Discogenic Back Pain

Radiofrequency & PRF Therapies

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Faculty Disclosure

	No, nothing to disclose
x	Yes, please specify:

Company Name	*Honoraria/ Expenses*	*Consulting/ Advisory Board*	*Funded Research*	*Royalties/ Patent*	*Stock Options*	*Ownership/ Equity Position*	*Employee*	*Other (please specify)*
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MSD	x							
Arthrocare	x							
Kromax South Asia	x							
Mundipharma	x							

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GREETINGS FROM SINGAPORE

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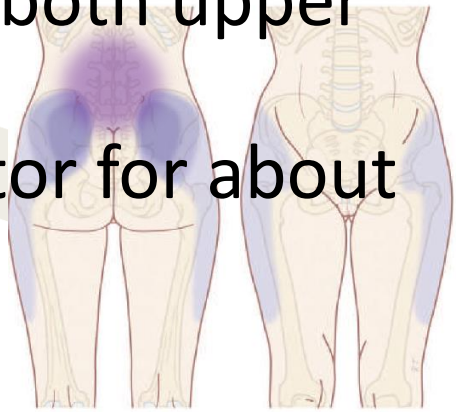
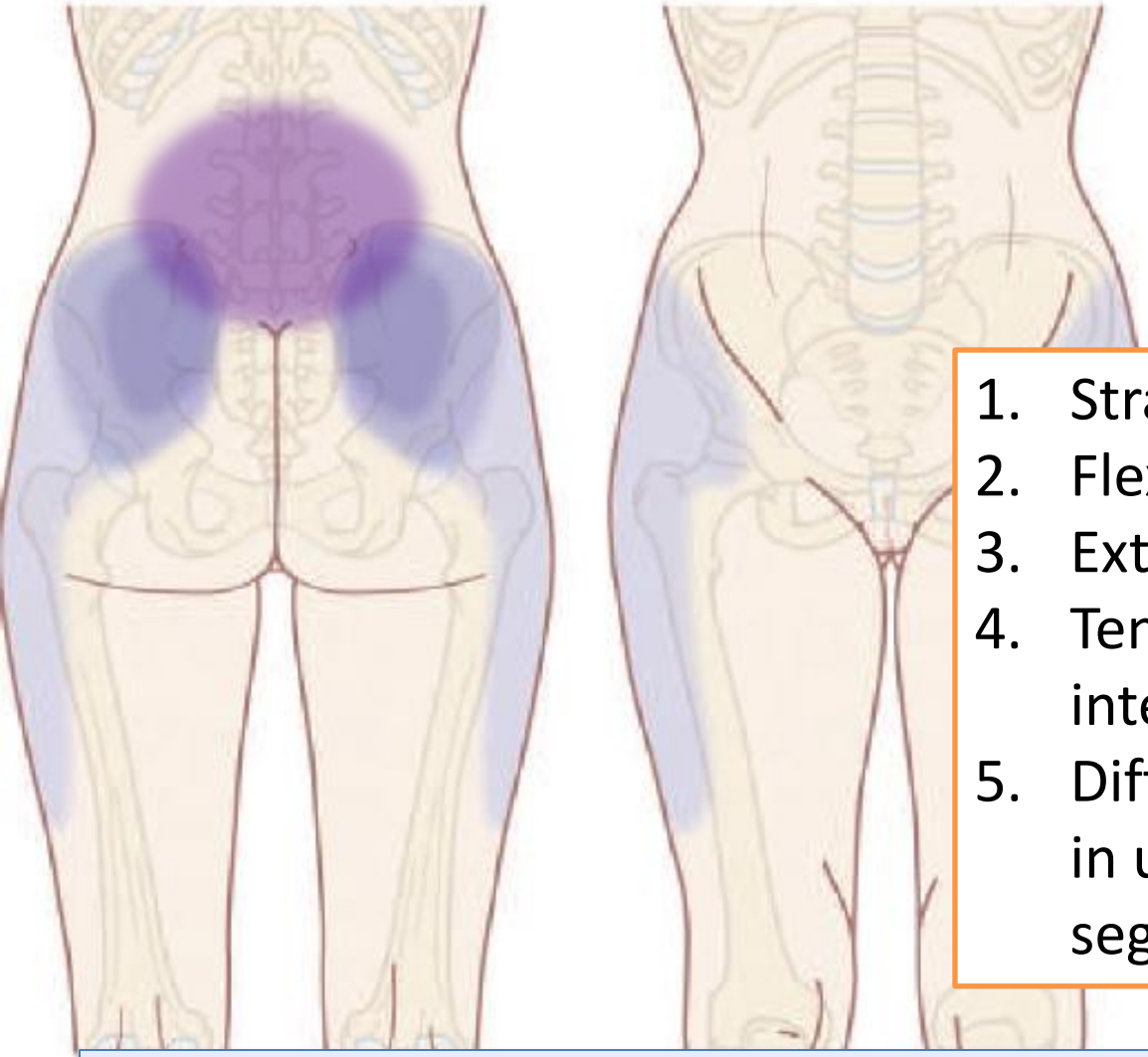
Axial Low Back Pain

Low Back Pain- Localised

Patient: Ms M

- Ms M, 45 years of age
- Administrator
- Sustained fall 6 yrs ago
- Low back pain developed 2 weeks after fall
- Initially only intermittent episodes
- Progressively worse in severity and occasionally feels it in both upper thighs
- Consulted a chiropractor for about 20 sessions

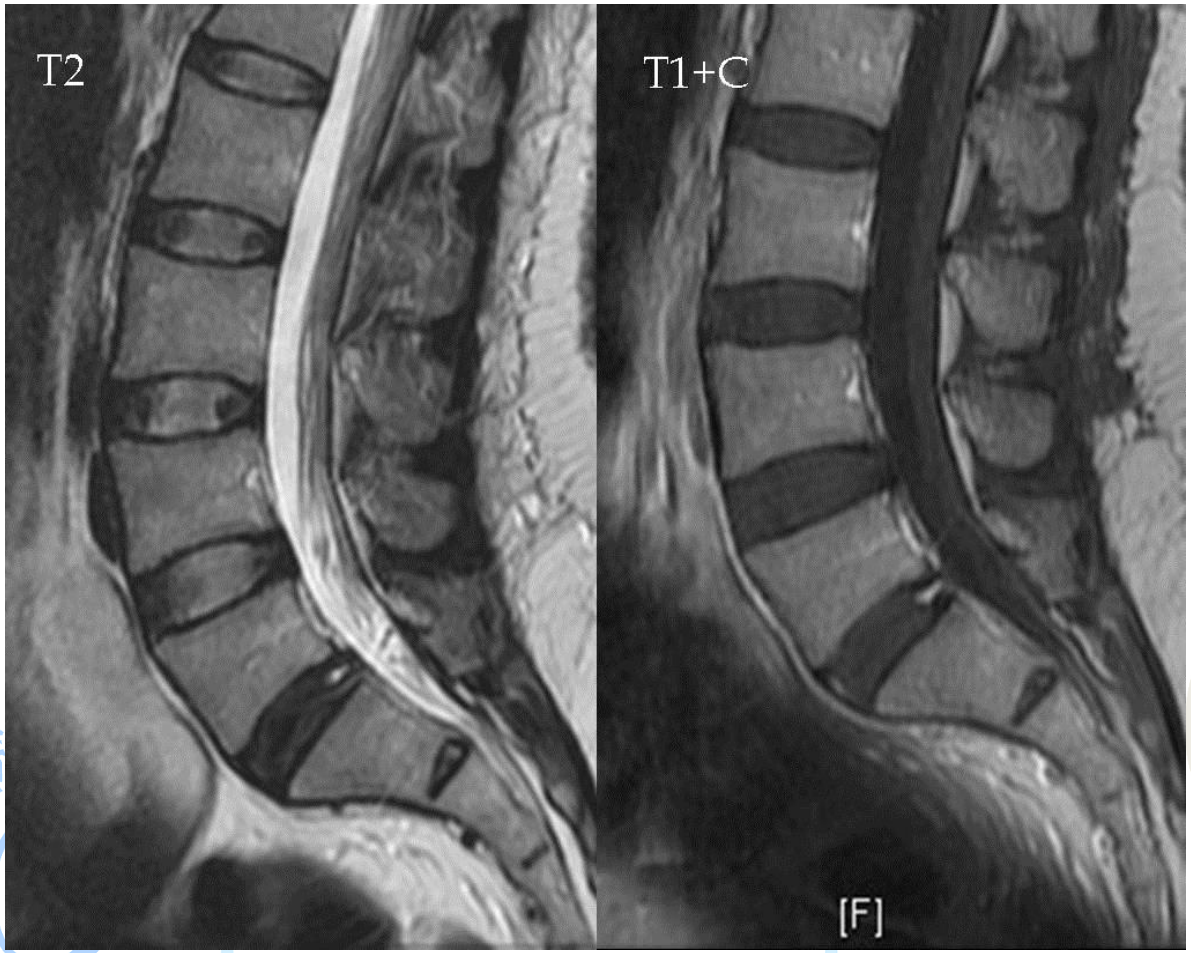


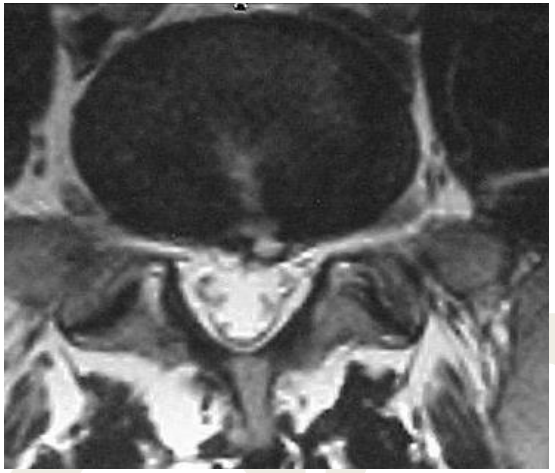


1. Straight leg raise 70 deg
2. Flexion 30 deg
3. Extension 10 deg
4. Tenderness most in L5S1 interspinous midpoint
5. Diffuse level of hyperalgesia in upper and lower 1-2 segments

Pattern of Back Pain

Discogenic Back Pain





Scope

- Introduction to Discogenic Low Back Pain
- Innervation of Intervertebral Disc
- Pathophysiological mechanisms of disc degeneration
- Annular Fissures, High Intensity Zone (HIZ) and Discography
- Radiofrequency therapeutic options

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Low Back Pain: How BIG a problem?

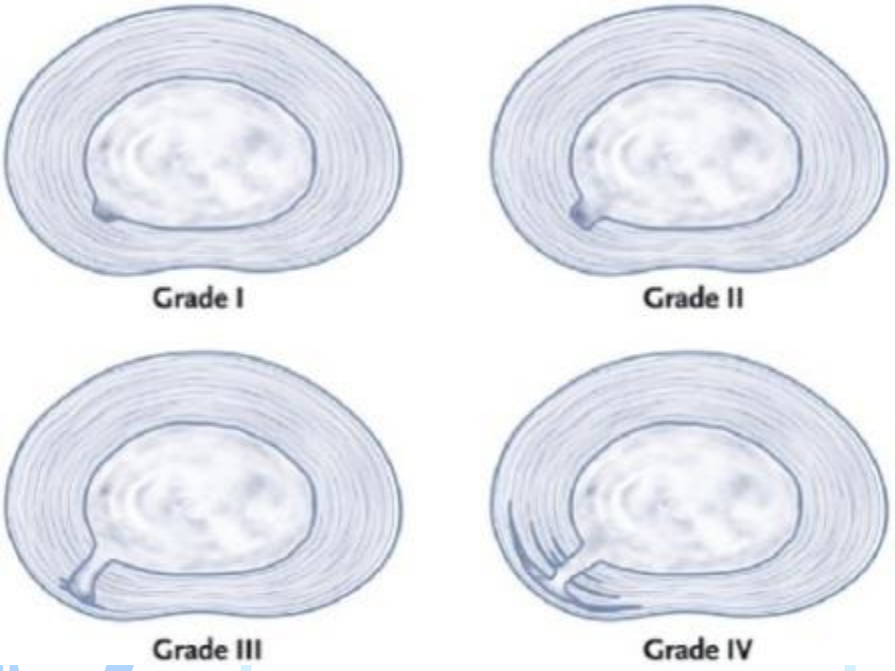
- Major cause of disability.
- Low back pain has a lifetime prevalence of 84%
  - Federico F Balagué et al. **Non-specific low back pain**. Lancet. 379; 9814, 4-10 February 2012, Pages 482-491
- Global age-standardized point prevalence of LBP was 9.4%, higher in men at 10.1% compared with women at 8.7% .
  - Hoy D, March L, Brooks P, et al. **The global burden of low back pain: estimates from the Global Burden of Disease 2010 study**. Annals of the rheumatic diseases 2014:73: 968-974.
- Socio-economic costs estimated at **$85 billion** in 2008 in the USA ; and in UK, in terms of lost productivity, disability benefits total more than **£12 billion**.
  - Makarand V et al**. Role of cytokines in intervertebral disc degeneration: pain and disc content**. Nature Reviews Rheumatology 10, 44-56 (2014)

Low Back Pain: Causes

- The *intervertebral disc, lumbar facet joints* and *sacroiliac joints* accounted for more than 90% of patients with chronic LBP.
- The intervertebral disc by itself contributed to **41.8%**.
- Discogenic LBP patients were younger (44 years old) than facet joint (60 years old) or sacro-iliac joint (61 years old) patients.
    - DePalma MJ, Ketchum JM, Saullo T. **What is the source of chronic low back pain and does age play a role?** Pain Med 2011:12: 224-233.

Discogenic Low Back Pain (DLBP)

- Crock in **1970** was the first to describe internal disc disruption as a cause of DLBP



H.V. Crock. **A reappraisal of intervertebral disc lesions.** Med J Aust, 20 (1970), pp. 983–989

Discogenic Low Back Pain

- Disruption of the internal architecture of the disc.
- External shape remains normal; there is no nerve root compression.
- Patients with DLBP mostly suffer from diffuse or dull ache or deep-seated pain, although radiation to the hips, groins, buttocks, or thighs has also been described.
    - N. Sehgal, J.D. Fortin. **Internal disc disruption and low back pain.** Pain Physician, 3 (2000), pp. 143–157
    - A. Saifuddin, R. Emanuel, J. White, *et al.* **An analysis of radiating pain at lumbar discography.** Eur Spine J, 7 (1998), pp. 358–362

For a structure to be capable of producing pain, it must have a sensory nerve supply.

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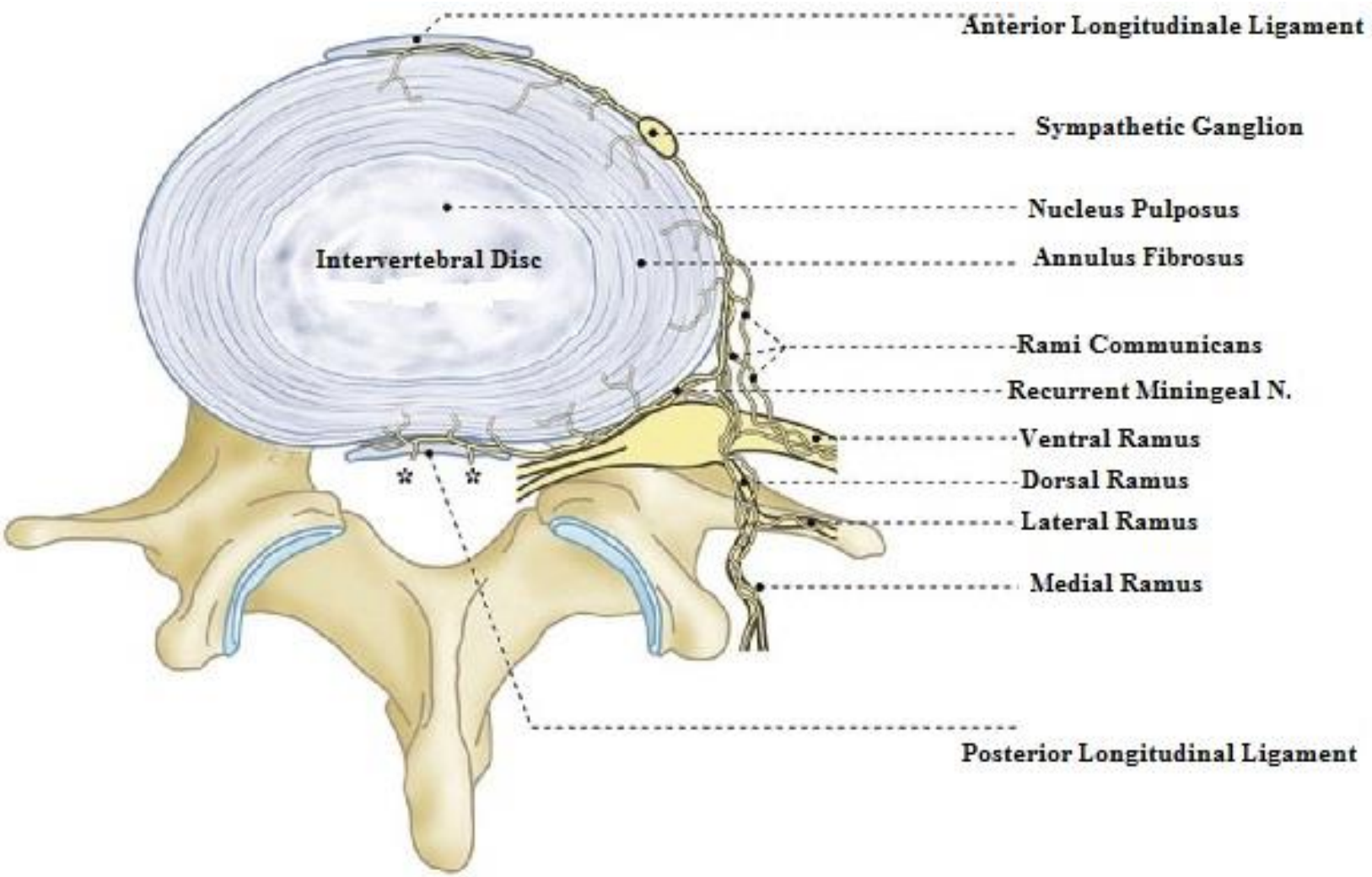
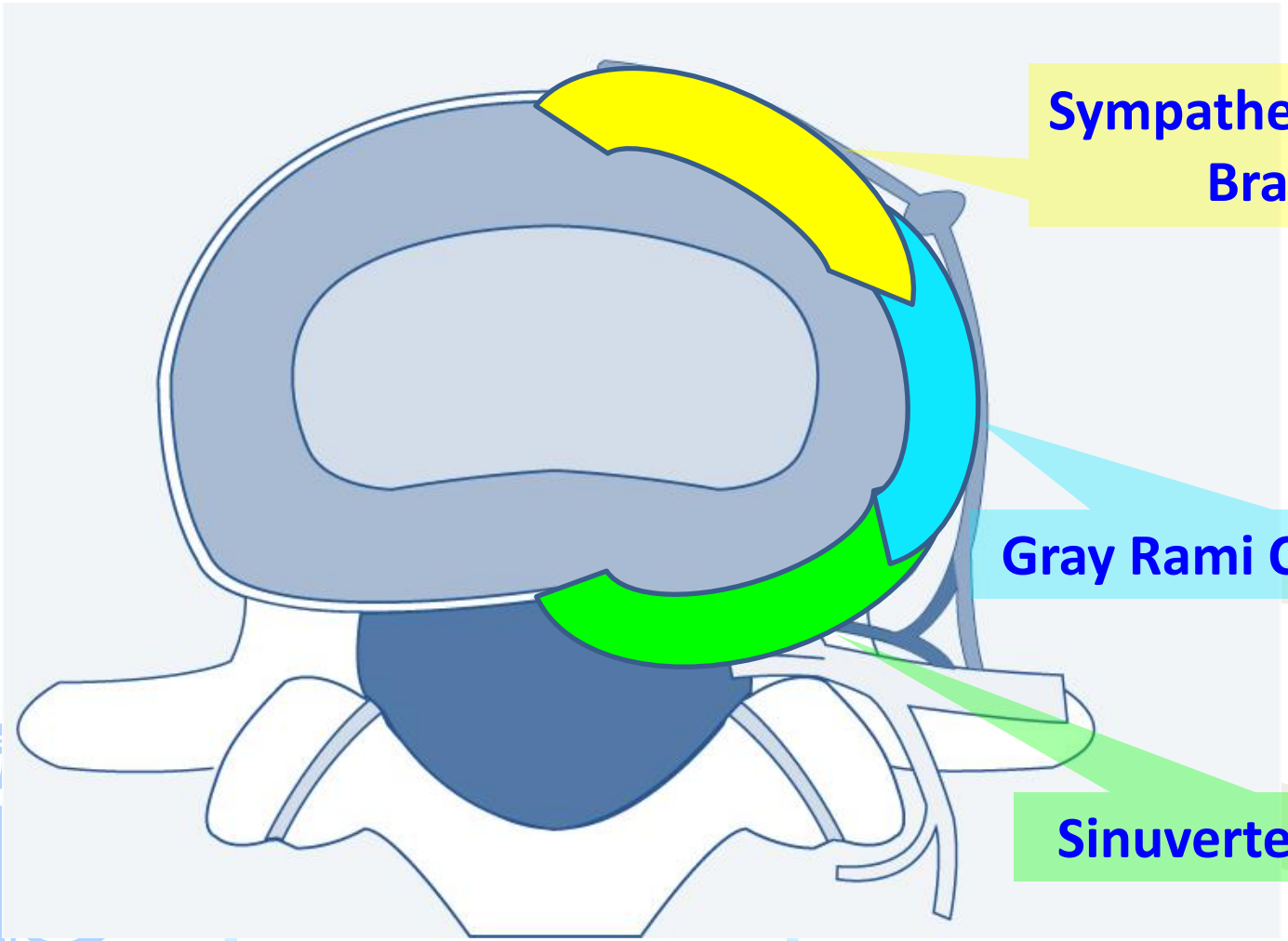
Innervation of Lumbar Intervertebral Discs (IVD)

- Bogduk described the innervation of the lumbar intervertebral disc in **1980** .
- Anterior and lateral portions of the annulus fibrosus (AF) are supplied by branches of the **grey rami communicantes** of the sympathetic trunk.
- Posterior aspect of the AF is supplied by the sinuvertebral nerve, which is a *combination of a branch from the ventral ramus and a branch of the grey ramus communicates of the corresponding segment*.
  - Bogduk N. **The innervation of the lumbar spine**. Spine 1983:8: 286-293.

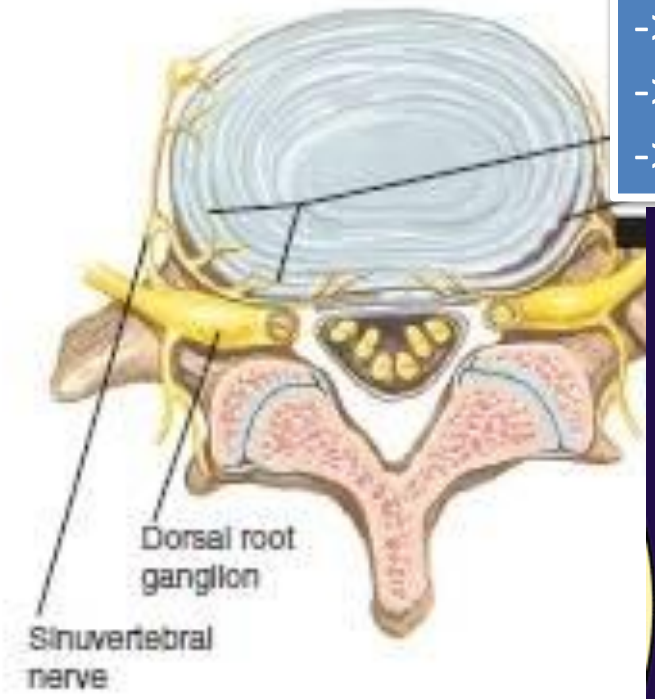
Innervation of Lumbar Intervertebral Discs (LID)



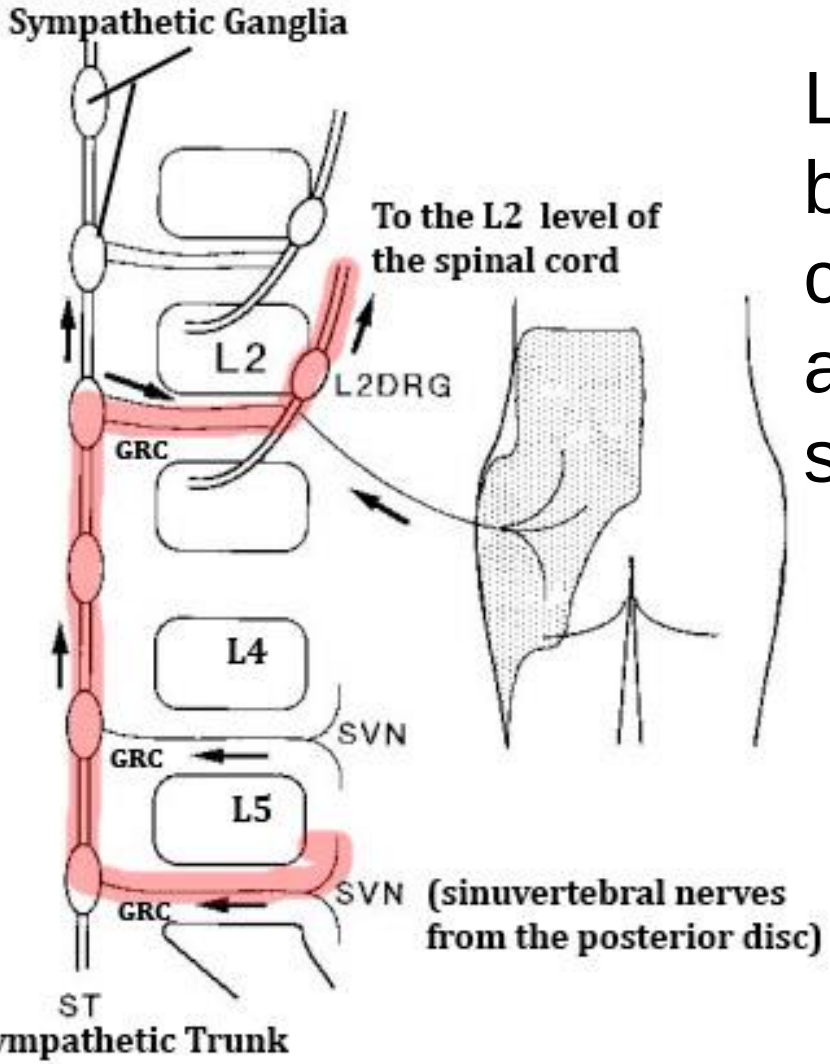
Innervation of Lumbar Intervertebral Discs (LID)



Peripheral annulus fibrosus and posterior longitudinal ligament nociceptors
-> Sinuvertebral nerve
-> travel up sympathetic chain to L2 DRG
-> Spinothalamic tract



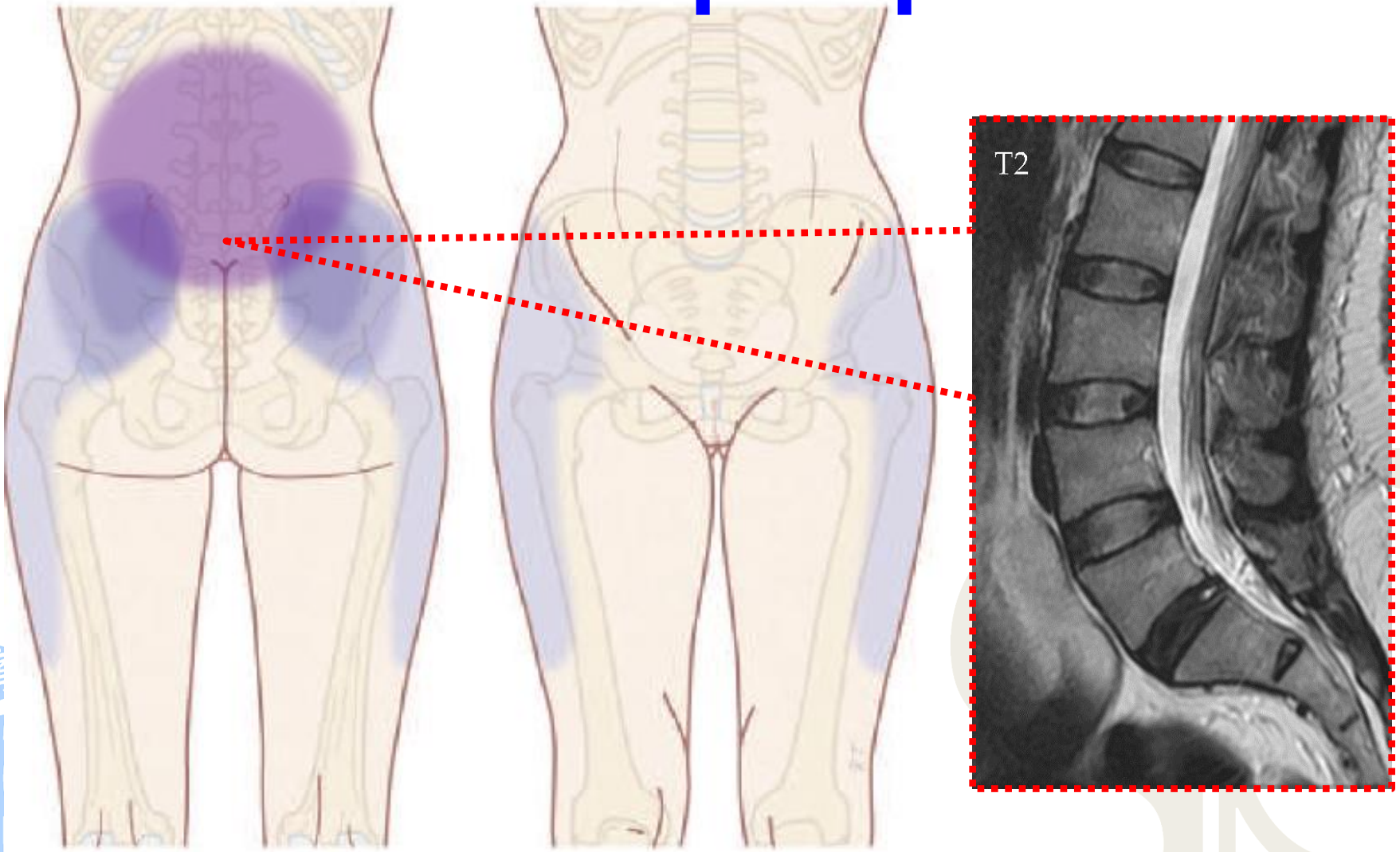
Sinuvertebral Nerve



Lumbar disc is innervated by sinuvertebral nerves consisting of spinal sensory and postganglionic sympathetic fibers

H.V. Luschka. **Die Nerven des menschlichen Wirbelkanales** H. Laupp, Tübingen, Germany (1850)

Sinuvertebral Nerve
Diffuse back pain pattern



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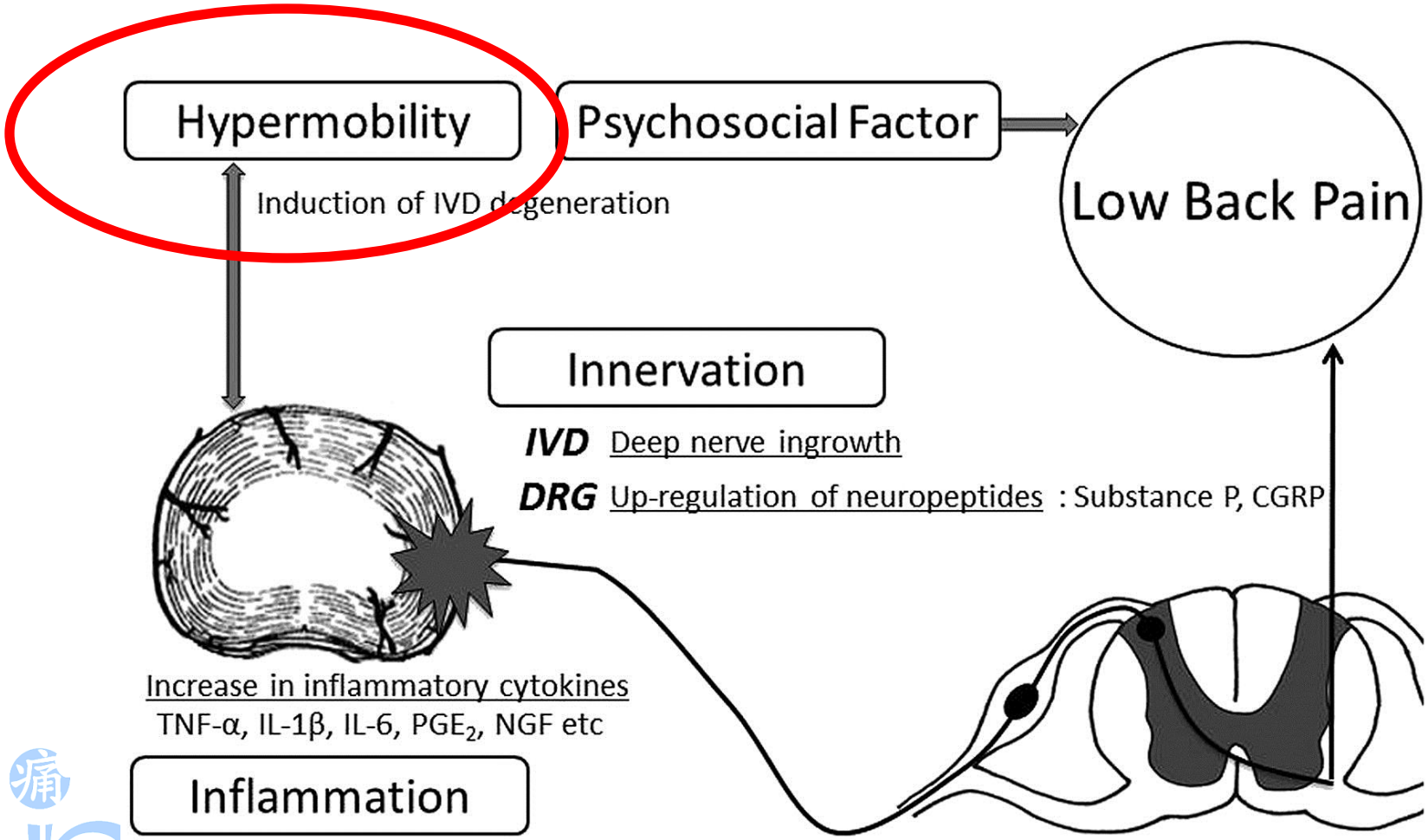
Pathophysiological mechanisms of discogenic low back pain (DLBP)



Seiji Ohtori et al. **Pathomechanisms of discogenic low back pain in humans and animal models**. The Spine Journal; 15 (6), 2015,1347–1355

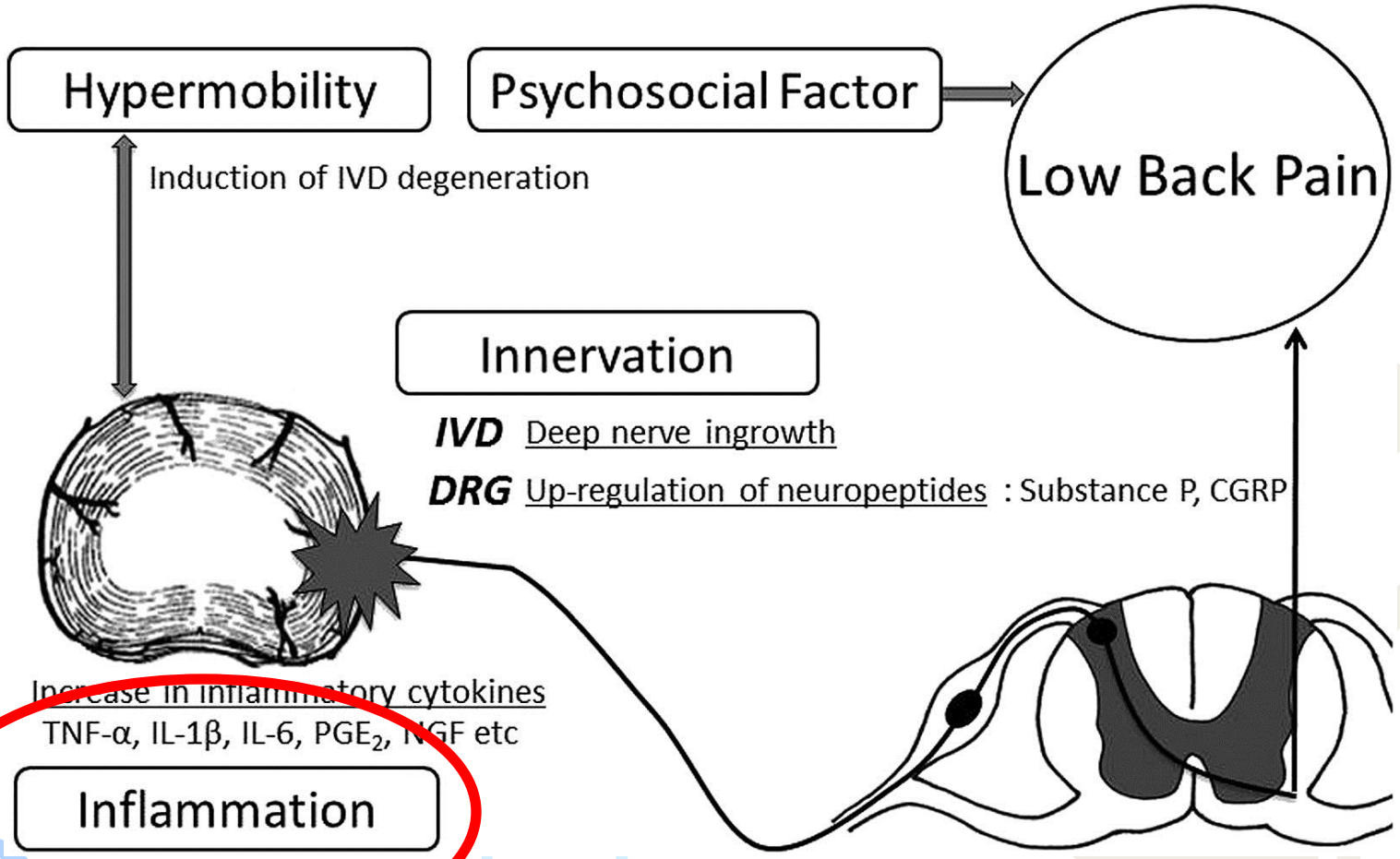
Disc Degeneration & Lumbar Hypermobility

- Hypermobility is thought to be one of the major factors that induces discogenic LBP
  - W.H. Kirkaldy-Willis, H.F. Farfan. **Instability of the lumbar spine.** Clin Orthop Relat Res, 165 (1982), pp. 110–123
  - A.L. Nachemson, A.B. Schultz, M.H. Berkson. **Mechanical properties of human lumbar spine motion segments: influences of age, sex, disc level, and degeneration.** Spine, 4 (1979), pp. 1–8

Disc Degeneration & Lumbar Hypermobility

- Biochemical composition and architecture of the IVD changes, altering its internal mechanical environment
  - J.C. Lotz, J.A. Ulrich. Innervation, inflammation, and hypermobility may characterize pathologic disc degeneration: review of animal model data. J Bone Joint Surg Am, 88 (2006), pp. 76–82
- More common and more severe at lower lumbar levels; thus likely **mechanical factors** are involved
- Cell-mediated breakdown of collagen and the compromised collagen stability result in degradation of fibres in the annulus fibrosus, further worsening hypermobility of the motion segment.

Pathophysiological mechanisms of discogenic low back pain (DLBP)



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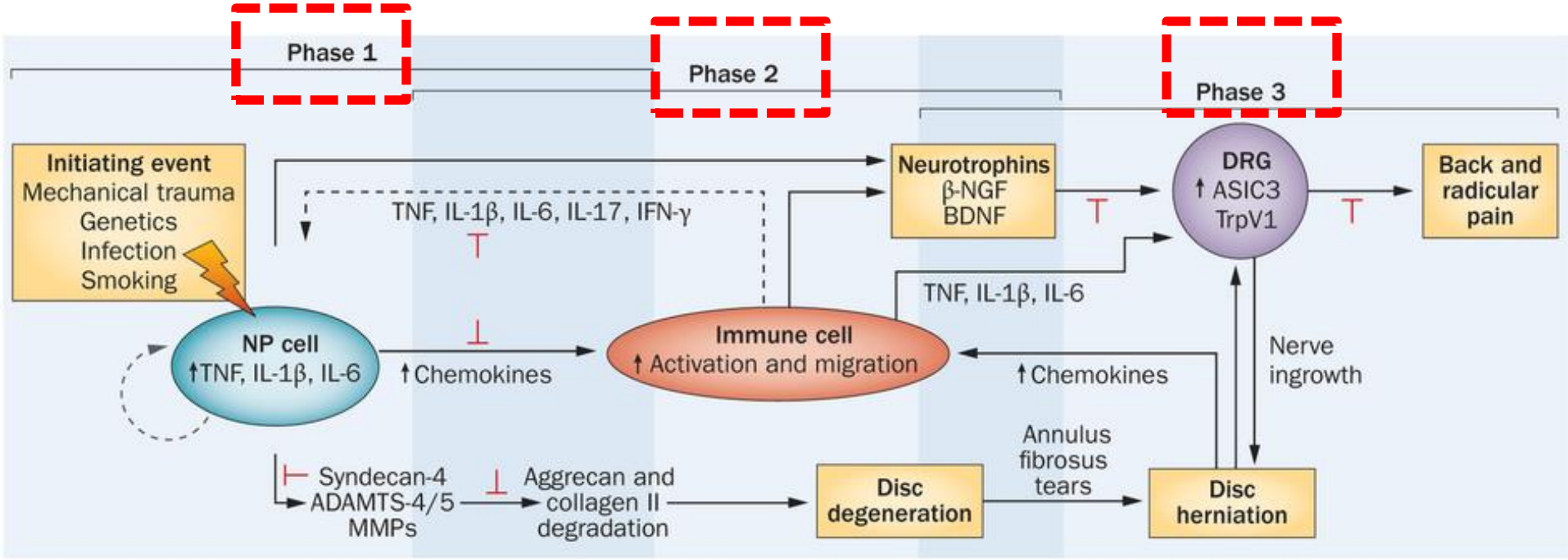
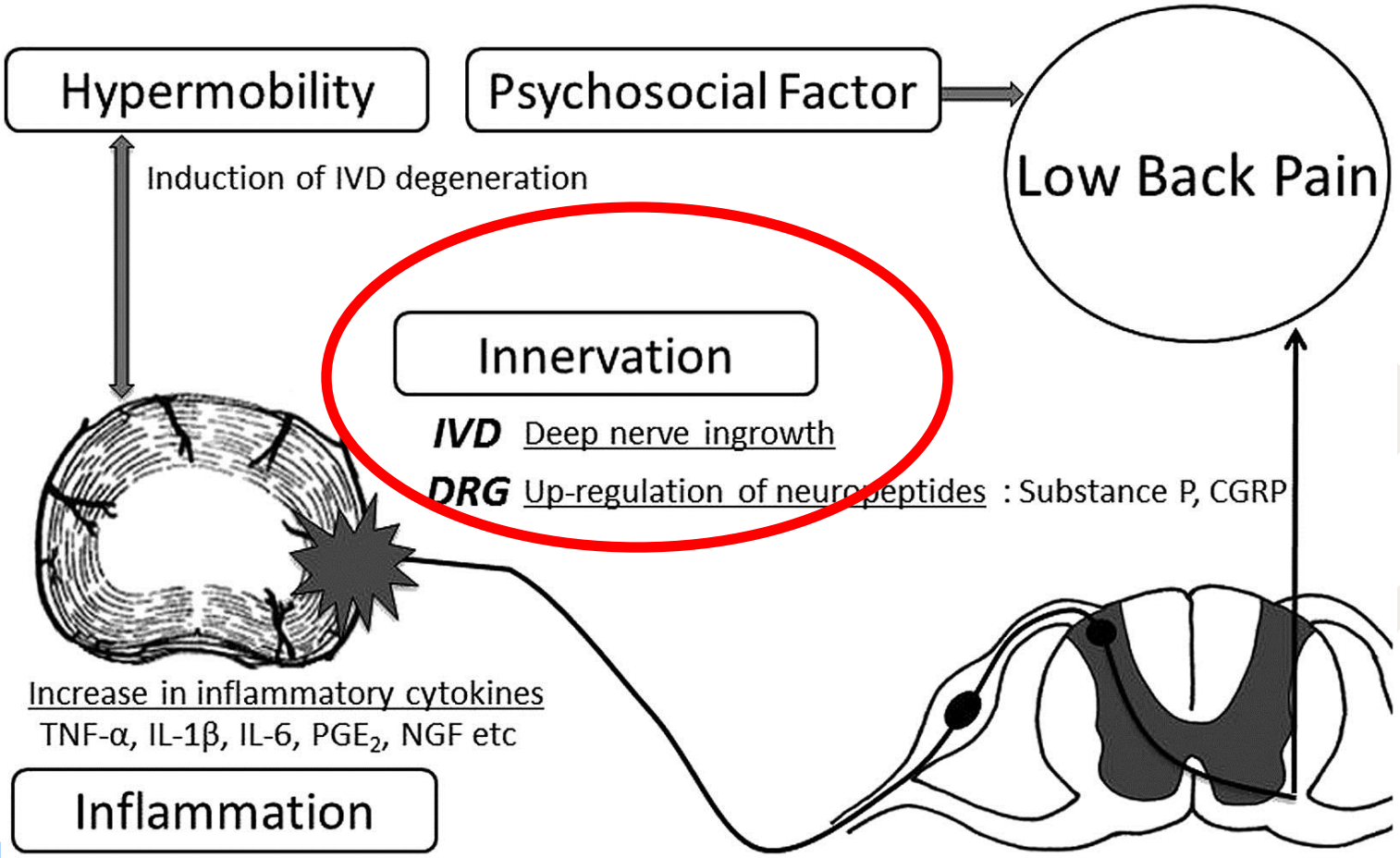
INFLAMMATION
Degenerative Disc Disease



Makarand V et al. ***Role of cytokines in intervertebral disc degeneration: pain and disc content***. *Nature Reviews Rheumatology 10, 44–56 (2014)*

Pathophysiological mechanisms of discogenic low back pain (DLBP)

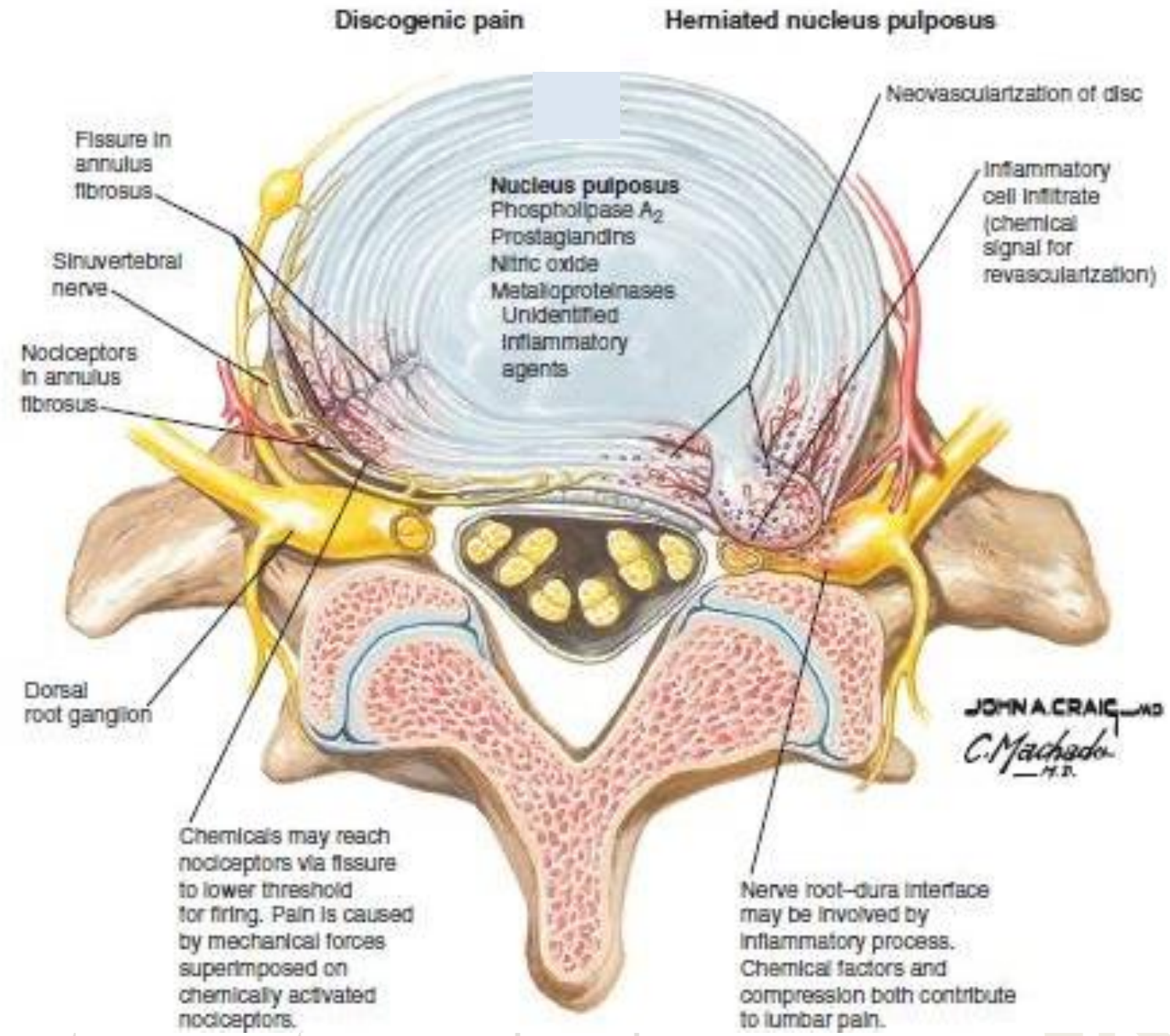


Seiji Ohtori et al. **Pathomechanisms of discogenic low back pain in humans and animal models**. The Spine Journal; 15 (6), 2015,1347–1355

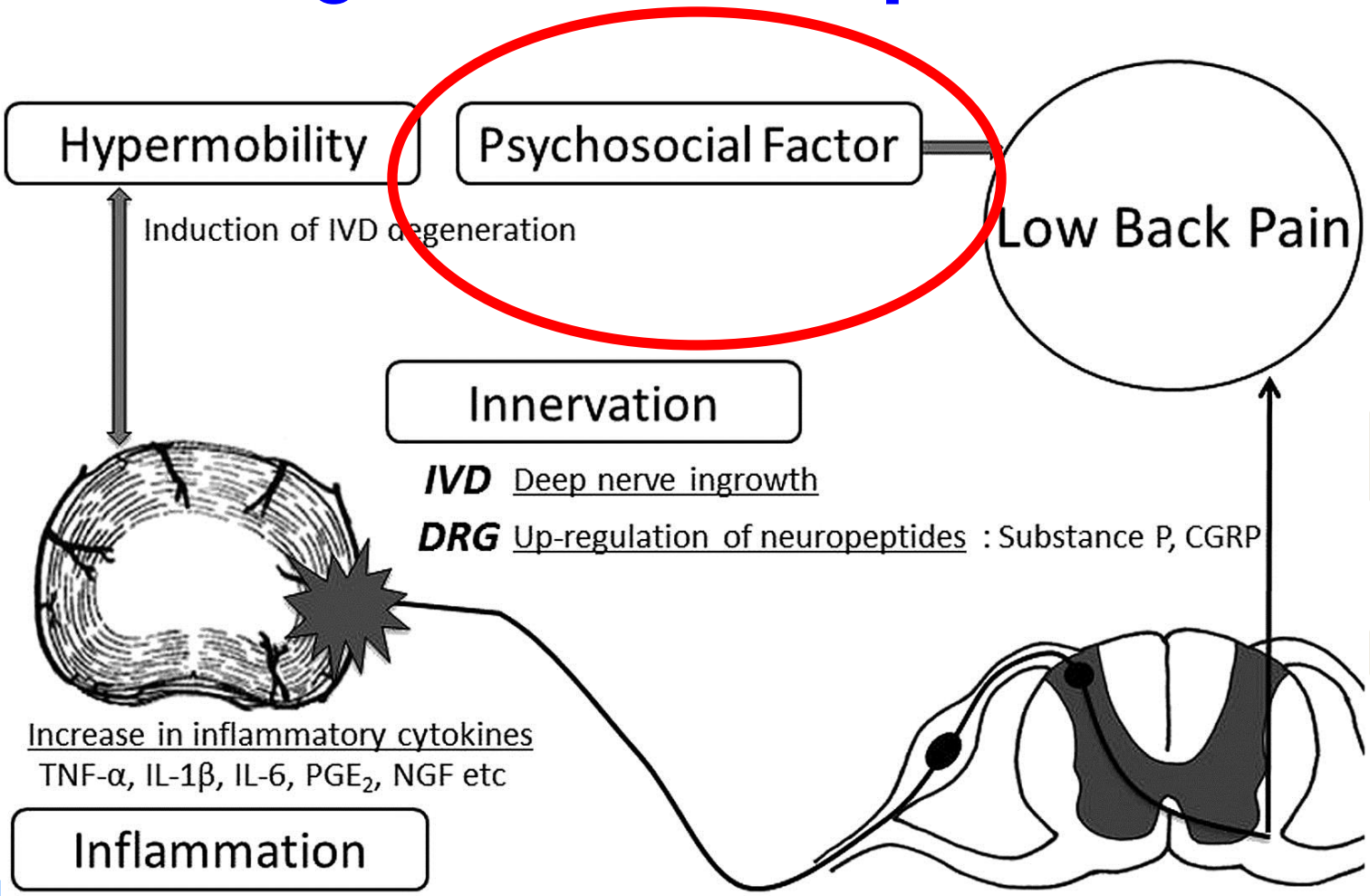
Innervation of a Degenerated Disc

- In a normal disc, only the outer 1/3 of the AF is innervated.
- In degenerated painful discs, there is innervation all the way into the inner 1/3 of the AF and even into the nucleus pulposus (NP).
- The tears in the AF, which are commonly in the posterior part, are associated with the formation of a vascularized granulation tissue.
- Nerve fibres are found within this granulation tissue.

  - Freemont AJ, Peacock TE, Goupille P, et al. Nerve ingrowth into diseased intervertebral disc in chronic back pain. *Lancet* 1997:350: 178-181.
  - Coppes MH, Marani E, Thomeer RT, et al. Innervation of "painful" lumbar discs. *Spine* 1997:22: 2342-2349; discussion 2349-2350.
  - Coppes MH, Marani E, Thomeer RT, et al. Innervation of annulus fibrosis in low back pain. *Lancet* 1990:336: 189-190.
  - Peng B, Wu W, Hou S, et al. The pathogenesis of discogenic low back pain. *The Journal of bone and joint surgery British volume* 2005:87: 62-67.



Pathophysiological mechanisms of discogenic low back pain (DLBP)



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Psychosocial Factors

- Results of a systematic review showed that the most helpful baseline predictors (of non-recovery at 1 year) were in fact:
  - *Maladaptive pain coping behaviours*
  - *Non-organic signs*
  - *Functional impairment*
  - *Low general health status*
  - *Presence of psychiatric comorbidities*
  - *Low levels of fear avoidance*

    ➢ R Chou, P Shekelle. **Will this patient develop persistent disabling low back pain?** JAMA, 303 (2010), pp. 1295–1302

- Other reports suggest that, within 3 weeks of the onset of non-specific low back pain,
  - Low recovery expectations can identify people at risk of a poor functional outcome up to 6 months later

    ➢ RA Iles, M Davidson, NF Taylor, P O'Halloran. **Systematic review of the ability of recovery expectations to predict outcomes in non-chronic non-specific low back pain.** J Occup Rehabil, 19 (2009), pp. 25–40

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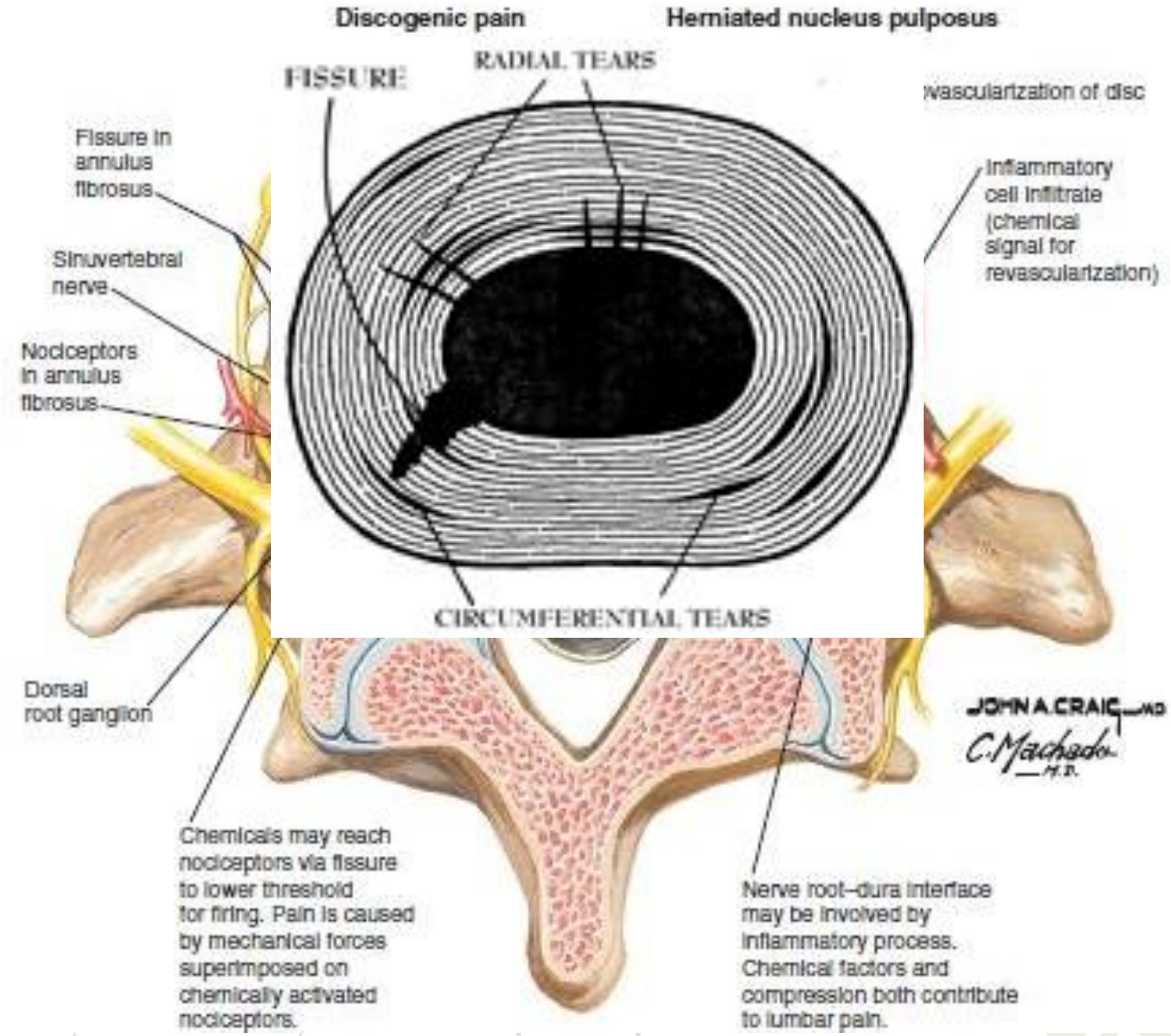
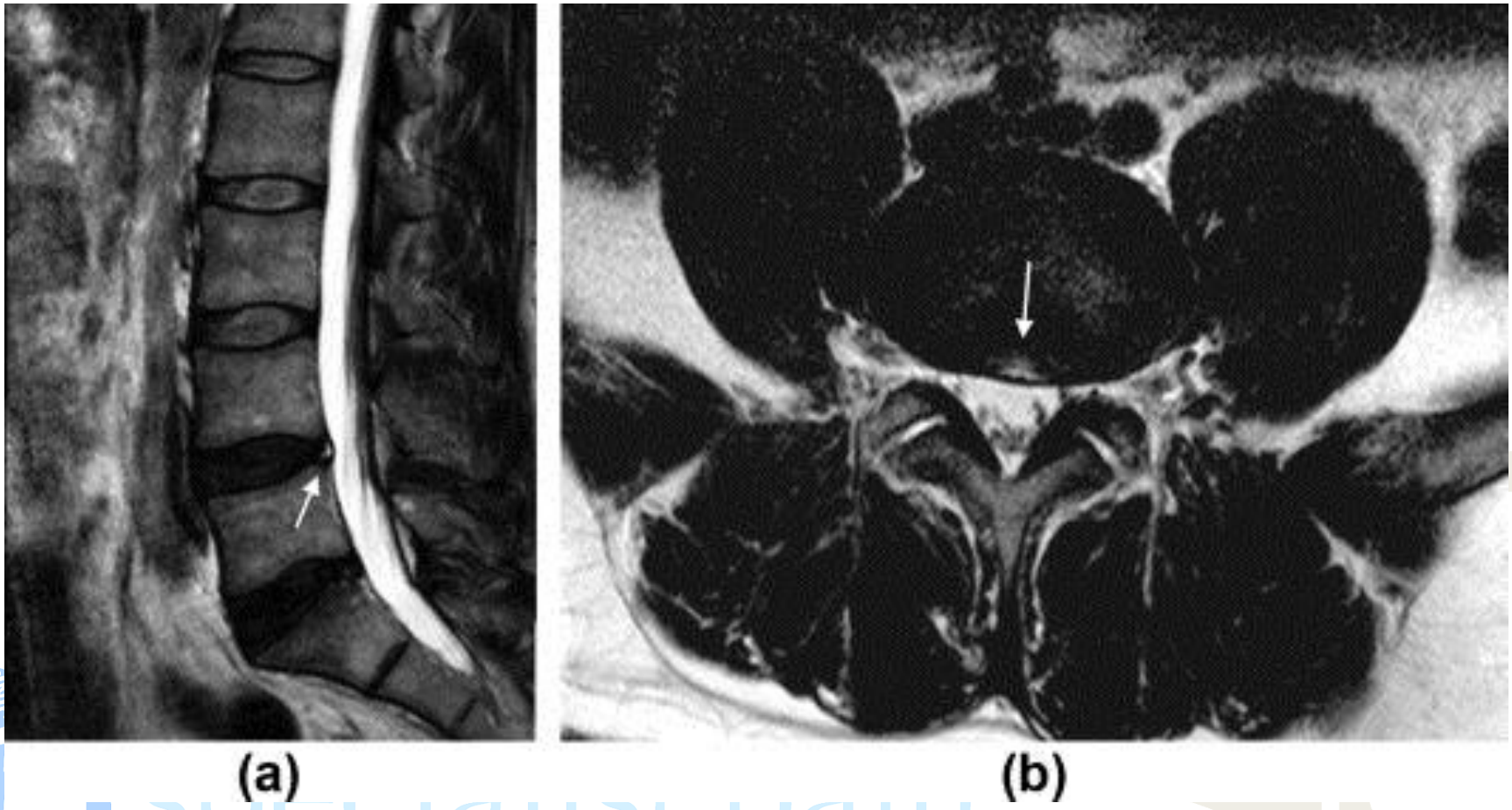


High Intensity Zone

- In 1992, the high-intensity zone (HIZ) was first described by Aprill and Bogduk - a focal high-intensity signal on T2-weighted sequences in the posterior annulus fibrosus with appreciably brighter signal intensity than nucleus pulposus and clearly dissociated from it

➢C. Aprill, N. Bogduk. High-intensity zone: a diagnostic sign of painful lumbar disc on magnetic resonance imaging. Br J Radiol, 65 (1992), pp. 361–369

High Intensity Zone



But, the presence of a high intensity zone does not equal the diagnosis of discogenic back pain!

HIZs in Asymptomatic Individuals

- HIZs are present in asymptomatic individuals with incidence that varies from **24 to 56%**
  - Stadnik TW, Lee RR, Coen HL, et al. Annular tears and disk herniation: prevalence and contrast enhancement on MR images in the absence of low back pain or sciatica. Radiology 1998;206:49e55.
  - Weishaupt D, Zanetti M, Hodler J, et al. MR imaging of the lumbar spine: prevalence of intervertebral disk extrusion and sequestration, nerve root compression, end plate abnormalities, and osteoarthritis of the facet joints in asymptomatic volunteers. Radiology 1998;209:661e6.
  - Rankine JJ, Gill KP, Hutchinson CE, et al. The clinical significance of the high-intensity zone on lumbar spine magnetic resonance imaging. Spine (Phila Pa 1976) 1999;24:1913e9. discussion 1920.
  - Carragee EJ, Paragioudakis SJ, Khurana S. 2000 Volvo Award winner in clinical studies: lumbar high-intensity zone and discography in subjects without low back problems. Spine (Phila Pa 1976) 2000;25:2987e92.

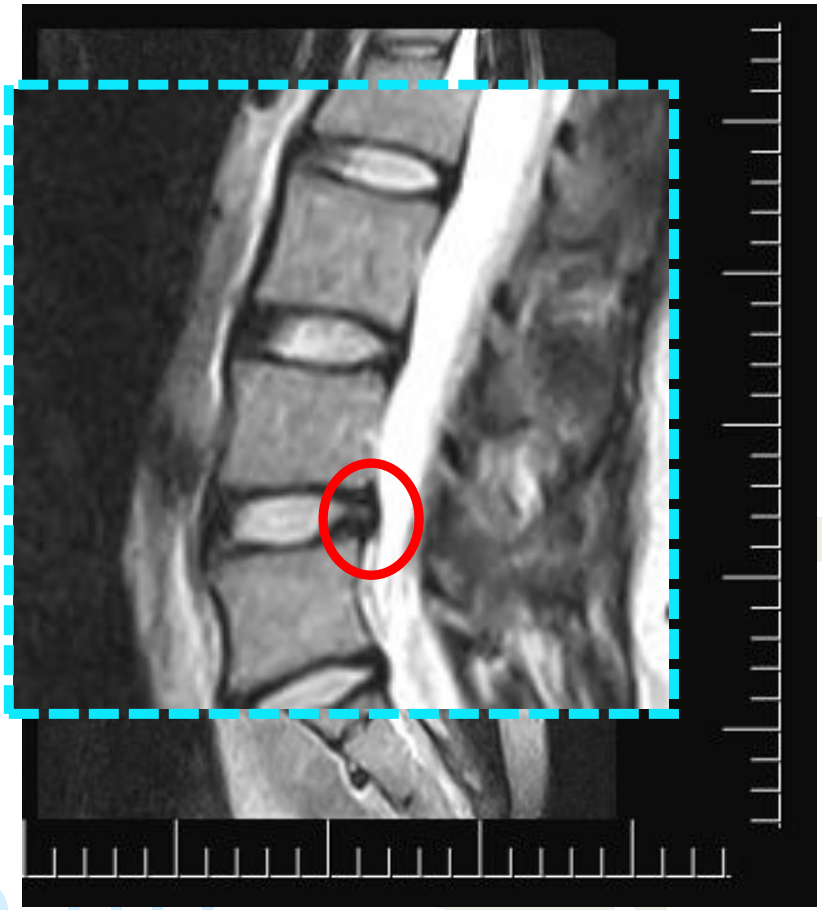
Role of Axial Loading

- Saifuddin et al. demonstrated the presence of HIZs on axial loading of the spine, where earlier conventional MRI had failed to demonstrate them.
- Axial loading causes changes in intradiscal pressure and annular stresses, causing fluid to move through a radial tear into the outer annulus.

➢ A. Saifuddin et al. Development of lumbar high intensity zone on axial loaded magnetic resonance imaging. Spine (Phila Pa 1976), 28 (2003), pp. E449–E451

Role of Axial Loading

Supine



Standing

Provocative Discography

- Many describe provocative discography, especially combined with HIZs, to be a useful tool in the diagnosis of chronic lumbar disc pain

- E.P. Holt Jr. The question of lumbar discography. J Bone Joint Surg Am, 50 (1968), pp. 720–726
- E.J. Carragee, C.M. Tanner, B. Yang, *et al.* False-positive findings on lumbar discography. Reliability of subjective concordance assessment during provocative disc injection. Spine (Phila Pa 1976), 24 (1999), pp. 2542–2547
- T.R. Walsh, J.N. Weinstein, K.F. Spratt, *et al.* Lumbar discography in normal subjects. A controlled, prospective study. J Bone Joint Surg Am, 72 (1990), pp. 1081–1088
- L.R. Wolfer, R. Derby, J.E. Lee, *et al.* Systematic review of lumbar provocation discography in asymptomatic subjects with a meta-analysis of false-positive rates. Pain Physician, 11 (2008), pp. 513–538
- R.V. Shah, C.R. Everett, A.M. McKenzie-Brown, *et al.* Discography as a diagnostic test for spinal pain: a systematic and narrative review. Pain Physician, 8 (2005), pp. 187–209
- L. Manchikanti, S.E. Glaser, L. Wolfer, *et al.* Systematic review of lumbar discography as a diagnostic test for chronic low back pain. Pain Physician, 12 (2009), pp. 541–559

Discography

Positive predictive value is the probability that subjects with a positive discography truly have discogenic pain

- Good inter-observer reliability

	Sensitivity (%)	Specificity (5)	PPV (%)
Aprill, Bogduk	71	89	86
Lam	81	79	87
Chen	44.8	94.2	87.7
Saifuddin	26.7	95.2	88.9

Specificity is the fraction of those without discogenic back pain who will have a negative discography

- *C. Aprill, N. Bogduk. Br J Radiol, 65 (1992), pp. 361–369*
- *K.S. Lam. Eur Spine J, 9 (2000), pp. 36–41*
- *J.Y. Chen. Clin J Pain, 27 (2011), pp. 125–130*
- *A. Saifuddin. Spine (Phila Pa 1976), 23 (1998), pp. 453–457*

WIP Classification of Discs based on Discography pressures

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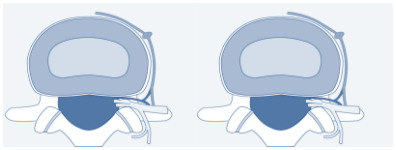
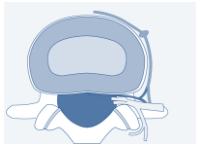
Absolute discogenic pain 

Highly probable discogenic pain 

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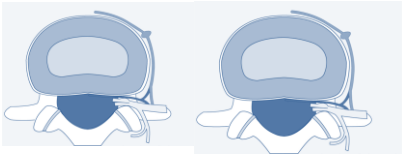
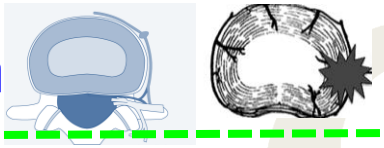
Discogenic pain 

Possible discogenic pain 

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Indeterminate Disc

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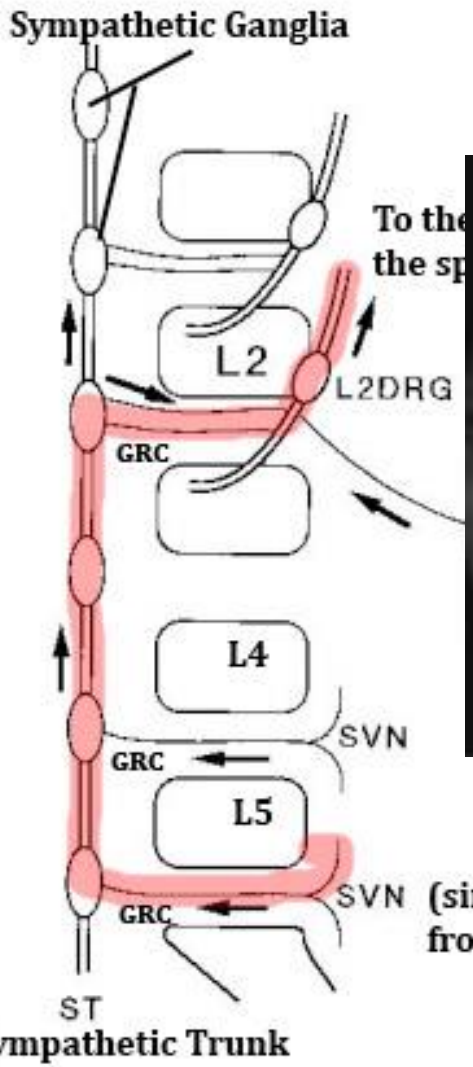
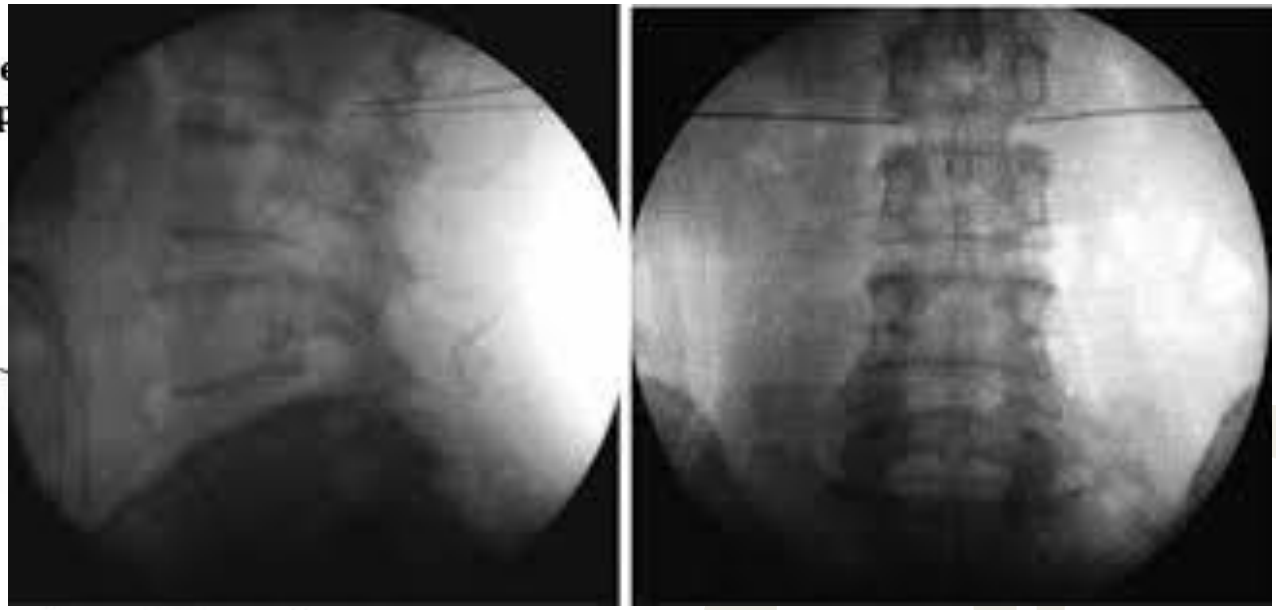
  1. L2 DRG Treatment (Pulsed RF?)
  2. IDET
  3. Intradiscal radiofrequency/PRF
  4. Intradiscal biaculoplasty
  5. DiscTRODE
  6. Bipolar radiofrequency annuloplasty

1. L2 Dorsal Root Ganglion treatment

Sinuvertebral Nerve L2 DRG





H.V. Luschka. **Die Nerven des menschlichen Wirbelkanales** H. Laupp, Tübingen, Germany (1850)

L_2 Dorsal Root Ganglion treatment

- Nakamura et al. performed an L2 spinal nerve block on 33 patients with L4/5 or L5S1 annular tears. Reported that the block was effective in patients suffering from discogenic LBP.
  - S.I. Nakamura, K. Takahashi, Y. Takahashi, M. Yamagata, H. Moriya. **The afferent pathways of discogenic low back pain.** J Bone Joint Surg Br, 78 (1996), pp. 606–612
- Suggests that lower IVDs are innervated by DRGs at the corresponding level and multi-segmentally by DRGs at upper levels, particularly by L2.
  - S. Ohtori, S. Nakamura, T. Koshi, M. Yamashita, K. Yamauchi, G. Inoue, *et al.* **Effectiveness of L2 spinal nerve infiltration for selective discogenic low back pain patients.** J Orthop Sci, 15 (2010), pp. 731–736

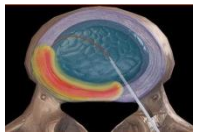
L_2 DRG Pulsed RF

- Dorsal root ganglion L2-treatment for suspected discogenic lumbar pain was done on 39 patients
- After one month,
  - effect was not assessable in 17% of patients
  - 14% had major improvement
  - 14% minor improvement
  - 55% had no change
    - Lindquist J et al. *Pulsed radiofrequency in clinical practice - A retrospective analysis of 238 patients with chronic non-cancer pain*. Scand J Pain. 2016 Jul;12:68-73.

2. IDET (Intradiscal Electrothermal Therapy)

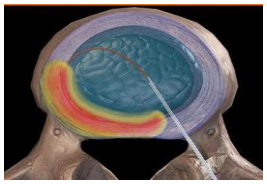
Damian O, Nicholas HL C, Kris V. *Discogenic Low Back Pain: A Topical Review.* Ortho & Rheum Open Access 2018; 10(4): 555795

Author	Study	Results
Saal et al, 2000	Prospective. 25 patients. Mean FU of 7 months.	80% had reduction in VAS score of at least 2 points. 72% had increase in sitting tolerance and reduction of analgesic use.
Derby et al, 2000	Prospective, 32 patients, 12 months FU	62.5% had a favourable outcome, 12.5% non favourable and 25% no change.
Karasek et al, 2000	**Prospective case-control study**. 36 treatment, 17 controls. Controls were patients who were diagnosed with IDD on provocative discography but denied IDET by their insurance companies. 12 months FU	•Mean VAS score of IDET group dropped from 8 to 3. •60% had greater than 50% reduction in VAS and returned to work. •23% obtained complete pain relief. •No improvement of control group in VAS at 3 months.
Saal et al, 2000	Prospective. 62 patients. 16 months mean FU.	•Mean drop of 3 on VAS scores. •71-74% had improvement in either the SF-36 physical function, SF-36 bodily pain or the VAS scores. •19% had no improvement in any score.



IDET

Singh, 2000	Prospective. 23 patients. 6 months FU.	•67% had greater than 50% pain relief. •Statistically significant increase in standing and walking time.
Spruit et al, 2002	Prospective. 20 patients. 6 months FU.	•Drop of 14mm on VAS (p=0.046) but much variation noted between patients. •ODI did not improve significantly. •SF36 vitality and bodily pain subscales improved significantly but not others.
Freedman et al, 2003	Prospective. 36 patients who are active military personnel. Mean FU of 29.7 months.	•47% of 36 patients had >50% reduction at 6 months FU but only 16% at final FU. •52% had a 2 point or greater decrease in NRS. •29% stated they had improved at final FU and only 16% said they were satisfied with IDET.
Lee et al, 2003	Prospective. 62 patients. Average FU of 34 months.	•11 patients lost by final follow-up. •Back pain visual numerical scale (VNS) improvement of 3.2 (p<0.001). •53% demonstrated clinically significant VNS and RM improvements.
Pauza et al, 2004	**RCT of IDET vs. sham placebo**. 6 months FU. 37 IDET, 27 placebo.	•56% of IDET and 38% of placebo had >2 points improvement in VAS. Only 40% of patients with IDET had >50% reduction in pain vs. 33% in placebo. •Both groups had significant improvements in pain scores but the IDET group had statistically greater improvements. •Mean change in VAS is 2.4. •IDET group had better outcomes in ODI. •NNT for IDET for >75% relief = 5.



IDET

Freeman et al, 2005	**RCT. IDET vs. Sham Placebo**. 57 patients in total. 6 months FU. 38 IDET and 19 to placebo.	•Successful outcome is defined as no neurological deficit, improvement of at least 7 points in Low Back Pain Outcome score and improvement of 1 standard deviation from mean in SF-bodily pain and physical functioning subscales at 6 months (No patient in either group achieved it). •No difference between the IDET and placebo group in primary and secondary outcomes.
Maurer et al, 2008	Prospective. 56 patients. Mean FU of 20.5 months.	•16% receiving worker's compensation •75% treatment success. •VAS improved from 6.1 to 2.4 at final FU. •Sitting, standing and walking tolerance all had statistically significant improvements.
Nunley et al, 2008	Prospective. 53 patients with worker's compensation. 12 months FU.	•Significant reduction in both VAS (62.6%) and Oswestry scores (69.3%) •Significant increase in economic productivity post-IDET.
Assietti et al, 2010	Prospective. 50 patients. 24 months FU.	•78% success rate at 24 months. •Pain score improved from 7.6 (baseline) to 3.0 (12 months) and 2.4 (24 months. •ODI improved from 59.0 (baseline) to 27.0 (12 months) and 20.1 (24 months)

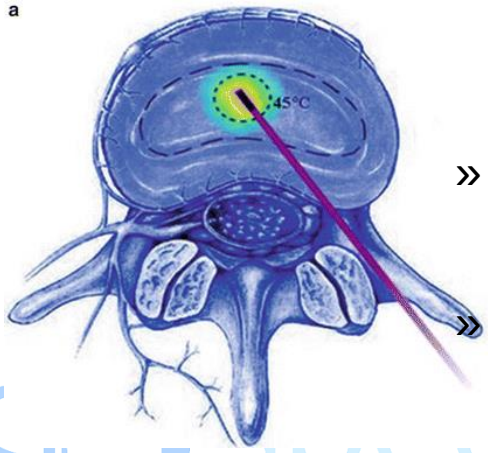
IDET

- Complications encountered includes:
  1. cauda equina syndrome
  2. increased disc herniation
  3. vertebral osteonecrosis
  4. a broken catheter that migrated intradurally causing radiculopathy
  5. nerve root injury
  6. anterolisthesis
  7. discitism
- Though severe complications can occur, the *overall rate of complications is low*.
- Use still clinically equivocal

3. Intradiscal (Nucleus) Radiofrequency

Damian O, Nicholas HL C, Kris V. *Discogenic Low Back Pain: A Topical Review.* Ortho & Rheum Open Access 2018; 10(4): 555795

- 10mm active tip cannula into the centre of the Nucleus. An RF electrode is then inserted and a lesion is made.
- 2 RCTs which showed that intradiscal RF has no long-term utility in the treatment of discogenic pain.
- Based on current evidence, there is no role for single needle intradiscal RF.



» Barendse GA et al. Randomized controlled trial of percutaneous intradiscal radiofrequency thermocoagulation for chronic discogenic back pain: lack of effect from a 90-second 70 C lesion. *Spine*.

» Van Kleef M et al. Percutaneous intradiscal radio-frequency thermocoagulation in chronic non-specific low back pain. The Pain Clinic. 1996;9(3):259-68.

» Ercelen O *et al.* Radiofrequency lesioning using two different time modalities for the treatment of lumbar discogenic pain: a randomized trial. *Spine*.

3A. Intradiscal Pulsed Radiofrequency

- Only prospective observational studies have been done and the results differ substantially between studies.
- More studies are needed and at the current time intradiscal pRF cannot be routinely recommended.
    - Teixeira A et al (2006) Intradiscal high-voltage, long-duration pulsed radiofrequency for discogenic pain: a preliminary report. Pain Med 7(5): 424-428.
    - Jung YJ et al(2012) Effect of intradiscal monopolar pulsed radiofrequency on chronic discogenic back pain diagnosed by pressure-controlled provocative discography: a one year prospective study. Annals of rehabilitation medicine 36(5): 648-656.
    - Rohof O (2012) Intradiscal pulsed radiofrequency application following provocative discography for the management of degenerative disc disease and concordant pain: a pilot study. Pain Pract 12(5): 342-349.
    - Fukui S et al. (2013) Intradiscal pulsed radiofrequency for chronic lumbar discogenic low back pain: a one year prospective outcome study using discoblock for diagnosis. Pain physician 16(4): E435-E42.

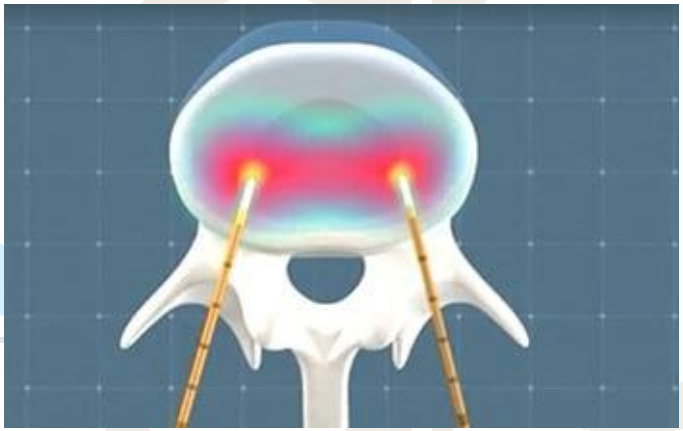
4. Intradiscal Biaculoplasty

Damian O, Nicholas HL C, Kris V. *Discogenic Low Back Pain: A Topical Review.* Ortho & Rheum Open Access 2018; 10(4): 555795

Author	Type of study	Intervention performed	Results
Kapural et al, 2008	Prospective, 15 patients. 6 months FU.	Ramp up to 55° C over 11 minutes then held at 55° C for 4 minutes	•Significant drop in ODI from 23.3 to 17.1 •Significant drop in VAS from 7 to 3 •Non-significant drop in opioid use from 73.5mg to 38.8mg.
Karaman et al, 2011	Prospective, 15 patients. 6 months FU.	45° C, ramp time of 2° C /min and for 15 minutes	•Significant drop in VAS score from 8.3 to 4.6. •ODI dropped significantly from 34.9 to 17.9
Kapural et al, 2013	**Double blinded, placebo controlled RCT**. 32 patients in treatment group, 32 in sham group 6 months FU.	In 13 patients of treatment group, target of 45° C for 15minutes In 16 patients of treatment group, target of 50° C for 15 minutes followed by monopolar lesioning around each electrode at 60° C for 2.5 minutes Control group consisted of insertion of introducers and electrodes just outside the disc with no current being delivered.	•Significant decreases in NRS from 7.13 to 4.94 (p=0.006) and ODI from 40.37 to 32.94 (p=0.037) in treatment group •Significant difference in SF-36 scores from 47 to 62 in treatment group compared to 46 to 48 in sham (p=0.029)

Intradiscal Biaculoplasty

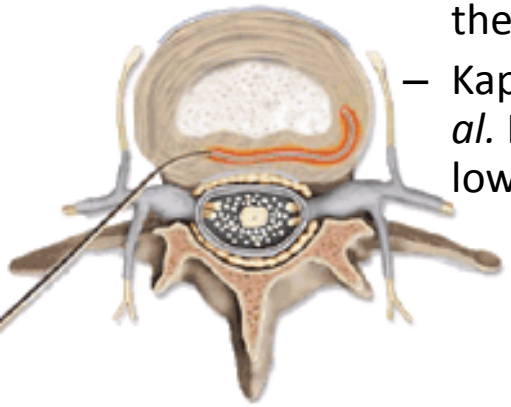
- 1 RCT of moderate quality and 2 prospective studies that show positive results for intradiscal biacuplasty.
  - No complications have been reported that is directly related to this procedure.
  - This modality may be useful for the treatment of discogenic pain.



5. DiscTRODE

Damian O, Nicholas HL C, Kris V. *Discogenic Low Back Pain: A Topical Review.* Ortho & Rheum Open Access 2018; 10(4): 555795

- A well-conducted but underpowered RCT which showed no significant difference between DiscTRODE and sham procedure
- A comparative study that showed inferiority of DiscTRODE to IDET and a positive prospective study showed that the evidence is not supportive of DiscTRODE for the treatment of discogenic pain.
  - Kvarstein G, Mawe L, Indahl A, Hol PK, Tennoe B, Digernes R, *et al.* A randomized double-blind controlled trial of intra-annular radiofrequency thermal disc therapy--a 12-month follow-up. *Pain*. 2009;**145**(3):279-86.
  - Kapural L, Vrooman B, Sarwar S, Krizanac-Bengez L, Rauck R, Gilmore C, *et al.* Radiofrequency intradiscal biacuplasty for treatment of discogenic lower back pain: a 12-month follow-up. *Pain Med*. 2015;**16**(3):425-31.



6. Bipolar Radiofrequency Annuloplasty

- Retrospective study
- All 60 patients who had undergone bipolar radiofrequency annuloplasty
- Patients from single pain centre from November 2014 to January 2017
- Data collected from EMR, pain questionnaires (BPI) and telephone verification of details

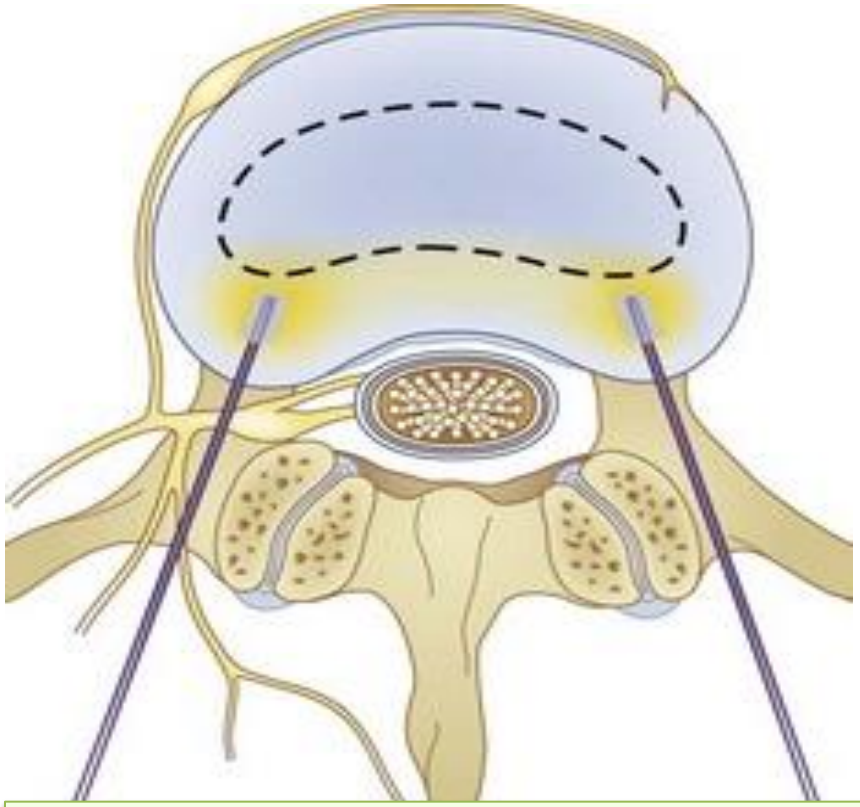
Patient Selection

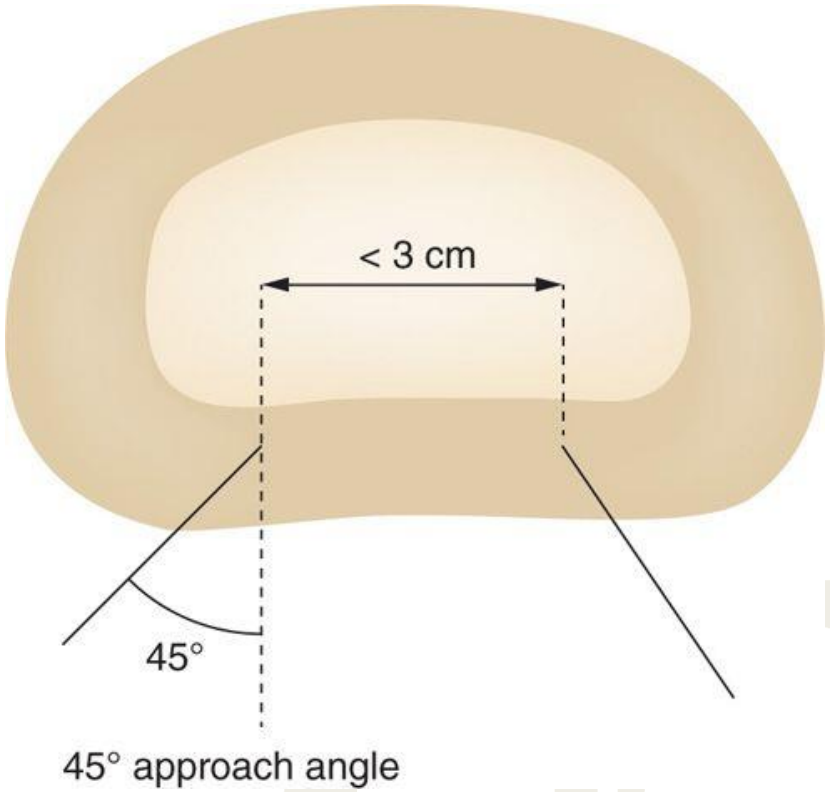
1. Axial back pain (with no radicular symptoms) for duration more than 6 months
2. Predominantly more sitting pain than standing/walking pain
3. No tenderness in sacroiliac joint or piriformis muscles
4. Recent MRI (less than 3 months ago) showing 1 or more levels of HIZ (high intensity zone)
5. Positive provocative discography (no control disc)

Technique

- Two 20G RF (Diskit; Cosman) needles with 20mm exposed tips placed in the posterior annulus of disc using fluoroscopic posterolateral, oblique approach
- Our protocol included a gradual increase in the temperature to from 60 - 75 deg celsius over 12 min.
- Patient remained awake and communicative.
- Patient then transferred to recovery and monitored for 2 hr, then discharged with instructions and abdominal binder.

Technique





45° approach angle

Clinical tips:

1. Motor stimulation up to 1.2V, Sensory stimulation up to 1.0V exclude proximity to nerve root
2. Bipolar- one electrode emitting, other electrode receiving. Temperature variance between the 2 usually 5-8 deg celsius difference.

Statistics

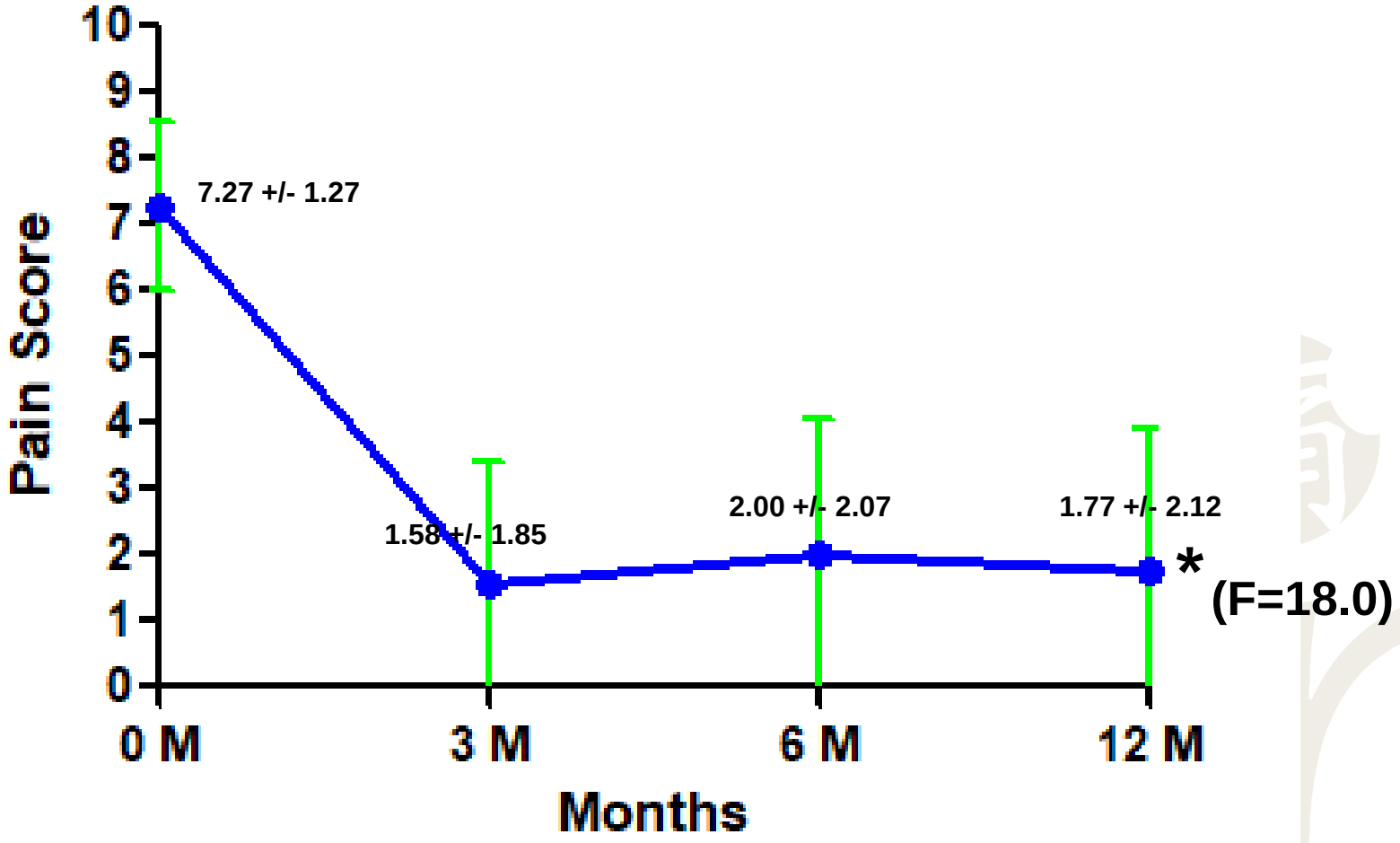
- Multivariate testing using the General Linear Model with repeated measures
- Age, Baseline pain, Gender as defined as covariates
- Tests of sphericity <0.05
- Post-hoc analysis were not performed as this was a retrospective hypothesis generating study
- Significance level was set at $p < 0.05$
- SPSS Version 25.0

Demographic Characteristics	n= 60
Gender	
Male	40% (24/60)
Female	60% (36/60)
Age (years) Mean ± SD	49.5 ± 11.6
Duration of Backpain (years) Mean ±SD	2.7 ± 4.0
VAS (Baseline) Mean ± SD	7.3 ± 1.3
Lumbar Discs	
L1/2	1.1% (1/88)
L2/3	4.5% (4/88)
L3/4	15.9% (14/88)
L4/5	50.0% (44/88)
L5/S1	28.4% (25/88)

Results

- Mauchly's test of sphericity $p<0.01$
- 47/60 (78%) had a 3-point or more reduction in VAS
- Decrease in pain scores within cohort from baseline to 3, 6 and 12 months significant ($p<0.01$)
  - Pain score-Age interaction significant ($p=0.014$, $F=3.87$)
  - Rest of interactions- Duration of pain, gender NOT significant.
- Complications: 1 patient had radicular pain 3 months post-procedure; MRI showed slightly larger disc bulge.

Results

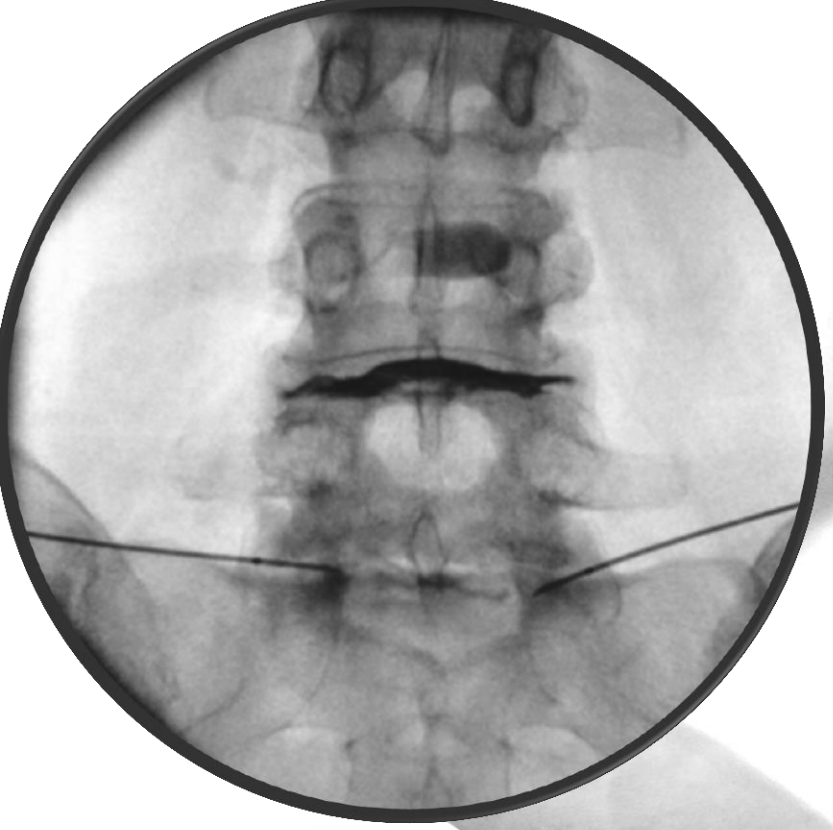


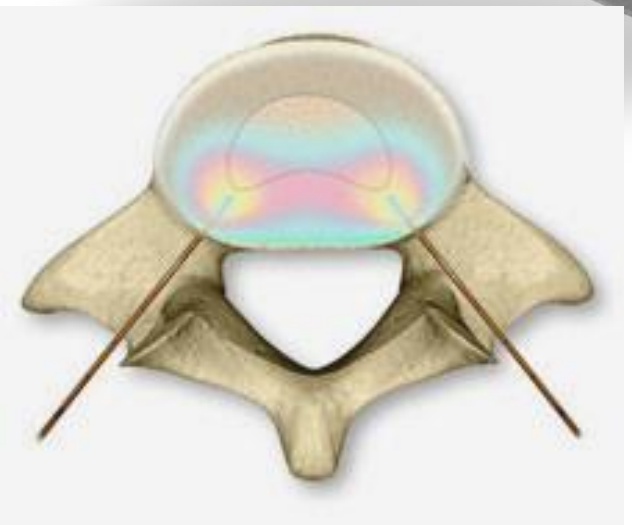
Limitations

- The major limitations of our study are:
  1. Retrospective design
  2. Only 60 patients were evaluated
  3. A contemporaneous control group was not included
  4. Neither patients nor the investigators conducting follow-up assessments were blinded to treatment
- The observed changes cannot be attributed solely to the intervention.
- Results should thus be considered preliminary rather than definitive
- Suggest that an adequately powered, randomized, and blinded trial would be worth conducting

Summary

- Discogenic low back pain is a major cause of disability; Large socioeconomic healthcare costs
- Diffuse pattern of discogenic low back pain makes its difficult to define clinically
- Inflammation and neo-innervation important part of pathomechanism process
- HIZs has high sensitivity but low specificity
- Provocative discography has high specificity and positive predictive value
- Numerous discogenic treatment modalities available, many of which are radiofrequency modalities. IDET and Biaculoplasty amongst the most widely studied.





“The most important point is to correlate the findings on MRI with patients' clinical symptoms.”


Thank you for your kind attention!
Questions or *Slides Request*?
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