Right patient, right target, right time: radiologically-guided injections for pain management

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Physical Medicine and Rehabilitation

McGill Annual Refresher Course for Family Physicians

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Conflict of Interest- real or potential
Mohan Radhakrishna

I have no conflict of interest with the contents of this presentation

Objectives

At the end of this session the participant will be able to:

- Identify which patients are likely to respond to spinal injections
- Classify patients into the most probable cause of symptoms
- Discuss considerations for repeated injections

Table 2. Health Care Estimated Spending in 2016 for the 100 Most Expensive Health Conditions of the 154 Health Conditions Analyzed

Health Care Spending Rank (High to Low)	Health Condition	Category Code[b]	Health Care Spending, 2016 $Billion (95% CI)	Estimate, %[a]												Government Administration and Net Cost of Insurance Programs
				Aggregated Age Group, y			Type of Payer			Type of Care						
				<20	20-64	≥65	Public Insurance	Private Insurance	Out-of-Pocket Payments	Ambulatory	Inpatient	Prescribed Pharmaceuticals	Nursing Care Facility	ED	Dental	
1	Low back and neck pain	A	134.5 (122.4-146.9)	1.9	67.9	30.3	33.7	57.2	9.2	58.7	22.4	3.5	1.4	3.9	0	10.0
2	Other musculoskeletal disorders[c]	A	129.8 (116.3-149.7)	3.9	60.7	35.4	36.2	56.4	7.5	64.5	8.6	8.7	5.5	2.5	0	10.2
3	Diabetes	B	111.2 (105.7-115.9)	2.5	57.4	40.1	49.8	44.2	6.0	27.1	8.6	46.3	5.8	2.1	0	10.1
4	Ischemic heart disease	C	89.3 (81.1-95.5)	0.4	42.7	56.9	54.0	42.4	3.5	23.8	49.5	7.5	3.8	5.1	0	10.3
5	Falls	F	87.4 (75-100.1)	5.2	38.4	56.4	46.7	39.7	13.6	27.7	31.1	1.1	21.1	9.7	0	9.2
6	Urinary diseases[d]	B	86.0 (76.3-95.9)	4.1	48.2	47.7	49.2	45.1	5.7	52.0	14.1	7.8	5.1	11.0	0	10.1
7	Skin and subcutaneous diseases[e]	E	85.0 (80.5-90.2)	15.2	55.3	29.5	35.0	58.0	7.0	54.1	12.3	13.6	3.8	5.9	0	10.2
8	Osteoarthritis	A	80.0 (72.2-86.1)	0	50.1	49.9	45.4	49.5	5.1	26.7	49.9	6.1	6.6	0.4	0	10.3
9	Dementias	H	79.2 (67.6-90.8)	0	3.1	96.9	56.1	19.2	24.6	2.2	9.3	2.4	77.1	1.2	0	7.8
10	Hypertension	M	79.0 (72.6-86.8)	0.7	48.1	51.2	56.9	36.5	6.6	60.1	5.2	12.1	7.1	5.6	0	9.9
11	Oral disorders[f]	E	76.4 (73.8-79.4)	16.3	58.1	25.6	15.1	45.0	40.0	1.4	1.6	0.7	0	1.0	88.5	6.7
12	Pregnancy and postpartum care[g]	I	71.3 (64.9-77.7)	2.7	97.3	0	20.9	74.0	5.1	42.0	46.5	0.3	0	0.6	0	10.7
13	Depressive disorders	G	67.5 (62.3-72.7)	10.0	75.5	14.5	53.4	37.7	8.9	53.1	12.5	21.2	2.1	1.4	0	9.7
14	Sense organ disorders[h]	E	64.1 (58.1-69.8)	7.9	35.5	56.7	46.3	41.8	11.9	74.4	2.5	9.6	1.6	2.5	0	9.5
15	Well dental	I	60.5 (57.3-63.2)	39.8	44.3	16.0	10.7	54.4	34.9	0	0	0	0	0	92.6	7.4
16	Road injuries	F	57.9 (46.7-71.6)	8.7	72.5	18.8	36.2	58.9	4.9	11.8	59.5	0.2	0.7	17.2	0	10.5
17	Other neurological diseases[i]	H	52.9 (47.1-58.7)	5.2	62.2	32.6	41.7	50.1	8.2	59.3	7.7	11.1	6.3	5.6	0	10.0
18	Septicemia	D	52.5 (42.0-62.9)	2.5	53.3	44.2	55.0	40.6	4.4	0	84.6	0	3.1	2.2	0	10.2
19	Other chronic respiratory diseases[j]	L	45.0 (39.4-50.1)	22.6	57.7	19.7	26.9	65.0	8.1	72.3	4.9	8.0	0.2	4.3	0	10.3
20	Other digestive diseases[k]	J	44.4 (40.6-49.5)	8.8	54.0	37.2	48.5	45.3	6.1	29.4	19.9	19.8	8.5	12.3	0	10.1
21	Anxiety disorders	G	42.4 (37.8-47.7)	9.7	75.3	15.0	49.6	41.2	9.2	55.7	7.0	21.3	2.5	3.8	0	9.7
22	Cerebrovascular disease	C	41.9 (37.7-47.1)	1.1	35.8	63.1	56.5	32.8	10.7	4.6	48.1	1.0	32.7	4.1	0	9.4
23	Gynecological diseases[l]	B	39.4 (35.3-43.3)	2.4	86.3	11.2	18.5	73.5	8.0	51.7	17.1	12.2	0.7	8.0	0	10.4
24	Asthma	L	35.5 (32.4-38.2)	22.1	56.8	21.1	41.4	51.5	7.1	21.9	8.6	48.0	1.5	9.9	0	10.1
25	COPD	L	34.3 (31.5-37.3)	0.6	35.8	63.6	69.8	24.2	6.0	10.6	28.8	28.5	12.7	9.7	0	9.7
26	Rheumatoid arthritis	A	33.8 (28.9-37.7)	17.8	66.1	16.1	36.8	43.2	20.0	6.0	1.1	83.8	0.4	0.1	0	8.7
27	Heart failure	C	33.4 (30.7-36.8)	5.1	34.8	60.1	68.0	23.7	8.3	6.9	51.2	11.4	16.5	4.6	0	9.5

JAMA 2020

Global causes of disability

LBP

Is an injection indicated?

- What is the diagnosis?

- Must provide correct injection for patient's pathology

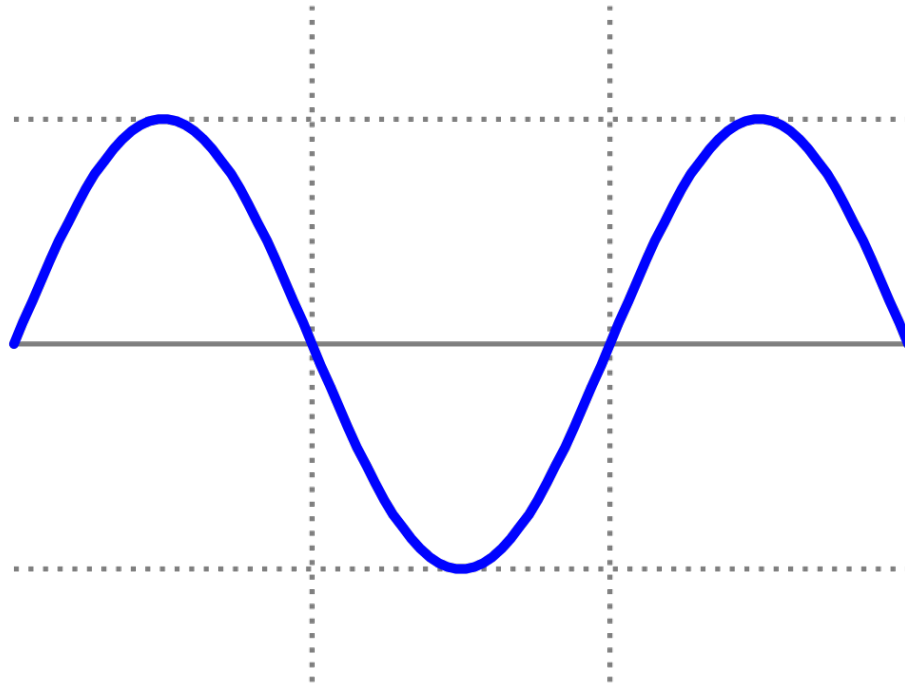- If an injection is indicated what variables are present that could affect results?

Artificial constructs

- Acute LBP

- Subacute LBP

- Chronic LBP

Blocks are not for everyone…

- Most improve within 1 month
- Often recurrent

The 'right' patient

Physical Exam

- Inspection
- ROM
- Palpation
- Special tests
- Neuro
- Vascular

LIFE ON EARTH by Ham

Extra, extra, read all about it!

A new kind of pain?

- Nociceptive
- Neuropathic

- Nociplastic?

IASP definition

Nociplastic pain:

Pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence for disease or lesion of the somatosensory system causing the pain

Nociplastic pain

- Thought to represent confluence of altered function on the periphery and CNS resulting in increased sensitivity

Lancet May 29, 2021

Features of nociplastic pain conditions
- Combined peripheral and central pain sensitisation
- Hyper-responsiveness to painful and non-painful sensory stimuli
- Associated features
  - Fatigue
  - Sleep disturbance
  - Cognitive disturbances
  - Hypersensitivity to environmental stimuli
  - Anxiety and depressed mood

Supraspinal mechanisms
- Hyper-responsiveness to pain stimuli
- Hyperactivity and connectivity in and between brain regions involved in pain
- Decreased activity of brain regions involved in pain inhibition (ie, descending inhibitory pathways)
- Elevated cerebrospinal fluid substance P and glutamate concentrations, decreased GABAergic transmission
- Changes in the size and shape of grey and white matter regions involved in pain processing
- Glial cell activation

Spinal mechanisms
- Regional clustering and convergence of signals from different pain loci
- Spinal cord reorganisation
- Amplified spinal reflex transmission
- Diminished spinal inhibition
- Wind-up and temporal summation
- Glial cell activation

Peripheral features
- Minor local muscle pathology (eg, changes in pH, muscle fibre composition, and latent and active trigger points)
- Peripheral sensitisation (eg, expansion of receptive fields, elevated cytokine and chemokine concentrations)
- Hyperalgesia, dysesthesia, and allodynia
- Localised or diffuse tenderness, or both

Pain > 3 months — No → Not chronic nociplastic pain

Yes ↓

Regional rather than discrete — No → Not nociplastic pain

Yes ↓

Nociceptive pain — Yes → Entirely responsible for pain — Yes → Not nociplastic pain

No ↓   No ↓

Neuropathic pain — Yes → Entirely responsible for pain — Yes → Not nociplastic pain

No ↓   No ↓

Evoked pain hypersensitivity phenomena

Evoked pain hypersensitivity phenomena can be elicited clinically in the region of pain.
Any one of:
- static mechanical allodynia
- dynamic mechanical allodynia
- heat/cold allodynia
- painful after-sensations reported following the assessment of any of the above alternatives.

Yes ↓

Possible nociplastic pain

↓

History of pain hypersensitivity and comorbidities

There is a history of pain hypersensitivity in the region of pain.
Any one of:
- sensitivity to touch
- sensitivity to pressure
- sensitivity to movement
- sensitivity to heat/cold

Presence of co-morbidities (any one of):
- Increased sensitivity to sound and/or light and/or odors
- Sleep disturbance with frequent nocturnal awakenings
- Fatigue
- Cognitive problems such as difficulty to focus attention, memory disturbances etc.

Yes ↓

Probable nociplastic pain

Figure 1. Flow chart of identifying and grading nociplastic pain affecting the musculoskeletal system. Musculoskeletal pain is deep, rather than cutaneous and regional, multifocal, or widespread in distribution (rather than discrete). In case of multifocal pain states that can be caused by different chronic pain conditions (eg, shoulder myalgia and knee osteoarthritis), each chronic pain condition or pain region must be assessed separately.

The most important slide of this talk:

Part 1: Right person
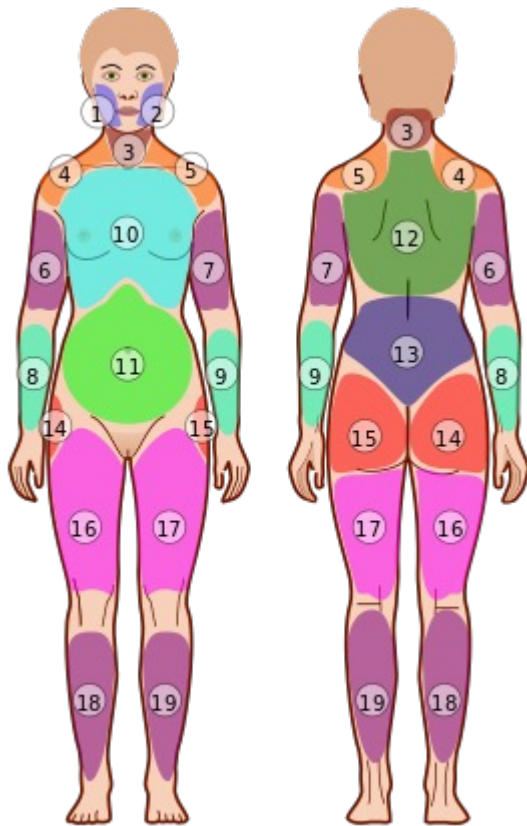
- Imagine LBP + fibromyalgia construct

  - Eg fatigue, sleep disturbance, cognitive disturbance, anxiety-depression, hypersensitivity to environmental stimuli

Things people say……

- I do not want to do too much
- I wonder if I can ever return to work
- I do not want to pay for it tomorrow

- I have a high pain tolerance

Low back pain and yellow flags
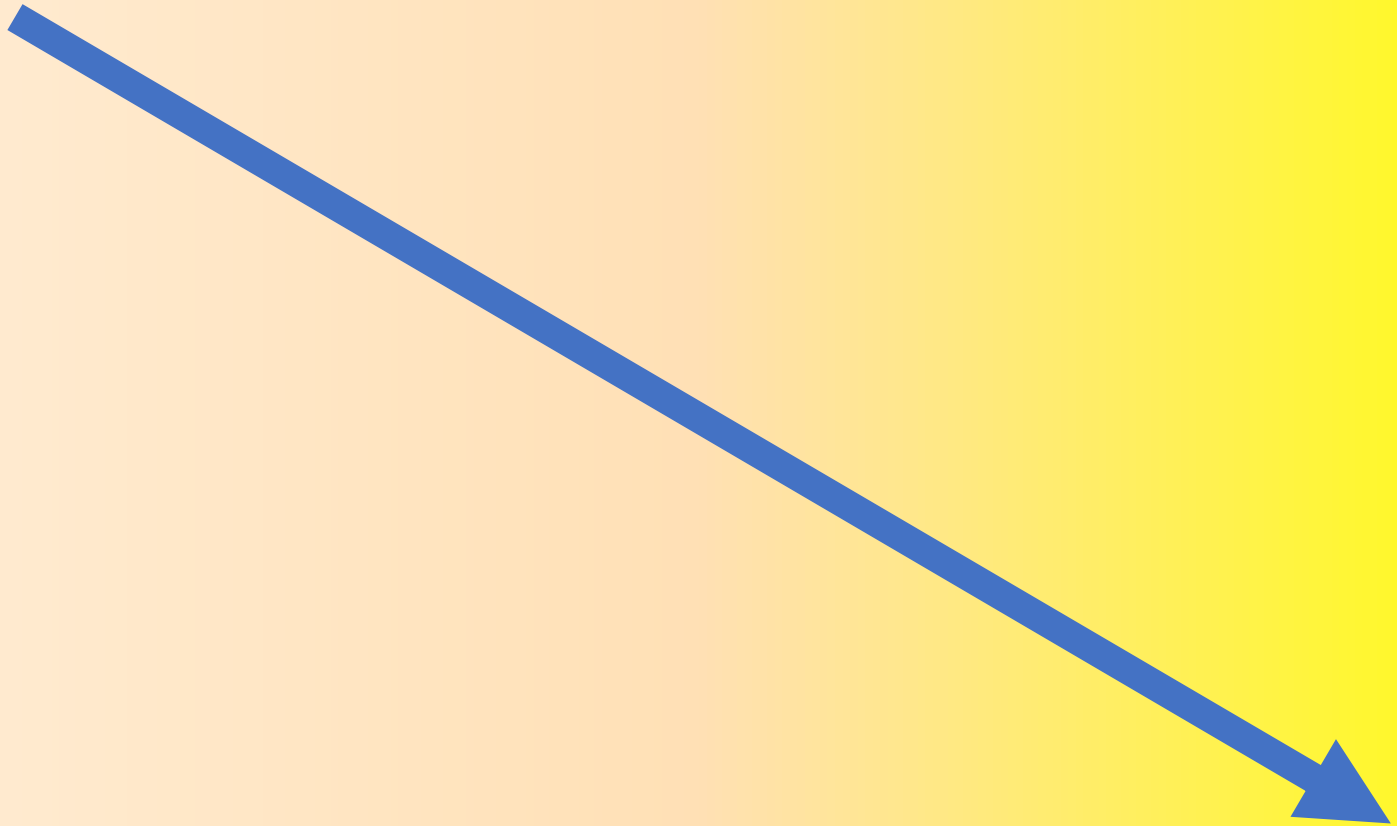
PARTY LIKE IT'S 1999 2022

Non-specific LBP

Cancer

Fracture

Infection

Cauda equina

Rheum

Nociplastic LBP

Fracture

Infection

Cancer

Cauda equina

Rheum

MYOFASCIAL PAIN CLINIC

R   L

TRIGGER POINT AND
PAIN LOCATION
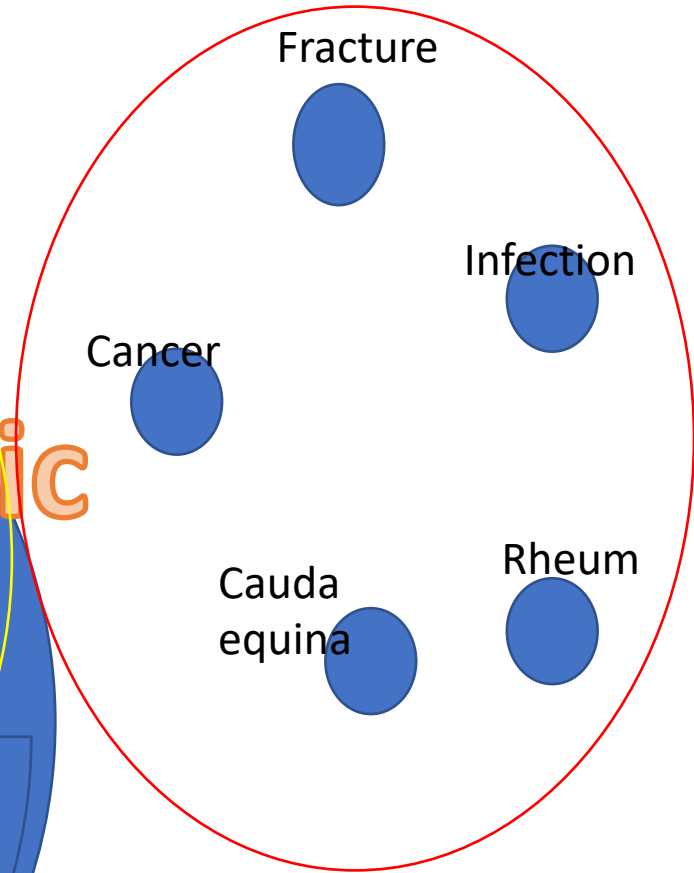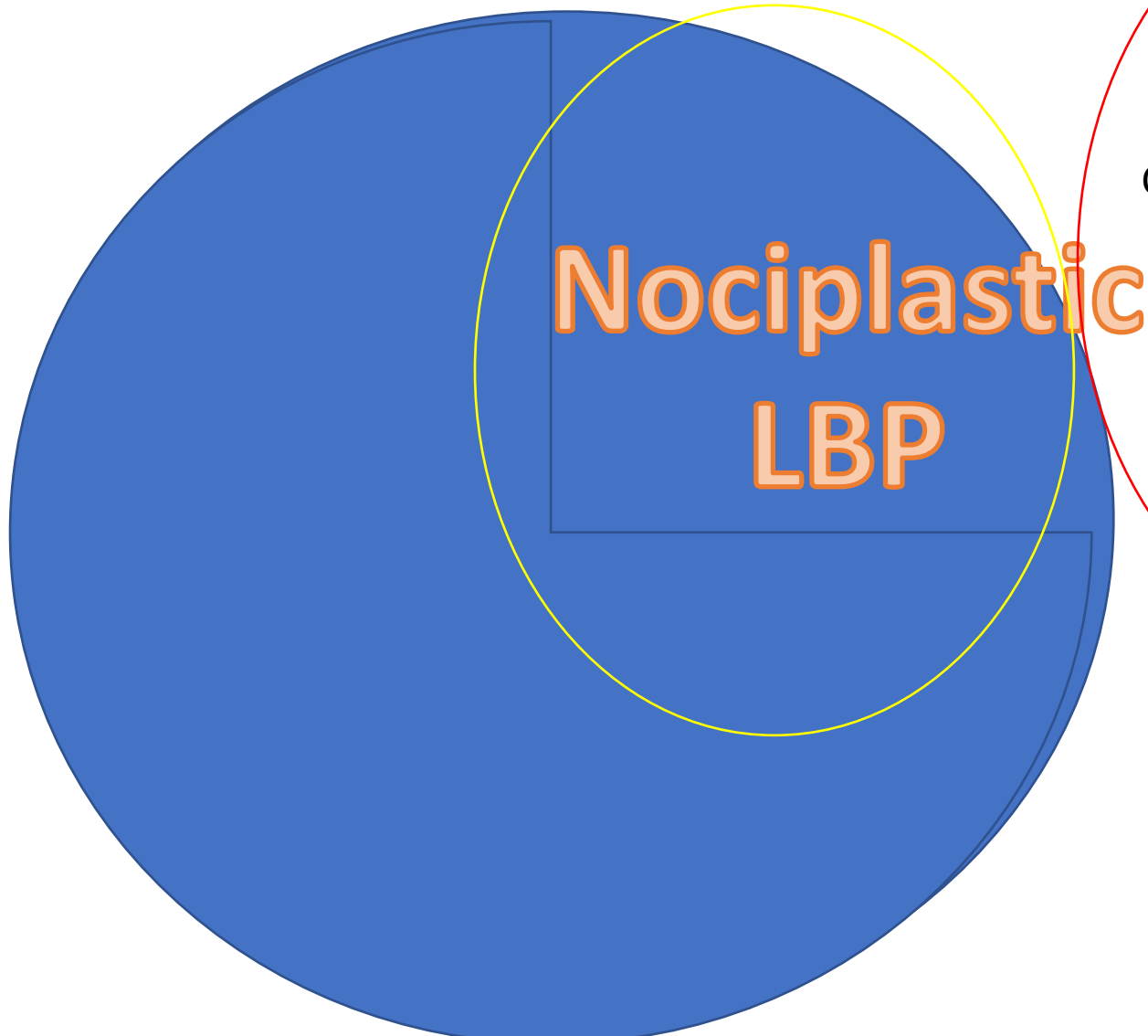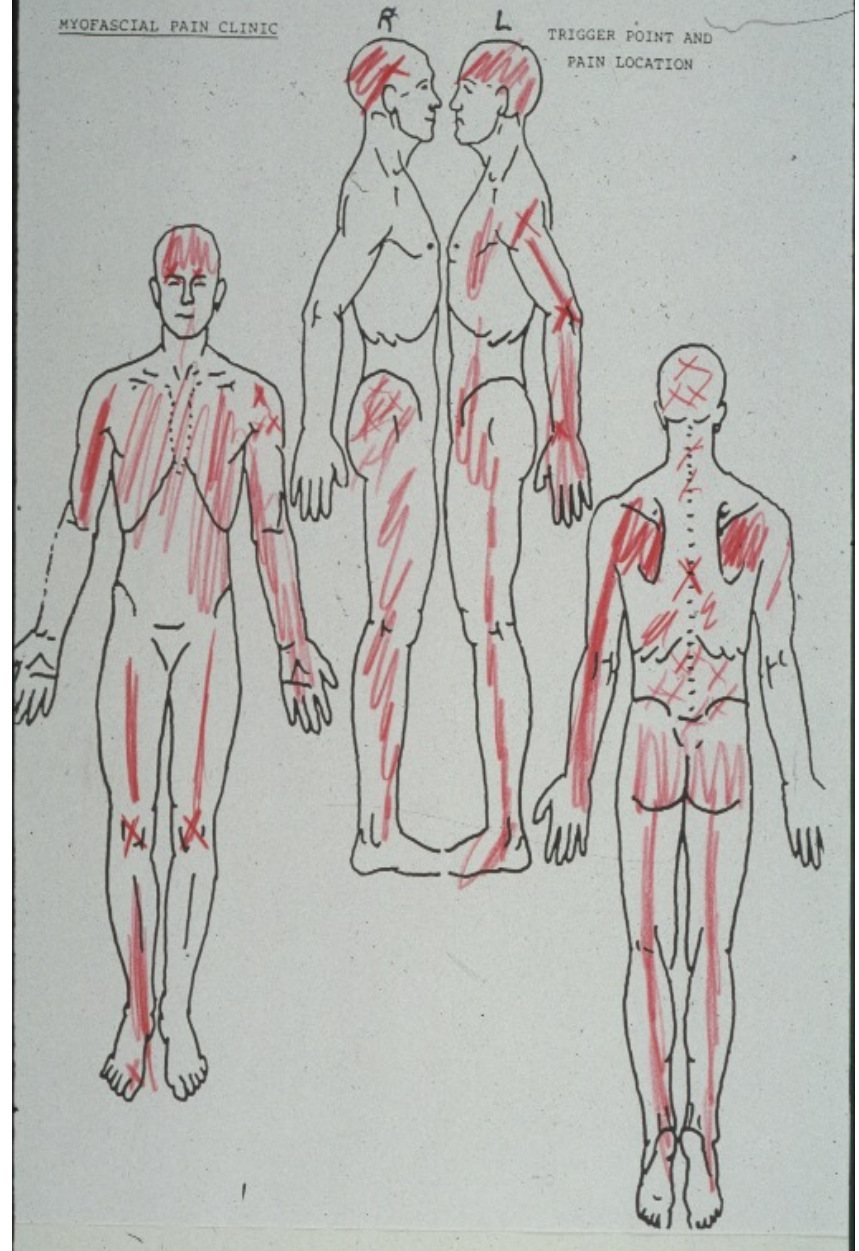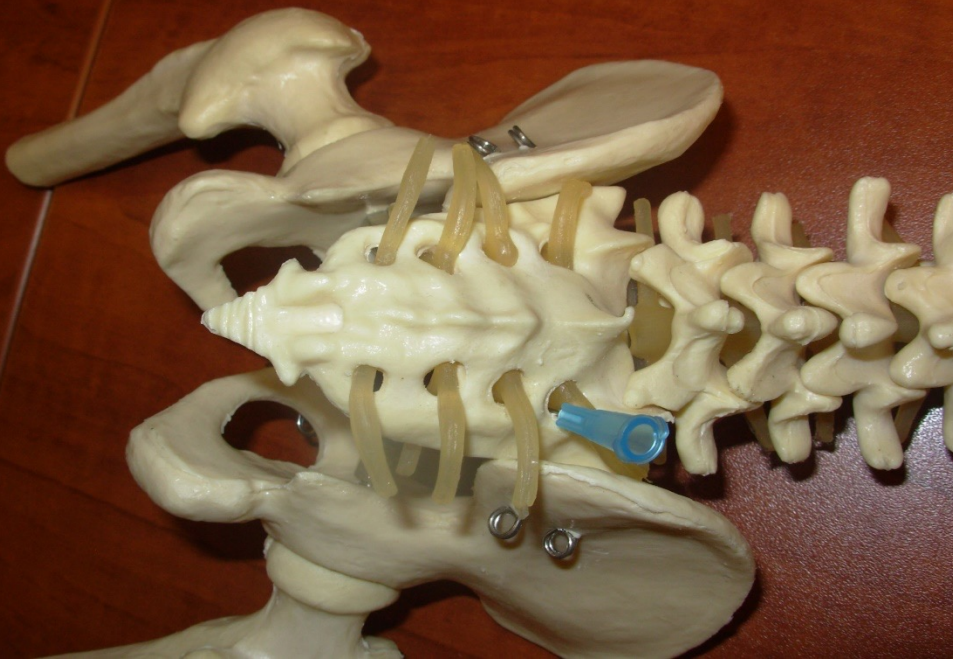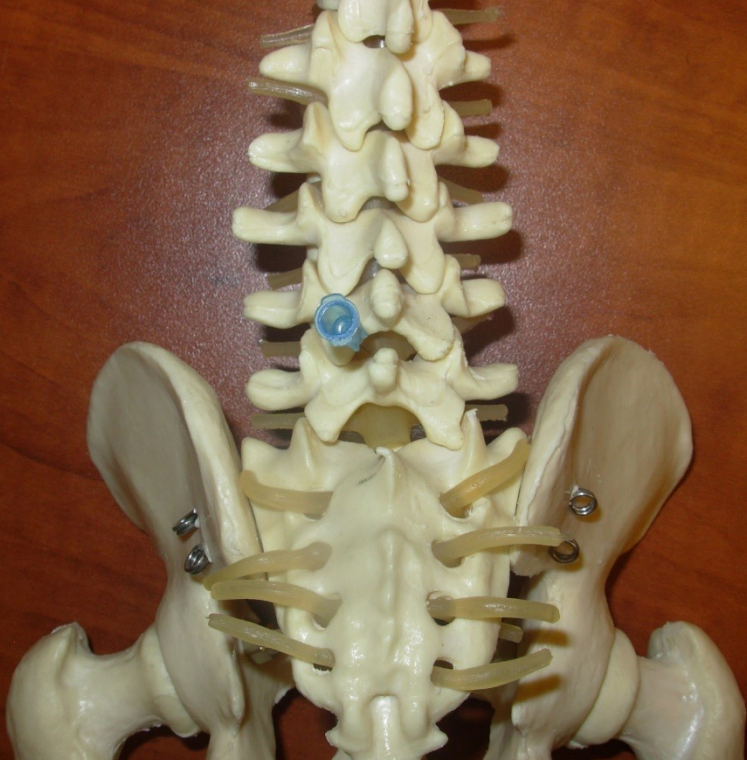
A simplified interventional approach for LBP: the diagnoses...

- Disk
- Facet
- Sacroiliac joint
- ?Myofascial

A simplified interventional approach: the options…

- Epidural
- Facet procedure
- Disk procedure
- Sacroiliac procedure

- Could it be muscular? Myofascial pain very controversial……

- Radiculopathy $\longrightarrow$ Epidural
- Lumbar stenosis
- Mechanical pain
- Facet procedure
- Disk procedure
- Sacroiliac procedure
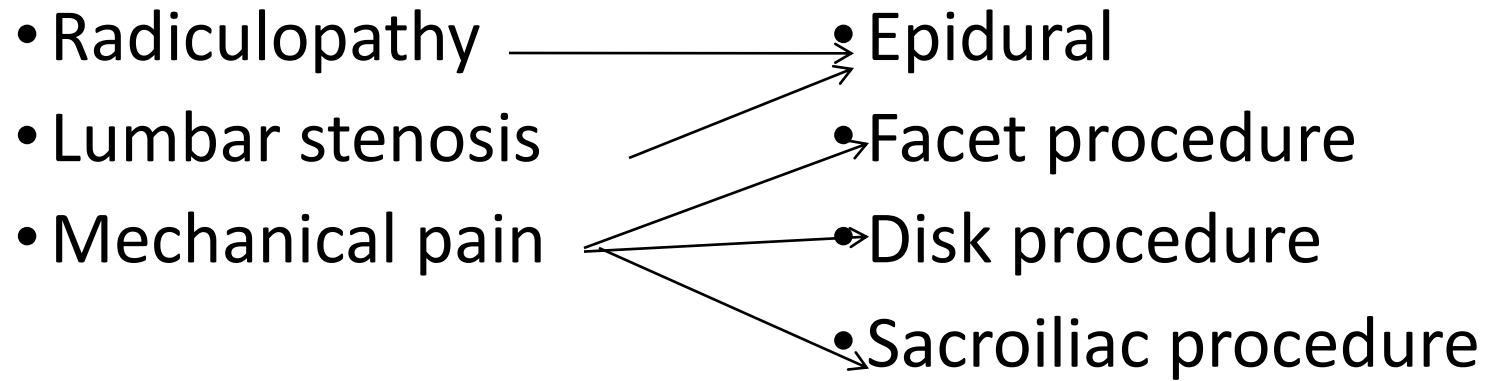
The second most important slide of this talk

Predicted Probability of IDD versus Age (years)
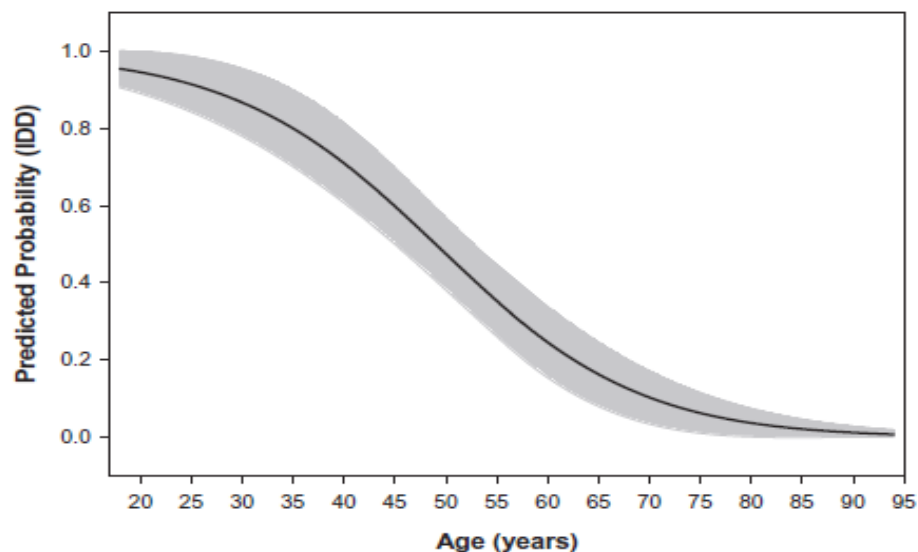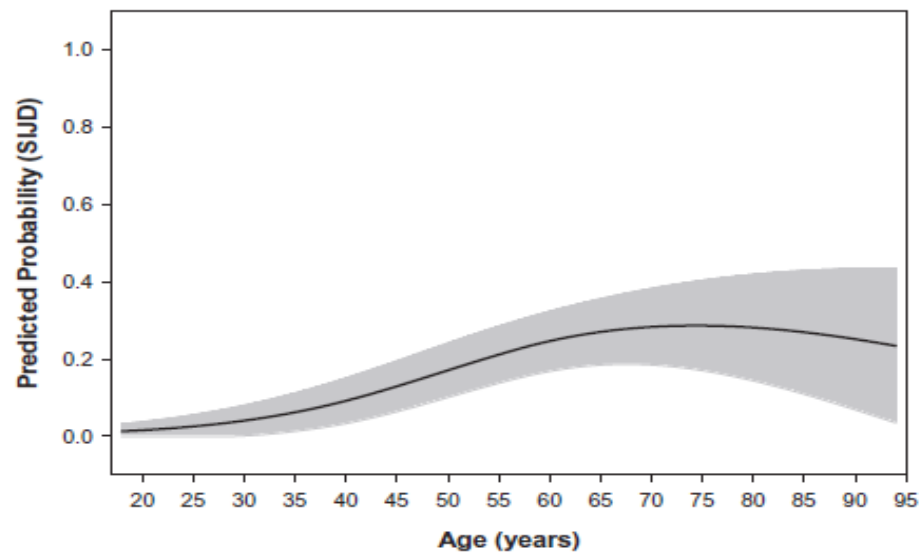
Predicted Probability of FJA versus Age (years)
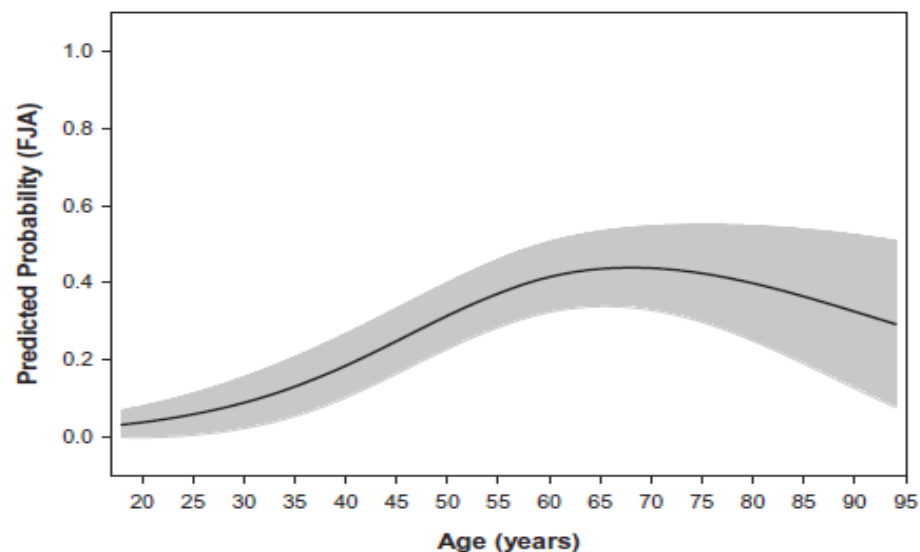
Predicted Probability of SIJD versus Age (years)
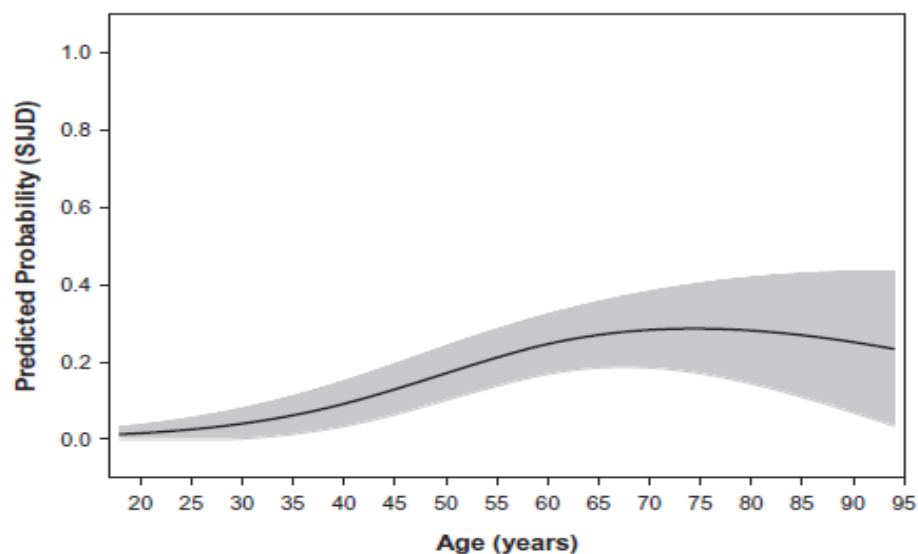
Predicted Probability of Other Source versus Age (years)
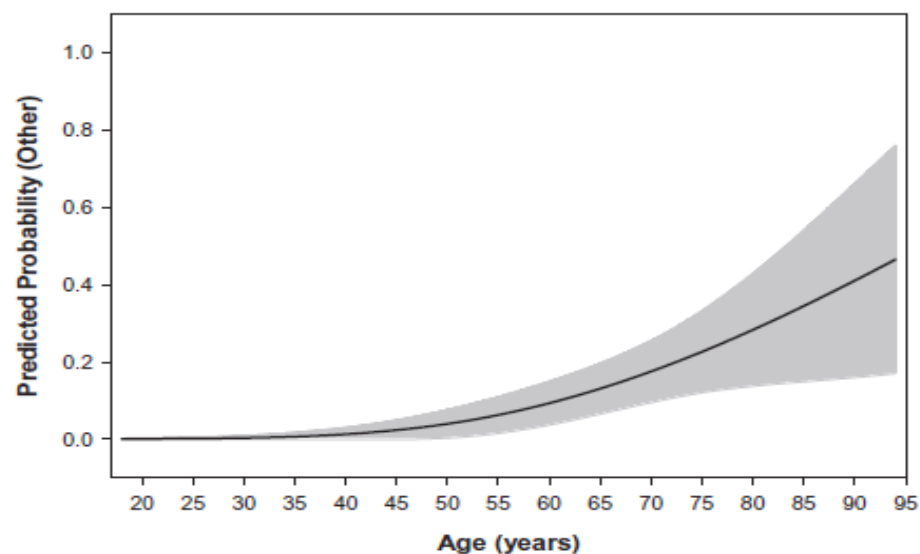
Right target for LBP

- Young person– think disk, endplate, consider spondylolysis
- Middle-age to older– think facet or SI joint

Right target for radicular pain
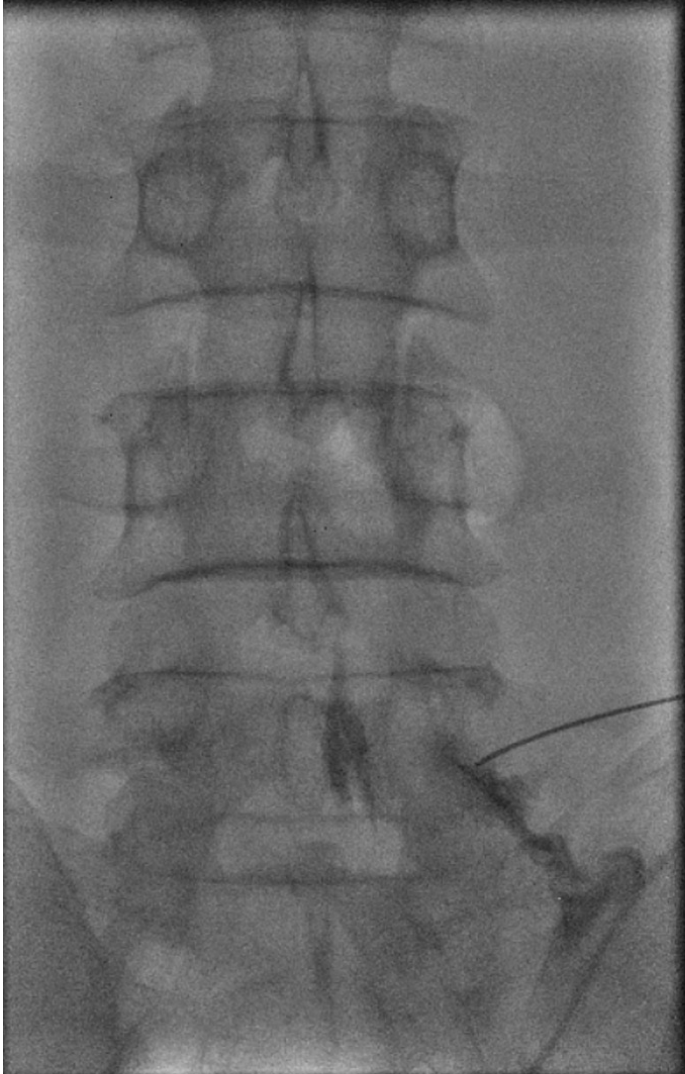
- Medication must get to the nerve that is provoking symptoms.

Case 1

- 35 year old banker

- No PMHx

- LBP, no sciatica

- 8 years

- Numerous tries at physio
- NSAIDS caused stomach ulcer
- Had lumbar radiofrequency neurotomy with a few weeks of pain relief

Medial branch blocks
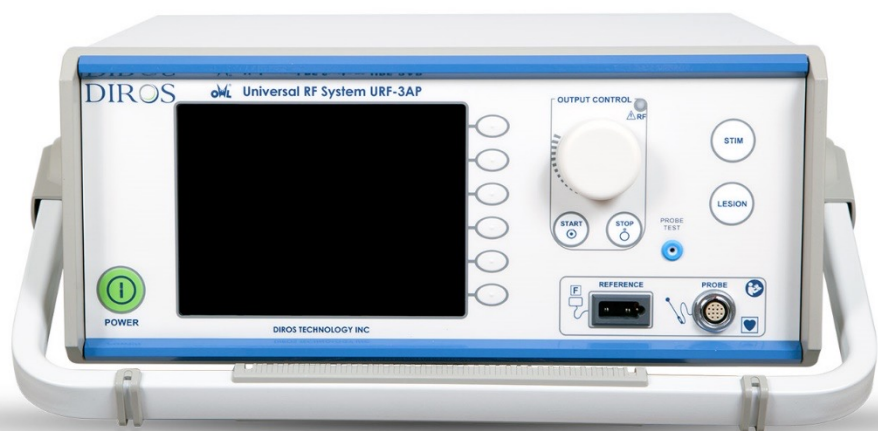
Predicted Probability of IDD versus Age (years)
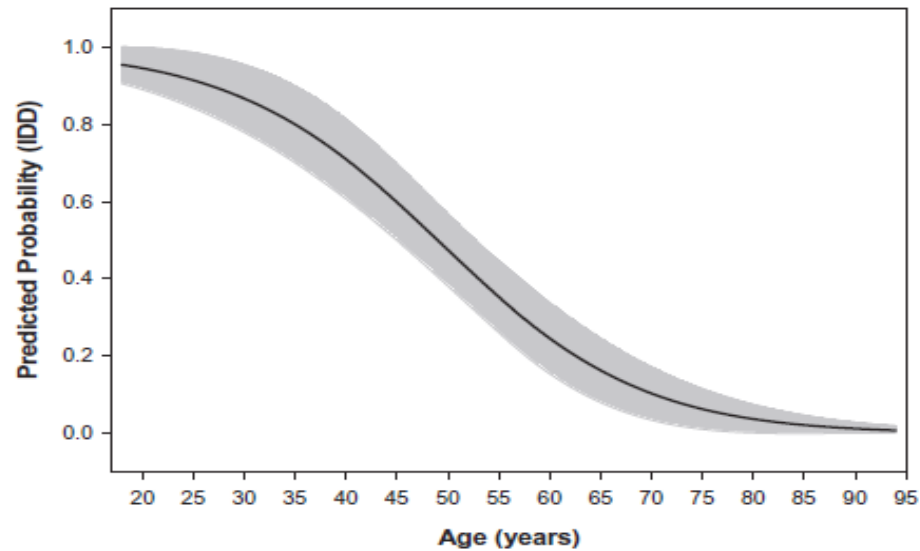
Predicted Probability of FJA versus Age (years)
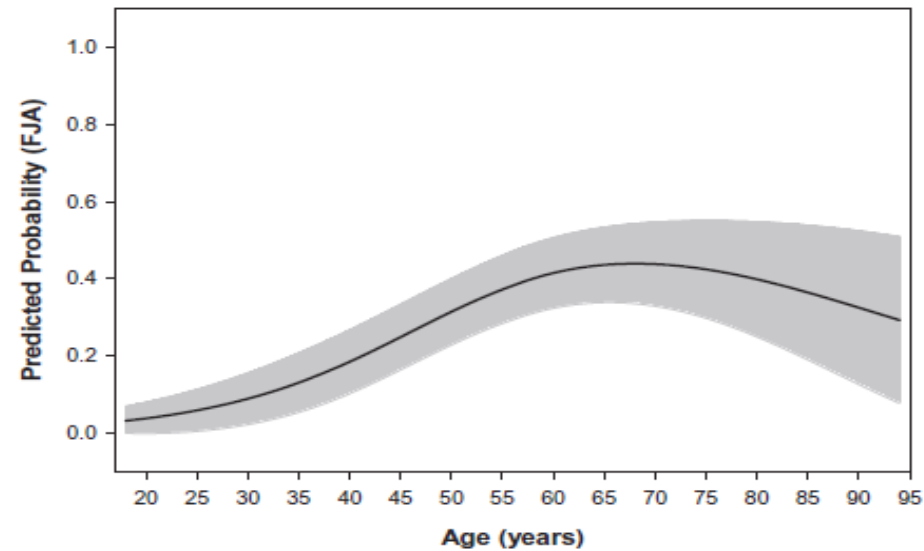
Predicted Probability of SIJD versus Age (years)
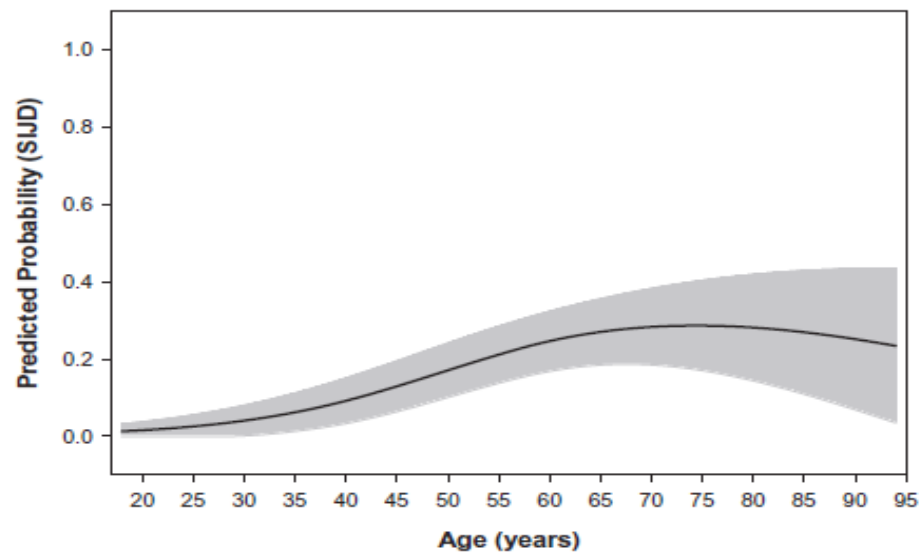
Predicted Probability of Other Source versus Age (years)
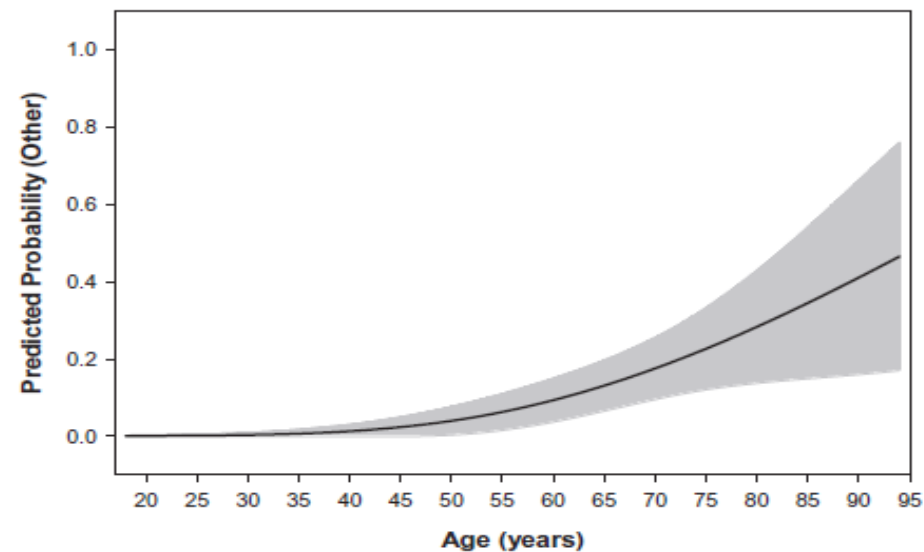
Understanding prevalence…

- 25 year old with chest pain
- 70 year old with chest pain

- What is the pre-test probability?
- Multiply that by the LR

Case 2

- 70 year old female with LBP

- Refers into buttocks and upper thighs

- X-ray shows DDD and arthritis

Predicted Probability of IDD versus Age (years)
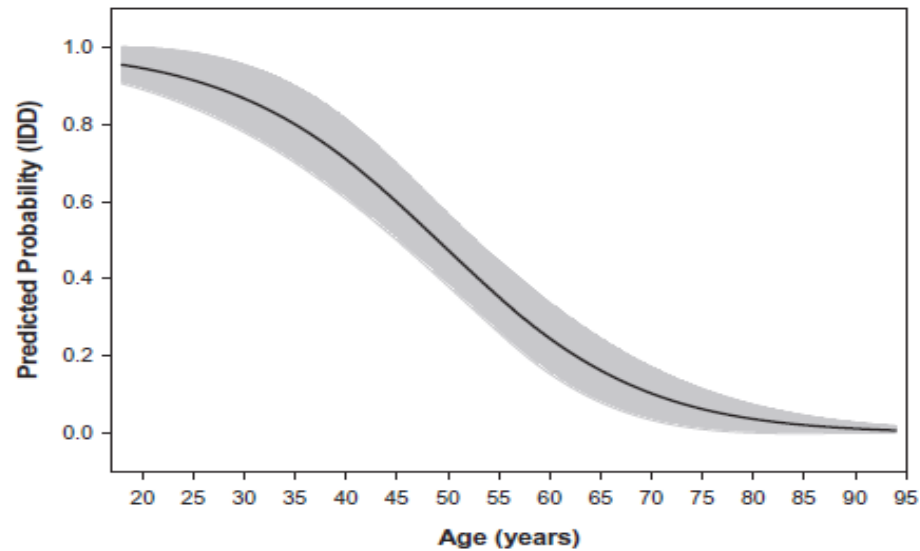
Predicted Probability of FJA versus Age (years)
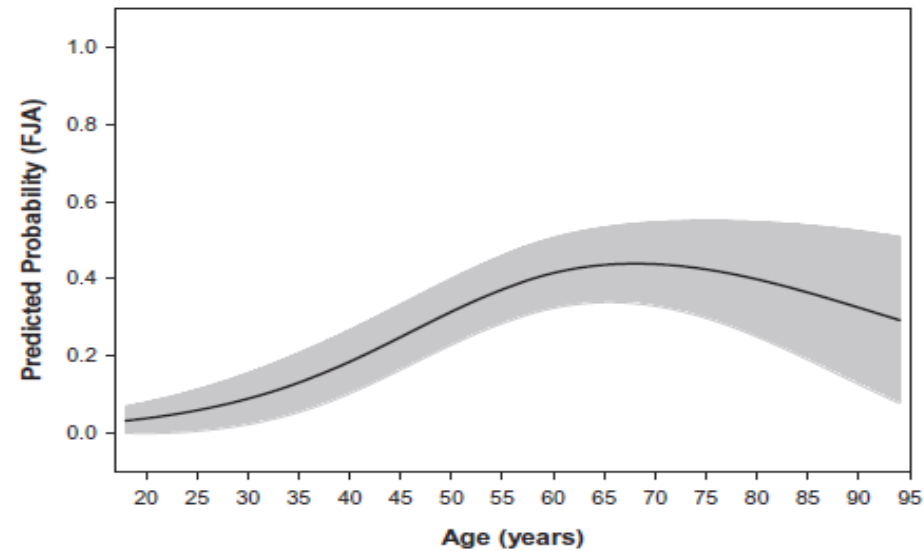
Predicted Probability of SIJD versus Age (years)

Predicted Probability of Other Source versus Age (years)
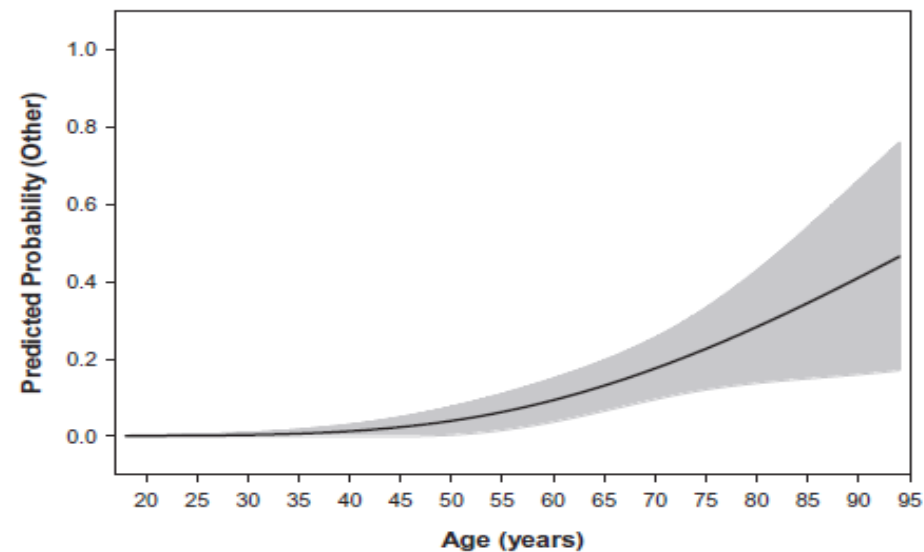
Are there radiological features that predict facetogenic pain?

- Not really
- One study using SPECT (1995)

Are there historical features that predict facetogenic pain

- No!

Approach

- Assess individual situation
- Consider DDx before labelling as 'arthritis'

- Conservative management:
- Healthy living vs seeking health care

Regional Anesthesia and Pain Medicine, May 2020

- Cohen et al

Consensus practice guidelines on interventions for lumbar facet joint pain from a multispecialty, international working group

Poor correlation of imaging and symptoms

No historical or PE tests reliably predict symptomatic facet pain except perhaps pain that is not midline and tenderness over facet joints.

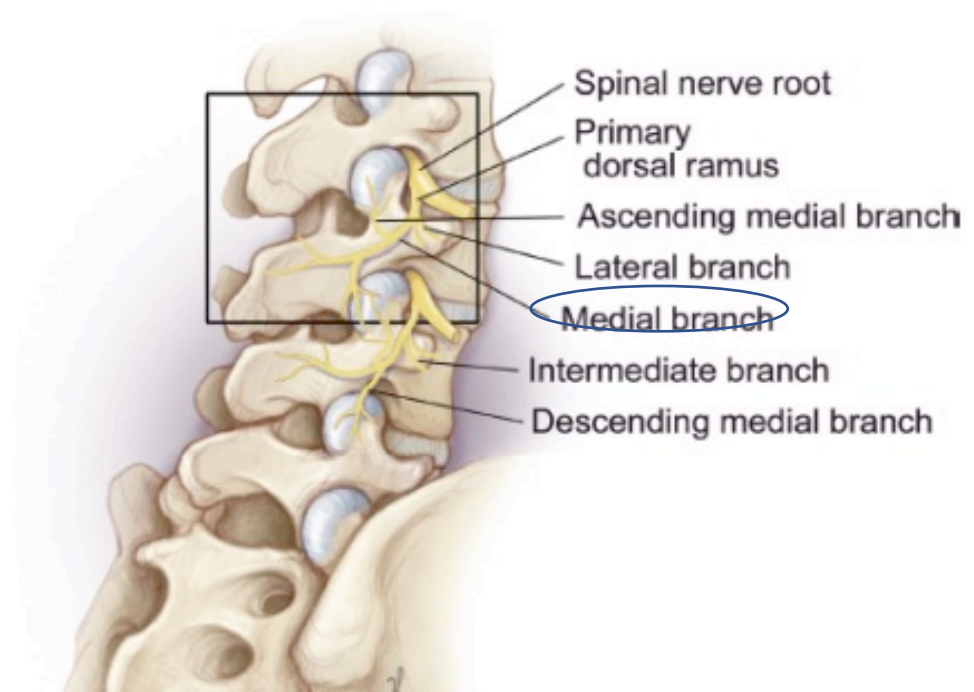Lumbar facet blocks are not recommended for diagnostic or therapeutic reasons
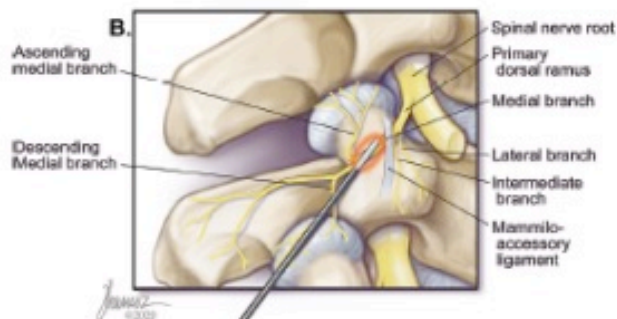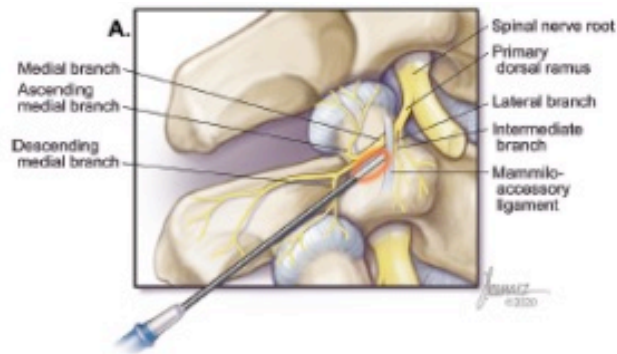
Facet blocks in Quebec

- Tens of thousands facet blocks done per year

- Few hundred radiofrequency procedures per year

Facet block vs Medial branch block

Anesthesiology and Pain Medicine,
August 2015

SIS Manual
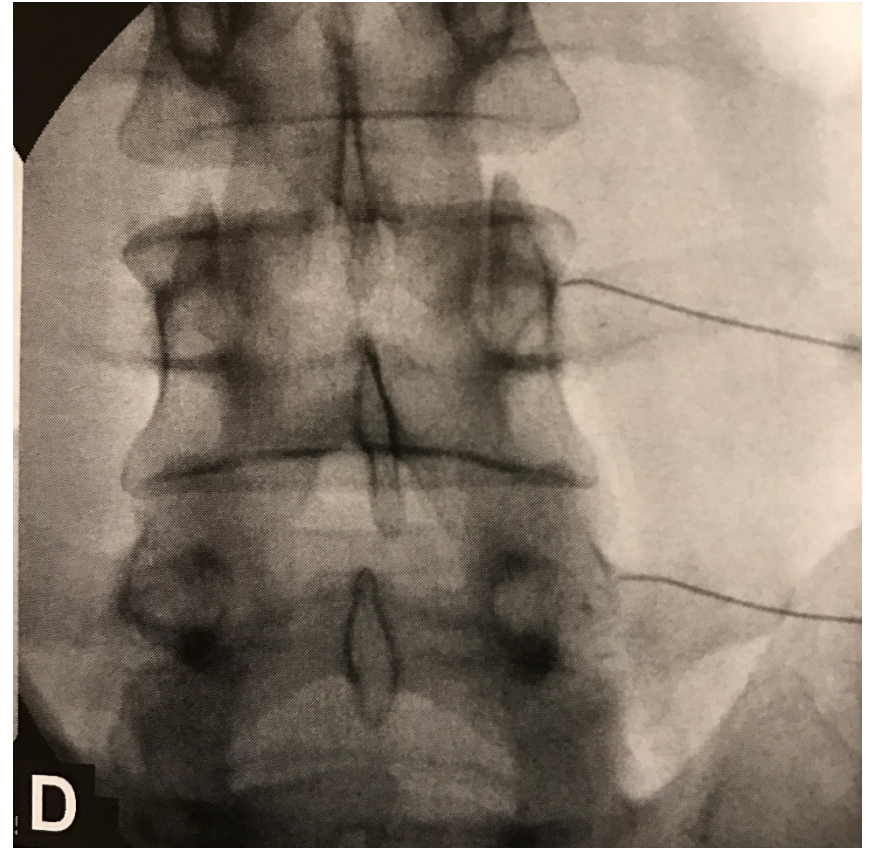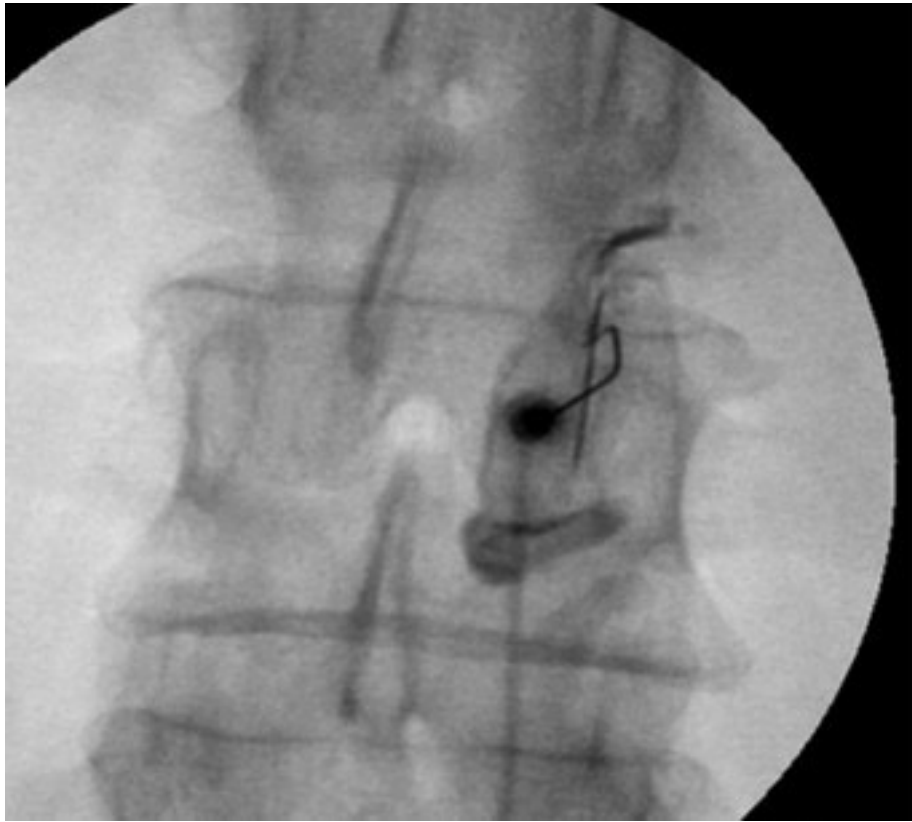
Concepts in Interventional Pain

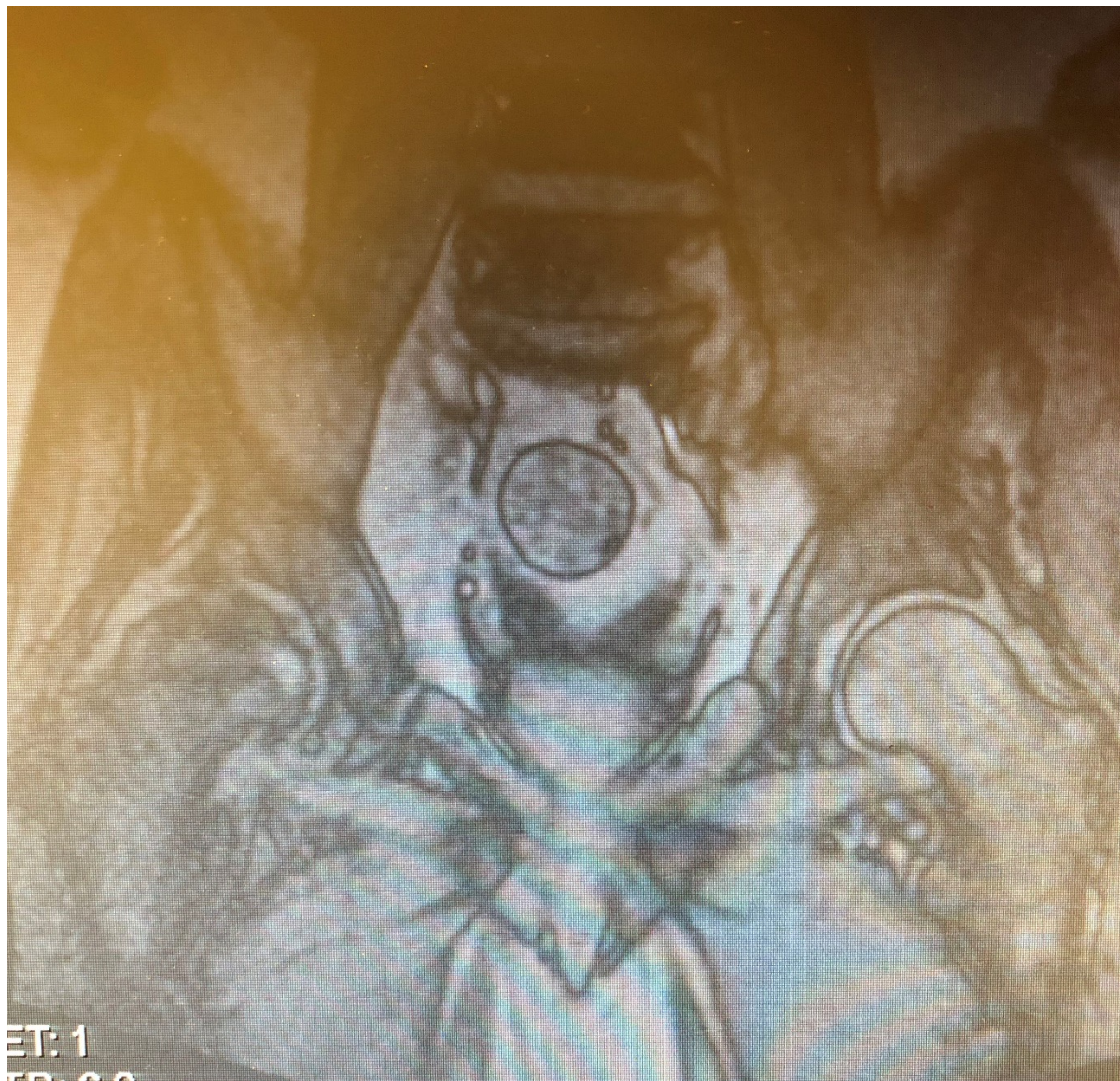- Radiofrequency neurotomy

Case 3

- 60 year-old male

- Right LBP

- Little radiation into his thigh

- Worse with ambulation

Think SI

- Unilateral
- Pain below L5
- No neurological symptoms

- Multiple positive SI joint tests are positive

Scout MRI image of the lumbar spine

SIJ options

Figure 1 Antero-posterior fluoroscopic view of a sacroiliac joint arthrogram showing contrast medium contained within the joint.
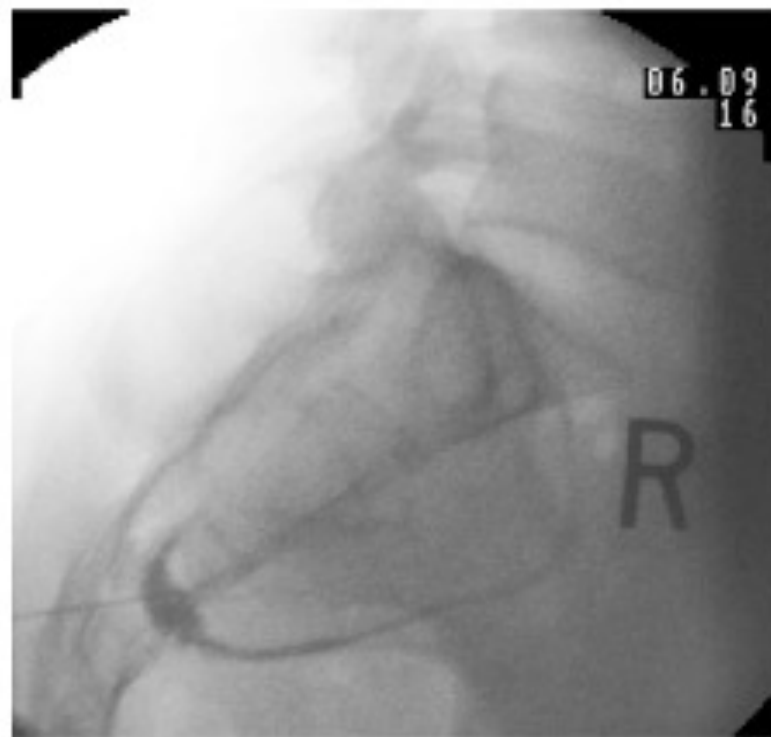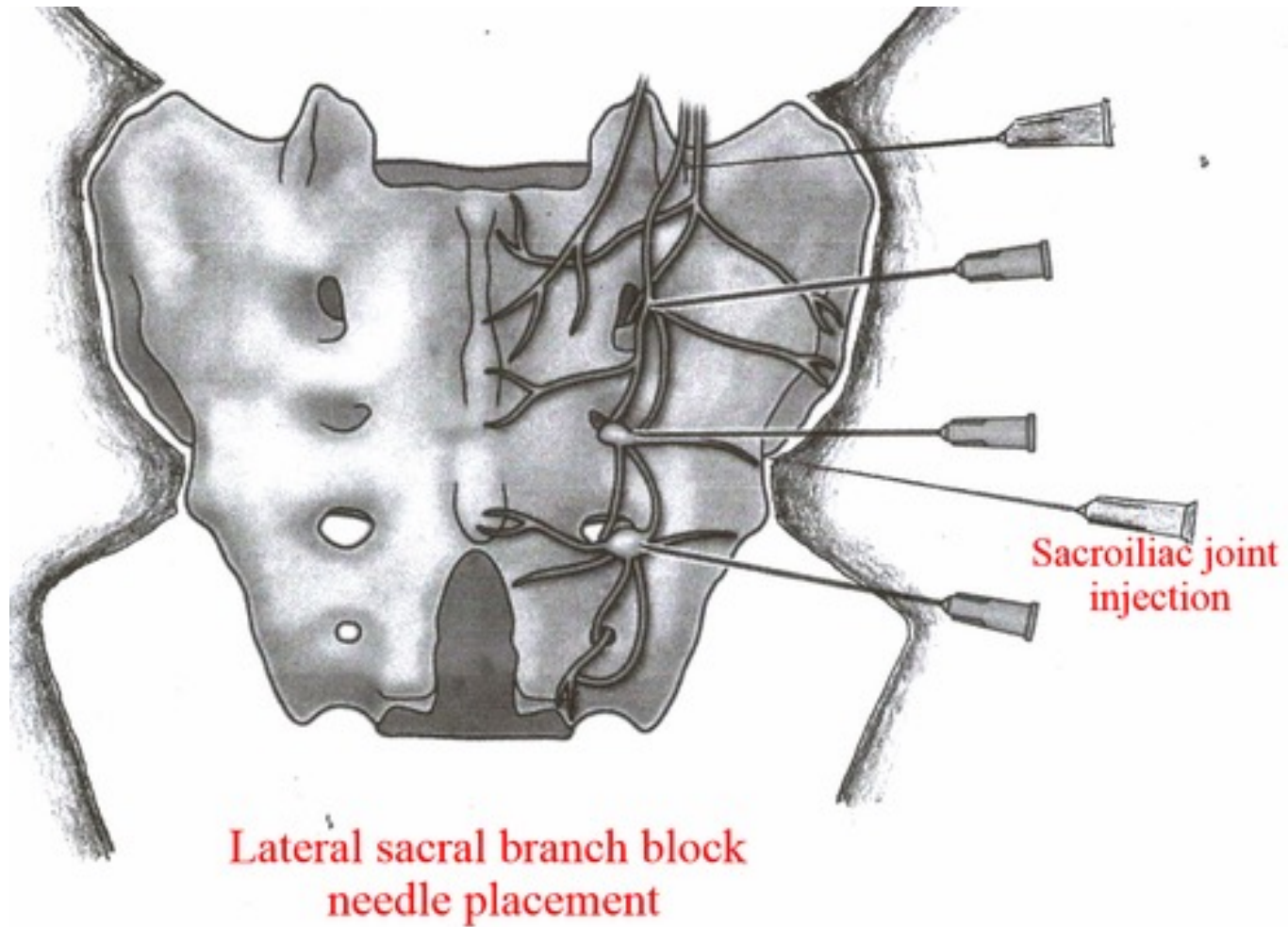
Figure 3 Lateral fluoroscopic view of a sacroiliac joint arthrogram showing contrast medium contained within the joint.

SIJ options

Sacroiliac joint injection

Lateral sacral branch block needle placement

Timing of blocks

- Reasonable for trial of conservative management first
- Should be some functional impairment
- Effect has to be long enough to warrant subsequent injections– 2 months is a failure!
- When failure- reconsider diagnosis, technique

Conclusion

At the end of this session the participant will be able to:

- Identify which patients are likely to respond to spinal injections

- Classify patients into the most probable cause of symptoms

- Discuss considerations for repeated injections

Defining success in LBP

- Less pain– MID of 2 points on a VAS?
- Less disability- improvement on Oswestry or Roland-Morris Questionnaires?
- SF-36?
- Less medication use?
- Return to work?