NUTS AND BOLTS OF LOW BACK PAIN

MAY 6TH 2021

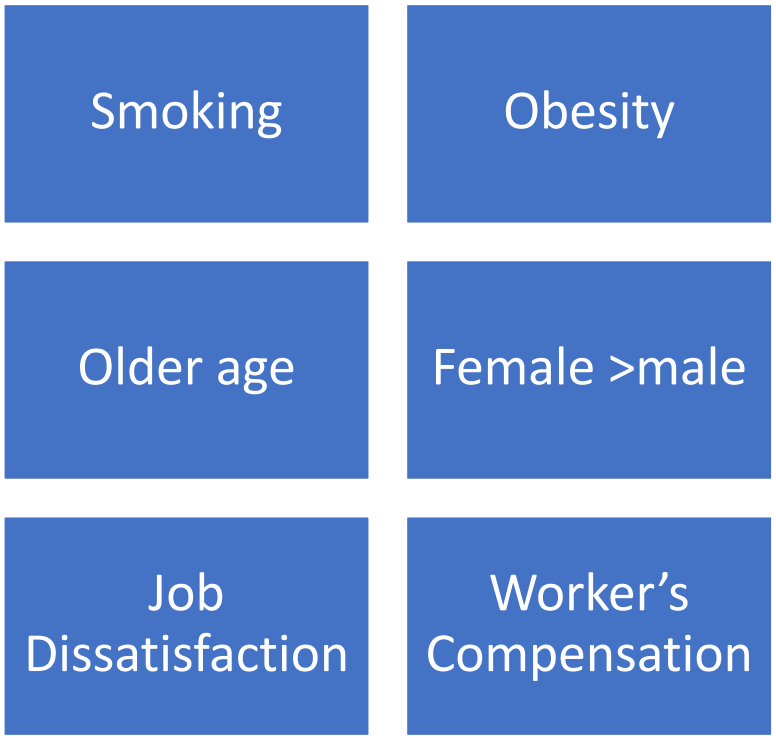
I HAVE NO FINANCIAL DISCLOSURES APART FROM THE SESSIONAL PAYMENT I MIGHT RECIEVE FROM PATHWAYS.

I HAVE NO CONFLICTS OF INTEREST WITH THE PRESENTED MATERIAL IN THIS PRESENTATION.

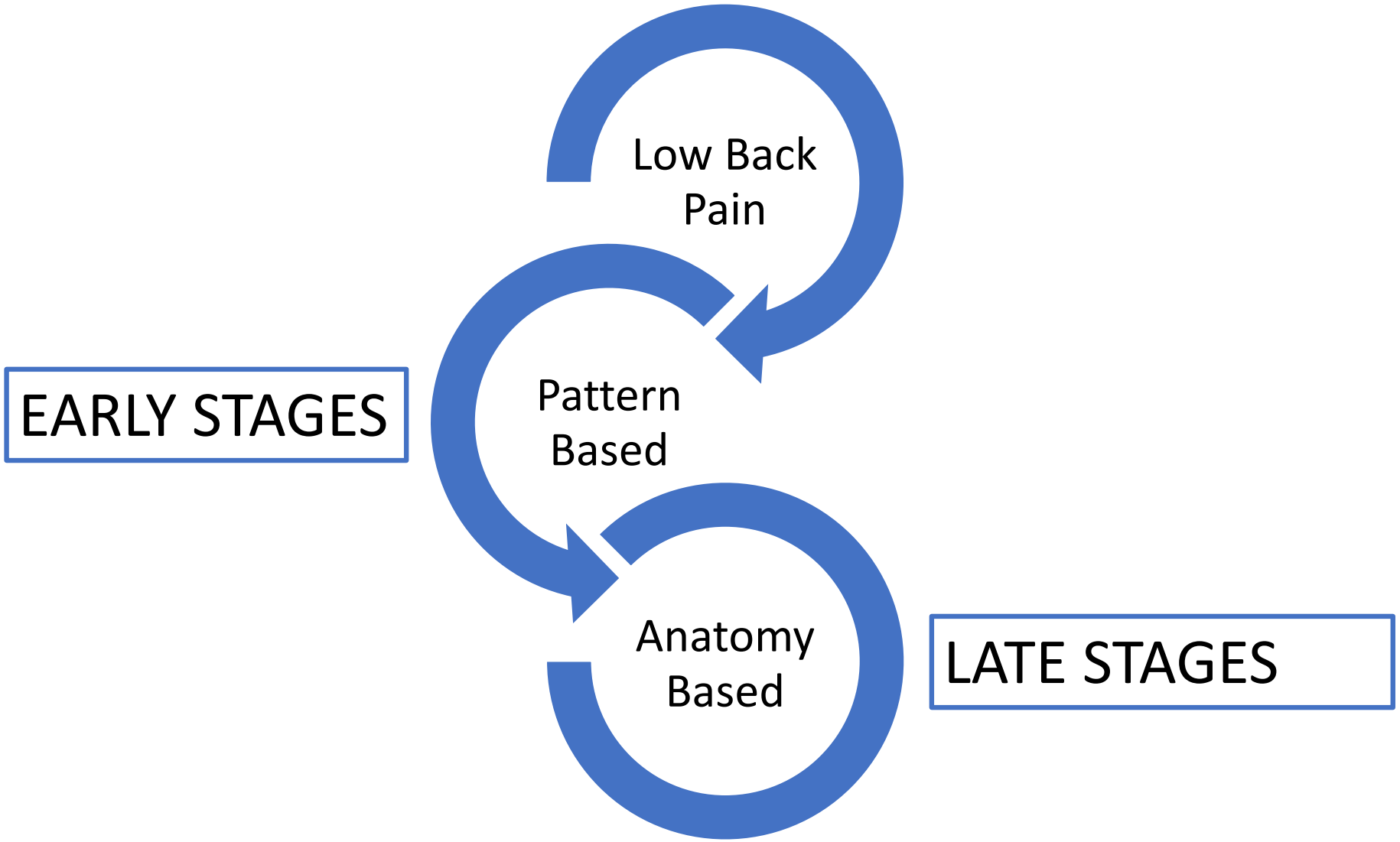
OBJECTIVES

1. Back pain Pattern recognition
2. Exercise prescription
3. Radicular pain vs. Radiculopathy vs. Referred Pain
4. The power of imaging and the importance of avoiding being a VOMIT
5. Importance of delinking of the Pain from suffering and anatomical diagnosis

Low Back Pain Risk factors



- Sedentary work
- Physically strenuous work
- Psychologically strenuous work
- Psychological factors – somatization, anxiety, depression


Low Back Pain
Pattern Based
Anatomy Based
EARLY STAGES
LATE STAGES

Developed by: Centre for Effective Practice

Endorsed by: Canadian Spine Society; Nurse Practitioners' Association of Ontario; The College of Family Physicians of Canada / Le Collège des médecins de famille du Canada

Centre for Effective Practice

Clinically Organized Relevant Exam (CORE) Back Tool

This tool will guide the family physician and/or nurse practitioner to recognize common mechanical back pain syndromes and screen for other conditions where management may include investigations, referrals and specific medications. This is a focused examination for clinical decision-making in primary care.

Overview of Tool and Key Points

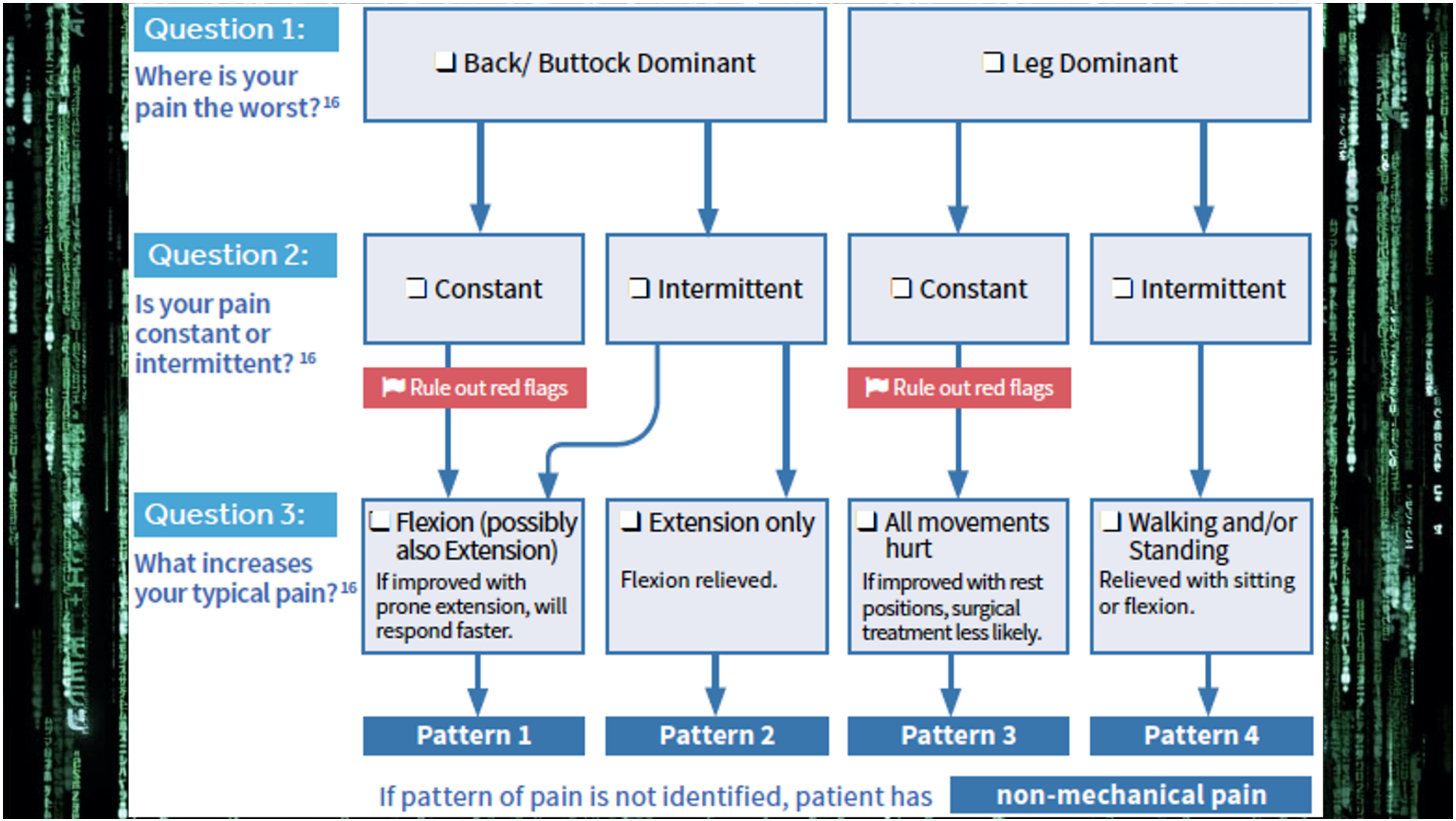
Throughout this tool, key messages for your patient are embedded in each section as indicated by a key symbol ( ).

RED FLAGS

• Neurological: diffuse motor/sensory loss, progressive neurological deficits, cauda equina syndrome	• Urgent MRI indicated
• Infection: fever, IV drug use, immune suppressed	• X-ray and MRI
• Fracture: trauma, osteoporosis risk/ fragility fracture	• X-ray and may require CT
• Tumour: hx of cancer, unexplained weight loss, significant unexpected night pain, severe fatigue	• X-Ray and MRI
• Inflammation: chronic low back pain > 3 months, age of onset < 45, morning stiffness > 30 minutes, improves with exercise, disproportionate night pain	• Rheumatology consultation and Guidelines

Pattern recognition – BACK PAIN MATRIX

- Back dominant vs. leg dominant
- Intermittent or constant
- Aggravating movement


Question 1:
Where is your pain the worst? 16
❑ Back/ Buttock Dominant
❑ Leg Dominant
Question 2:
Is your pain constant or intermittent? 16
❑ Constant
❑ Intermittent
❑ Constant
❑ Intermittent
Rule out red flags
Rule out red flags
Question 3:
What increases your typical pain? 16
❑ Flexion (possibly also Extension)
If improved with prone extension, will respond faster.
❑ Extension only
Flexion relieved.
❑ All movements hurt
If improved with rest positions, surgical treatment less likely.
❑ Walking and/or Standing
Relieved with sitting or flexion.
Pattern 1
Pattern 2
Pattern 3
Pattern 4
If pattern of pain is not identified, patient has
non-mechanical pain

PHYSICAL EXAM

Gait	Heel Walking (L4-5) Toe Walking (S1)
Standing	**Movement testing in flexion** **Movement testing in extension** Trendelenburg test (L5) Repeated toe raises (S1)
Sitting	**Patellar reflex (L3-4)** Quadriceps power (L3-4) Ankle dorsiflexion power (L4-5) **Great toe extension power (L5)** **Great toe flexion power (S1)** **Plantar response, upper motor test**
Kneeling	Ankle reflex (S1)
Lying	Supine **Passive straight leg raise (SLR)** Passive hip range of motion Prone Femoral nerve stretch (L3-4) Gluteus maximus power (S1) **Saddle sensation testing (S2-3-4)** Passive back extension (patient uses arms to elevate upper body)

Yellow Flags

- 30-40% of patients with chronic back pain also have depression; difficult to know which was first:

1) Persistent pain leading to Depression

2) Depressed patients are at higher risk of developing neck and back pain

- 1628 patients were studied with LBP: 3x as likely to have low physical and emotional functioning
- Fear Avoidance Beliefs/ Kinesophobia Predicts performance on physical activity tests better than actual pain during testing
- Reluctance to engage in active rehabilitation program
- Treating fear avoidance significantly reduces disability

YELLOW	FLAGS
“Do you think your pain will improve or become worse?”	Belief that back pain is harmful or potentially severely disabling.
“Do you think you would benefit from activity, movement or exercise?”	Fear and avoidance of activity or movement.
“How are you emotionally coping with your back pain?”	Tendency to low mood and withdrawal from social interaction.
“What treatments or activities do you think will help you recover?”	Expectation of passive treatment(s) rather than a belief that active participation will help.

	Pattern 1
Commonly Called[27]	**Disc Pain**
Medication[5,6,7] ④	❑ Acetaminophen ❑ NSAID
Recovery Positions[28]	
Starter Exercises[29]	Repeated prone lying passive extensions (i.e. hips on ground, arms straight). 10 reps, 3 x day
Exercises	ISAEC[35]; HealthLink BC[34]; SASK Pattern 1[30]
Functional Activities[36]	❑ Encourage short frequent walking ❑ Reduce sitting activities ❑ Use extension roll for short duration sitting
Follow-up	❑ **2–4 weeks** if referred to therapy, or prescribed medication ❑ **PRN** if given home program and relief noted in office visit
Self Management[37-40] ⑥	Once pain is reduced, engage patient for self management goals

	Pattern 1	Pattern 2
Commonly Called[27]	**Disc Pain**	**Facet Joint Pain**
Medication[5,6,7] ④	❑ Acetaminophen ❑ NSAID	❑ Acetaminophen ❑ NSAID
Recovery Positions[28]		
Starter Exercises[29]	Repeated prone lying passive extensions (i.e. hips on ground, arms straight). 10 reps, 3 x day	Sitting in a chair, bend forward and stretch in flexion. Use hands on knees to push trunk upright. Small frequent repetitions through the day
Exercises	ISAEC[35]; HealthLink BC[34]; SASK Pattern 1[30]	ISAEC[35]; HealthLink BC[34]; SASK Pattern 2[31]
Functional Activities[36]	❑ Encourage short frequent walking ❑ Reduce sitting activities ❑ Use extension roll for short duration sitting	❑ Encourage sitting or standing with foot stool ❑ Reduce back extension and overhead reach
Follow-up	❑ **2–4 weeks** if referred to therapy, or prescribed medication ❑ **PRN** if given home program and relief noted in office visit	❑ **2–4 weeks** if referred to therapy, or prescribed medication ❑ **PRN** if given home program and relief noted in office visit
Self Management[37-40] ⑥	Once pain is reduced, engage patient for self management goals	Self management can be initiated in 1st or 2nd session with most patients

	Pattern 1	Pattern 2	Pattern 3
Commonly Called[27]	**Disc Pain**	**Facet Joint Pain**	**Compressed Nerve Pain**
Medication[5,6,7] ④	❑ Acetaminophen ❑ NSAID	❑ Acetaminophen ❑ NSAID	❑ May require opioids if 1st line pain meds not sufficient ⑤
Recovery Positions[28]			
Starter Exercises[29]	Repeated prone lying passive extensions (i.e. hips on ground, arms straight). 10 reps, 3 x day	Sitting in a chair, bend forward and stretch in flexion. Use hands on knees to push trunk upright. Small frequent repetitions through the day	"Z" lie (see image above) **Caution:** exercise will aggravate the pain so start with pain reducing positions
Exercises	ISAEC[35]; HealthLink BC[34]; SASK Pattern 1[30]	ISAEC[35]; HealthLink BC[34]; SASK Pattern 2[31]	ISAEC[35]; HealthLink BC[34]; SASK Pattern 3[32]
Functional Activities[36]	❑ Encourage short frequent walking ❑ Reduce sitting activities ❑ Use extension roll for short duration sitting	❑ Encourage sitting or standing with foot stool ❑ Reduce back extension and overhead reach	❑ Change positions frequently from sit to stand to lie to walk
Follow-up	❑ **2–4 weeks** if referred to therapy, or prescribed medication ❑ **PRN** if given home program and relief noted in office visit	❑ **2–4 weeks** if referred to therapy, or prescribed medication ❑ **PRN** if given home program and relief noted in office visit	❑ **2 weeks** for pain management and neurological review
Self Management[37-40] ⑥	Once pain is reduced, engage patient for self management goals	Self management can be initiated in 1st or 2nd session with most patients	Patient is not usually suitable for self management due to high pain levels and possible surgical intervention

	Pattern 1	Pattern 2	Pattern 3	Pattern 4
Commonly Called[27]	**Disc Pain**	**Facet Joint Pain**	**Compressed Nerve Pain**	**Symptomatic Spinal Stenosis (Neurogenic Claudication)**
Medication[5,6,7] ④	❑ Acetaminophen ❑ NSAID	❑ Acetaminophen ❑ NSAID	❑ May require opioids if 1st line pain meds not sufficient ⑤	❑ Acetaminophen ❑ NSAID
Recovery Positions[28]				
Starter Exercises[29]	Repeated prone lying passive extensions (i.e. hips on ground, arms straight). 10 reps, 3 x day	Sitting in a chair, bend forward and stretch in flexion. Use hands on knees to push trunk upright. Small frequent repetitions through the day	"Z" lie (see image above) **Caution:** exercise will aggravate the pain so start with pain reducing positions	Rest in a seated or other flexed position to relieve the leg pain
Exercises	ISAEC[35]; HealthLink BC[34]; SASK Pattern 1[30]	ISAEC[35]; HealthLink BC[34]; SASK Pattern 2[31]	ISAEC[35]; HealthLink BC[34]; SASK Pattern 3[32]	ISAEC[35]; HealthLink BC[34]; SASK Pattern 4[33]
Functional Activities[36]	❑ Encourage short frequent walking ❑ Reduce sitting activities ❑ Use extension roll for short duration sitting	❑ Encourage sitting or standing with foot stool ❑ Reduce back extension and overhead reach	❑ Change positions frequently from sit to stand to lie to walk	❑ Use support with walking or standing. Use frequent sitting breaks
Follow-up	❑ **2–4 weeks** if referred to therapy, or prescribed medication ❑ **PRN** if given home program and relief noted in office visit	❑ **2–4 weeks** if referred to therapy, or prescribed medication ❑ **PRN** if given home program and relief noted in office visit	❑ **2 weeks** for pain management and neurological review	❑ **6–12 weeks** for symptom management and determination of functional impact
Self Management[37-40] ⑥	Once pain is reduced, engage patient for self management goals	Self management can be initiated in 1st or 2nd session with most patients	Patient is not usually suitable for self management due to high pain levels and possible surgical intervention	Self management can be initiated in 1st or 2nd session with most patients

Non-Mechanical Pain
❑ **Non-spine related pain**
↓
Consider other etiologies prior to pain medications
↓
Consider internal organ pain referral such as kidney, uterus, bowel, ovaries
❑ **Spine pain does not fit mechanical pattern**
↓
Consider centralized pain medications (i.e. anti-depressants, anti-seizure, opioids)
↓
Consider pain disorder

Prescription Exercise

- Motion is lotion
- https://www.healthlinkbc.ca/health-topics/tr5948

Exercises to try if your back pain is eased by standing or lying down:

- Alternate arm and leg (bird dog)
- Backward bend
- Bridging
- Hip flexor stretch
- Press-up
- Relax and rest

Exercises to try if your back pain is eased by sitting down:

- Double knee-to-chest
- Piriformis stretch
- Single knee-to-chest

Exercises to try when no position eases your back pain:

- Cat-camel
- Clamshell
- Curl-ups
- Front plank
- Hamstring stretch
- Pelvic rock, sitting
- Pelvic rock, standing
- Pelvic tilt
- Side plank, beginner
- Side plank, intermediate
- Walking
- Wall sit

Referrals

❑ **Rehabilitation referral**

Rehabilitation Referral Criteria (4–12 treatments)

❑ Absence of red flags
❑ Pain is managed well so that patient can tolerate treatment
❑ Pain has mechanical directional preference – varies with movement, position or activity
❑ Patient is ready to be an active partner in goal setting and self management

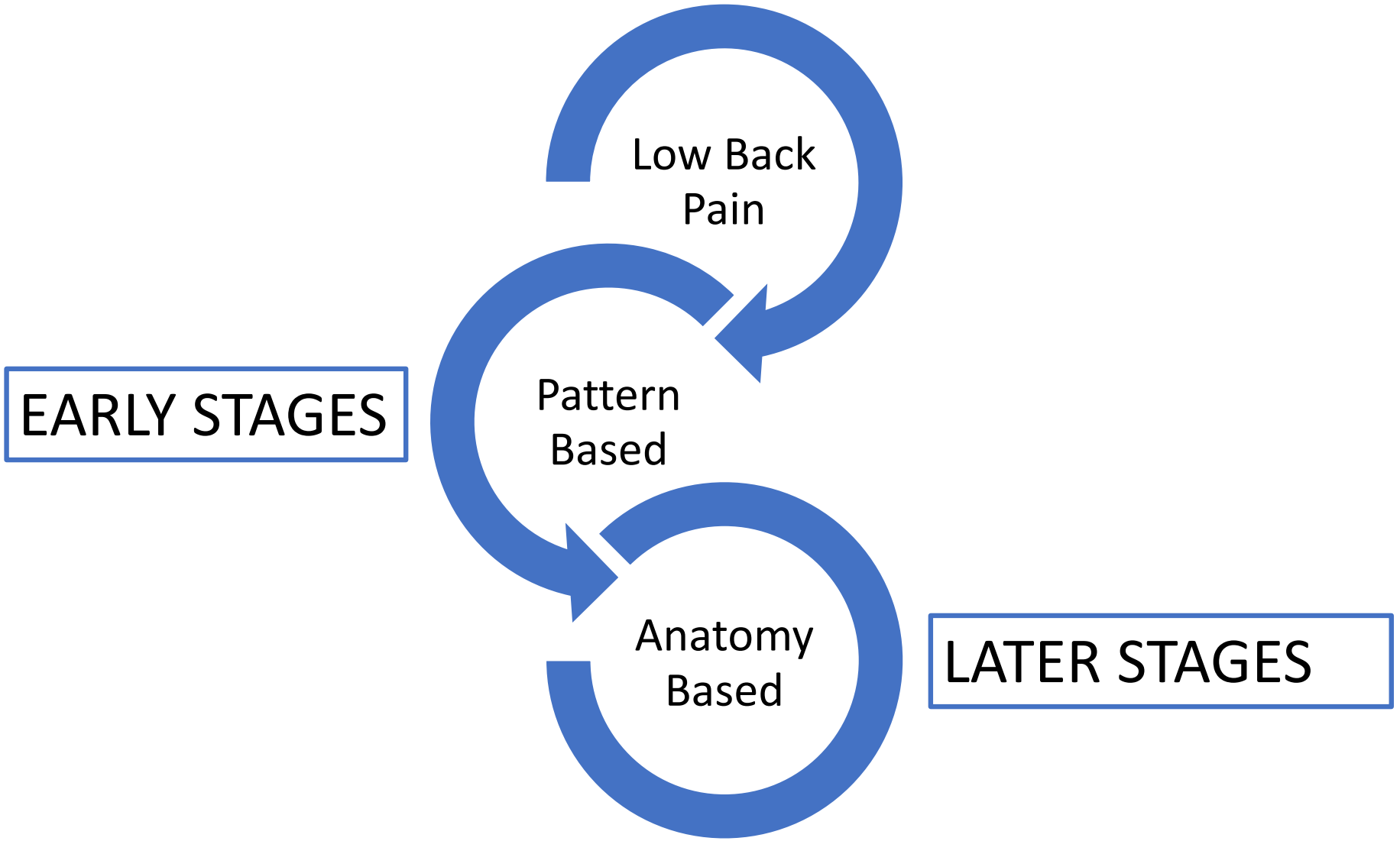
❑ **Surgical referral**

Surgical Referral Criteria [23]

❑ Failure to respond to evidence based compliant conservative care of at least 12 weeks
❑ Unbearable constant leg dominant pain
❑ Worsening nerve irritation tests (SLR or femoral nerve stretch)
❑ Expanding motor, sensory or reflex deficits
❑ Recurrent disabling sciatica
❑ Disabling neurogenic claudication

❑ **Specialist referral**

❑ Physiatry
❑ Cognitive Behavioural Therapy
❑ Pain specialist
❑ Multidisciplinary Pain Clinic
❑ Rheumatologist
❑ Other: _____


Low Back Pain
Pattern Based
Anatomy Based
EARLY STAGES
LATER STAGES

Disc

Z-joint

Sacroiliac joint

Nerves and dura

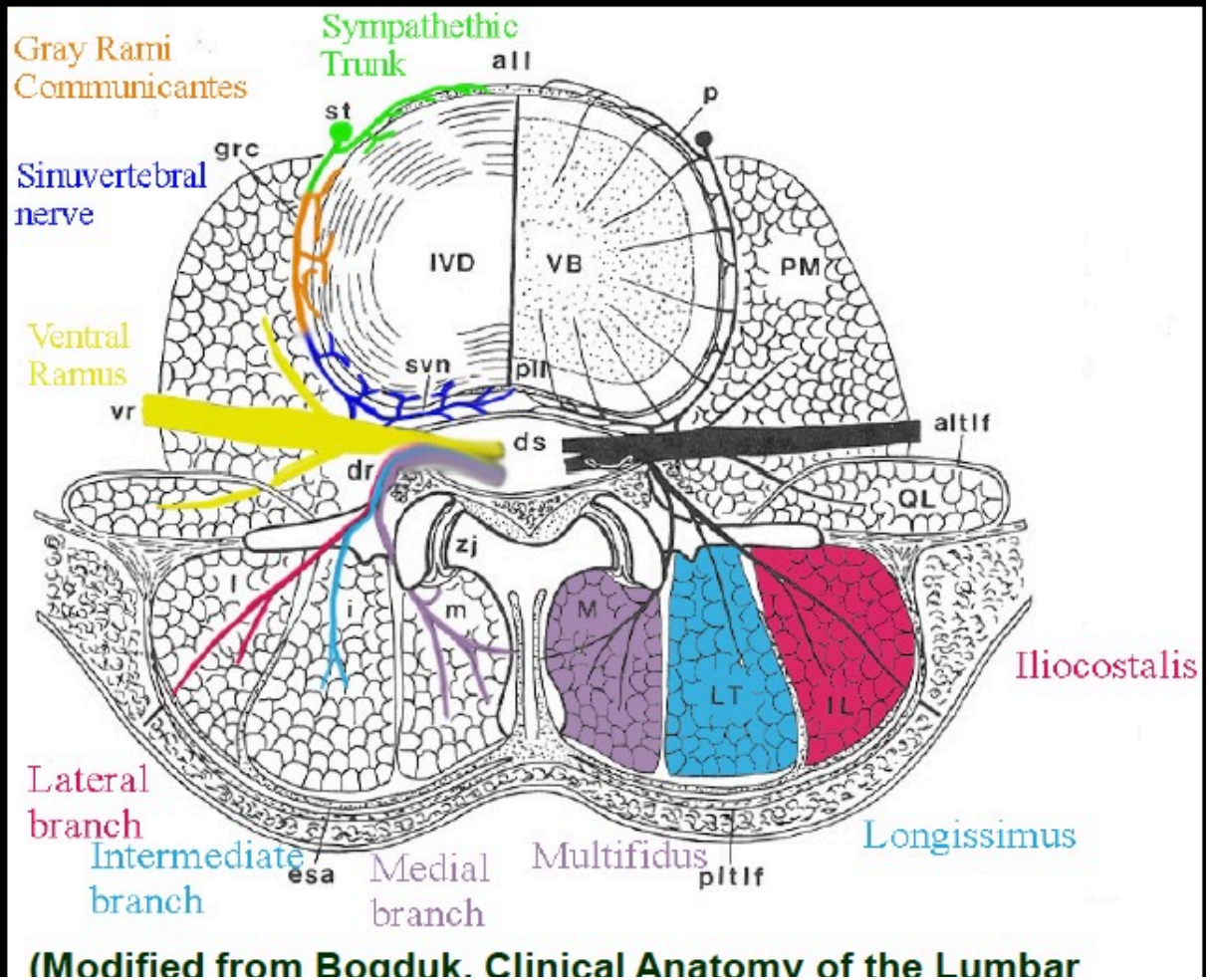
Ligaments-PLL, ALL

Muscle

Vertebral body and sacrum

periosteum

Hip



(Modified from Bogduk, Clinical Anatomy of the Lumbar

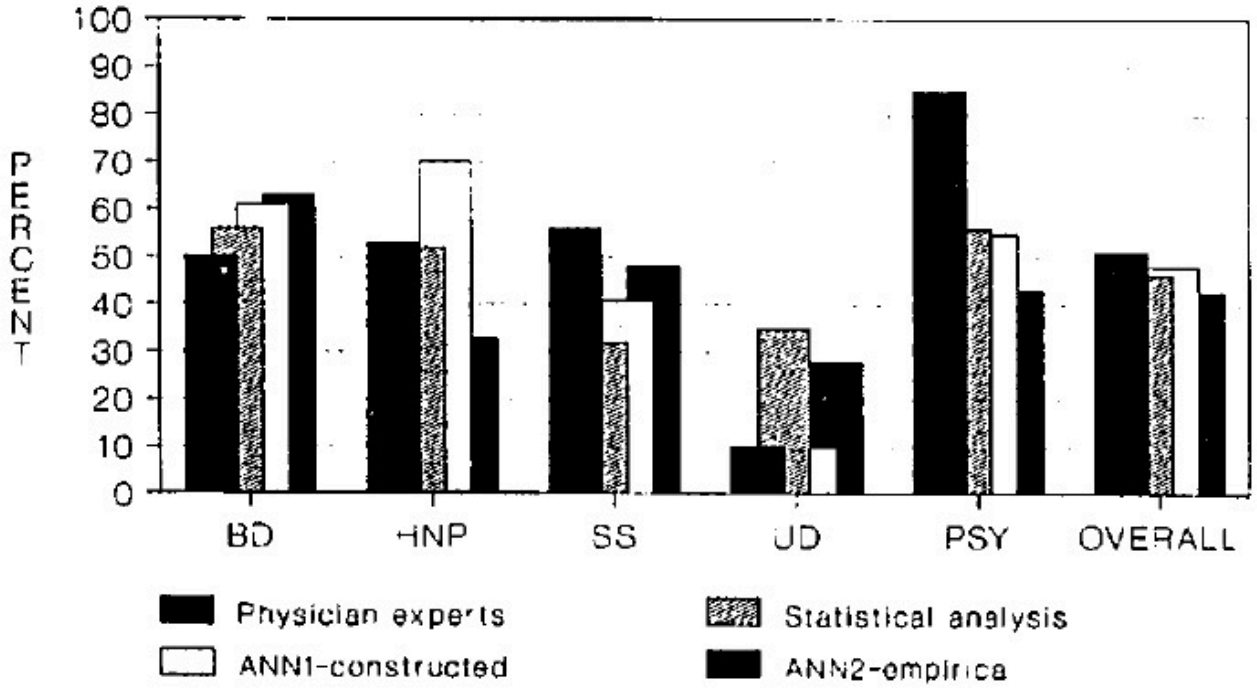


Figure 4. Accuracy (sensitivity) of physician experts, discriminant analysis, and the most accurate networks trained on constructed (ANN1) and empirical (ANN2) pain drawings (BD = benign disorder, HNP = herniated disc, SS = spinal stenosis, UD = underlying disorder, PSY = psychogenic disorder).

Spine 1993 Jan;18(1):41-53.

Initial-impression diagnosis using low-back pain patient pain drawings

N H Mann 3rd [1], M D Brown, D B Hertz, I Enger, J Tompkins

Pain Diagram

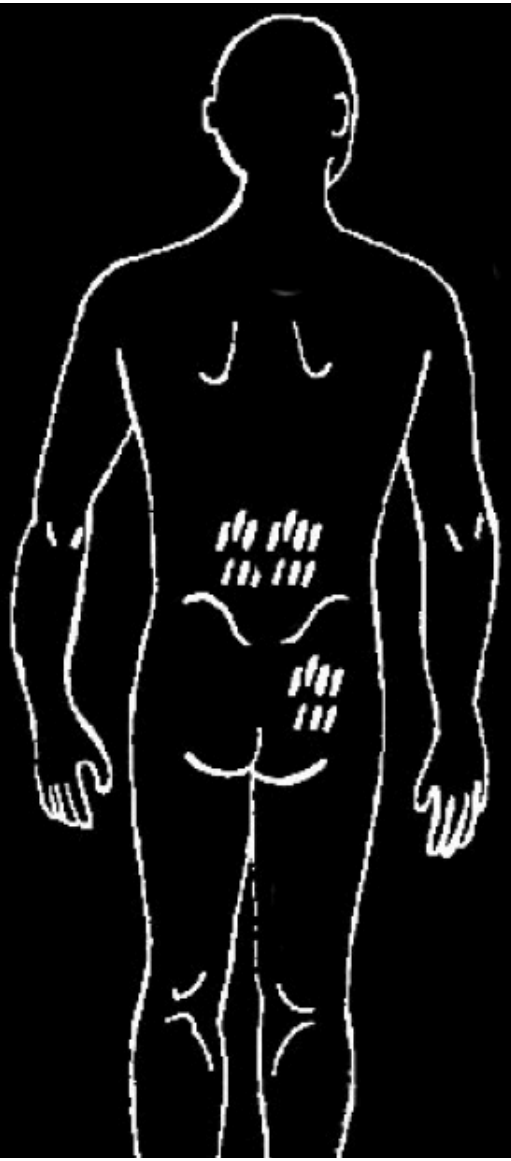
51% Overall accuracy of dx using pain drawing alone

85% for psychogenic pain

58% spinal stenosis

52% herniated disc

10% for underlying disorder



Radiating Pain

Radicular pain

- Not simply nerve root compression
- *Inflammatory mediators cause sensitization*
- May be sharp, stabbing, burning, or electrical, numbness/tingling
- Well localized, segmental distribution

With or Without

RADICULOPATHY

Either Sensory Deficit or Motor Deficit

Radicular Pain
Differential Diagnosis

- Herniated disc
  - Chemical radiculitis related to inflammatory mediators +/- nerve root compression
- Spondylosis with lateral recess or foraminal stenosis
- Spondylolisthesis with foraminal stenosis
- Z-joint synovial cyst
- Herpes zoster
- Pseudoradicular - peripheral nerve entrapment

Radiating pain

Somatic Referred Pain

- Dull, achy
- More vague localization
- **Multiple potential pain sources produce similar pattern**
- Neuro intact

Axial & Somatic Referred Pain

Differential Diagnosis

Intervertebral disc

Zygapophysial joint

Sacroiliac joint

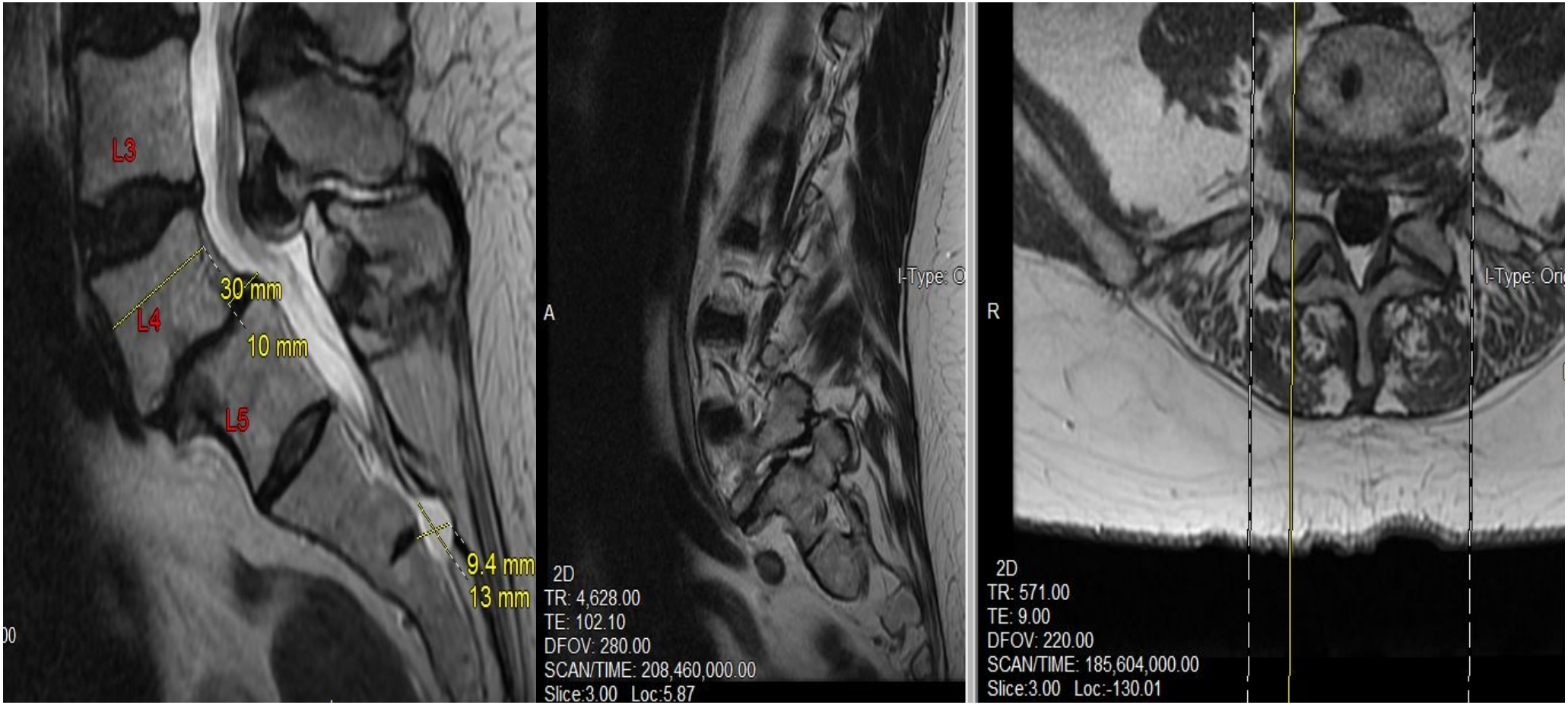
Ligamentous and muscular

Vertebral body or sacral (fracture)

Pars interarticularis

69 Female patient

- LBP since 1996
- Recent worsening
- Back dominant pain – NO LEG PAIN
- Extension restricted
- Flexion restricted
- Ramps and speed bumps worsens pain
- Sitting 15 minutes – back pain
- Standing 15 minutes – back pain
- Walking 15 minutes – develops back pain
- Back pain above and below the belt
- Left below the belt
- Right at the belt
- Both sides above the belt
- Decreased sensation in Left L4 dermatome
- Right Patrick's positive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13 mm
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TE: 102.10
DFOV: 280.00
SCAN/TIME: 208,460,000.00
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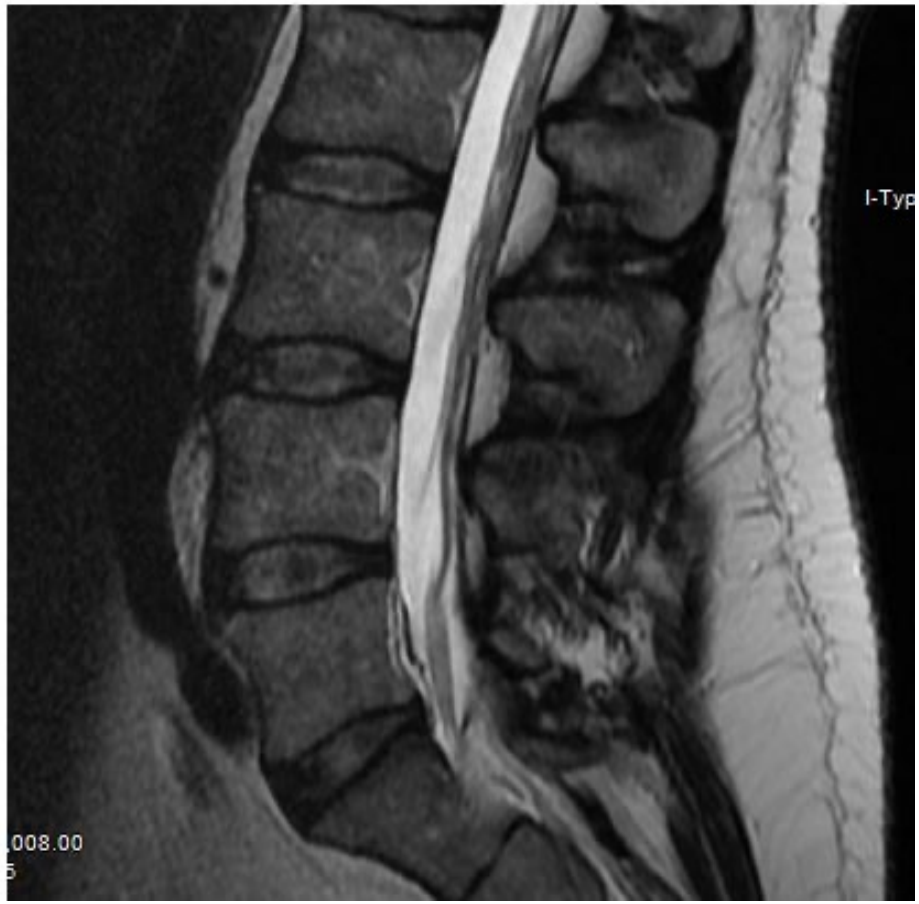
I-Type: Ori
2D
TR: 571.00
TE: 9.00
DFOV: 220.00
SCAN/TIME: 185,604,000.00
Slice:3.00 Loc:-130.01

45 Male

- Back pain 2 years
- Axial and across the back
- Seen in 5 pain clinics
- Asked to get back to work
- Flexion is mildly limited
- Was quiet distressed
- Black flag
- Feels unsupported
- Extension is limited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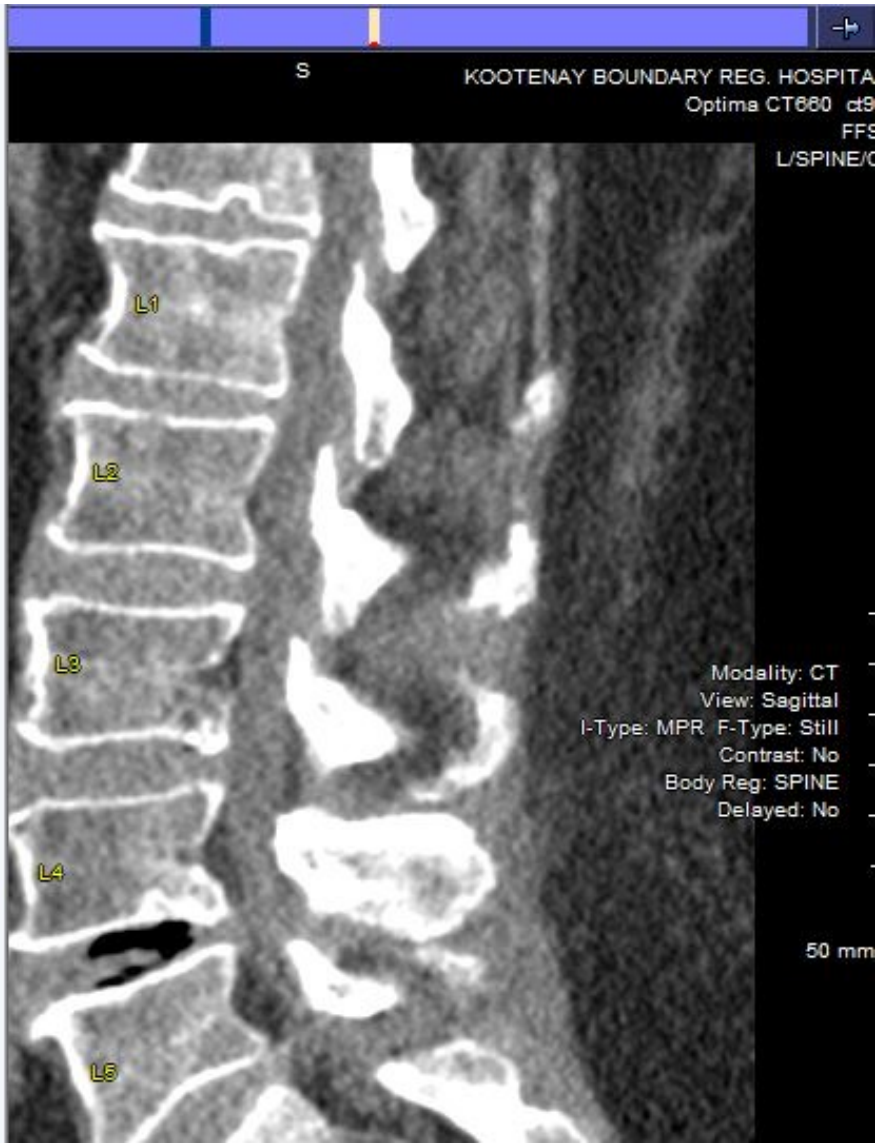
Spinal stenosis

- 67 M wheelchair
- 130 Kg
- DM, HTN, CAD
- Back dominant pain
- Some pain in legs

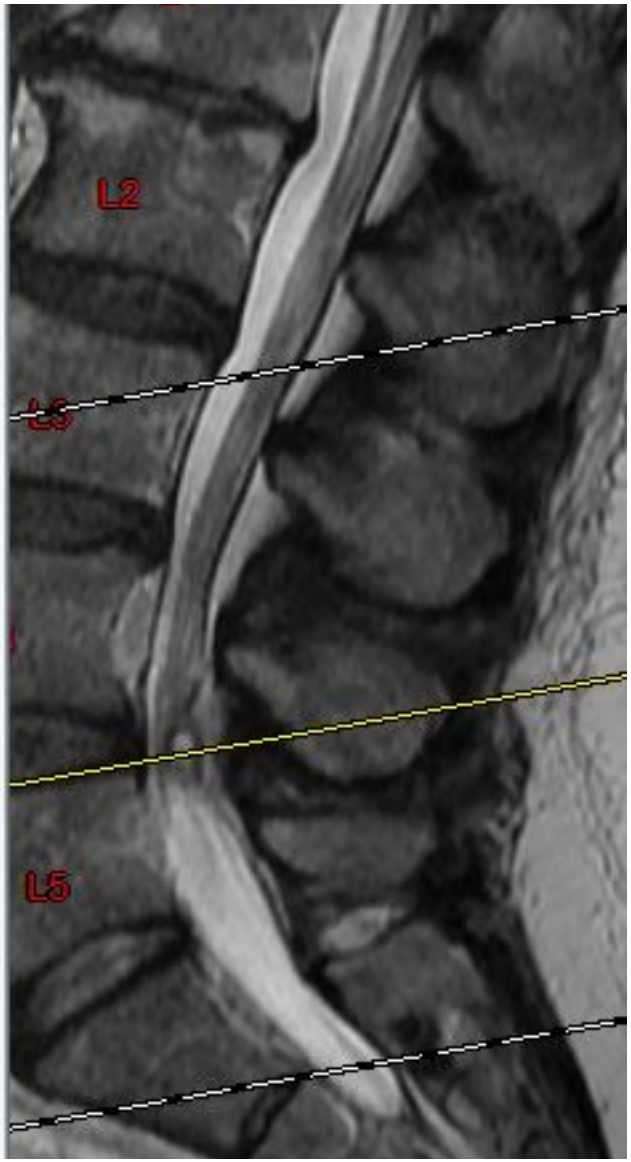

S
KOOTENAY BOUNDARY REG. HOSPITAL
Optima CT660 ct99
FFS
L/SPINE/C-
100 mm
Modality: CT
View: Sagittal
I-Type: Scout F-Type: Still
Contrast: No
Body Reg: SPINE
Delayed: No
159 mm


S
KOOTENAY BOUNDARY REG. HOSPITA
Optima CT660 ct9
FFS
L/SPINE/C
L1
L2
L3
L4
L5
Modality: CT
View: Sagittal
I-Type: MPR F-Type: Still
Contrast: No
Body Reg: SPINE
Delayed: No
50 mm

Synovial Cysts

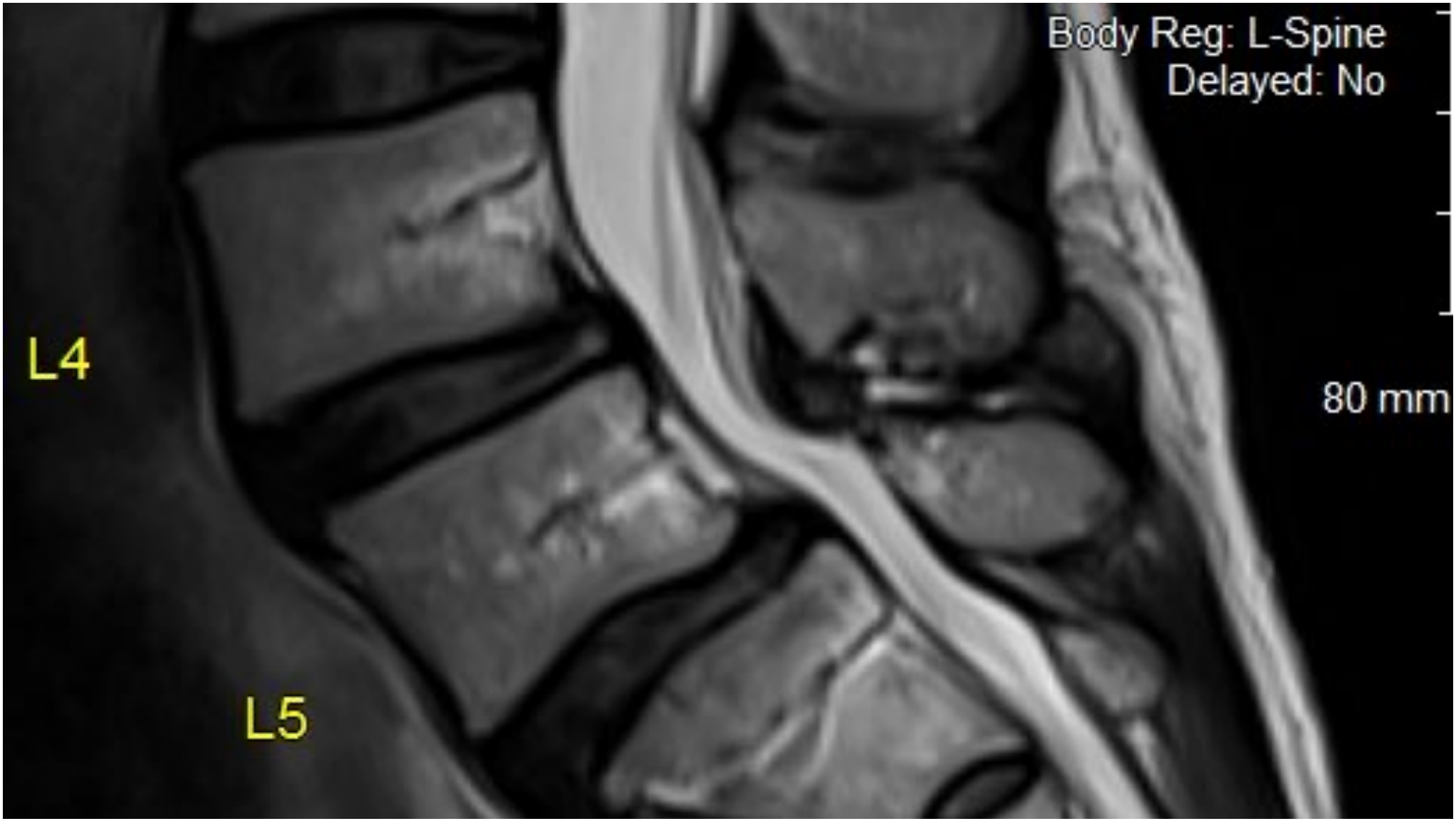
- 52 M
- Back dominant pain – mainly left
- Minimal radiation to legs
- No radicular pattern
- WCB


Modality: MR
View: Axial
I-Type: Original F-Type: Still
Contrast: No
Echo Type: T2
Pulse: SE
Body Reg: SPINE
Delayed: No
L
50 mm


L2
L3
L5

ZOOM appointment, not so good!!

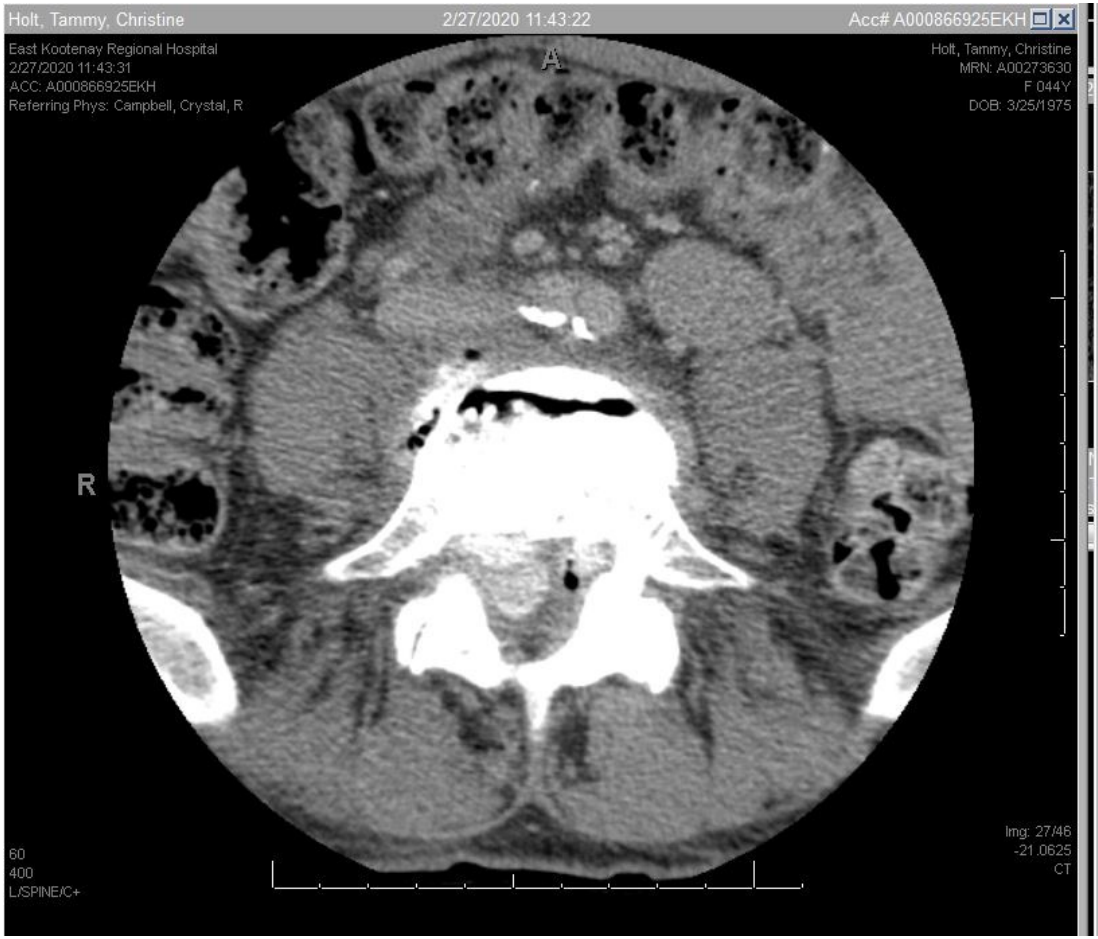
- 60 F, active
- Features of neurogenic claudication
- Across the back band like pain
- Spouse works in the allied sciences “pain field”
- Some back pan with dominant limb pain
- MRI – reported no stenosis


Body Reg: L-Spine
Delayed: No
L4
L5
80 mm

Fungal Mass

IVDA

Other risk factors


Holt, Tammy, Christine
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East Kootenay Regional Hospital
2/27/2020 11:43:31
ACC: A000866925EKH
Referring Phys: Campbell, Crystal, R
Holt, Tammy, Christine
MRN: A00273630
F 044Y
DOB: 3/25/1975
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R
Img: 27/46
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CT
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400
L/SPINE/C+


East Kootenay Regional Hospital
2/27/2020 11:43:06
ACC: A000866925EKH
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Holt, Tammy, Christine
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DOB: 3/25/1975
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241
L/SPINE/C+

Who is a V O M I T?

- Lumbar disc degeneration is present in 40% by the age of 30 and 90% by the age 55
- Thoracic spine disc tears and pressing the cord can be a normal finding
- Cervical spine disc bulges and disc tears are completely normal aging process starting as early as 20s even after an MVA.

Concerned About Your X-ray or MRI Findings?

Medical Imaging: The Untold Truth

Medical imaging such as x-rays, ultrasounds, CT scans and MRIs can be very valuable for identifying serious medical conditions such as broken bones. However, once serious problems have been ruled out by a doctor, minor findings are of no value in helping to explain the vast majority of aches and pains. Not only are the majority of imaging results not helpful, studies support that they are even harmful from a psychological point of view. Several studies have shown that those who are told of "abnormal" (though irrelevant) findings on their medical imaging have more doctor's visits, longer lasting pain, more disability, and a lower sense of well being. [1,2,3]

Despite this fact, every day, thousands of patients are deceived by their imaging reports as they are informed of coincidental tendon tears, disc bulges, degenerations and arthritic changes. Regrettably, patients are rarely told the whole truth about their imaging results as they are simply not informed of what is normal and what is not normal. **If you have been told of "abnormal" findings on your medical imaging and are rightfully concerned about them, please read the information below.**

Lumbar Spine

Studies have shown that lumbar disc degeneration is present in 40% of individuals under the age of 30 and is present in **over 90%** of those between the ages of 50-55. [4]

Another study showed that amongst healthy young adults aged 20-22 years with no back pain, 48% had at least one degenerated disc, and 25% had a bulging disc. [6]

Leading physicians at the department of Neurosurgery at the University of California strongly recommend AGAINST the routine use of MRI for low back pain since they have found NO LINK between degenerative changes seen on x-rays or MRIs and low back pain. [11]

Translation: Do not panic if your x-ray or MRI shows "problems" with your discs; **they are simply NORMAL changes that happen from the age of 20 onwards.**

Thoracic Spine

MRI studies of healthy adults with no history of upper or low back pain found that 47% had disc degeneration, 53% had disc bulges and 58% had disc tears in their thoracic spine. Amazingly 29% of these healthy adults had a disc bulge that was actually deforming and pressing on the spinal cord, yet they did not even know about it. [7,8]

Translation: Do not panic if your x-ray or MRI shows "problems" with your discs; they are simply common and NORMAL findings.

Cervical Spine

An MRI study of healthy adults and seniors found that **98% of all** the men and women with no neck pain had evidence of "degenerative changes" in their cervical discs. [4] In addition, among healthy pain-free young adults in their 20's, up to 78% have been shown to have disc bulges. [5]

A 10 year study compared the MRIs of healthy people to those with neck whiplash injuries. Both immediately and 10 years later, both group had similar MRIs with 3/4 having neck disc bulges. [6]

Translation: The far majority of all healthy adults get **neck degeneration (arthritis) and disc bulges, meaning they are a NORMAL aging process!** Therefore neck arthritis or mild to moderate disc bulges cannot possibly be a reasonable explanation of your neck pain, or else 98% of people would have neck pain.

Hip

There is only a weak association between joint space narrowing seen on hip x-rays and actual symptoms. [12]

In fact, one study showed that 77% of healthy hockey players **who had no pain**, had hip and groin abnormalities on their MRIs. [13]

Translation: Do not panic if your hip x-ray or MRI shows cartilage tears or narrowing; **it is NOT a sign of permanent pain or disability.**

Shoulder

MRI studies of adults who have no shoulder pain show that 20% have partial rotator cuff tears and 15% have full thickness tears. In addition, in those 60 and older, 50% (half) who had no shoulder pain or injury had rotator cuff tears on their MRI that they did not even know about. [14]

A study on professional baseball pitchers showed that 40% of them had either partial or full thickness rotator cuff tears yet had no pain while playing and remained pain free even 5 years after the study. [15]

Translation: Do not panic if your ultrasound and/or MRI shows a rotator cuff tear; **it is NOT necessarily associated with shoulder pain!**

Knee

Studies have shown that when x-rayed, up to 85% of adults with no actual knee pain have x-rays that show knee arthritis. This means that there is little correlation between the degree of arthritis seen on x-ray, and actual pain. [1]

In fact, one study showed that 48% of healthy professional basketball players had meniscal (cartilage) "damage" on their knee MRIs. [2]

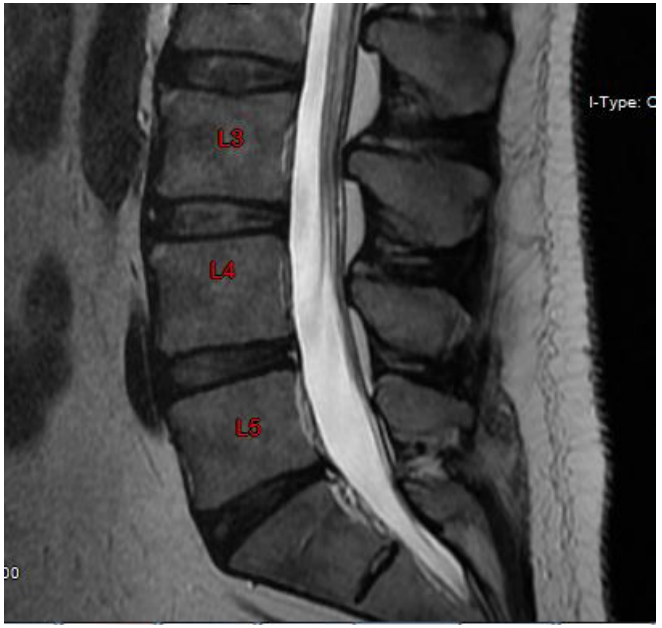
Translation: Do not panic if your knee x-ray or MRI shows degeneration, arthritis or mild cartilage tears; **it is NORMAL!**

Ankle

Although there is an association with plantar fasciitis and heel spurs, it should also be known that 32% of people with no foot or heel pain have a heel spur visible on x-ray. [16]

Translation: One third of all people have a heel spur and **have no pain.**

Anatomic Pathology Linked To Pain



Reference Standard For Lumbosacral Spine Structure as a Source of Pain

- Intervertebral disc - Provocation discography
- Facet joint - Double MBB
- Sacroiliac joint - Double Intra-articular Injections
- Nerve root involvement -Magnetic resonance imaging, myelography, surgical finding
- Spinal stenosis – Magnetic resonance imaging or surgical finding
- Spondylolisthesis - Sagittal plane rotation, translation movement on functional radiograph or translation on static radiograph
- Myofascial structures, Peripheral nerve, Central sensitization –N/A

https://doi.org/10.1016/j.jmpt.2019.08.002; Journal of Manipulative and Physiological Therapeutics Diagnosis for Low Back Pain November/December 2019

Nociceptive Pain

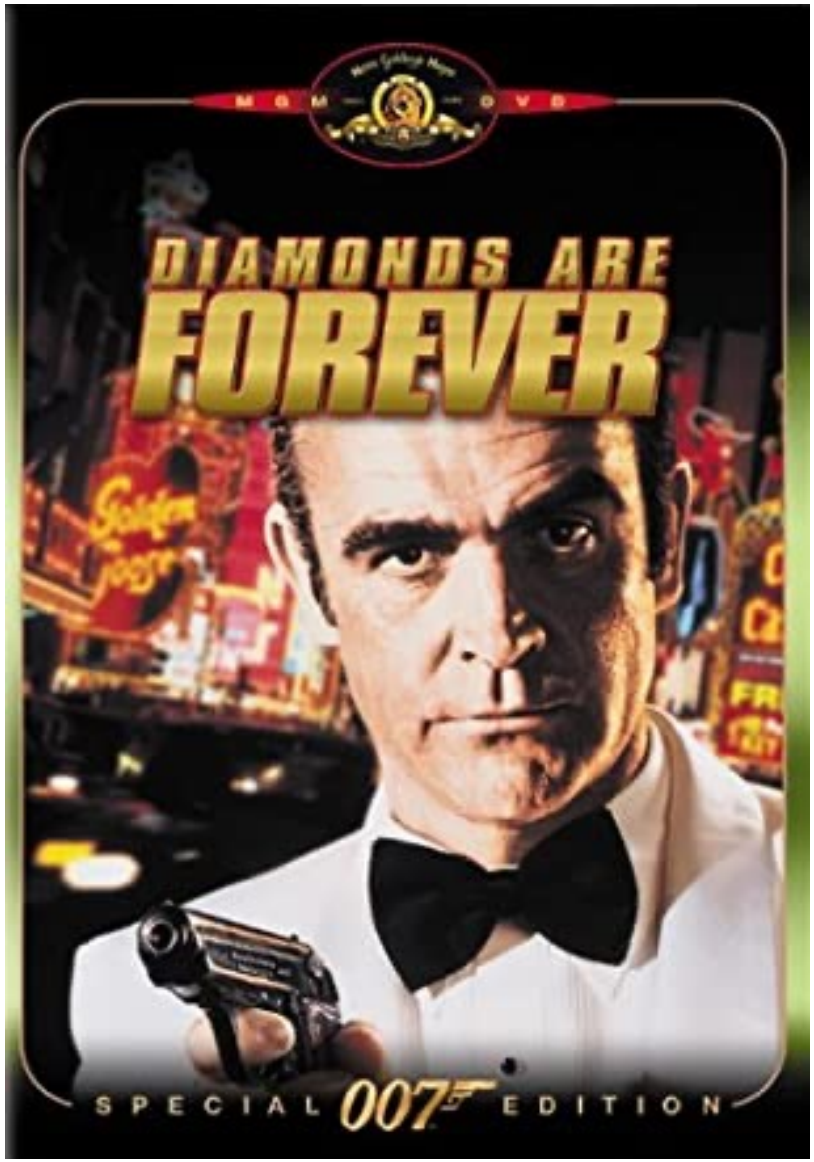
- Pain that arises from actual or threatened damage to non-neural tissue and is due to the activation of nociceptors.”

Discogenic Pain

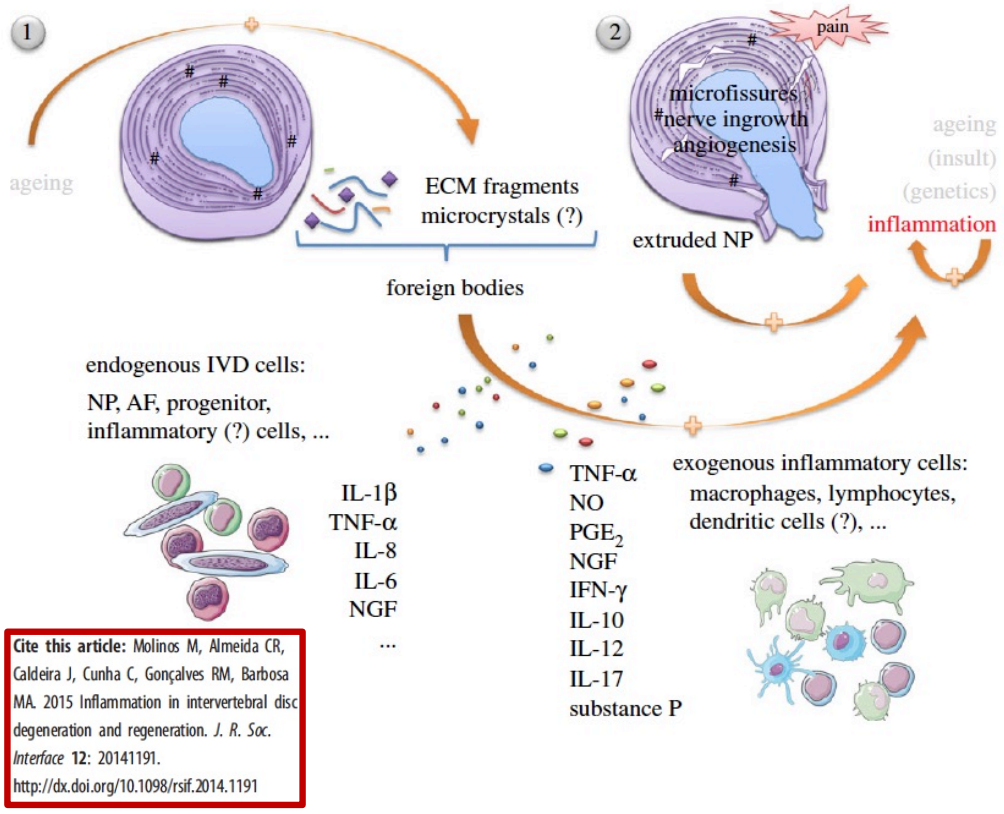
- Anterior and posterior longitudinal plexus fed by sympathetic and sinuvertebral nerves
- Outer third of annulus fibrosis richly innervated with nociceptive fibers
- Painful disc demonstrates neo-innervation extending to inner annulus

Discogenic Pain

- CENTRALIZATION is the only clinical diagnostic test.
- Calf pain moves to a proximal location and abolishes distal symptoms after a few repeating lumbar extension a few times.
- Repeated movements and/or positioning are able to move the nucleus material inside the disc.



IVD IS NOT FOREVER



Cite this article: Molinos M, Almeida CR, Caldeira J, Cunha C, Gonçalves RM, Barbosa MA. 2015 Inflammation in intervertebral disc degeneration and regeneration. *J. R. Soc. Interface* **12**: 20141191. http://dx.doi.org/10.1098/rsif.2014.1191

Cunha et al. Arthritis Research & Therapy (2018) 20:251
https://doi.org/10.1186/s13075-018-1743-4

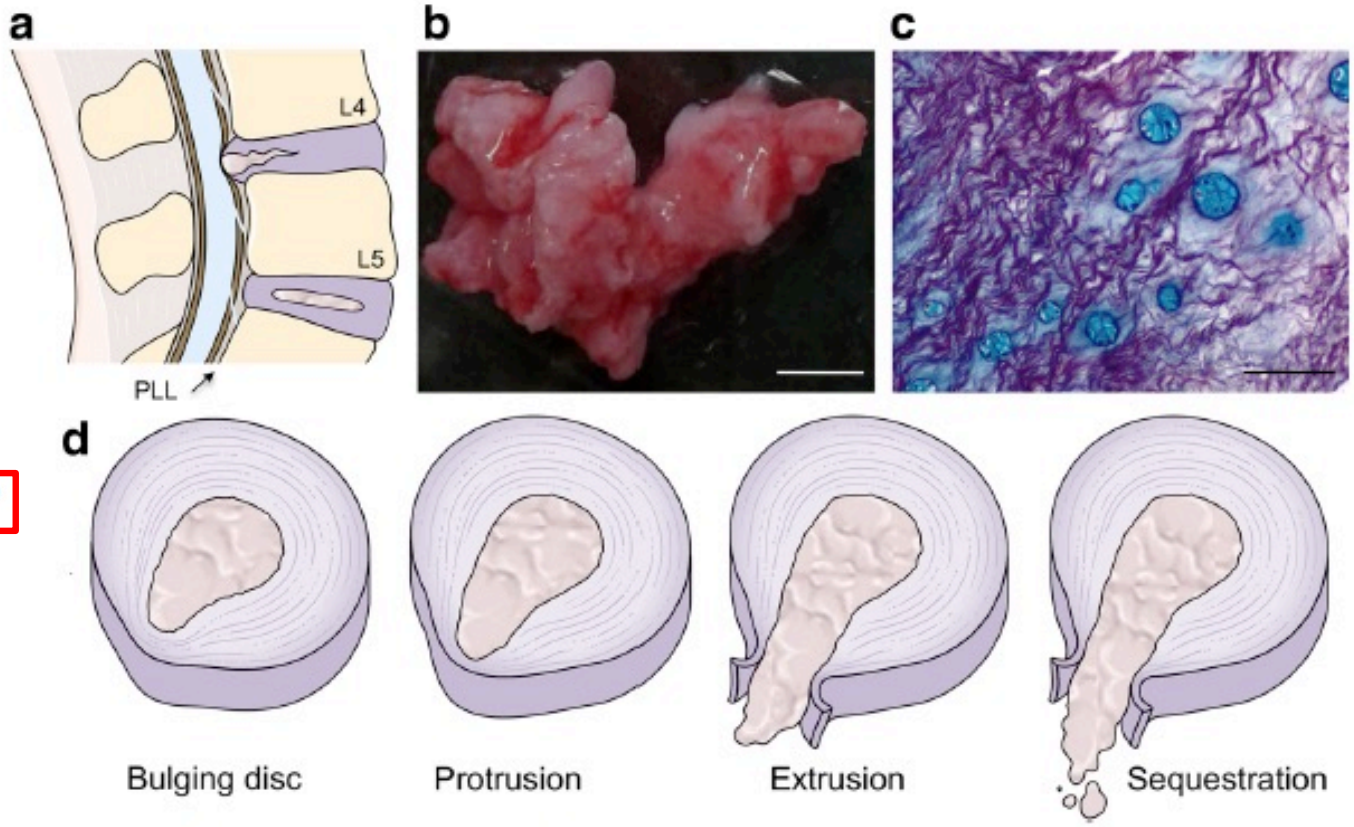


Fig. 1 **a** Schematic representation of typical L4–L5 hernia, with compression and possible rupture of posterior longitudinal ligament (PLL). **b** Human LDH fragment, obtained from patient who underwent microdiscectomy after informed consent and ethics committee approval from Centro Hospitalar São João. **c** Histological staining of tissue collected in (b), showing cell clusters producing proteoglycans (Alcian blue) embedded in a collagen matrix (Picrosirius red). **d** LDH is currently divided into four subtypes, according to MRI, as bulging disc (mildest form), protrusion, extrusion, and sequestration, the severest form of LDH. Proteoglycan-rich nucleus pulposus in center is surrounded by collagen-rich concentric rings of annulus fibrosus. Scale bars: (**b**) 3 cm, (**c**) 100 μm. Image credits: (**a**, **d**) used elements from Servier Medical Art; (**b**, **c**) unpublished

Intradiscal Pressure

Braddom's Physical Medicine and Rehabilitation 5th ed. Elsevier

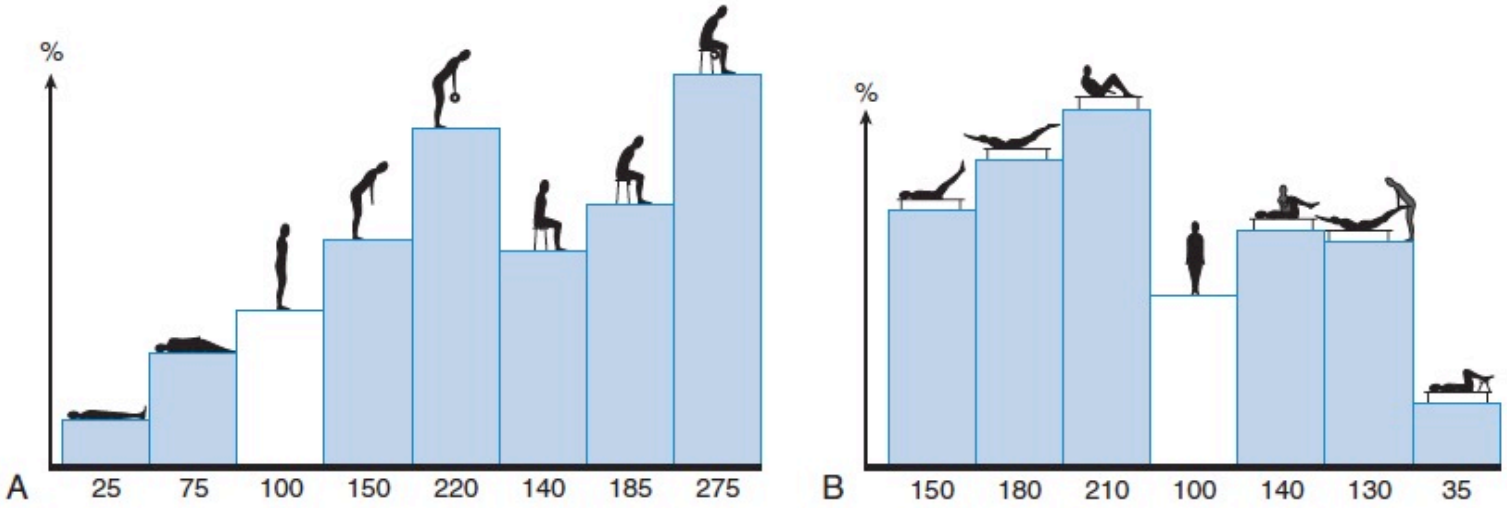


FIGURE 33-9 **A,** Relative change in pressure (or load) in the third lumbar disk in various positions in living individuals. **B,** Relative change in pressure (or load) in the third lumbar disk during various muscle-strengthening exercises in living individuals. Neutral erect posture is considered 100% in these figures; other positions and activities are calculated in relationship to this. (Modified from Nachemson AL, Morris JM: In vivo measurements of intradiscal pressure, *J Bone Joint Surg Am* 46:1077-1092, 1964.)

Incidence Of Regression Of Disc

- 56% of 18 subligamentous herniations, 79% of 14 transligamentous herniations, and all 100% of sequestered herniations were reduced in size. The average decreases in herniation ratio of the subligamentous, transligamentous, and sequestered disc groups were 17%, 48%, and 82% respectively. (Ahn et al, Spine. 2000;25:475–80)

Incidence of Regression of Disc

- Overall Incidence of Regression of 63% among patients with SLDH who were treated non-surgically, follow-up timeline that consists of the time points 4 and 10.5 months after onset when deciding whether to perform surgery for SLDH.

(Wang et al. BMC Musculoskeletal Disorders (2020) 21:530)

Fig 1. Pain in specific locati
(The Fortin Finger Te

SI Joint Pain

- Three or more positive provocation tests (distraction, compression, thigh thrust, Gaenslen's, sacral thrust, Patrick's test)
- No CENTRALIZATION
- Dominant pain PSIS area

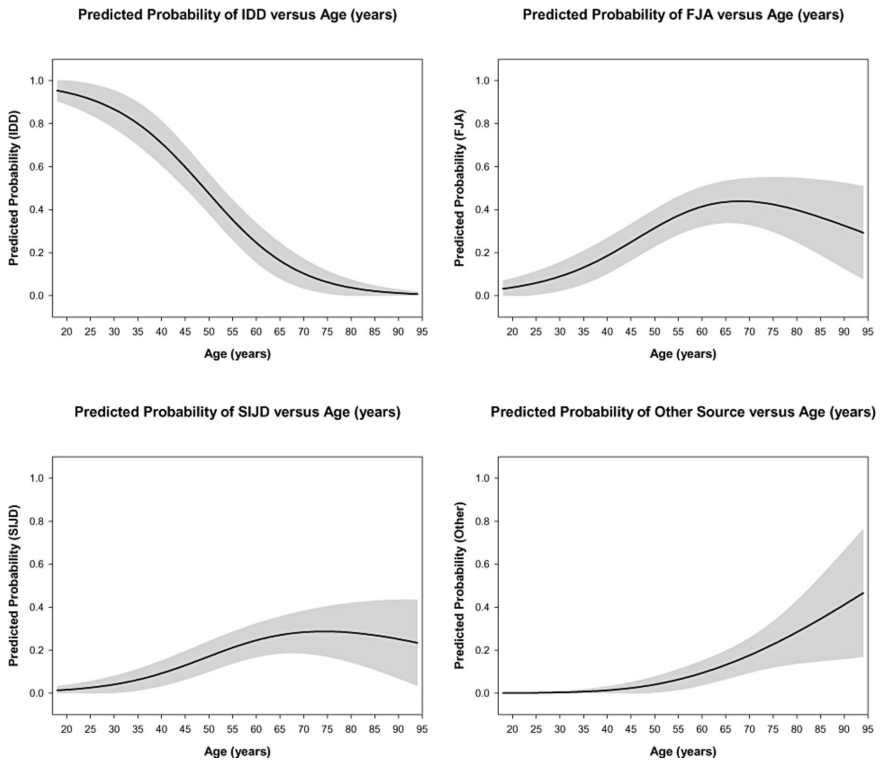
SI Joint Pain Chou et al., 2004

- 1. Inflammatory
- 2. Trauma
- 3. Osteoarthritis
- 4. Scoliosis
- 5. Leg length discrepancy
- 6 Gait abnormalities

I like to add abdominal obesity..

- 7. Spinal fusion to the sacrum
- 8. Lumbar spine surgery
- 9. Pregnancy (3rd trimester)
- 10. Idiopathic – 35%

Figure 4 Predicted probabilities and 95% confidence intervals for internal disc disruption (IDD), facet joint pain ...



Pain Med, Volume 12, Issue 2, February 2011, Pages 224–233, https://doi.org/10.1111/j.1526-4637.2010.01045.x

Sources of Low Back Pain

40 y/o: Disc 70%, Facet 18%, SIJ 10%

65 y/o: Disc – 18%, Facet 45%, SIJ 28%

Discogenic 42%

Facetogenic 31%

Sacroiliac – 18%

Facet Joint Pain

The lordosis maneuver

Facet joint loading

Rule out FJ pain if there is centralization and no relief with recumbency

Asymptomatic Facet Joint Changes

https://doi.org/10.31616/asj.2018.0235

Excluded patients with evidence, or histories, of neck or back pain, patients seen by a spine surgeon for a treatment of neck or back pain,

Patients with a history spinal fracture, and those with any evidence of prior spine surgery.

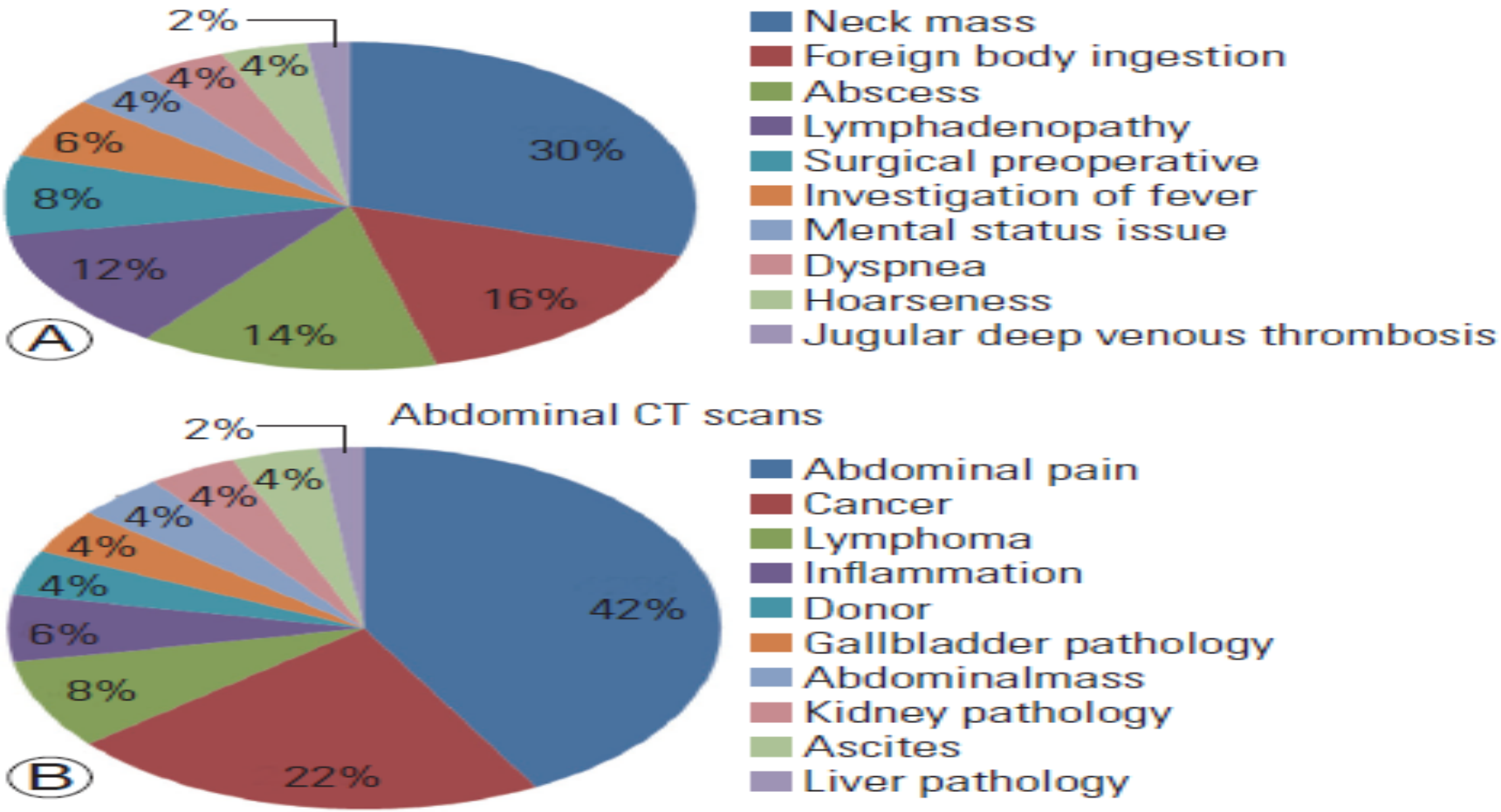


Fig. 1. Non-spinal pathology indications for CT scans for **(A)** neck pathologies and **(B)** abdominal and pelvic pathologies. CT, computed tomography.

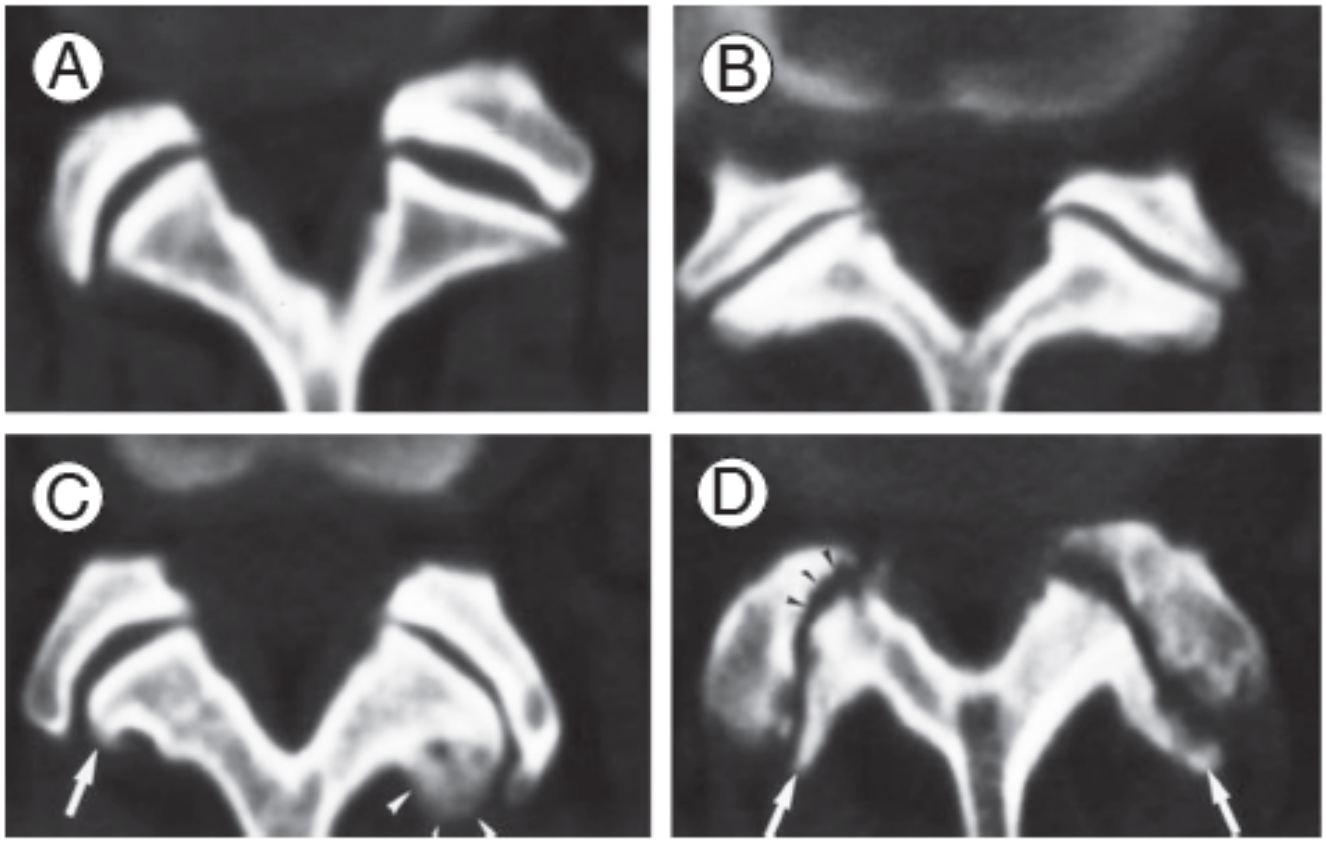
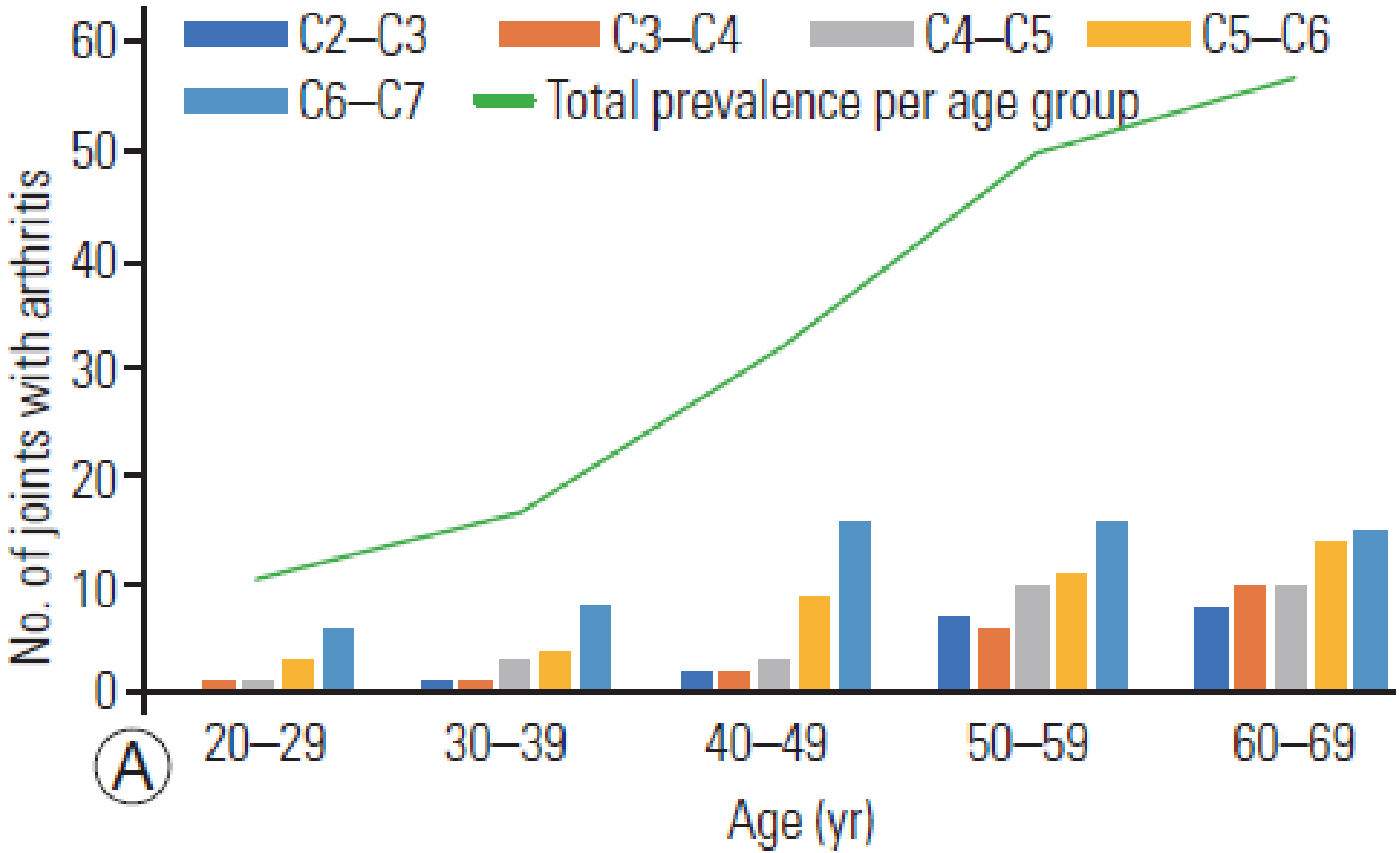


Fig. 2. Criteria for grading arthritis of the facet joints. Adapted from Weishaupt et al. Skeletal Radiol 1999;28:215-9, with permission of Springer Science+Business Media [9]. **(A)** Grade 0, **(B)** grade 1, **(C)** grade 2, **(D)** grade 3. Disregard arrows in **(C)** and **(D)**.

Table 1. Criteria for grading severity of arthritis in facet joints

Grade	Criteria
0	No narrowing, sclerosis, or osteophytes
1	Joint space narrowing or irregularity
2	Narrowing plus sclerosis and/or hypertrophy with osteophyte formation
3	Complete narrowing, sclerosis, and/or severe osteophyte formation

Adapted from Weishaupt et al. Skeletal Radiol 1999;28:215-9, with permission of Springer Science+Business Media [9].


C2–C3
C3–C4
C4–C5
C5–C6
C6–C7
Total prevalence per age group
No. of joints with arthritis
60
50
40
30
20
10
0
20–29
30–39
40–49
50–59
60–69
Age (yr)
A

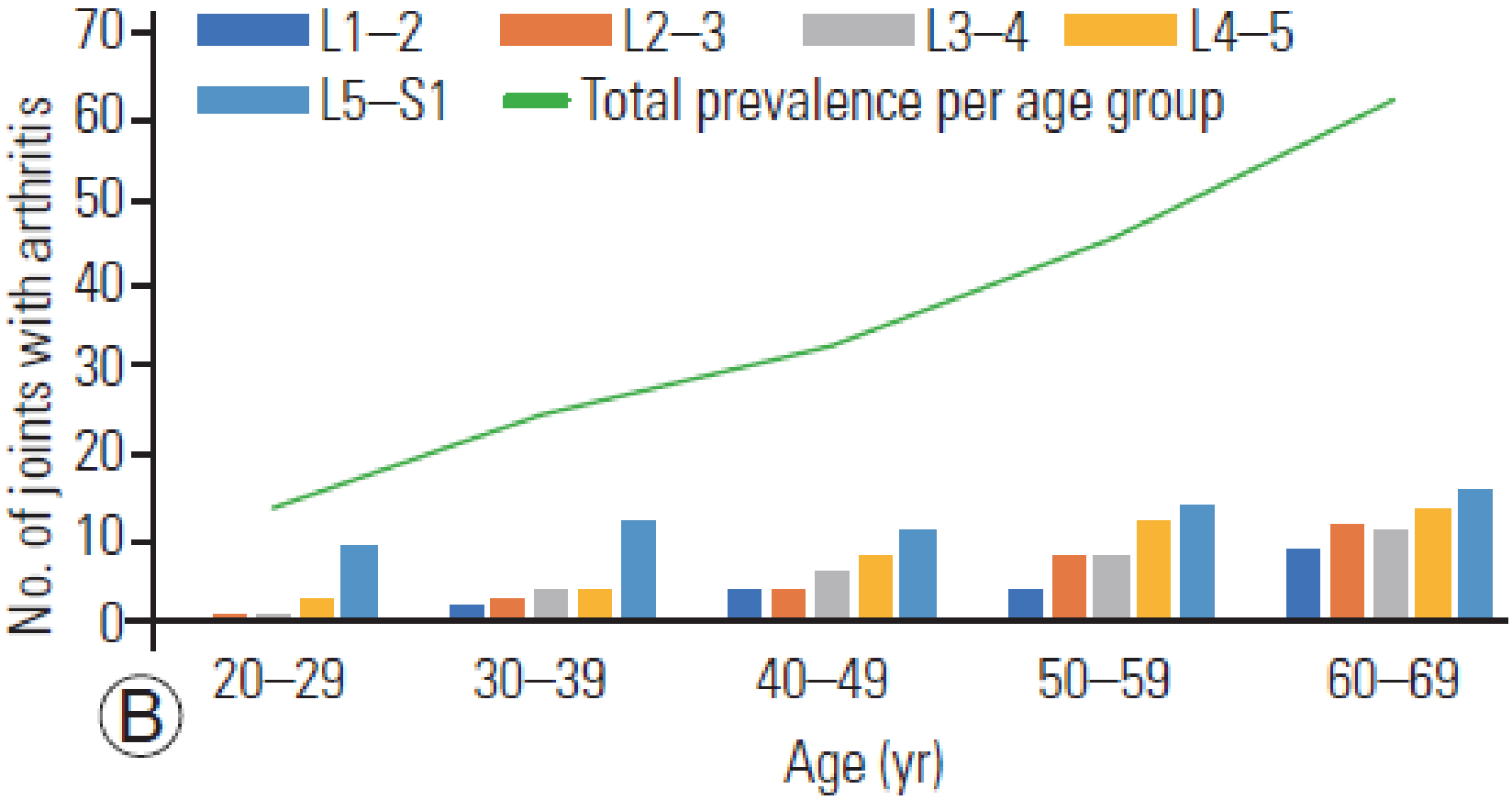
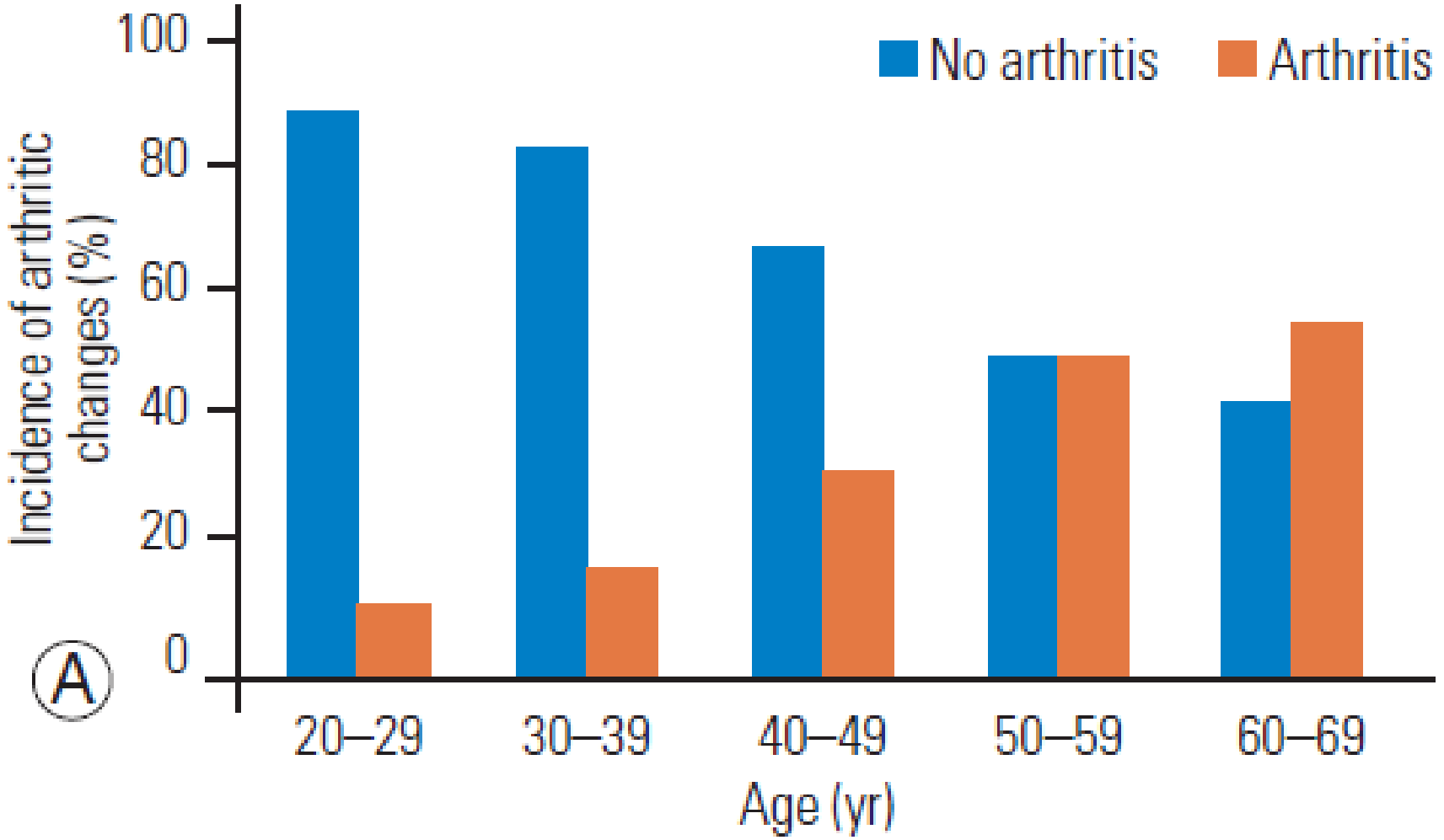


Fig. 4. Each bar represents the number of facet joints at each spinal level, per age group, with signs of degeneration (grades 1, 2, 3). **(A)** Cervical facets with arthritis and **(B)** lumbar facets with arthritis.

Table 2. Prevalence and severity of arthritic changes in cervical and lumbar facet joints

Grade	Cervical	Lumbar
0	333 (67)	320 (63)
1	93 (19)	118 (24)
2	57 (11)	44 (9)
3	17 (3)	18 (4)

Values are presented as number of arthritic joints (%). The prevalence of asymptomatic cervical facet arthritis was 33% and lumbar facet arthritis was 37%.


No arthritis
Arthritis
Incidence of arthritic changes (%)
100
80
60
40
20
0
20–29
30–39
40–49
50–59
60–69
Age (yr)
A

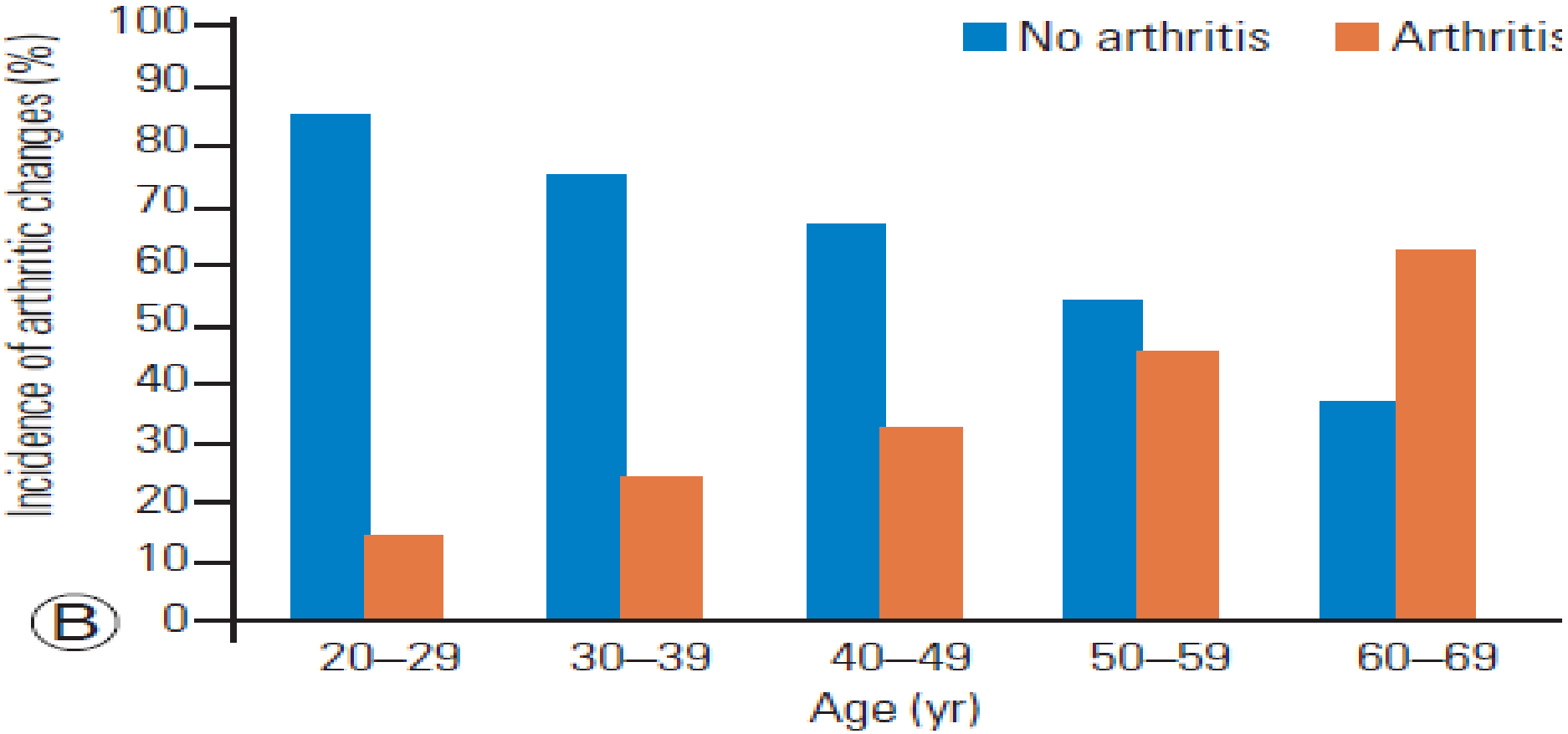


Fig. 3. The incidence of no arthritic changes (grade 0) decreases with age, whereas arthritis (grades 1, 2, 3) increases among the different age groups. **(A)** Arthritis in cervical facet joints and **(B)** arthritis in lumbar facet joints.

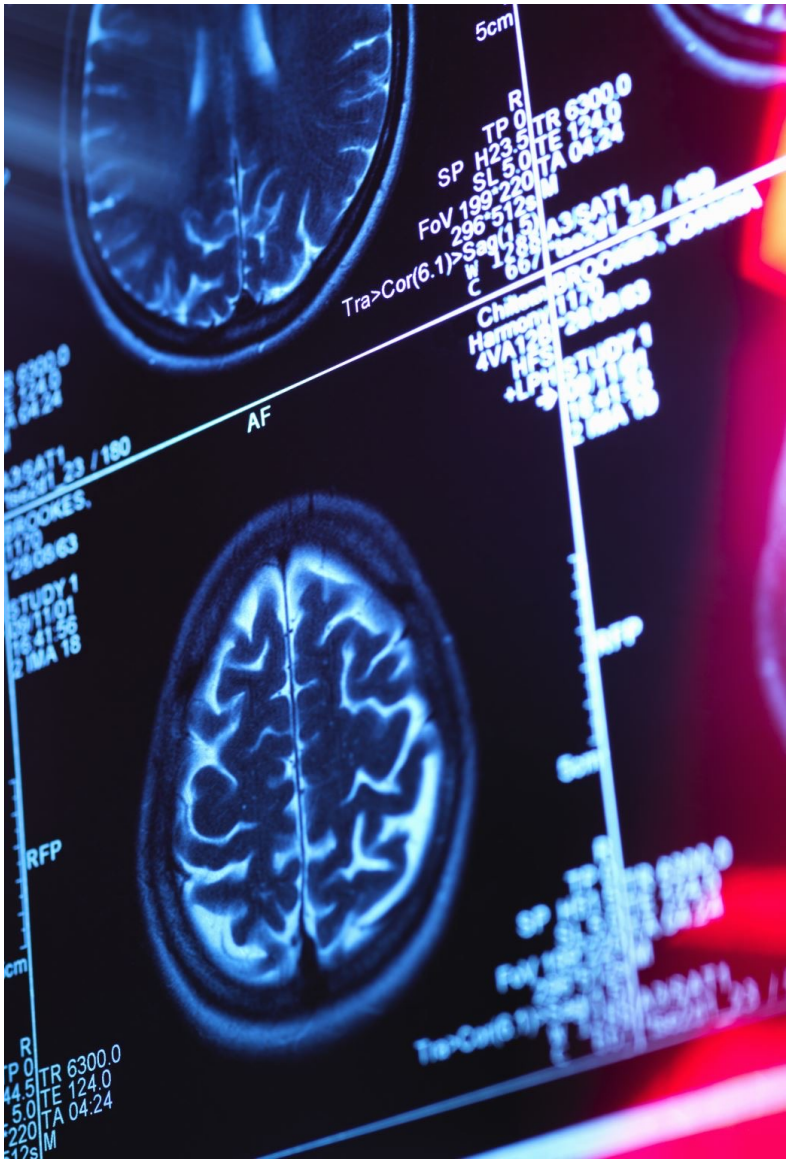
Asymptomatic Facet Joint Changes

The high prevalence of this condition in seemingly asymptomatic patients indicates that CT might be a non-specific diagnostic modality for neck or low back pain, originating from the facet joint

High-resolution single-photon emission computed tomography (SPECT) may be an even better diagnostic tool, because of its ability to detect inflammation

Myofascial Pain

- Palpable taut muscle region, hypersensitivity within taut muscle region with or without referred pain, and elicited pain reproduces familiar pain



Neuropathic Pain

- “Pain caused by a lesion or disease of the somatosensory nervous system.”
- History of lesion or disease of nervous system, comorbidities relating to neuropathic pain
- Pain and sensory dysfunction neuroanatomically distributed

Neuropathy - Sensitization

- Sensitization: Increased responsiveness of nociceptive neurons to their normal input, and/or subthreshold inputs.
- Peripheral sensitization: Reduced activation threshold among nociceptors in the periphery
- Central sensitization: Reduced activation threshold among spinal cord and cerebral cortex neurons. Central sensitization also involves additional neuroplastic/neuroadaptive processes.

Neuropathic Pain Associated With Low Back Pain

Neurogenic claudication: Pain from intermittent compression and/or ischemia of a single or multiple nerve roots within an intervertebral foramen or the central spinal canal

- Symptoms triggered with walking & standing
- Symptoms relieved when sitting
- Symptoms primarily located above knees
- Positive shopping cart sign
- Age > 48 years
- Bilateral symptoms

Radicular Pain

- Pain from ectopic activation of nociceptors in a spinal nerve or its roots or from other mechanisms (eg, inflammation, tensile strain)

- Lancinating
- Travels along narrow region
- Pain beyond the spine
- May be episodic, recurrent, or paroxysmal

Radiculopathy

- Objective sensory and/or motor function loss caused by conduction block in axons of a spinal nerve or its roots
- Objective findings of nerve root conduction loss in the distribution of a spinal nerve (eg, reduced deep tendon reflex, reduced motor strength, and/or reduced sensation corresponding to a nerve root)

Peripheral Nerve Entrapment

- Pyriformis syndrome
- Thoracolumbar syndrome
- Meralgia Presthetica

Pyriformis Syndrome

- Pain from inflammation, compression, or entrapment of the sciatic nerve in the region of the piriformis muscle

- Radiating pain into an ipsilateral leg
- Tenderness of the greater sciatic notch
- Buttock pain
- Positive SLR test
- Increased pain with prolonged sitting

Thoracolumbar (Maigne's) Syndrome

- Cluneal nerve entrapment causing pain in the cluneal nerve distribution
- Trigger point over iliac crest approximately 7 cm from midline and sensitivity to iliac crest skin rolling
- Tenderness of 1 or more thoracolumbar spinous processes or facet joints

Maigne's syndrome: the most common features

- Pain in the lower back region, typically around the SI joint
- Pain in the groin or genitals
- Lower abdominal pain
- Pain in the pubic bone
- Pain in the lumbo-sacral region

Central Sensitization

- THREE CRITERIA
- Low back pain disproportionate to nature or extent of injury/pathology.
- Neuroanatomically illogical pattern. Bilaterally symmetrical.
- Hypersensitivity of senses unrelated to musculoskeletal system; generalized sensitivity remote from low back area; Central sensitization inventory score 40

Arousal And Lack Of Self-Regulation

- Patients with chronic pain may display adverse health behaviors (illness behaviors) because chronic pain may deplete the important self-regulation resource.
- Arousal is under tonic inhibitory control of the parasympathetic system termed the “vagal brake” or “parasympathetic maintenance”.
- Parasympathetic maintenance promotes calm engagement, whereas vagal withdrawal facilitates quick escape from danger.
- Fibromyalgia and temporomandibular disorders are linked to higher baseline sympathetic activity or predominance, especially at night, and lower baseline parasympathetic activity.

Genetics and Psychosocial factors

- COMT – Val159Met, Beta2 adrenoceptor gene, Serotonin pathway, 5HT receptor 2A pathways.
- Endophenotypes – autonomic dysregulation and altered pain processing and modulation.
- A history of childhood stress and current psychosocial stress increases the risk for developing chronic centrally maintained pain.
- Is there a medical answer for Chronic pain?

Biopsychosocial Model
Psychosocial Factors Influencing Pain-Related Outcomes

General Psychological Factors

- Distress
- Childhood trauma experience
- Social and Interpersonal processes

Pain Specific Psychologic Constructs

- Catastrophizing
- Self efficacy
- Positive factors

Downstream Pathways- Maladaptive behaviors, Information processing biases and increased attention to pain, Central nervous system pathways

Defensive Medical Practice

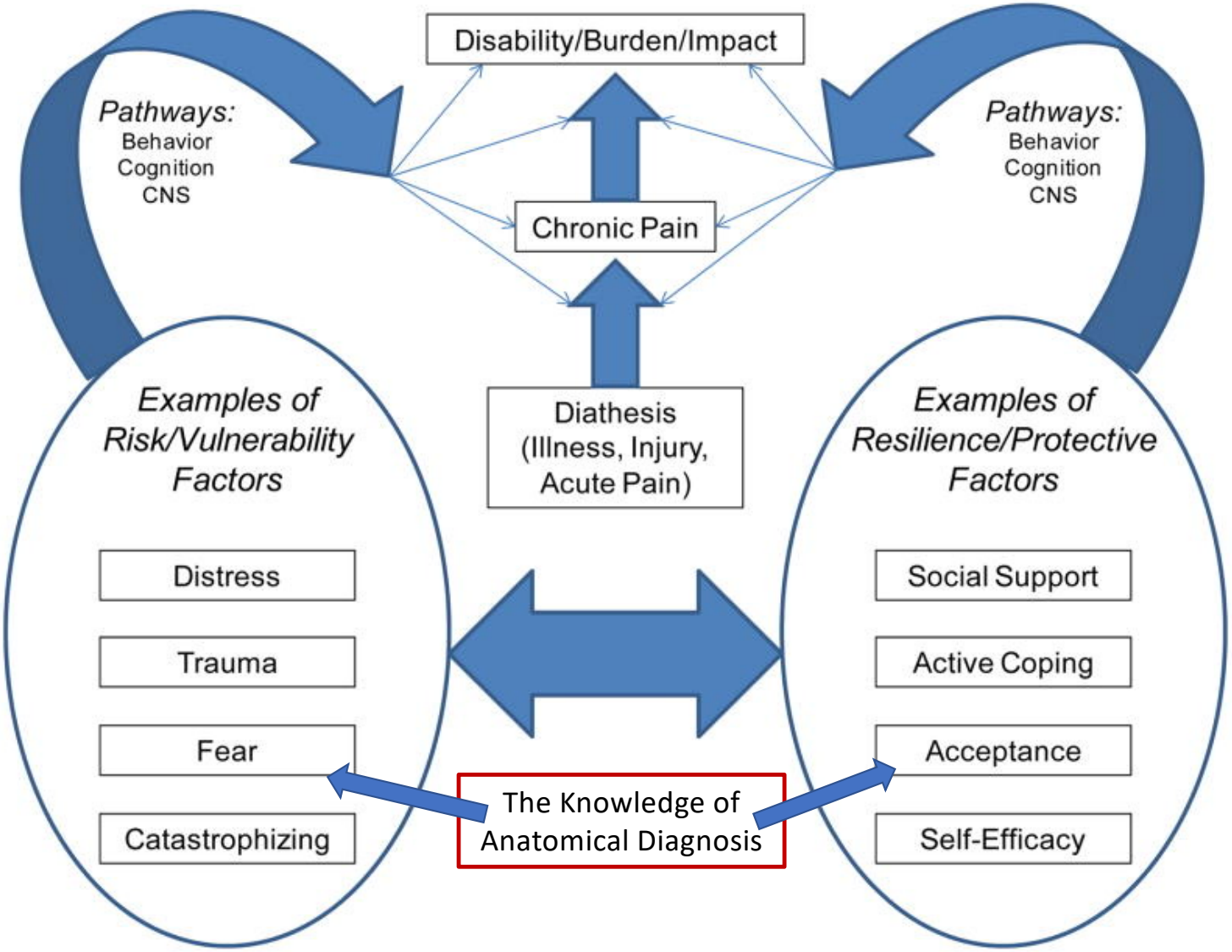
- Often the factors that precipitate and maintain chronic pain are beyond the reach of medicine.
- Providing behavioral guidance is more time consuming than ordering a test or writing a prescription. Also, it can't happen until trust is earned.
- Sometimes it becomes a challenging situation when you like to be truthful to the patient!!!

Pain and Suffering

- Psychosocial factors that propel symptom amplification:
- 1. The belief that one has a serious disease
- 2. The expectation that one's condition is likely to worsen
- 3. The sick role including the effects of litigation and compensation
- 4. The alarming portrayal of the condition as catastrophic and disabling
- There is also often an influence of negative memory of past symptoms and expectations of future symptoms that may play a role in the cognitive amplification processes.

Pain and Suffering

- Chronic pain and other somatic symptoms can be predicted by childhood abuse and traumas, low educational attainment, social isolation, depression and anxiety.
- Dr. Nuland *“pain is ubiquitous but suffering is optional.”*



J Pain. 2016 Sep; 17(9 Suppl): T70–T92.
doi: 10.1016/j.jpain.2016.01.001


Thank
you !