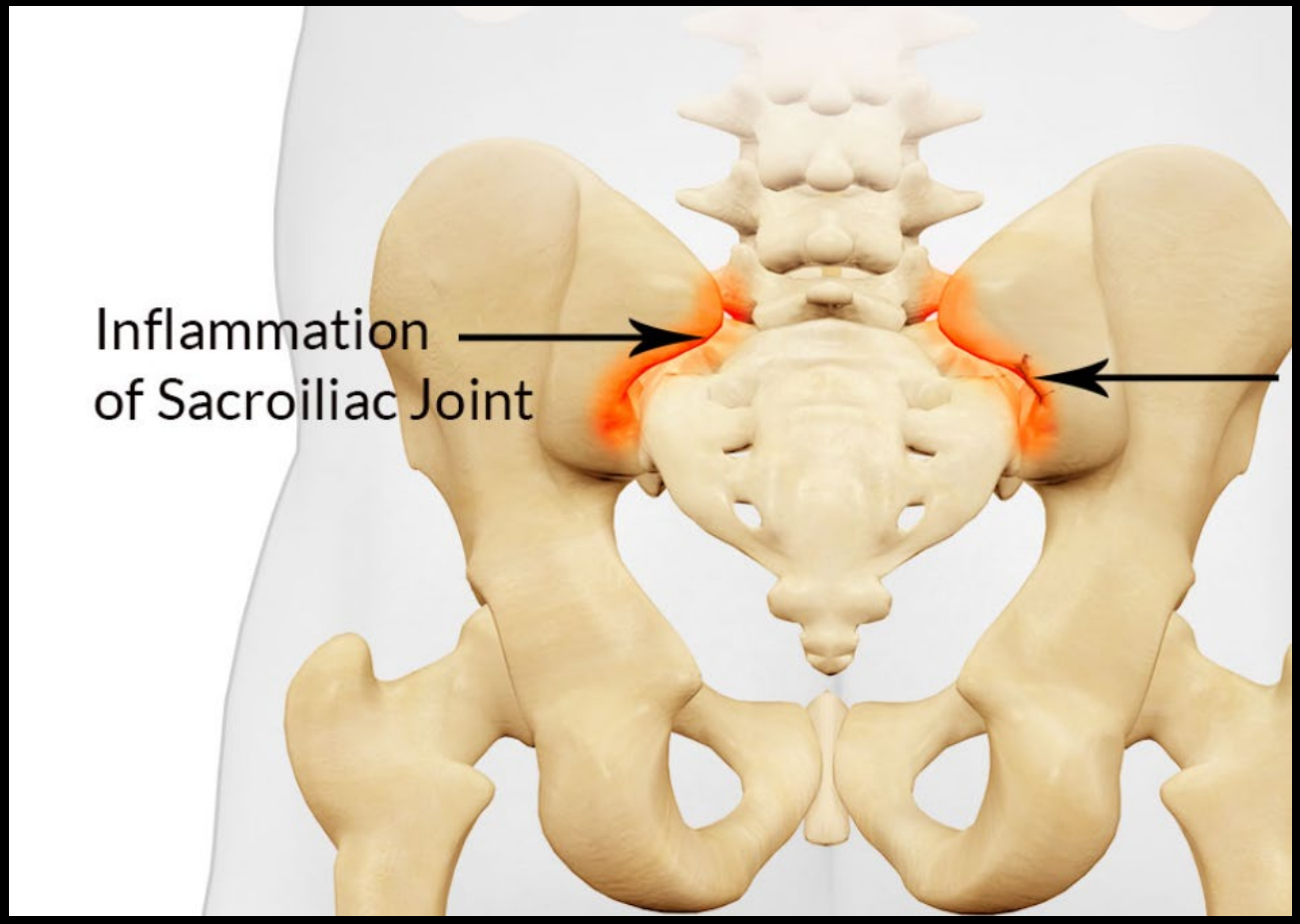
Sacroiliac Joint

- Diarthrodial
- Designed for stability
- Largest axial joint in the body



Sacroiliitis

- 16-30% of CLBP
- 6th decade – peri-capsular ankylosis
- 8th decade – ubiquitous marked erosion & plaque formation

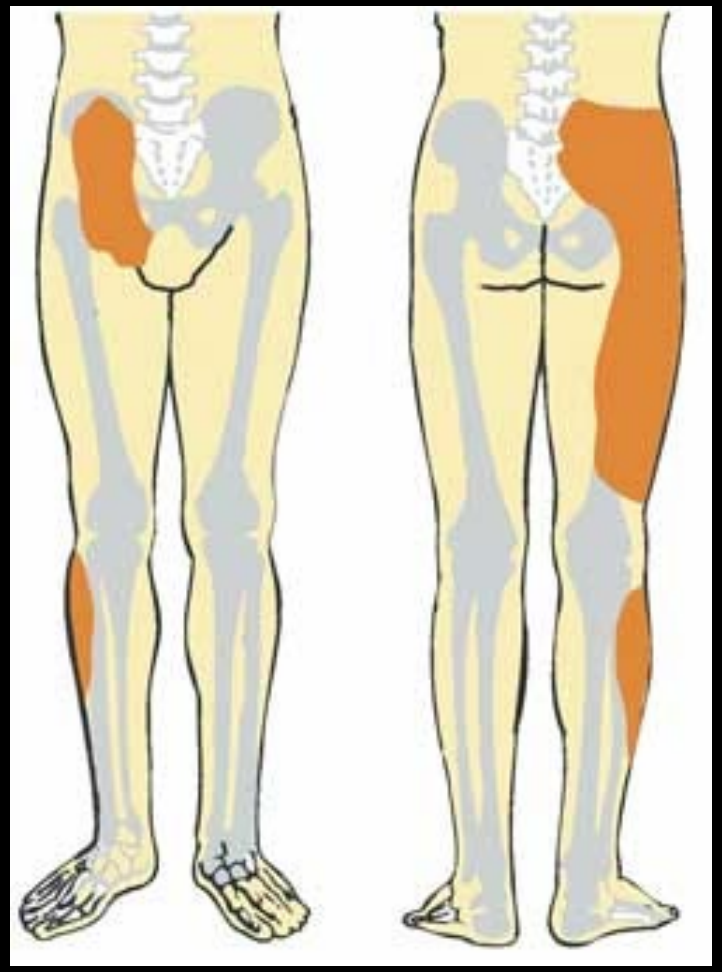


Slobodin G, Hussein H, Rosner I, Eshed I. Sacroiliitis - early diagnosis is key. J Inflamm Res. 2018 Sep 10;11:339-344.

Sacroiliitis Referral Patterns

2% abdomen

14% groin



72% lower lumbar region

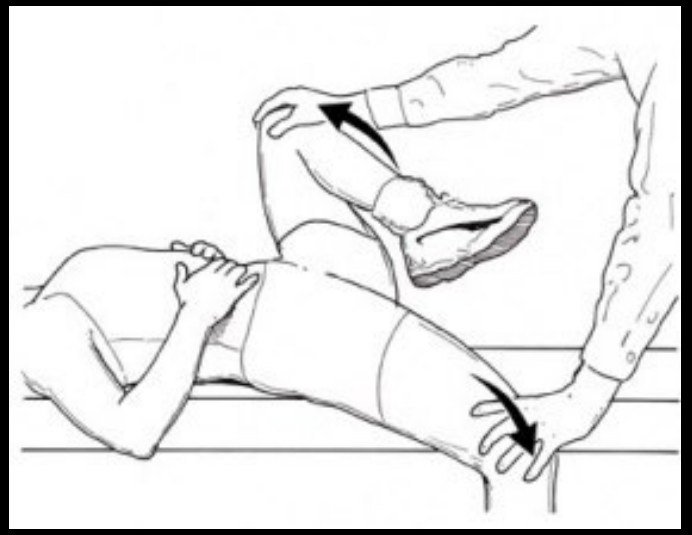
94% buttock

50% lower extremity

Vaneldran P et al. 13. Sacroiliac joint pain. Pain Pract. 2010 Sep-Oct; 10(5):470-8.

Sacroiliitis – Physical Exam

FABER Test



Gaenslen's Test

Slobodin G, Hussein H, Rosner I, Eshed I. Sacroiliitis - early diagnosis is key. J Inflamm Res. 2018 Sep 10;11:339-344.

SI Joint Injection

- “Gold standard” in diagnosing SI joint pain.
- Has been shown in various studies to be both diagnostic and therapeutic for a duration of 6 months to 1 year.

Cohen S P, et al. Facet joint pain--advances in patient selection and treatment. Nat Rev. Rheumatolog 2013. Feb;9(2):101-16.

Lateral Sacral Branch Denervation

- Used for over 14 years
- For those who have obtained effective but short-term relief with SIJ blocks
- Numerous controlled and uncontrolled studies have demonstrated benefit

Cohen S P, et al. Sacroiliac joint pain: a comprehensive review of epidemiology, diagnosis and treatment. Expert Rev Neurother. 2013 Jan;13(1):99-116.

Refractory Knee & Hip Pain

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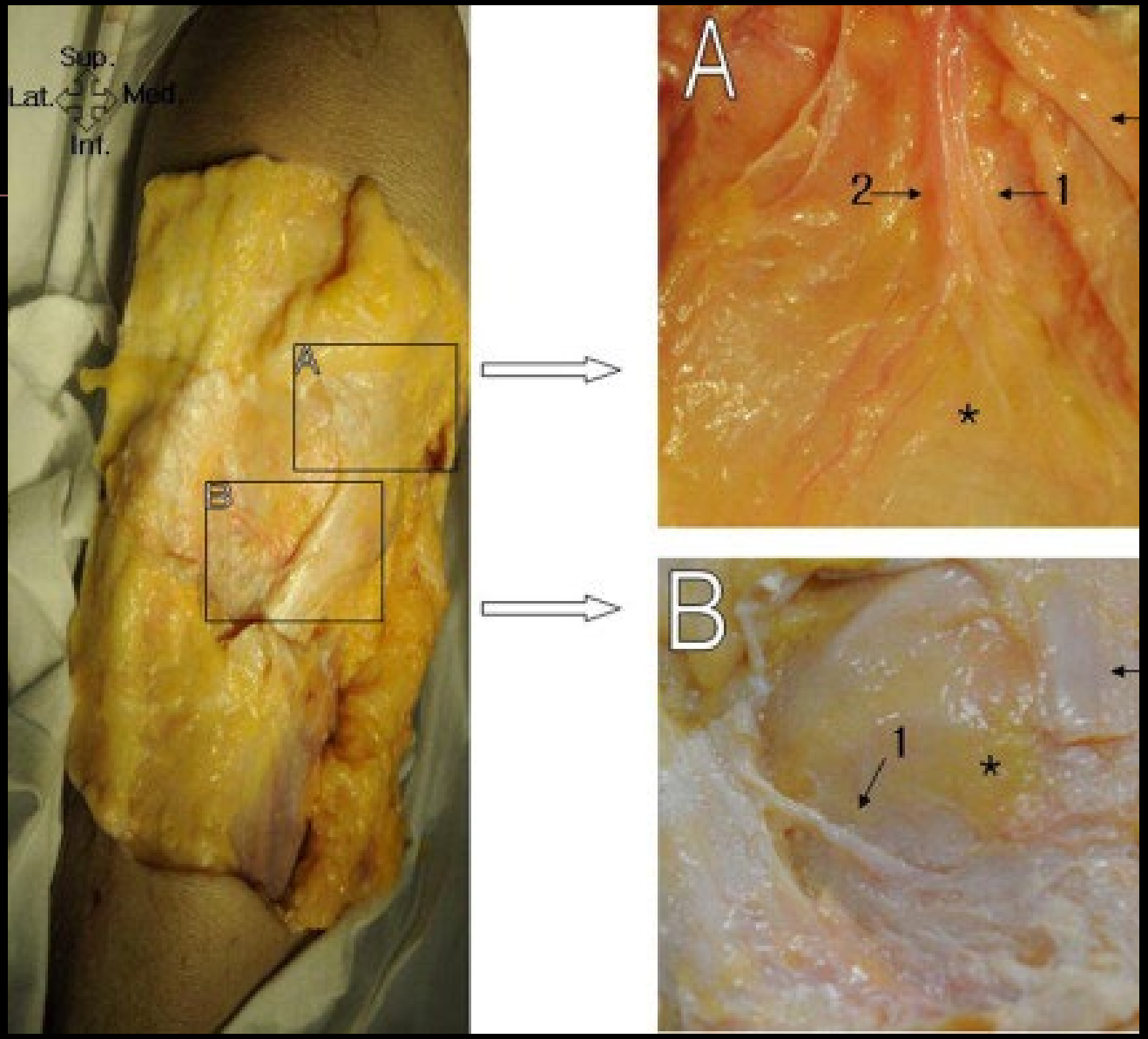
Genicular Nerve Anatomy

- The superior medial genicular nerve (1) runs down the upper part of the medial epicondyle (asterisk) of the femur with genicular vessels (2).
- The inferior medial genicular nerve (1) passes the lower parts of the medial epicondyle (asterisk) of the tibia.



Choi WJ, et al. Radiofrequency treatment relieves chronic knee osteoarthritis pain: a double-blind randomized controlled trial. Pain. 2011 Mar;152(3):481-7.

Genicular Radiofrequency

IASP

PAIN® 152 (2011) 481–487

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www.elsevier.com/locate/pain

Research papers

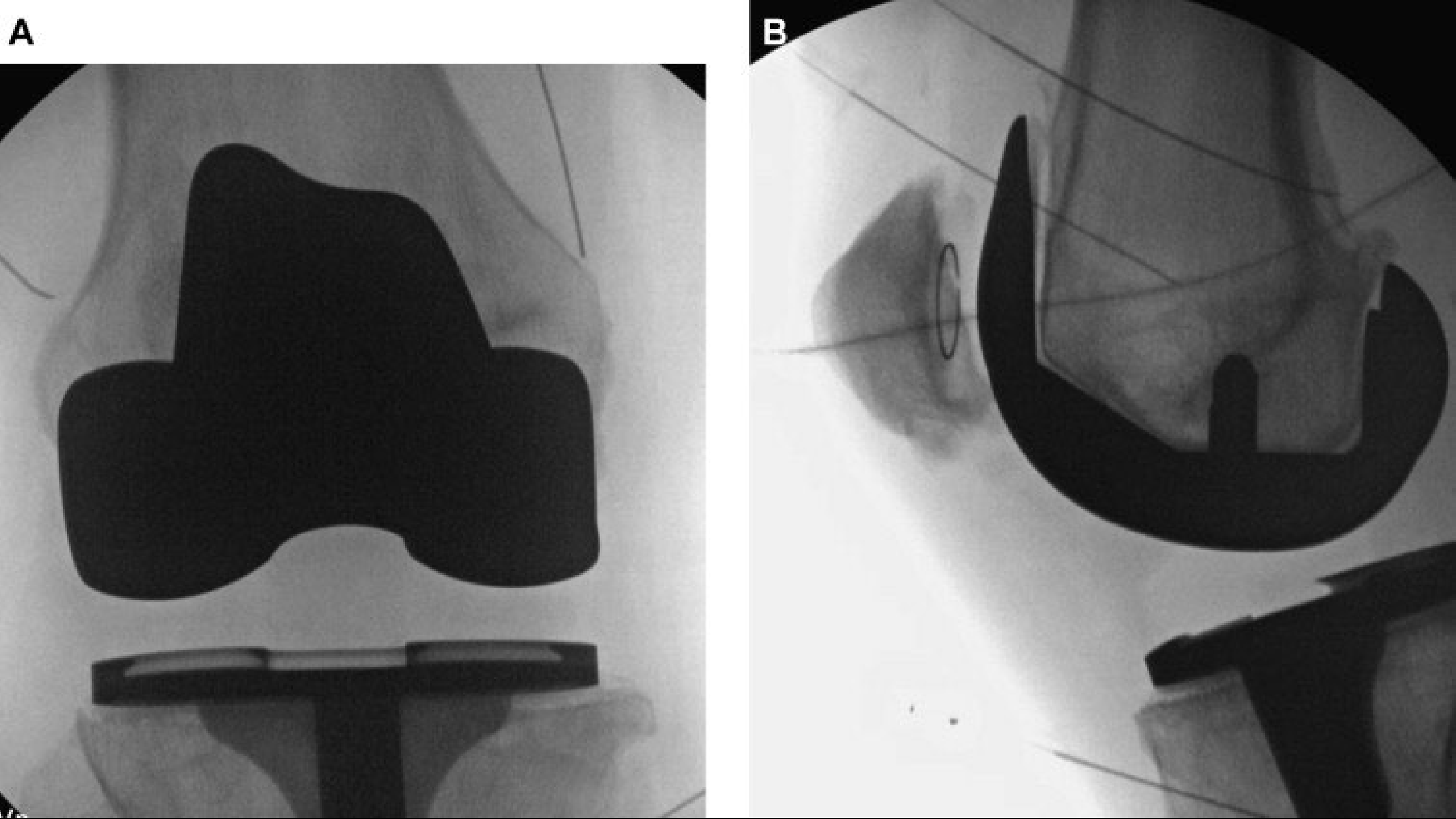
Radiofrequency treatment relieves chronic knee osteoarthritis pain: A double-blind randomized controlled trial

Woo-Jong Choi [a], Seung-Jun Hwang [b], Jun-Gol Song [a], Jeong-Gil Leem [a], Yong-Up Kang [c], Pyong-Hwan Park [a], Jin-Woo Shin [a,*]

[a] Department of Anesthesiology and Pain Medicine, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea
[b] Department of Anatomy and Cell biology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea
[c] Chung sol Pain Clinics, Pusan, Republic of Korea

- 38 elderly patients with
  - severe knee OA pain lasting more than 3 months
  - positive response to a diagnostic genicular nerve block
  - no response to conservative treatments
- Randomly assigned to receive percutaneous RF genicular neurotomy (RF group; n = 19) or sham (control group; n = 19)
- RF group had less knee joint pain at 4 ($p < 0.001$) and 12 ($p<0.001$) weeks compared with the control group (VAS)
- Oxford knee scores showed similar findings ($p < 0.001$)
- No adverse events
- RF neurotomy leads to significant pain reduction and functional improvement in knee OA pain

Choi WJ, et al. Radiofrequency treatment relieves chronic knee osteoarthritis pain: a double-blind randomized controlled trial. Pain. 2011 Mar;152(3):481-7.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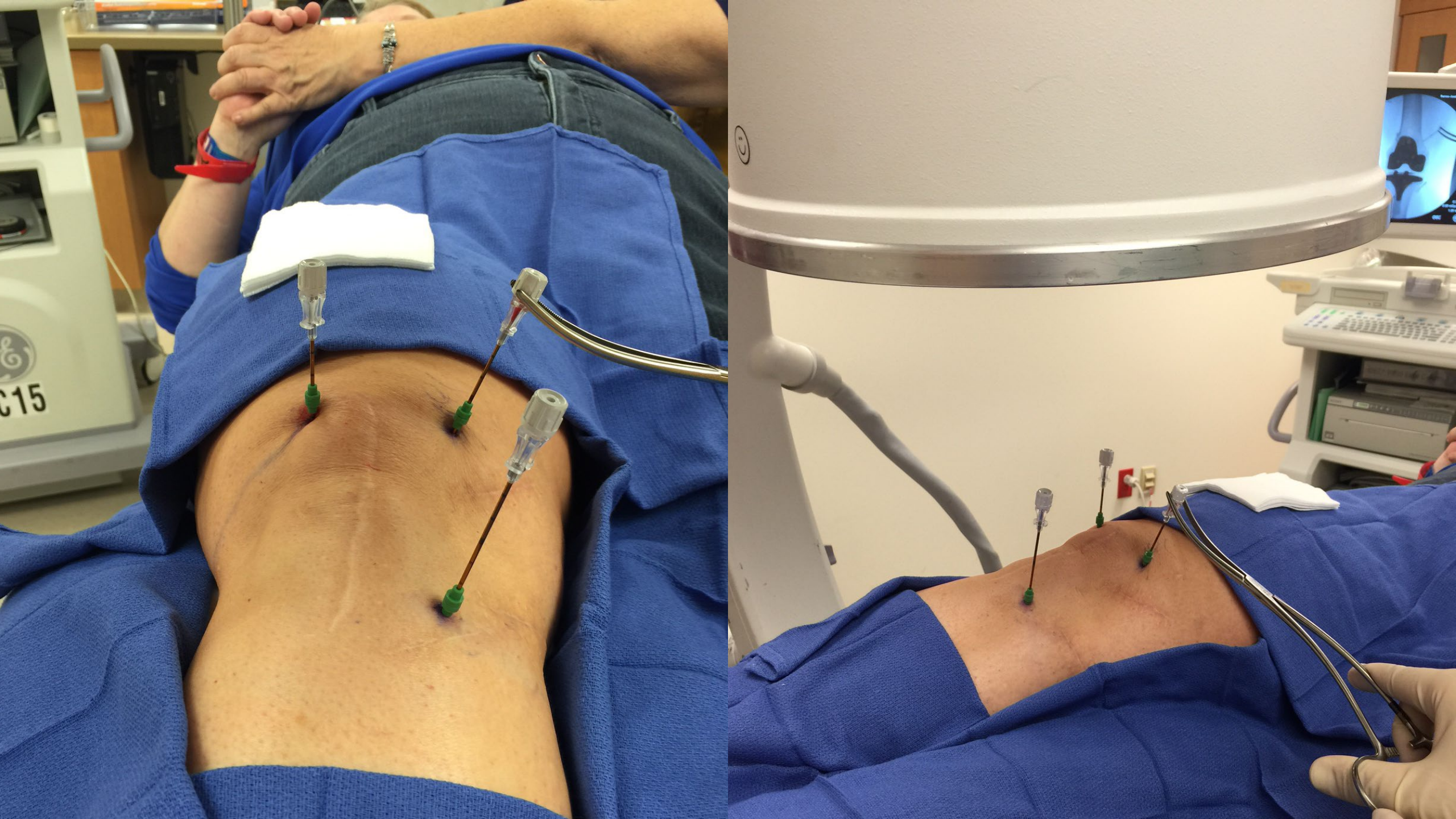
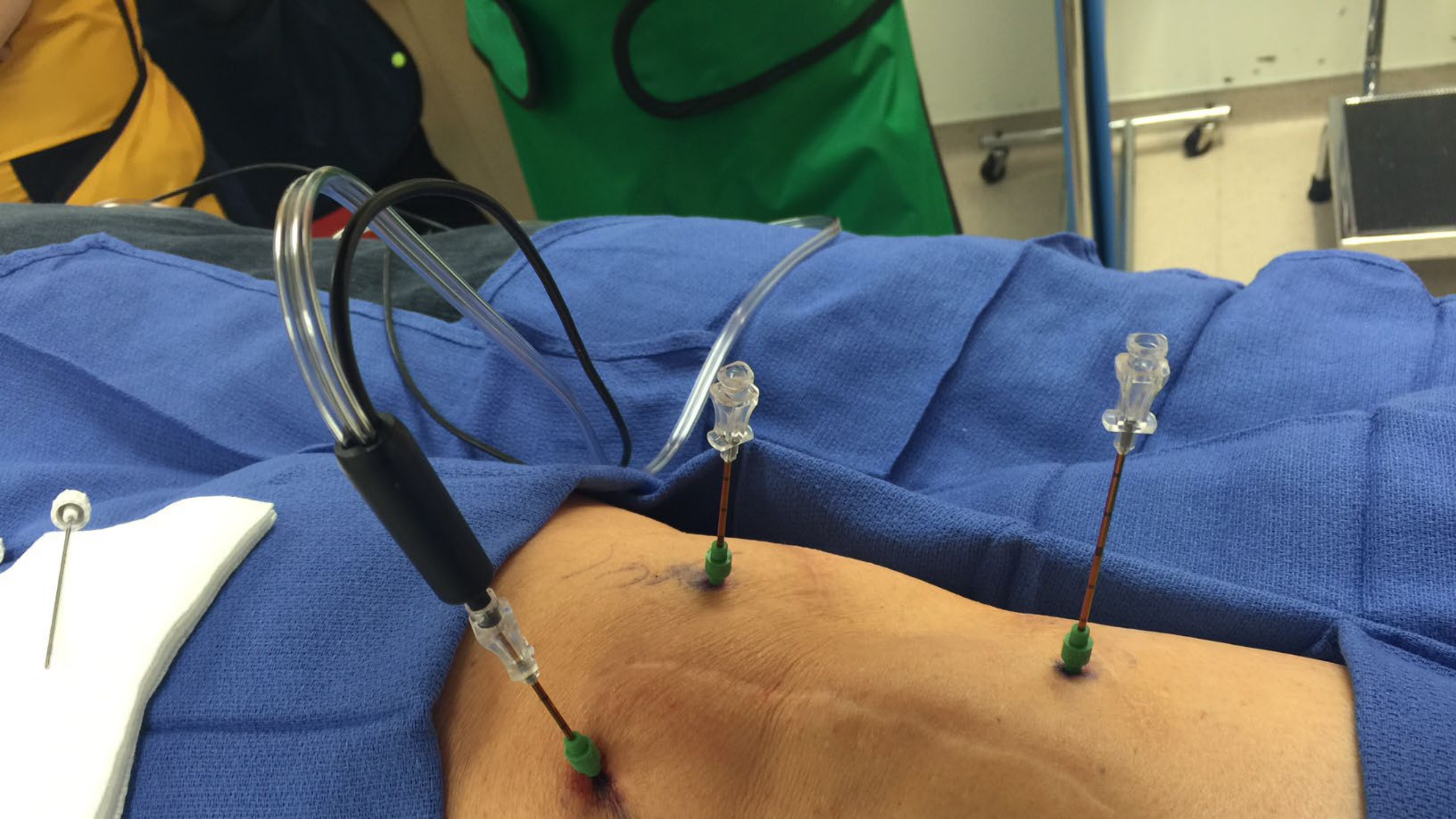
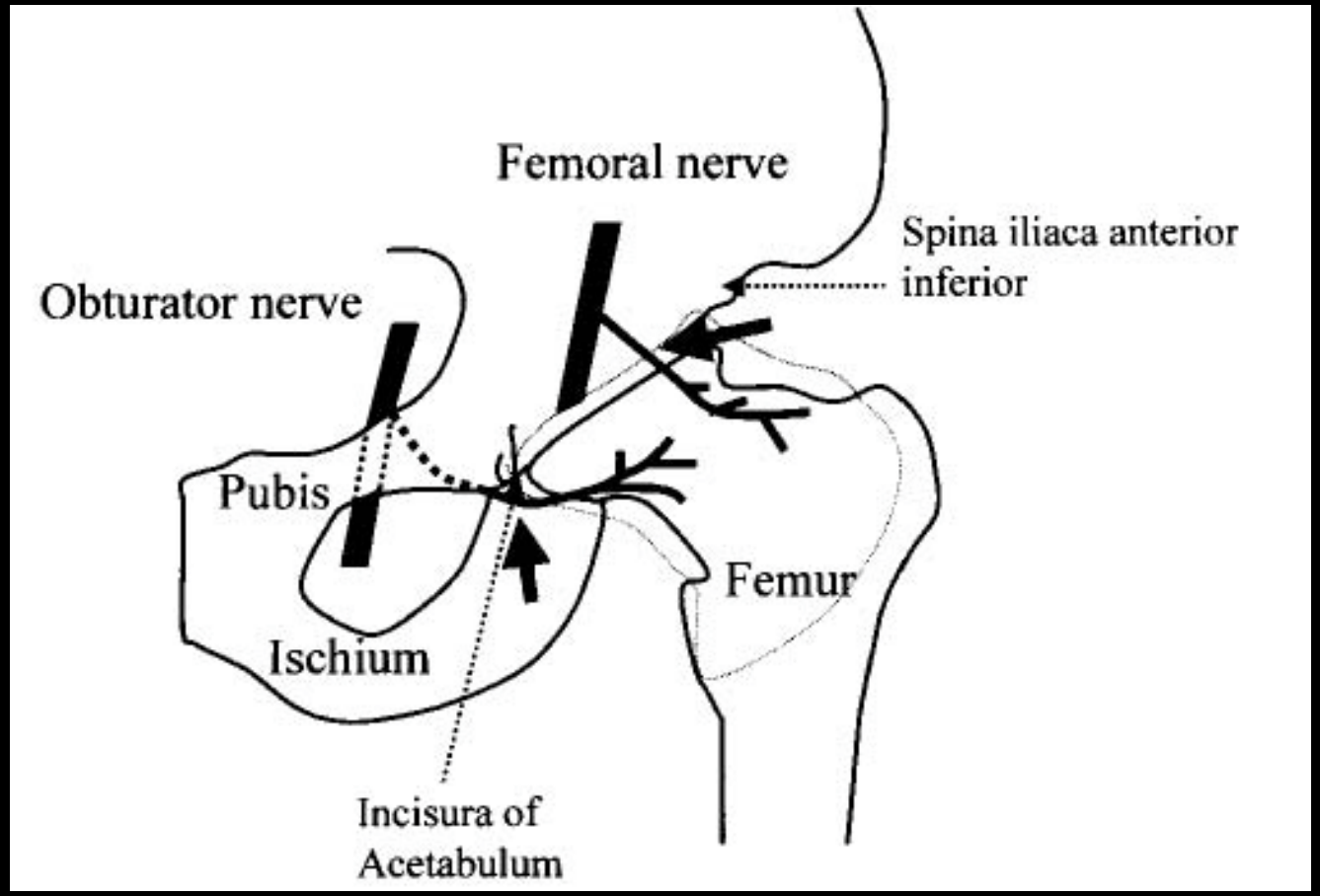
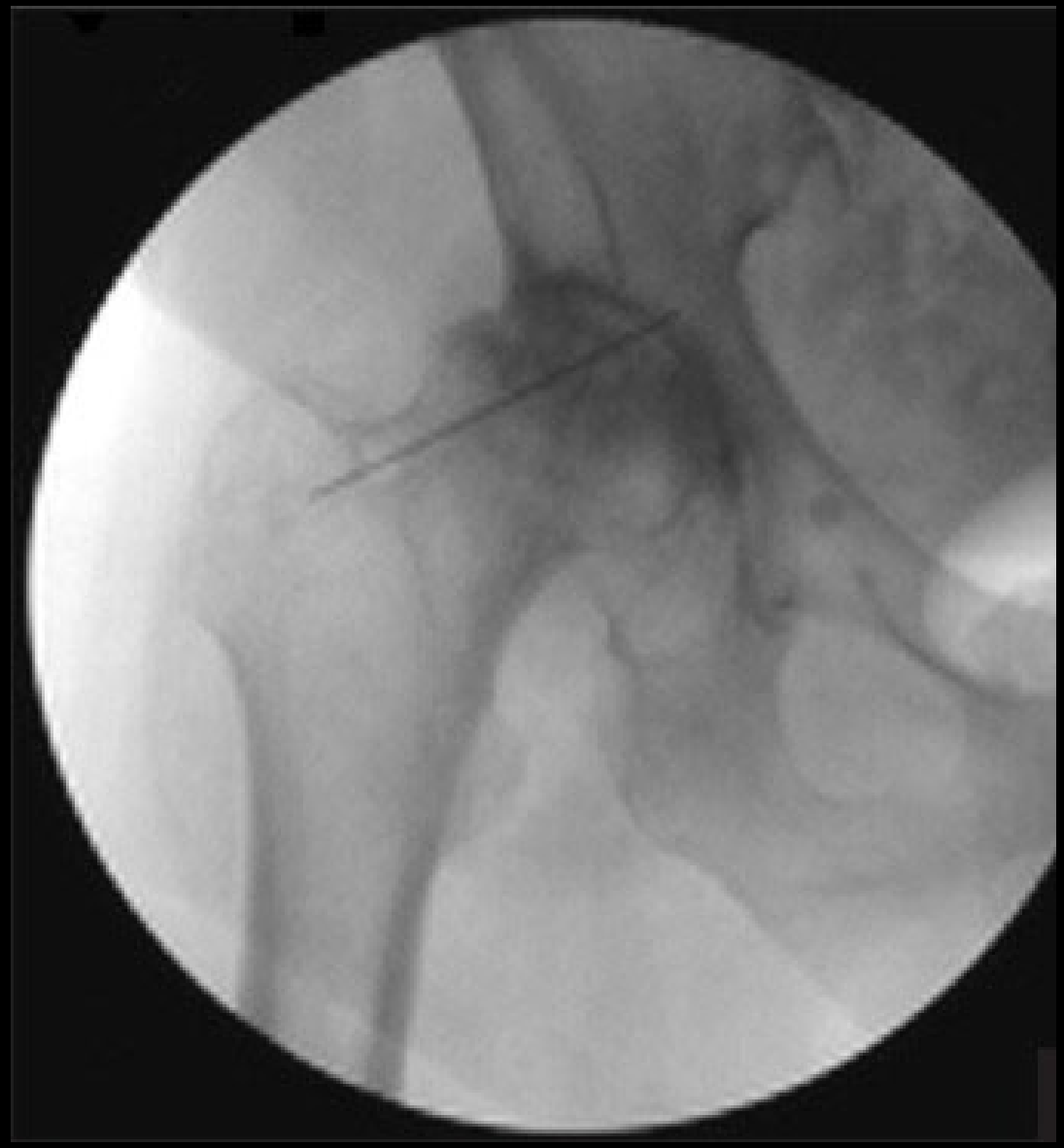


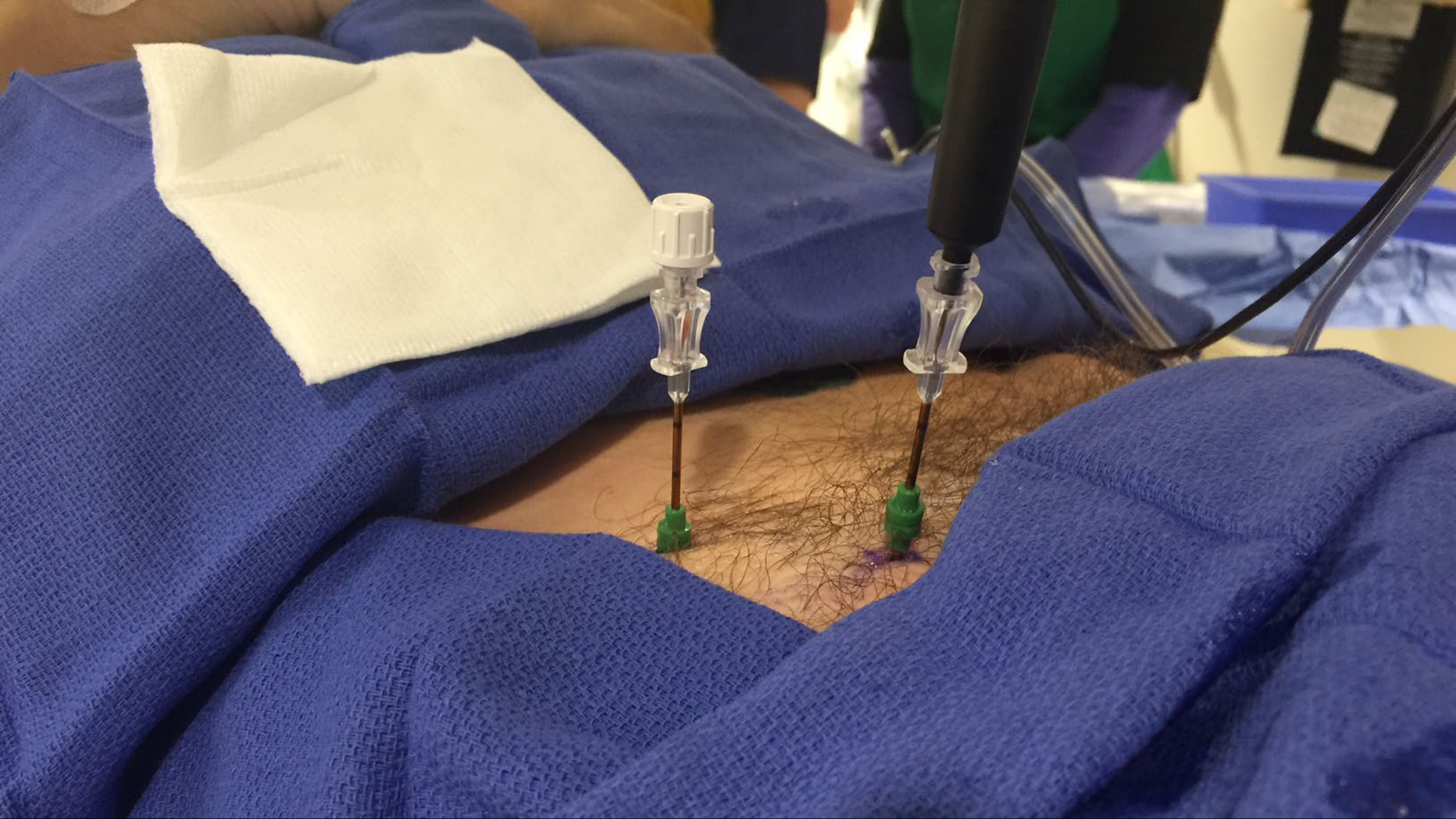


Hip Articular Anatomy



Kawaguchi M, et al. Percutaneous radiofrequency lesioning of sensory branches of the obturator and femoral nerves for the treatment of hip joint painReg Anesth Pain Med. 2001 Nov-Dec;26(6):576-81.





Shoulder Pain

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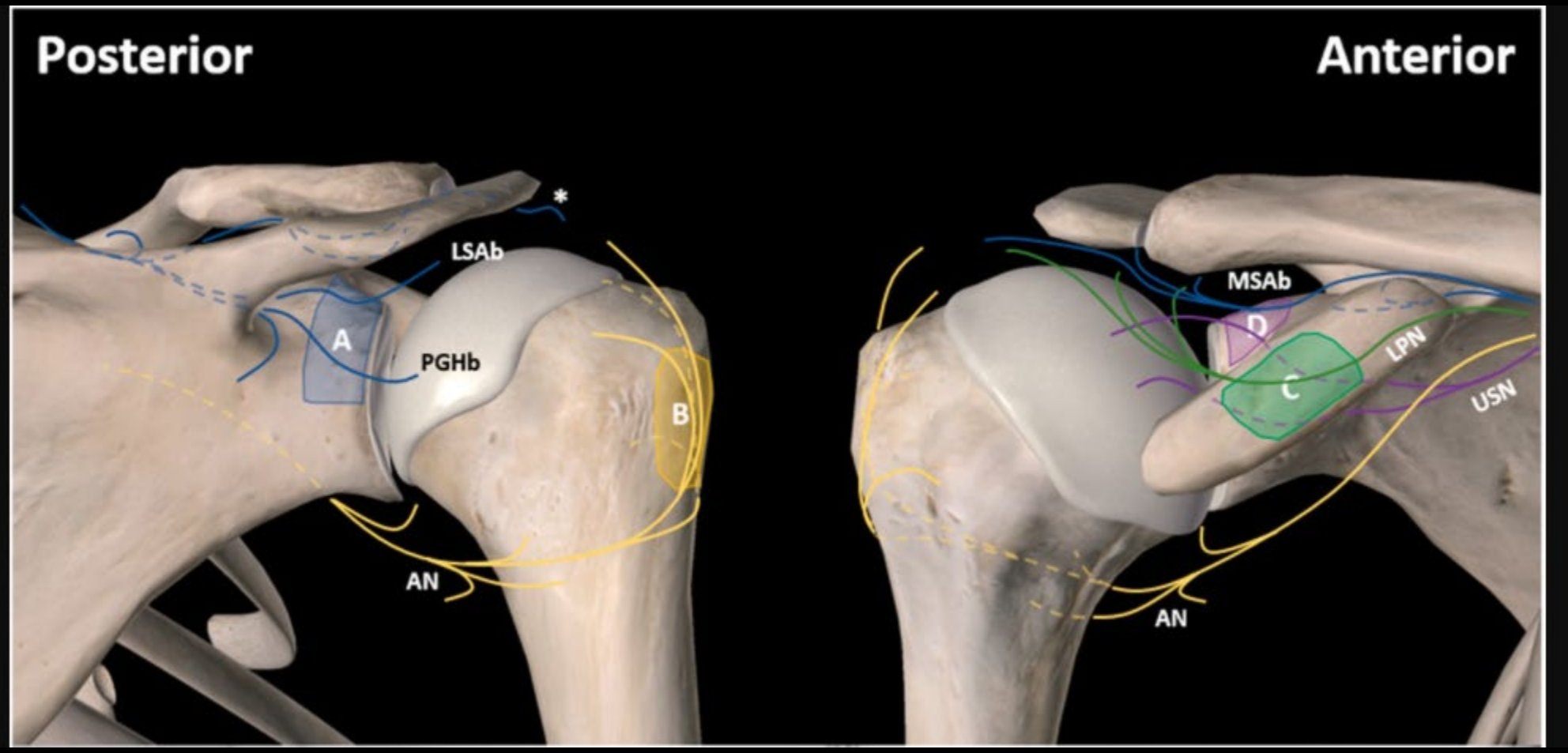
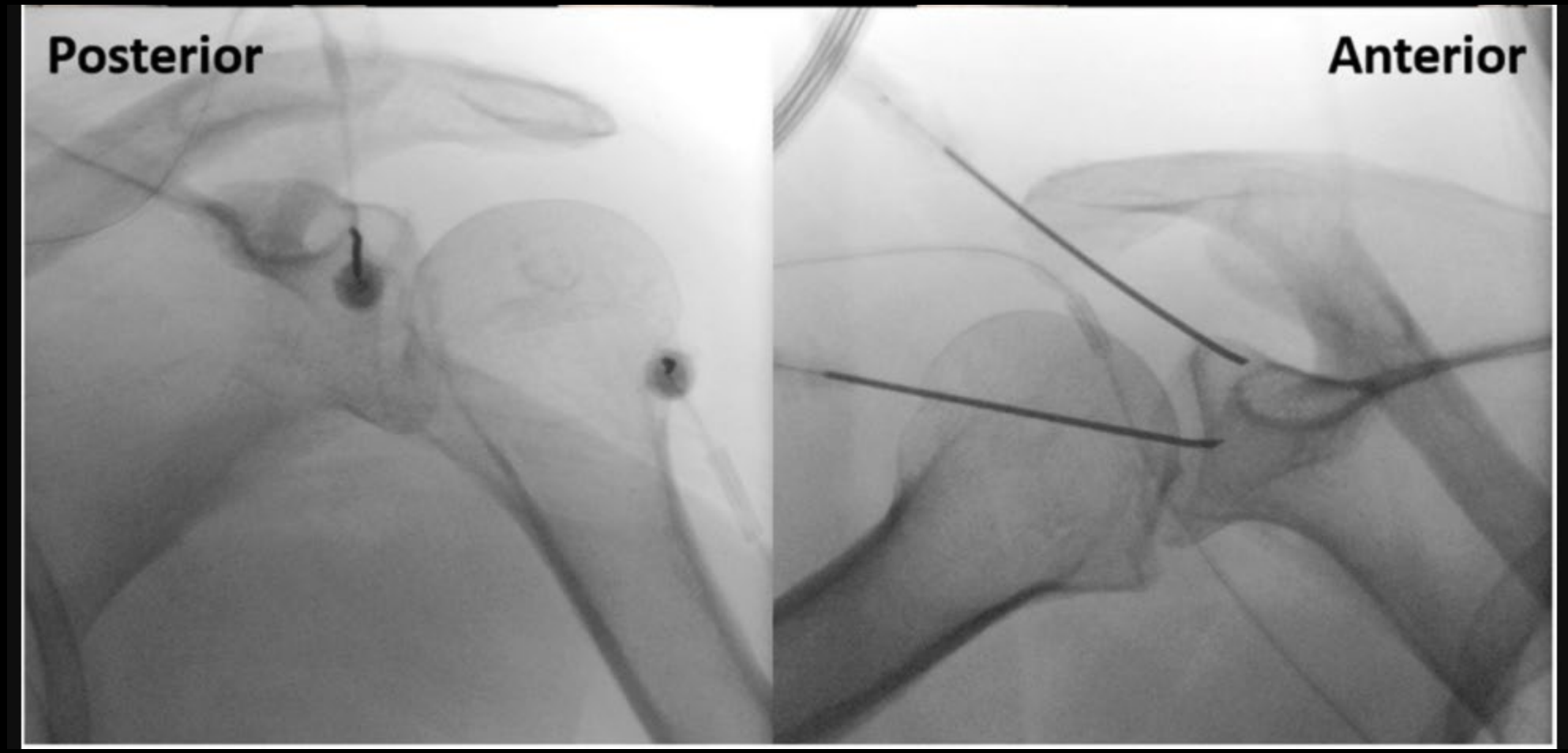
Shoulder Articular Anatomy



PAINWEEK

Eckmann MS, et al. Putting Our Shoulder to the Wheel: Current Understanding and Gaps in Nerve Ablation for Chronic Shoulder Pain. Pain Med. 2021 Jul 25;22(Suppl 1):S2-S8.

Shoulder Articular Targets



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Conclusions

- Chronic pain is a disease.
- Peripheral joint pain, such as OA, can cause central nervous system changes.
- Treatment should focus on multimodal, multidisciplinary strategies.
- In selected patients, interventional strategies, such as targeted radiofrequency ablation, can be a helpful component.
- Emerging literature suggests that peripheral nerve stimulation may be a viable alternative in refractory patients.