

# نقش اینترنشن ها در کنترل کمر درد

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- Low back pain is defined as an acute, subacute, or chronic discomfort localized to the anatomic area below the 12<sup>th</sup> rib posteriorly and above the lower margins of the buttock.
- Low back pain is second only to the common cold as the most common affliction of humans.
- The lifetime prevalence rate of back pain is **greater than 70%** in most industrialized countries.

- Low back pain is a symptom that is associated with a wide range of clinical disorders. Most patients with back pain have the symptom on a **mechanical basis**.
- Characteristically, mechanical disorders are exacerbated by physical activities, such as lifting, and are relieved by other activities, such as assuming a supine position.

- The remaining 10% of adults with back pain have the symptom as a manifestation of a systemic illness. In some systemic illnesses (i.e., nonmechanical), back pain is noted in almost every individual who has the disorder (e.g., ankylosing spondylitis).
- The most common systemic illness is vertebral fracture associated with osteoporosis.

**Table 87.1 Disorders Associated with Low Back Pain**

**MECHANICAL**

Muscle strain  
Herniated disk  
Osteoarthritis  
Spinal stenosis  
Spondylolysis  
Adult scoliosis

**RHEUMATOLOGIC**

Ankylosing spondylitis  
Reactive arthritis  
Psoriatic arthritis  
Enteropathic arthritis  
DISH syndrome  
Vertebral osteochondritis  
Polymyalgia rheumatica  
Fibromyalgia  
Behçet's syndrome  
Whipple's disease  
Hidradenitis suppurativa

**HEMATOLOGIC**

Hemoglobinopathies  
Myelofibrosis  
Mastocytosis

**ENDOCRINOLOGIC**

Osteoporosis  
Osteomalacia  
Parathyroid disease  
Microcrystalline disease  
Ochronosis  
Fluorosis  
Heritable genetic disorders

**MISCELLANEOUS**

Paget's disease  
Vertebral sarcoidosis  
Infective endocarditis  
Retroperitoneal fibrosis

**NEOPLASTIC/INFILTRATIVE**

***Benign Tumors***

Osteoid osteoma  
Osteoblastoma  
Osteochondroma  
Giant cell tumor  
Hemangioma  
Eosinophilic granuloma  
Aneurysmal bone cyst  
Gaucher's disease  
Sacroiliac lipoma

***Malignant Tumors***

Skeletal metastases  
Multiple myeloma  
Chondrosarcoma  
Chordoma  
Lymphoma

***Intraspinal Lesions***

Metastases  
Meningioma  
Gliomas  
Vascular malformations  
Syringomyelia

**INFECTIOUS**

Vertebral osteomyelitis  
Diskitis  
Pyogenic sacroiliitis  
Herpes zoster  
Lyme disease

**REFERRED PAIN**

***Vascular***

Abdominal aorta

***Gastrointestinal***

Pancreas  
Gallbladder  
Intestine

***Genitourinary***

Kidney  
Ureter  
Bladder  
Uterus  
Ovary  
Prostate

**NEUROLOGIC/PSYCHIATRIC**

Neuropathic arthropathy  
Neuropathies  
Tumors  
Vasculitis  
Compression  
Psychogenic rheumatism  
Malingering

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- More than 50% of all conditions improve after 1 week, and 90% are better at 8 weeks. Recurrence of spinal pain occurs in 75% of individuals, however, over the next year.
  - Back pain persists for 1 year or longer in 10% of patients with spinal pain.

- Radiculopathy is separate from radicular pain, with a combination of numbness, motor loss, and pain, depending on which fibers in the nerve roots are affected and how they are affected.
- The most common lesion that causes radiculopathy or radicular pain is lumbar disk herniation; it accounts for 98% of radicular pain or radiculopathy.

- Recent reports have suggested that systemic illnesses are so rare as not to be considered in the initial evaluation of patients with back pain.
- The most common systemic illness is vertebral fracture associated with **osteoporosis**.
- Physicians should consider mechanical problems first in the differential diagnosis but should remain aware of nonmechanical possibilities for those conditions that do not improve in the expected timeframe.

- Discogenic pain is defined as pain originating from the intervertebral disc itself.
- It is **nonradicular** and may occur in the absence of spinal deformity, instability, and signs of neural tension.
- Although the external outline of the disc may remain intact, multiple processes (e.g., annular tears, degeneration, endplate injury, inflammation) can stimulate multiplication and possibly sensitization of pain nociceptors within the disc independent of nerve root symptoms.

- Guidelines have been proposed for the evaluation and treatment of low back pain.
- The recommendations agree with a focused **history** and **physical examination** to differentiate patients with localized, nonspecific mechanical low back pain, from those with radicular symptoms and those with systemic diseases.



# Treatment



# **Mechanical Low Back Pain**

# Lumbar epidural steroid

- Lumbar epidural steroid injections are the most commonly used interventional modality for management of low back pain.
- Epidural steroids in the lumbar spine are administered transforaminally, caudally, or via interlaminar route.
- **Interlaminar epidural & caudal corticosteroid administration**  
2 B ±      **To be considered**
- **Transforaminal epidural corticosteroid administration in “contained herniation”**  
2 B +      **Recommended**

## Table 161.2 Nonsurgical Indications for Interlaminar Lumbar Epidural Block

Acute pain

Herpes zoster and postherpetic neuralgia

Ischemic pain syndromes

Renal colic

Preemptive analgesia before amputation

Complex regional pain syndromes I and II

Lumbar radiculopathy

Lumbar disk herniation

Lumbar spinal stenosis

Post-lumbar laminectomy syndrome

Lumbar degenerative disk disease

Chronic low back pain

Vertebral compression fractures

Diabetic polyneuropathy

Pelvic pain syndromes

Phantom limb syndrome

Peripheral neuropathy

Metastatic pain

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- Epidural corticosteroids are more effective for **(sub)acute** radicular pain where a significant inflammatory pain component is present.
  - In patients with chronic radicular complaints, corticosteroids will not provide any improvement in the outcome in comparison with local anesthetics alone.

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- The logic of epidural corticosteroid administration rests on the anti-inflammatory effect of the corticosteroids, which are administered directly onto the inflamed nerve root.

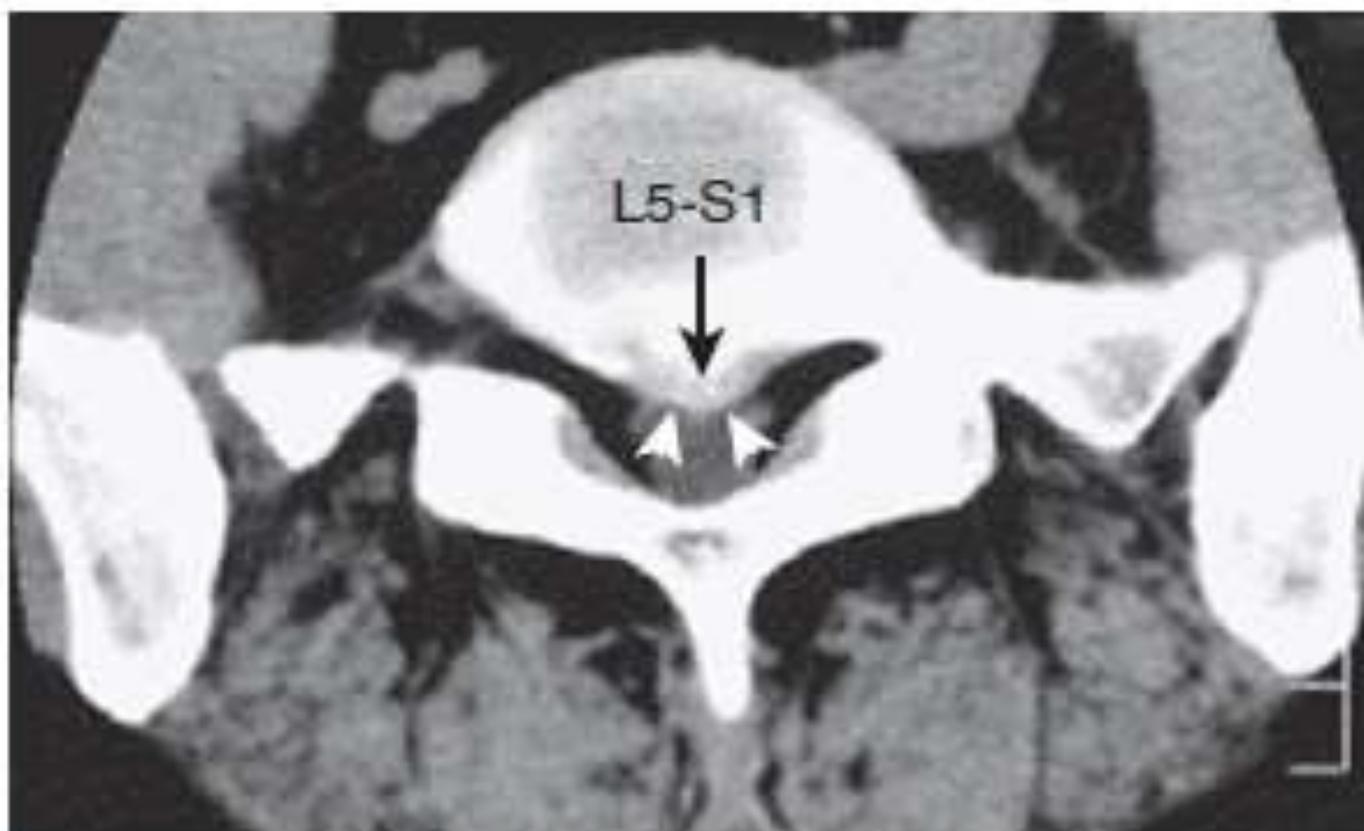
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- In a comparative study, the effectiveness of caudal, interlaminar, and transforaminal corticosteroid administration in the epidural space was compared in patients with radicular pain as a result of disk herniation.
  - The transforaminal approach gave the best clinical results.

# *Percutaneous Disk Decompression*

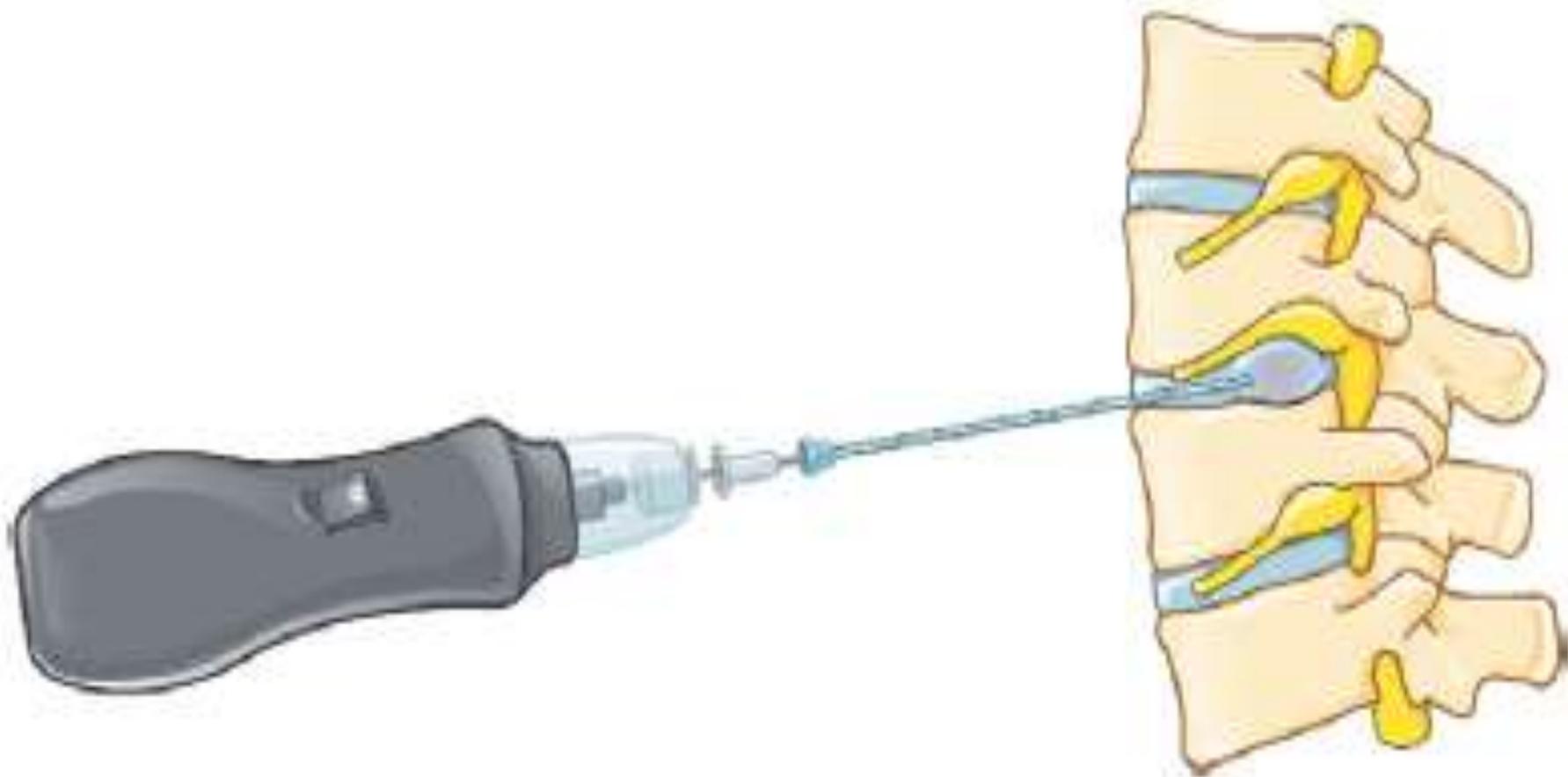
- The primary goal of surgical treatment of a disk prolapse, protrusion, or extrusion is the relief of nerve root compression with removal of the herniated nuclear material.
- Percutaneous disk decompression (PDD) was developed following the success of intradiskal injection of **chymopapain( Chemonucleolysis)**.

- Several alternative techniques to open diskectomy and microdiskectomy include automated percutaneous lumbar diskectomy (APLD), percutaneous lumbar laser diskectomy (PLLD), mechanical disk decompression with a high rotation-per-minute (RPM) device or DeKompressor (Stryker, Kalamazoo, MI), and nucleoplasty.

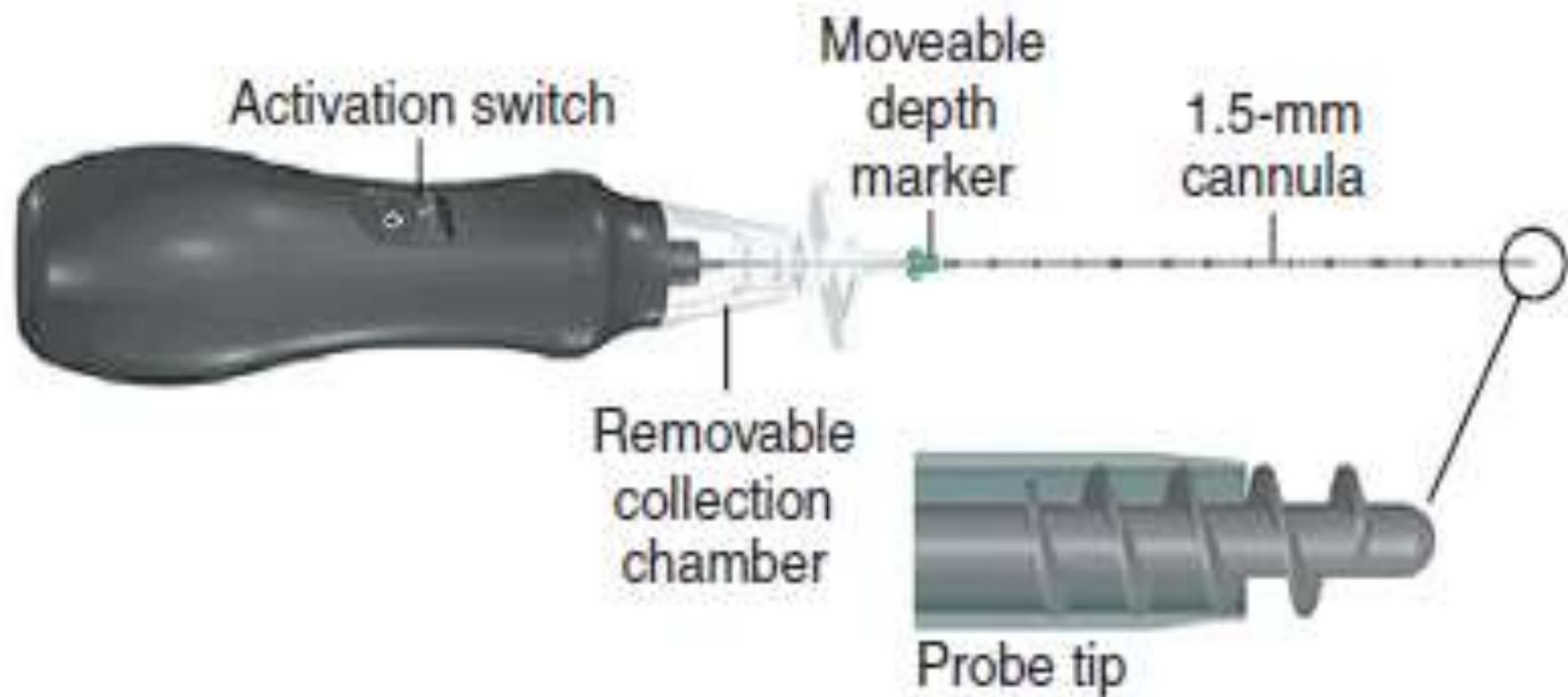
- The technique of automated percutaneous lumbar discectomy (APLD) was then introduced wherein a smaller introducer cannula (2.5 mm) was used and nuclear material removed by suction and cutting technique.
- Percutaneous discectomy using the automated technique is indicated for a specialized subset of patients who are suffering from low back and radicular pain thought to be caused by **contained disk protrusion**.
- In this group of patients, conservative therapy consisting of a trial of simple analgesics, nonsteroidal anti-inflammatory agents or cyclooxygenase-2 inhibitors, bed rest, and epidural steroids should have failed.



**Fig. 182.1** Lumbar spine computed tomography axial image at the L5-S1 level. Note: (1) the median disk protrusion (*black arrow*) abutting the left, and particularly the right, nerve roots (*small white arrows*) and indenting the dural tube anteriorly. R, right side of the patient. (From Giles LGF: *CT versus MRI for lumbar spine intervertebral disc protrusion*, 100 challenging spinal pain syndrome cases, ed 2, New York, 2009, Churchill Livingstone.)



**Fig. 182.3** Lateral view of the cannula within the disk. (From Waldman SD: Atlas of interventional pain management, ed 3, Philadelphia, 2009, Saunders Elsevier.)



**Fig. 182.7** The automated disk decompressor probe is then advanced through the cannula into the center of the disk nucleus until the probe extends beyond the end of the cannula. (From Waldman SD: Atlas of interventional pain management, ed 3, Philadelphia, 2009, Saunders.)

# *Percutaneous Laser Diskectomy*

- A variety of lasers has also been used to vaporize the nuclear material, including YAG, KTP, holmium, argon, and CO<sub>2</sub> lasers.
- The various percutaneous laser disk decompression (PLDD-LASE) devices use cannulas less than 3 mm in diameter.

# *Percutaneous Laser Diskectomy*

- In general, the **major indication** is the presence of a contained intervertebral disk herniation (confirmed by magnetic resonance imaging [MRI], computed tomography [CT] scan, or CT myelogram) in addition to a clinical presentation of radicular pain **with or without neurologic deficits**, and a minimum of **6 weeks** of conservative treatment without significant improvement.
- **Exclusion criteria** are patients with foraminal or central canal stenosis, symptoms of facet syndrome, previous spinal surgery in the same region, bony deformities (such as congenital abnormalities, spondylolisthesis), leakage of diskographic dye from the outer annulus, extruded disk fragment, cauda equina syndrome, other symptoms of myelopathy, and pregnancy.

- Using the selection criteria (leg pain, positive physical findings such as motor/sensory/reflex deficits and/or straight leg raise, contained disk herniation confirmed by diskography) and exclusion criteria (normal physical examination, presence of stenosis, spondylolisthesis, extruded disk fragment, leakage of diskographic dye from the outer annulus, multiple prior lumbar surgeries), the performance of laser disk decompression **resulted in a success rate of 71%.**

# *Nucleoplasty*

- The technique of disk nucleoplasty uses a 1.5-mm (17-G) introducer needle and bipolar radiofrequency (RF) energy to create small channels in the disk, removing finite amounts of nuclear material. The proponents of this technique claim that the procedure provides localized ablation with minimal damage to the surrounding tissue.

# Resadisc

## PERCUTANEOUS DISC DECOMPRESSION (PDD)

- The Resadisc device is an electrode with an active bipolar tip that uses QMR (Quantum Molecular Resonance) technology to perform disc decompression or the remission of disc protrusions.
- Disc decompression using QMR is achieved without causing ionic agitation, **preventing cellular overheating**. The molecular bonds disintegrate at low temperature, preserving the integrity of the adjacent bonds.

# Resaplus

## Catheter for epidural lysis with pulsed radiofrequency (PRF)

- Resaplus is the new multifunctional catheter designed and certified by AMS Group for the mechanical treatment of adhesiolysis, electrical treatment of spinal roots with PRF (in association with RF Generator) and pharmacological treatment in the epidural space.

# Features & Advantages

- Allows predictive stimulation at 50Hz (sensory) and 2Hz (motor)
- The device is equipped with a specific introducer needle (Tuohy 17 Gauge)
- PRF on all spinal segments, with temperature controlled at  $< 42^{\circ}$
- Infusion of drugs during the procedure
- The catheter can be left in place for up to 48 hours after surgery

# *RCE Epidural Pulsed RF*

## Reig-Cosman Electrode

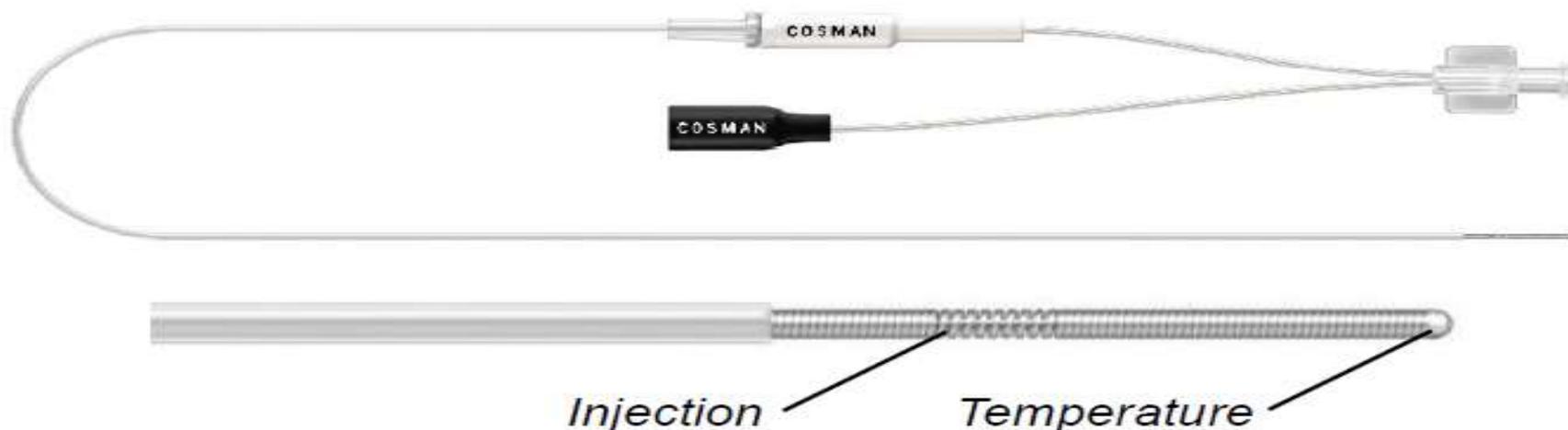
- Epidural Pulsed RF (PRF) at the dorsal nerve roots and dorsal root ganglia (DRG) can be used to treat radicular neuropathy.
- Epidural placement enables treatment of multiple spinal levels via a single needle, and targetry of nerves inaccessible due to normal anatomy, foraminal stenosis, or hardware.
- Temperature control at 42°C limits thermal effects and ensures safety.





## Intervention:

Under fluoroscopic guidance, a guidable RF injection electrode with 20ga/15mm active tip, embedded temperature sensor, and 19ga/40cm shaft (Cosman RCE-E401519) was introduced via the sacral hiatus using a straight 16ga/9cm epidural needle.



The active tip of the electrode was positioned at the level of L4-5 on the right side. Sensory stimulation at this level reproduced the patient's pain and pulsed RF was applied at this single location using an RF generator (Cosman G4) settings:

- Set Temperature: 42 °C
- Set Time: 12 minutes
- Set Voltage: 45 Volts
- Pulse Rate: 2 Hz
- Pulse Width: 5 milliseconds
- E-dose: Vary Voltage .The generator maintained 45 V output throughout and the measured temperature did not exceed 42 °C.

# Discogel nucleoplasty

- **Chemonucleolysis** is an efficient technique for the treatment of back pain; it consists of a percutaneous intradiscal injection that dissolves the nucleus pulposus and lowers intradiscal pressure.
- A mixture of gellified pure ethanol and a thickening substance with tungsten powder.

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- Treatment can be ambulatory
  - **Minimally invasive treatment**
  - Local Anesthesia
  - Absence of immediate and late complications
  - **The lack of disc space narrowing**

# Patient Selection

- Single Level Symptomatic HD
- Leg Pain More than Back pain
- No Response to medical Treatments for 4\_6 weeks
- Integrity of the Annulus fibrosus
- Disc Space Narrowing Less than 25-50%

# Relative Contraindications

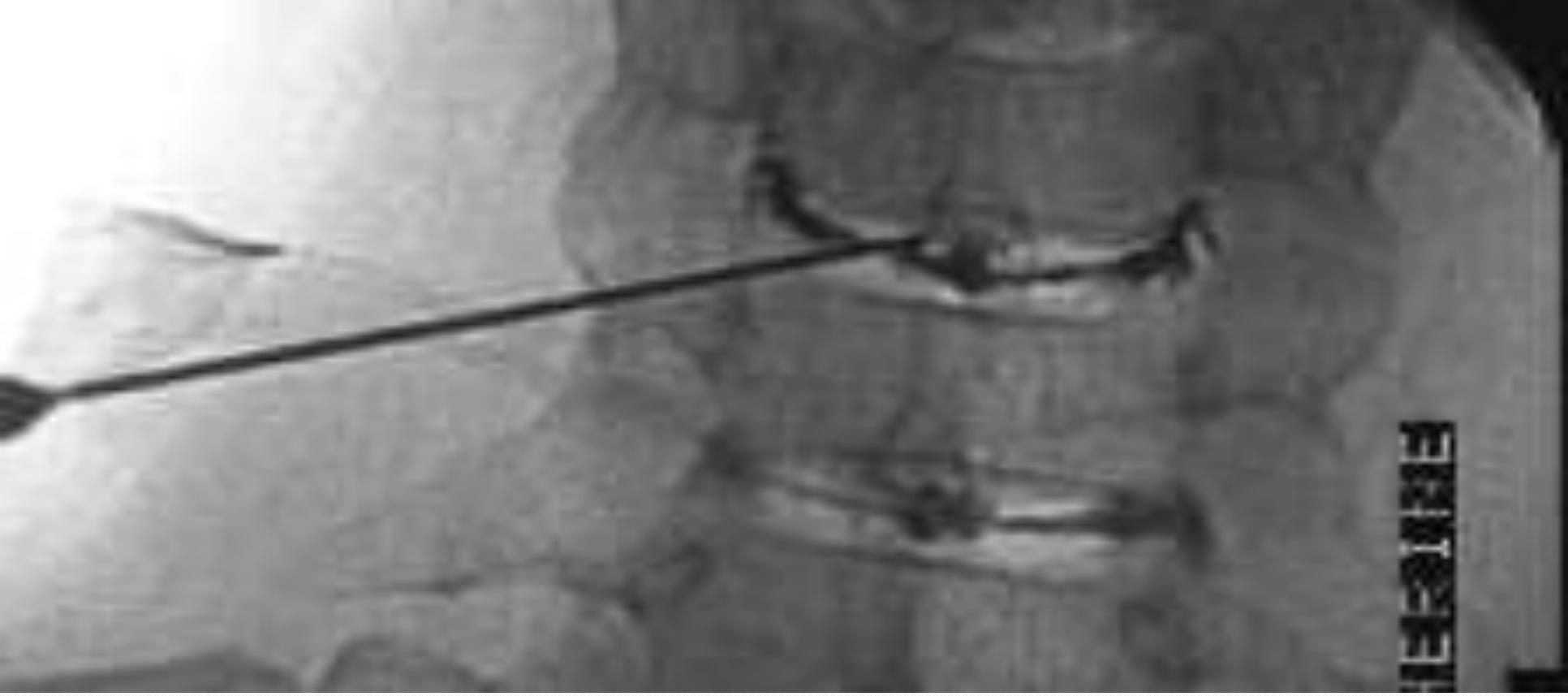
- Coagulations disorders
- Un controlled Bleeding Tendency
- Anticoagulant Therapy
- Sever Deg. Disc Dis.( more than 2/3 disc height Loss )
- Primary or Metastatic Tumor
- Prior surgical treatments at the same level
- Potential Secondary Gain...

# Bad Selections !

- Obese patients
- Back pain more than leg pain
- Psychotic patients
- Calcified Disc

# Absolute Contraindications

- Asymptomatic Disc Bulging as Incidental Finding In MRI
- Canal & Foraminal stenosis
- Spondilolistesis
- Segmental Instability/ Fractures
- Local and systemic infections
- Pregnancy
- Cauda Eq. syndrome
- Extruded disc and Free Fragments
- Efficacy of medical treatment



PHOTOGRAPH

# *lumbosacral pulsed radiofrequency(PRF) of the dorsal root ganglion(DRG)*

- RF lesioning adjacent to the lumbar ganglion spinale (DRG)

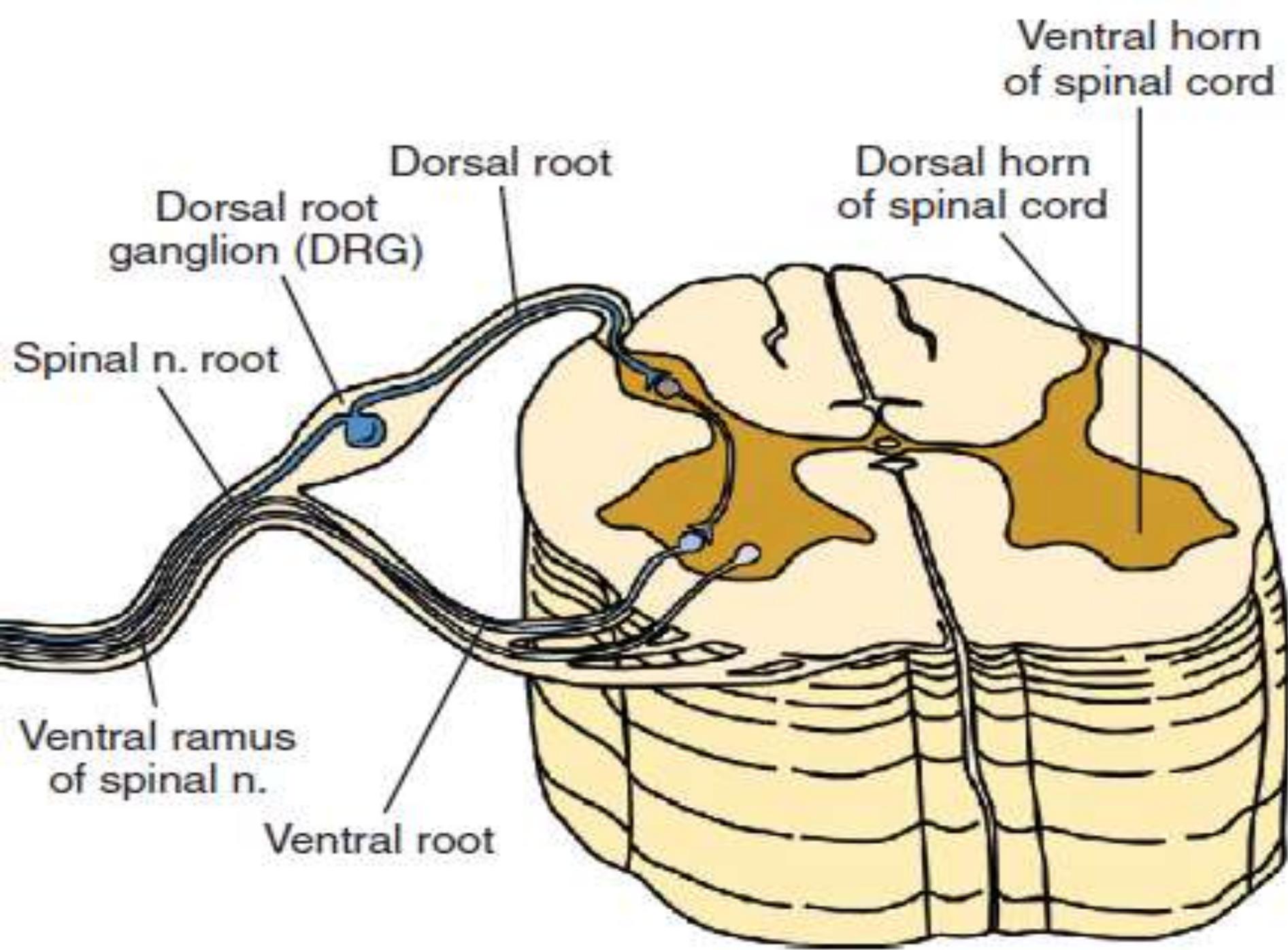
2 A –                      Negative recommendation

- Pulsed RF treatment adjacent to the lumbar ganglion spinale (DRG)

2 C +                      To be considered

- The DRG contains cell bodies that provide sensation, proprioception, and pain.
- PRF was introduced in 1998. This method allows delivery of high-frequency electric current without the development of heat.
- Given the potential for nerve damage with heating of the DRG, PRF was introduced as a method of treatment for radicular pain that had the potential for therapeutic efficacy without the attendant risks.
- Pulsed treatment of the DRG has shown increasing evidence of efficacy in studies conducted to date.

- In general, the indication for PRF is neuropathic pain that is confined to the distribution of a known nerve.
- The **specific indication** for PRF treatment of the DRG is radicular pain or radiculopathy that is completely but temporarily relieved by transforaminal injection of local anesthetic performed on two separate occasions. The local anesthetic injections are performed diagnostically to identify the location of the origin of the pain and to confirm the nerve levels involved.
- The procedure has been used for both acute and chronic radicular pain and radiculopathy.



# Postprocedure Advice

- The patient usually feels immediate relief on completion of the procedure, as a result of the injection of local anesthetic into the affected nerve.
- When the effect wears off, the patient may begin to feel sore. The patient should be advised that he or she may continue to feel sore for the **first** week and **better the second week**, and that **the full effect** can take **3 to 4** weeks to develop. During this time, the patient is not required to restrict activities except as needed to relieve pain.
- Deep tissue massage once a week for the first 3 weeks following the procedure may relieve soreness related to the procedure, as well as chronic trigger points that may have developed over the course of the disease.

# Complications

- The most common complication noted during **any spinal procedure** is **vasovagal syncope**. This symptom is more common during a cervical than lumbar procedure (8% versus 1%).
- Other complications include transient nonpositional headache, increased back pain, facial flushing (if steroids are used) and increased leg pain, ischemia of the anterior spinal artery if particulate steroid is injected, infection (epidural abscess, meningitis, diskitis), and other complications related to injected medications.
- A potential risk of neural trauma is associated with this procedure. In Rosenthal's experience, after performance of more than 1000 procedures, no incidence of neural trauma occurred.
- Most patients report mild discomfort in the treated extremity that spontaneously resolves within approximately 3 weeks.

# *Efficacy*

- PRF treatment adjacent to the lumbar ganglion spinale (DRG) was studied in a retrospective study. In a group of 13 patients for which a surgical intervention was planned, the PRF treatment adjacent to the ganglion spinale (DRG) of the nerve involved precluded the intervention in 11 patients.
- One patient had a disk operation and 1 underwent a spinal fusion 1 year after the treatment without having radicular pain at the time of the operation.

# *Efficacy*

- In another retrospective study, PRF treatments were carried out in patients with a radicular syndrome as a result of disk herniation, spinal canal stenosis, or failed back surgery syndrome (FBSS).
- A significant reduction in pain and in analgesic consumption was attained in the patients with a disk herniation (NNT: 1.38) and spinal canal stenosis (NNT: 1.19), but not in those with FBSS (NNT: 6.5).

# Sacroiliac Joint Radiofrequency

- Therapeutic intra-articular injections with corticosteroids and local anesthetic

1 B +

Recommended

- RF treatment of rami dorsales and rami laterales

2 C +

To be considered

- Pulsed RF treatment of rami dorsales and rami laterales

2 C +

To be considered

- Cooled / RF treatment of the rami laterales

2 B +

Recommended

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- The SI joint was first implicated as a source of pain as early as 1905.
  - It was considered the primary cause of low back pain before 1934.
  - Injection of anesthetic into the SI joint as a potential diagnostic and therapeutic intervention was first described in 1938.

- The SI joint is the primary source of pain in 10% to 25% of patients presenting with back pain, as well as in 32% of patients with lumbosacral fusion.
- The symptoms of SI joint pain may be similar to those seen in patients with facet joint abnormalities (e.g., low back and buttock pain referring to the leg).
- Pain originating from the SI joint is typically unilateral.

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- Approaches to RF lesioning of the SI joint include intraarticular, cooled-probe RF ablation, bipolar or monopolar strip lesions, and a combination of ligamentous and neural RF ablation.

# Indications

- The indications for SI joint RF lesioning are back pain below the L5 level for the past 3 months that has failed to respond to conservative therapy. The patient must report **a positive response** (i.e., >80% relief) to SI joint **injections on two occasions** to be considered a candidate for an SI joint RF procedure.
- Contraindications include local or systemic bacterial infection, bleeding diathesis, and possible pregnancy.

# Complications

- Expected procedure-related side effects are minor and self-limited.
- These include back pain that usually resolves within 1 to 2 weeks and neuritic pain lasting less than 2 weeks.
- In a review of 92 patients, neither complication had an incidence higher than 0.5%.
- No cases of infection or new motor or sensory deficits were reported.
- An additional risk is the possibility that the needles could enter the sacral foramina and cause heating and damage to the sacral nerve roots. Because the patient is awake and conversant during the procedure, this complication should not occur, given that the patient will feel a sensation of heating in the legs that can be communicated immediately.

# *Efficacy*

- A randomized, placebo-controlled study of 28 patients with SI joint pain confirmed by a single intraarticular diagnostic block.
- The study compared sham and cooled-probe denervation of the S1-3 lateral branches, with conventional lesions performed at L4 and L5 medial branches.
- Patients in the treatment group reported significant improvement in pain (a reduction by 60%, 60%, and 57%, at 1, 3, and 6 months, respectively) compared with the patients in the placebo group, none of whom reported significant improvement.
- Patients in the treatment group also reported improvement in functional capacity and medication usage.

# *Efficacy*

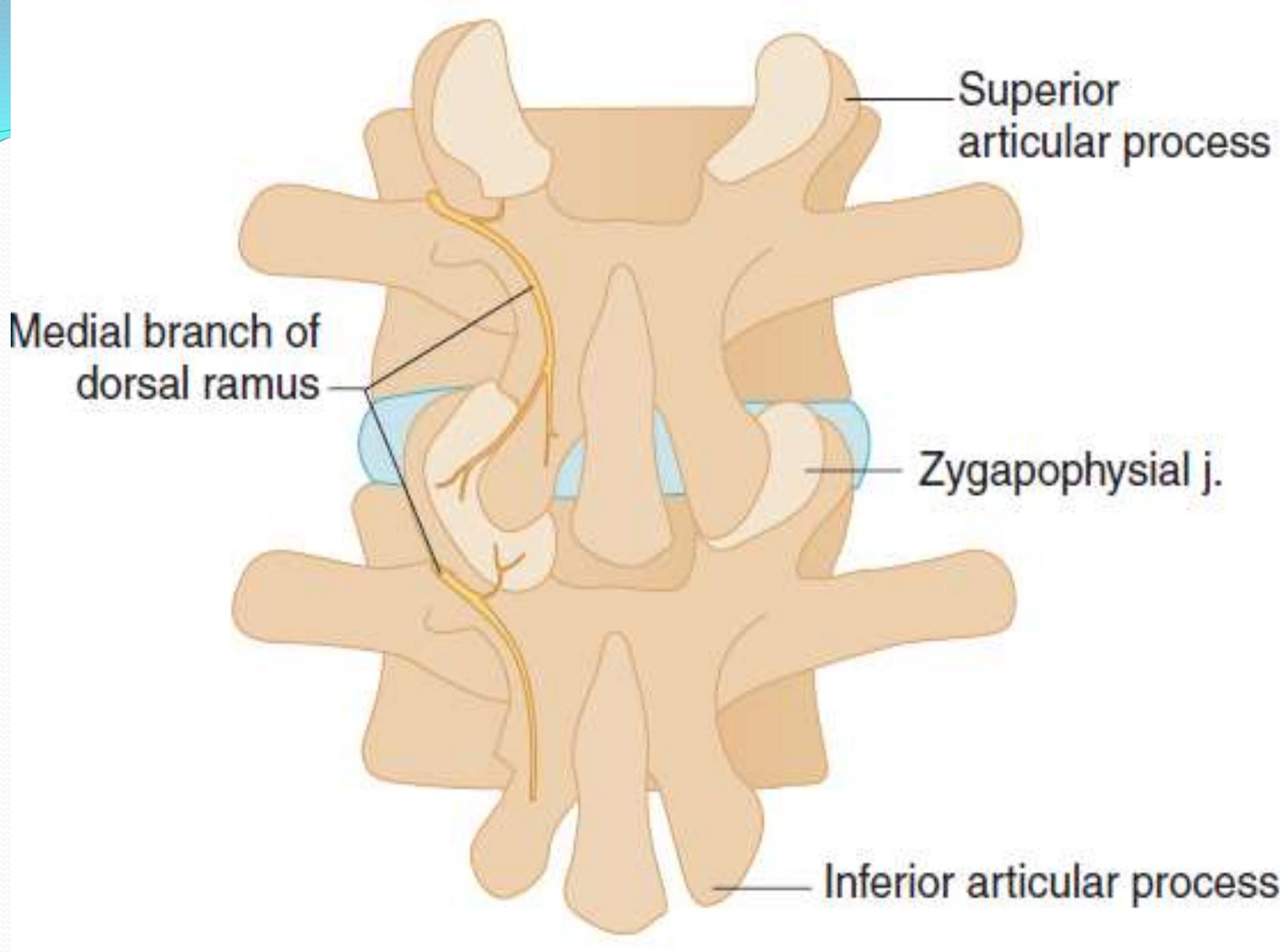
- A prospective observational study that included nine patients with SI joint pain confirmed by local anesthetic joint and lateral branch nerve blocks.
- Eight of the nine patients were satisfied with the treatment, and 78%, 67%, 67%, 89%, and 67% reported being very satisfied at 1, 3, 6, 9, and 12 months.
- Median improvement in pain intensity was 4.1 on a 10-point rating scale, and reduction in disability was 17.8 on the Oswestry Disability Index.

# *Efficacy*

- a meta-analysis of 10 studies in which RF ablation was used to treat SI joint pain demonstrated that the procedure is an effective treatment at 3 and 6 months.

# Pain Originating from the Lumbar Facet Joints

- Golthwaite was the first to describe the syndrome in 1911, and Ghormley is generally credited with coining the term “facet syndrome” in 1933.
- The reported prevalence rate varies widely in different studies from less than 5% to as high as 90%
- Intra-articular corticosteroid injections  
**2 B ±** **To be considered**
- RF treatment of the lumbar rami mediales (medial branches) of the dorsal ramus  
**1 B +** **Recommended**



**Ganglion spinale (DRG)** -----

**N. spinalis, ramus ventralis** -----

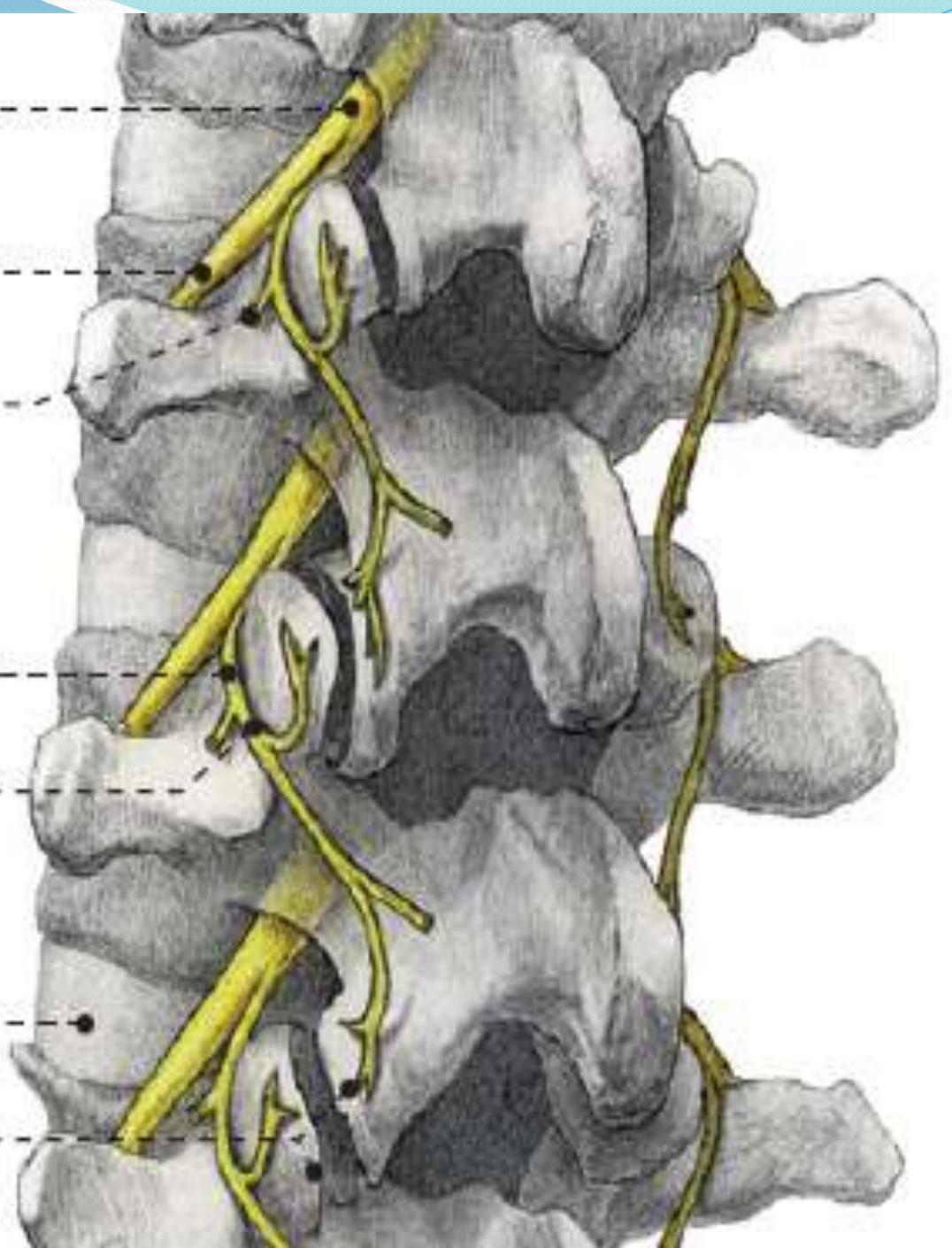
**Ramus lateralis of the  
ramus dorsalis** -----

**Ramus dorsalis** -----

**Ramus medialis  
(medial branch)  
of the ramus dorsalis** -----

**Discus intervertebralis** -----

**Facet joint** -----



## **Intra-articular corticosteroid injections**

- The use of intra-articular corticosteroid injections in the facet joints is controversial.
- Uncontrolled studies have mostly demonstrated transient beneficial effects, but the results of controlled studies have been mostly disappointing.

## *Lumbar Medial Branch Radiofrequency*

- Currently, the **gold standard** for treating facetogenic pain is RF treatment.
- RF facet treatment **can also be repeated without a loss of efficacy**, which is important because the duration of benefit is limited by the inexorable rate of nerve regeneration.

- The indication for this procedure is pain that has persisted for more than 3 months and has not responded to conservative therapy.
- The patient must have responded positively on two separate occasions to medial branch blocks with **greater than 50-80% pain relief.**

# *Postprocedure Advice*

- The patient should be advised that it could take up **to 3 or 4** weeks before the **full effect** of the procedure is experienced.
- During the first week following the procedure, the patient may notice increased pain, which should be treated with analgesics.
- During subsequent weeks, the physician may refer the patient to physical therapy.

# Complications of RF treatment

- The complications and side effects of RF treatment have been previously described in a small retrospective study by Kornick et al. Out of 116 procedures, the 2 most commonly occurring complications were **transient, localized burning pain** and **self-limiting back pain** lasting longer than 2 weeks, each occurring with a frequency of **2.5% per procedure**. In this study, no infections, motor, or new sensory deficits were identified.
- Unlike diagnostic blocks, which, in rare instances, have been complicated by spinal infection(s), RF treatment has never been associated with infectious complications. This may be because heat lesioning serves a protective function. In rare instances, local burns and motor weakness have been reported.

# *Cryoneurolysis*

- The most common use for cryoanalgesia for low back pain is the longterm treatment of lumbar facet pathology.
- When diagnostic lumbar facet blocks (either intraarticular or median branch blocks) have given good but only temporary relief, one option for further treatment is cryoneuroablation of the median branch.

- The rapid cooling of the cryoprobe produces a tip surface temperature of approximately  $-70^{\circ}\text{C}$  ( $-94^{\circ}\text{F}$ ). Tissue in contact with the tip cools rapidly and forms an ice ball.
- The ice ball typically measures 3.5 to 5.5 mm in diameter.

- Histologically, the axons and myelin sheaths degenerate after cryolesioning (wallerian degeneration), but the epineurium and perineurium remain intact, thus allowing subsequent nerve regeneration.
- The duration of the block is a function of the rate of axonal regeneration after cryolesioning, which is reported to be 1 to 3 mm/day.

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- Schuster studied 52 patients followed for a 13 month period. Forty-seven patients had significant relief of low back pain after cryoneuroablation, and only one patient had a repeat cryoneuroablation when the pain recurred after a 9-month pain free period.

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- Ross described 23 patients with complete but only short-term relief from lumbar facet blocks, who were treated with cryoneurolysis of the dorsal median nerve. Twentyone had complete relief for a follow up of six months to two years. Two patients had return of pain six to eight months later and underwent subsequent cryoneurolysis with complete relief.

- Brechner studied the effects of percutaneous cryoneuroablation of the lumbar facet in patients with neck and low back pain.
- There was 70% pain relief after 1 hour and relief lasted 1 week. Pain relief decreased to 50% at 3 weeks, and by 3 months had returned to baseline.

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- **The goal** is to provide a period of “analgesia” to allow appropriate rehabilitation; this does not necessarily require complete “anesthesia”.

# Main Types of Minimal Invasive Disc Therapies

- Automated percutaneous lumbar discectomy (APLD)
- Intradiscal electrothermal therapy (IDET)
- Percutaneous Laser disc Decompression(PLDD)
- Nucleoplasty
- Ozon
- SCS

