

# BACK PAIN

Mr SP Suresh

Consultant Orthopaedic Surgeon

Colchester Hospital University NHS Foundation Trust

# BACKGROUND

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- Treating all types of **back pain costs the NHS** more than £1000 million per year, with indirect costs secondary to loss of productivity being even higher. It is the most expensive cause of work disability.
  - Additionally, further unusually large non-NHS costs were accounted for by the use of private therapists (acupuncturists, chiropractors, occupational therapists, osteopaths, physiotherapists and others)
- Back pain is the **largest single cause of disability in the UK** in those <45, with lower back pain alone accounting for **11% of the total disability** of the UK population.
- Referrals for spinal surgery are increasing year on year and a growing number of patients are **waiting longer than 18 weeks from referral** to treatment.

# BACKGROUND

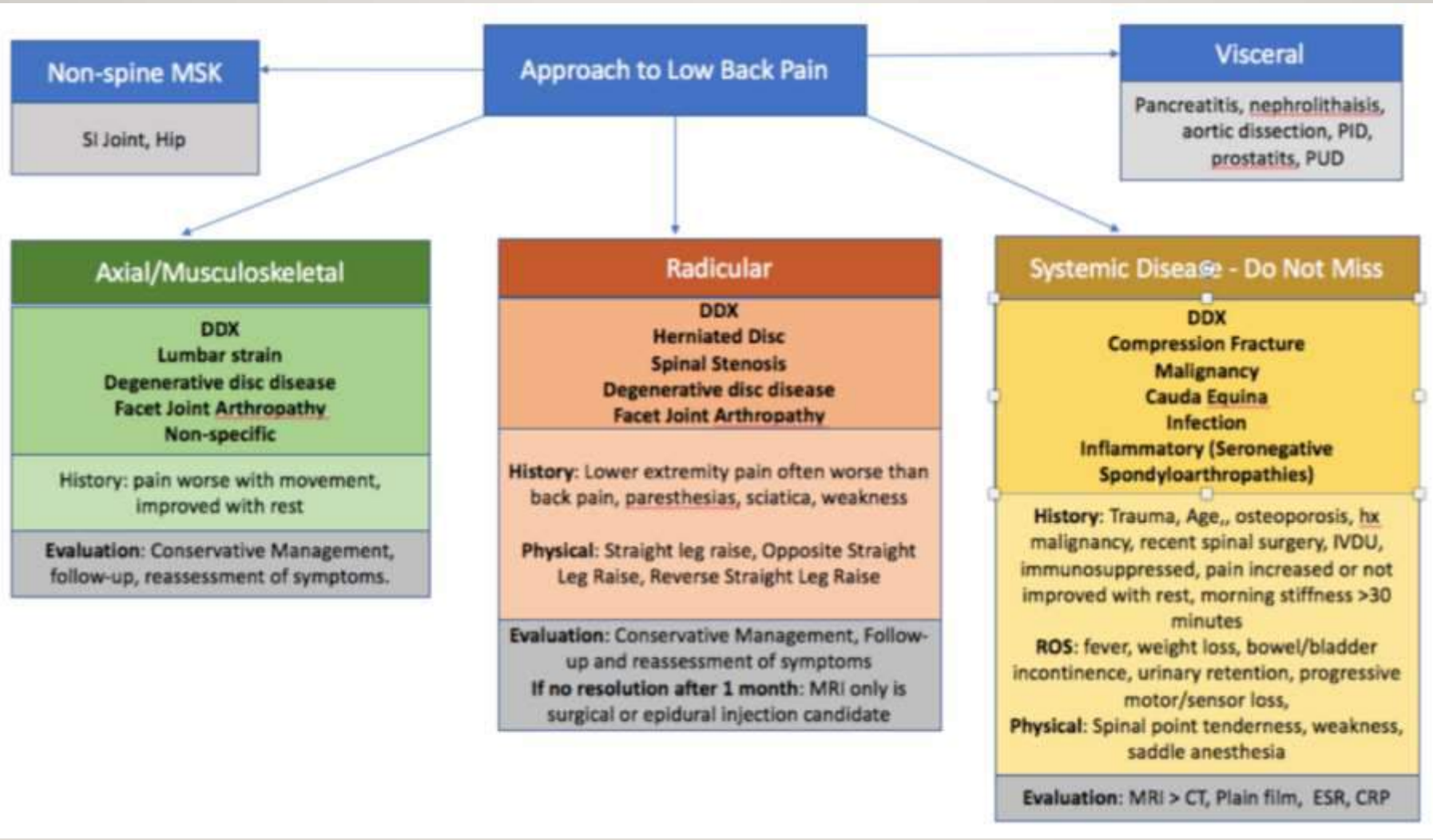
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- Low back pain affects 1/3<sup>rd</sup> of the UK Adult population each year (according to the Arthritis Research Campaign)
- 2.6 million of which will consult their GP's each year
- One year after a first episode of back pain 62% of people still have pain and 16% of those initially unable to work are not working after one year.
  - Typically, pain and disability improve rapidly during the first month and are self limited, however some develop chronic recurrent pain with a significant impact on quality of life

# RISK FACTORS

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- Increasing Age – starts 30-40, hereon increasing with age
- Low Physical Fitness and Sedentary Lifestyle
- Poor Diet and Obesity – puts stress on back
- Genetics / Race – eg degenerative disc disease
- Occupation – repetitive bending, heavy lifting, twisting, long hours standing / sitting
- Smoking





# LUMBAR SPINE DIFFERENTIAL DIAGNOSIS

## Rheumatological

- Systemic lupus erythematosus
- Ankylosing arthritis
- Rheumatoid arthritis
- Reactive arthritis

## Autoimmune

- AS
- RA
- SLE
- IBD
  - Colitis
  - Crohns

## Degenerative

- Osteoarthritis
- Spondylololysis
- Osteoporosis
- Disuse atrophy

## Infective

- Abscess
- Meningitis

## Inflammatory

- Ankylosing spondylitis
- Rheumatoid arthritis
- Reactive arthritis
- Facet joint inflammation
- Osteoarthritis
- Inflammatory bowel disease

## Psychogenic

- Depression
- Anxiety

## Traumatic

- Fracture
- Spondylololysis
- Disc
- Facet lock
- Muscle tear
- Ligament strain

## Iatrogenic

- Surgery
- Pelvic viscera
- Spinal
- Neurological
- Medications
  - statins

## Endocrinological

- Hypoparathyroid
- Cushings
- Osteoporosis

## Vascular

- AAA

## Neoplasm

- Metastises
  - Prostate
  - Breast
  - Lung
  - Bowl
  - Kidney
- Local
  - Myeloma
  - Meningioma
  - Schannoma
  - neurofibroma

## Congenital

- Scheurmanns
- Osteogenesis imperfecta
- Lumbarised sacral
- Sacralised lumbar
- Spinabifida occulta
- Spondylitic spondylololysis

# CLASSIFICATION

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- **Mechanical** (HNP, OA, spinal stenosis, spondylolisthesis, compression fracture)
- **Nonmechanical**
  - Tumor (metastases, MM, lymphoma)
  - Infection (osteomyelitis, diskitis)
  - Inflammatory arthritis (RA, AS)
- **Visceral disease** (AAA, nephrolithiasis, pancreatitis, prostatitis, PID)

# CLASSIFICATION

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- **Complicated** (“Red Flag” conditions)
- **Specific Diagnosis**
  - Lumbar Radiculopathy
  - Lumbar Spinal Stenosis
  - Others such as Ankylosing Spondylitis
- **Uncomplicated (Non-Specific)**
  - A diagnosis of exclusion



# “RED FLAGS”

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1. **Metastatic CA** (History of cancer\*, Unexplained weight loss, Rest pain, Age >50)
2. **Infection** (Unexplained fever\*, Recent bacterial infection, Immunosuppression, IVDA)
3. **Fracture** (Steroids\*, Osteoporosis, Recent trauma, Age >70)
4. **Cauda Equina Syndrome** (Urinary retention or incontinence, Saddle anesthesia, Decreased rectal tone, Bilateral lower extremity weakness/numbness)
5. **Severe or progressive focal neurologic deficit**
6. **Failure to improve with therapy**
7. **Pain > 4 weeks**

(\* Most important in the condition)

“RED FLAGS”

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# **I. Compression Fracture (4%)**

2. Metastatic CA (0.7%)
3. Cauda Equina Syndrome (0.04%)
4. Infection (0.01%)

# COMPRESSION FRACTURE

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- ❑ Osteoporosis
- ❑ Location
  1. Thoracolumbar junction
  2. Midthoracic spine
- ❑ Pain may not be localized to the level of fracture, as thoracolumbar fractures may present with low back or lumbosacral pain.

# CANCER

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- **Past history of cancer** is by far the single strongest indicator of cancer related low back pain.
  - Metastatic (Prostate, Lung, Breast)
  - Multiple myeloma
  - Lymphoma
- Increases post test probability from 0.7% to 9%
- Not including nonmelanoma skin CA

# CAUDA EQUINA SYNDROME

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- SURGICAL EMERGENCY
- Loss of power + myotomes
- Loss of dermatomal sensation
- Overflow urinary incontinence and faecal incontinence
- Loss of perianal sensation
- Loss of anal tone



# CAUDA EQUINA SYNDROME

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- Large central disc herniation (L4-5)
  - Urinary retention (Retention develops initially and leads to overflow incontinence later.)
  - Normal post-void residual essentially rules it out.
  - Surgical emergency

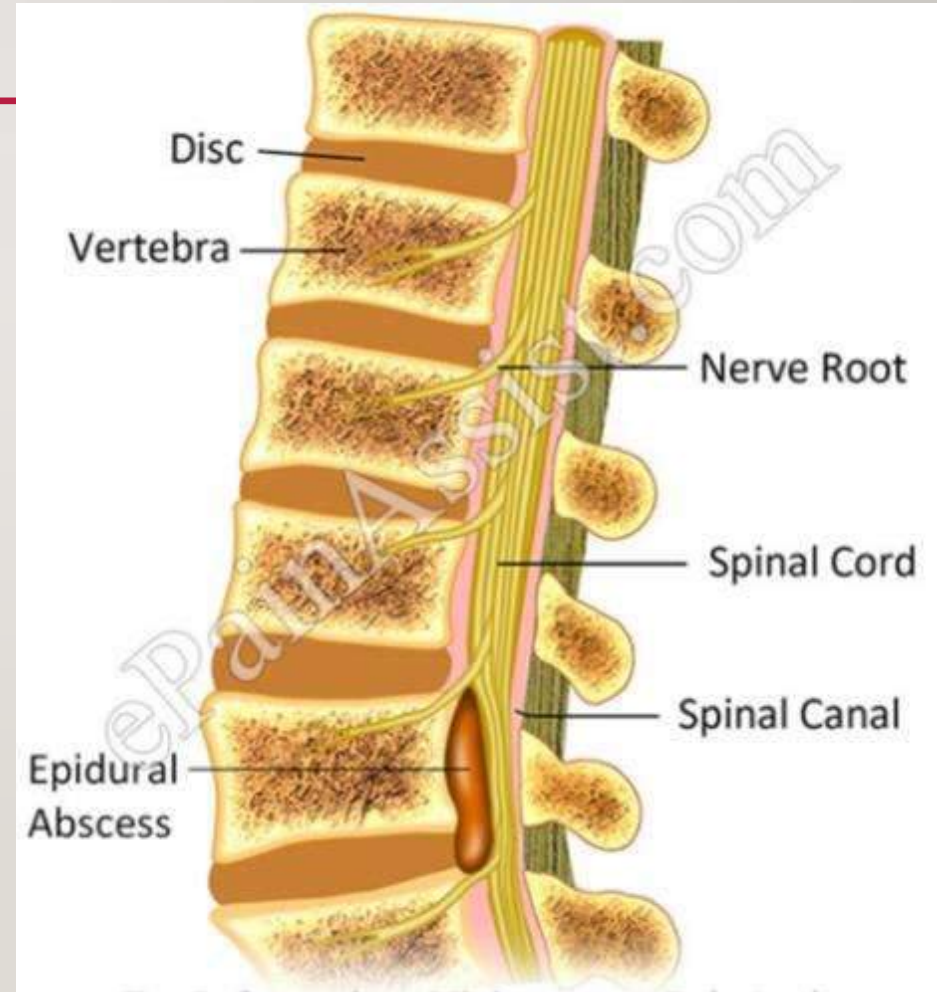
# TUMOUR

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# EPIDURAL ABSCESS

- ?IVDU / ?recent admission for Sepsis
- Fever, vertebral tenderness and neurology
- Bloods = CRP,WCC both raised



# NONSPINAL LBP

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1. AAA
2. Nephrolithiasis
3. Pancreatitis
4. Prostatitis
5. PID

\* Most spinal cause of low back pain will be aggravated by spinal movement.

# OTHER DIFFERENTIAL DIAGNOSES

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- Abdominal Aortic Aneurysm
  - - RF's for vasculopathy, abdominal expansile mass palpated
  
- Pancreatitis
  - - Background of alcohol excess / gallstone disease
  - - Steatorrhoea, N/V, jaundice
  
- Peptic Ulcer Disease
  - Pain / symptom relief related to meals
  - RF's of NSAID use, smoking, GORD (h.pylori)



# OTHER DIFFERENTIAL DIAGNOSES

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- Nephrolithiasis
  - Loin to groin pain, patient writhing in pain
  - Urine dip reveals microscopic haematuria
- Prostatitis
  - PR examination reveals warm, boggy prostate + tenderness to palpation
- PID
  - RF's = Female with multiple sexual partners / unprotected sexual intercourse
  - Adnexal tenderness / cervical excitation on examination

# LUMBAR RADICULOPATHY

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- L4-5 or L5-S1 levels (90%)
- Inflammation > Mechanical compression
- Phospholipase A2, TNF- $\alpha$
- Pain with sitting, bending and coughing
- Pain radiates below the knee in a narrow band.

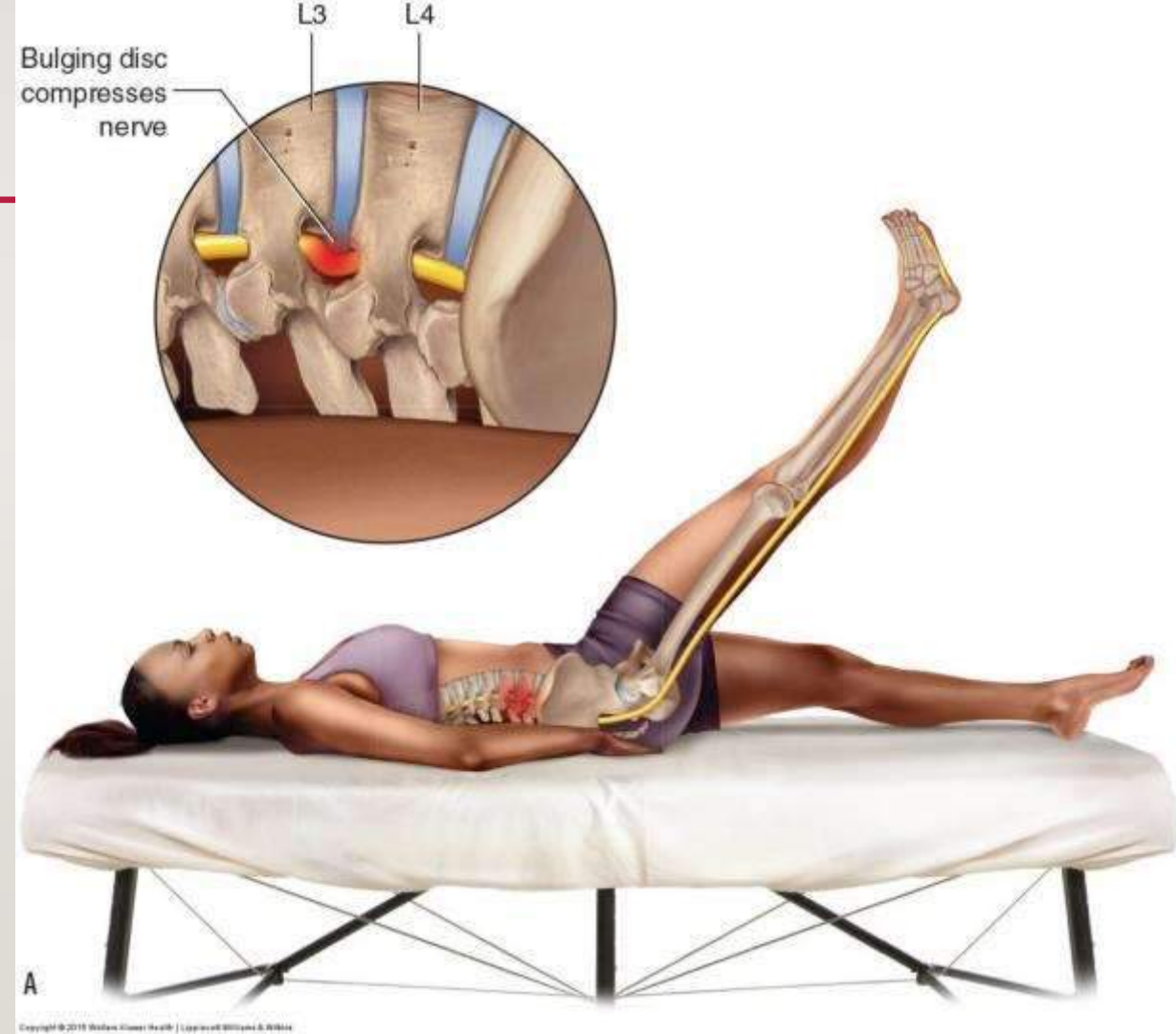
# EXAMINATION

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- *Inspection:*
  - Back, Posture, ROM
- *Palpation:*
  - Vertebral spinous processes
  - Paravertebral muscles
- *Other:*
  - Peripheral pulses (DDx Vascular Claudication)
  - ?Malignancy Dx = further examine breast / prostate / LN's

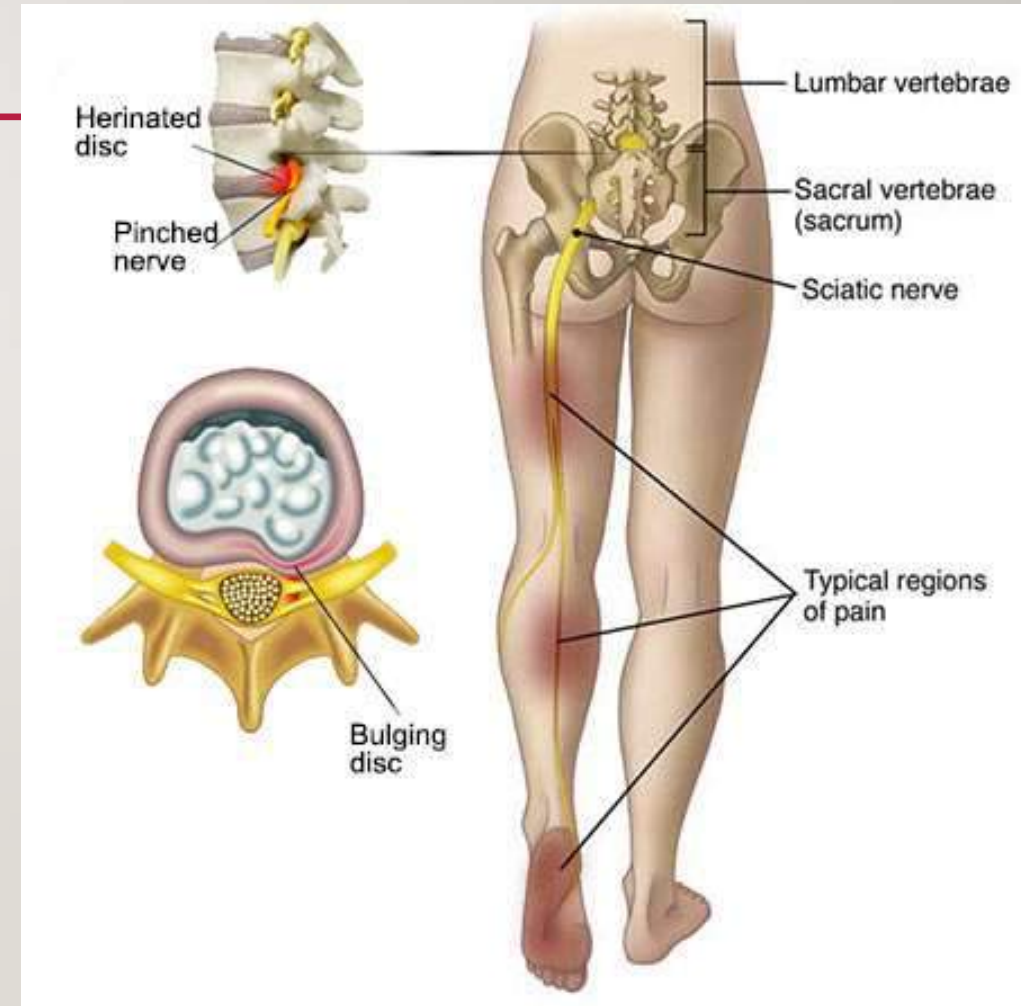
# EXAMINATION

- Straight Leg Raise:
  - $<60^\circ$  = abnormal
  - Reproduces symptoms of Sciatica = abnormal



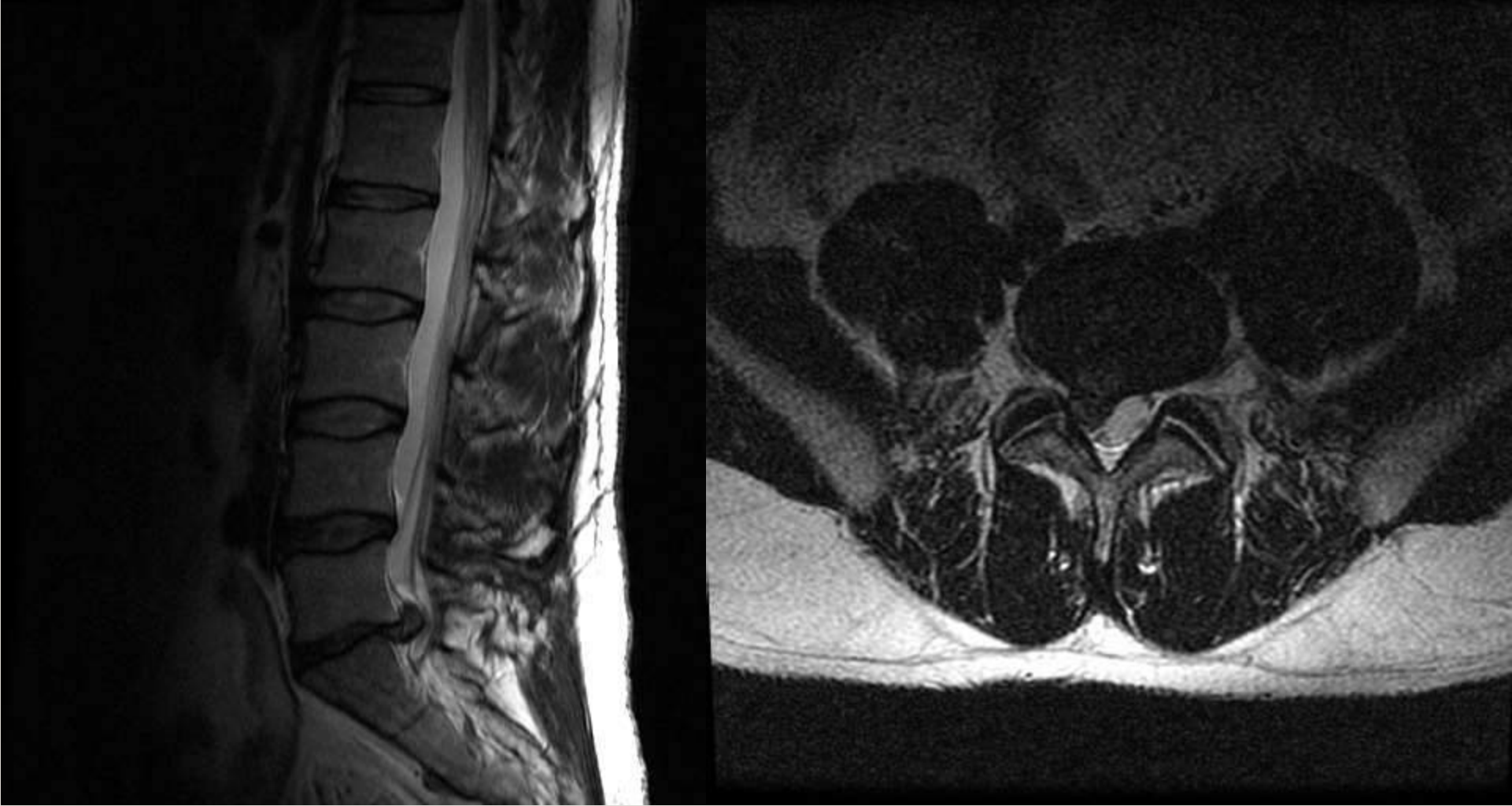
# SCIATICA

- Lower Back
- Radiates down ipsilateral leg
- Associated with weakness and loss of sensation



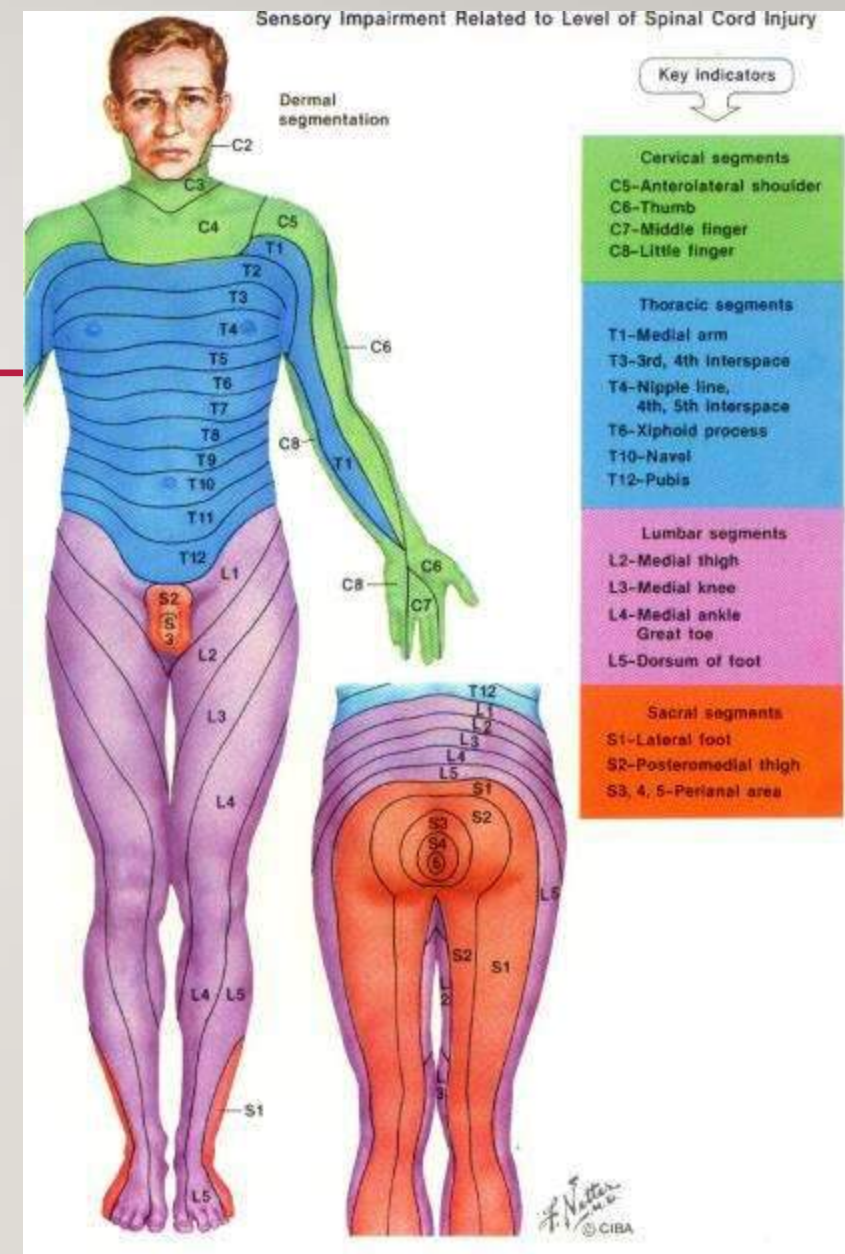






# NEUROLOGICAL EXAMINATION







- Important Myotomes:
- L3/4 = Knee Extension + Knee Reflex
- L4/5 = Ankle DorsiFlexion
- S1/2 = Ankle PlantarFlexion + Ankle Reflex
  
- Important Dermatomes:
- L4 = Medial Leg sensation
- L5 = medial foot + 1<sup>st</sup> dorsal webspace sensation
- S1 = lateral foot + sole of foot sensation





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Nerve root	L4	L5	S1
Pain			
Numbness			
Motor weakness	Extension of quadriceps	Dorsiflexion of great toe and foot	Plantar flexion of great toe and foot
Screening examination	Squat and rise	Heel walking	Walking on toes
Reflexes	Knee jerk diminished	None reliable	Ankle jerk diminished

# NOT ALL LEG PAIN IS FROM SCIATICA.

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- Uncomplicated low back pain is often referred to lower leg. (somatic referred pain)
- Ask “Where is the pain worst?” “Where do you feel the pain most consistently?”



# RADICULAR VS. REFERRED PAIN

Radicular Pain	Somatic Referred Pain
Leg > Back	Back > Leg
Shooting, Lancing, Cutaneous component	Dull, Pressure-like, Deep
Travels along the limb in a narrow band	Extends into limbs across a wide region
+/- neurologic deficit	- neurologic deficit

# NATURAL HISTORY

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- Favorable
- Conservative and surgical treatments are both successful.
- Large extruded discs are more likely to decrease in size.

# INITIAL TREATMENT

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- Mobility better than rest
- Physiotherapy important in early stages to prevent chronicity
- Core stability exercises
- Pilates and Yoga are good options
- Acupuncture variable results

# PAIN MEDICATION

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- Acute stage- combination of paracetamol, codeine and an NSAID
- Add muscle relaxant if required
- If significant leg pain consider amitryptiline, pregabalin or gabapentin
- Avoid opioids as much as possible
- Chronic back pain –refer to pain management for optimal treatment

# SURGERY VS. PROLONGED CONSERVATIVE TREATMENT FOR SCIATICA – NEJM 2007

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- Prospective randomized
- 283 patients with severe sciatica for 6 to 12 weeks
  - 141 → Early Microdiskectomy (2.2 weeks)
  - 142 → Conservative treatments
- Faster pain relief in surgery
- Same 1 year outcomes





# LUMBAR SPINAL STENOSIS

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- Congenital - Onset in 30s
- Degenerative
  - Most common
  - Onset in late 50s or early 60s
  - Most commonly involves L4-5 level followed by L3-4
- Mechanical Compression
  - Compression of microvasculature
  - Nerve root ischemia
  - Increased microvascular permeability and edema



# SPINAL STENOSIS

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- Back pain
- Pain / paraesthesia affecting ipsilateral leg
- Calf pain triggered by walking and improved with rest

# LUMBAR SPINAL STENOSIS

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- Insidious onset
- Chronic low back pain that progresses to buttock, thigh and leg pain.
- Fatigue, heaviness or pain in the legs with ambulation (Neurogenic claudication)



# NEUROGENIC VS. VASCULAR CLAUDICATION

Symptoms	<b>Neurogenic</b>	<b>Vascular</b>
Back Pain	Common	Uncommon
Pain Relief	Sitting or flexed posture Standing and resting usually insufficient Often slow (>5 mins)	Not positional  Pain relief while standing Almost immediate
Ambulatory tolerance	Variable	Fixed
Uphill vs. Downhill	Downhill more painful (extended posture)	Uphill more painful
Bicycle ride	No pain	Pain

# SPINAL STENOSIS

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# LUMBAR SPINAL STENOSIS

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## Most common exam findings

- Loss of lumbar lordosis with limited extension
- Trunk is flexed forward in standing and walking. (“Simian Posture”)
- No significant tenderness to palpation
- Negative SLR
- Normal motor exam despite the report of weakness

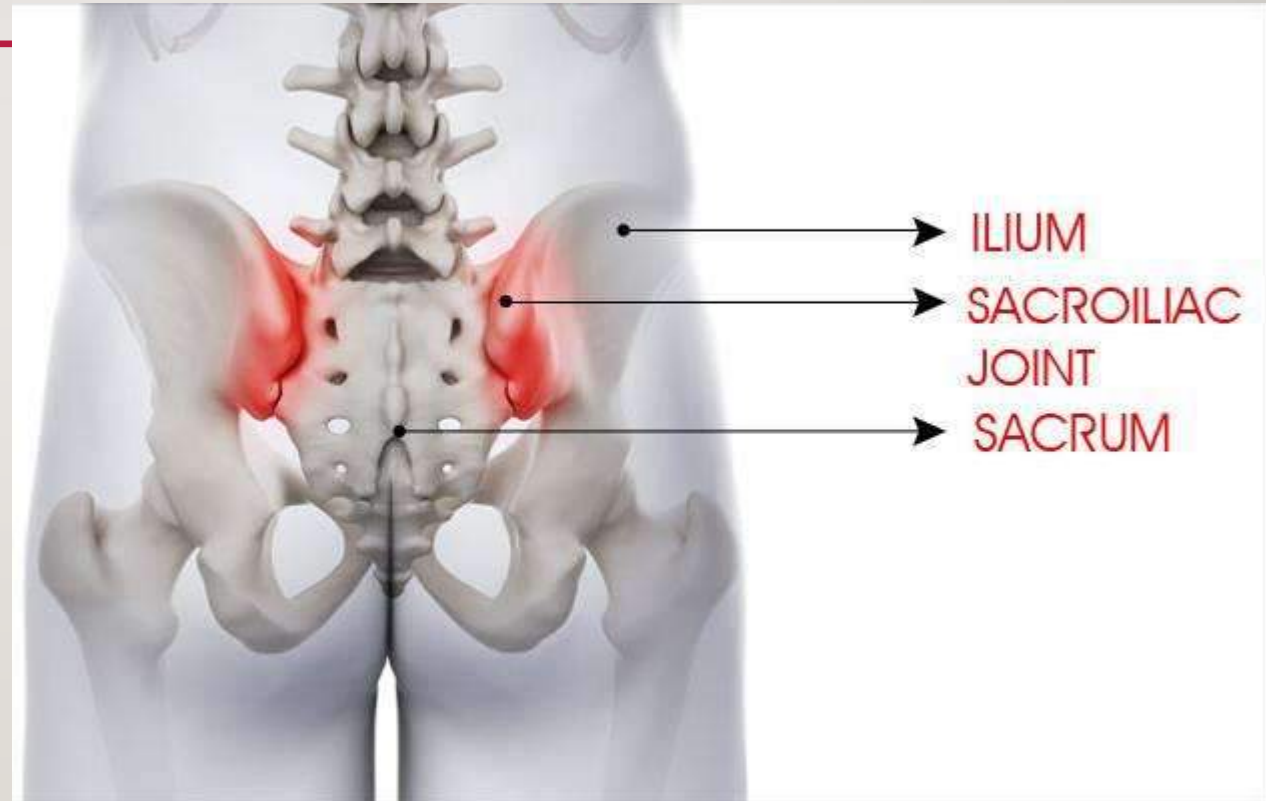
# NATURAL HISTORY

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- At 4 years
  - 70% No change
  - 15% Improved
  - 15% Worsened
- 5-15% may have coexisting cervical spinal stenosis.

# DIFFERENTIAL DX

- Sacro-iliitis
- Ankylosing Spondylitis
- Hip Osteoarthritis





# ANKYLOSING SPONDYLITIS

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- The earliest clinical features
  - Gradual onset in males < 30 years old
  - Morning stiffness
  - Improvement with exercise
  - Not relieved by bed rest
- Schober test
- Chest expansion < 2.5 cm (late stage)
- Plain films typically normal in early stages

# DIFF DX

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- Sacro-iliitis
- Ankylosing Spondylitis

# SACROILIAC JOINT PAIN

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- Sacroilitis (Inflammatory Arthritis)
  - AS
  - RA
- Sacroiliac Joint Dysfunction
  - Abnormal gait pattern
  - Leg length discrepancy
  - Lumbar fusion
  - Trauma
  - Scoliosis
  - Pregnancy

# ANATOMY

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## □ Diarthrodial Synovial Joint

- Anterior: true synovial
- Posterior: syndesmosis (ligaments and muscles – gluteal and piriformis)

## □ Innervation

- Anterior: lumbosacral plexus
- Posterior: primarily dorsal ramus L5 and lateral branches S1 to S4

# SACROILIAC JOINT DYSFUNCTION

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## □ Clinical Symptoms

- Pain near PSIS in gluteal area
- Unilateral
- Pain when rising from sitting
- May have somatic referred pain down the leg
- Does not pass above L4-5 level (iliac crest)

## □ Exam

- Multiple clinical exams
- Fortin Finger Test – simplest

# SUMMARY – SI JOINT PROCEDURES

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- SI Joint Dysfunction
- Intra-Articular Injection
- Radiofrequency Ablation
  - Diagnostic LBBs for patient selection
  - Long term relief
  - Developing techniques



# HIP OSTEOARTHRITIS

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- More than expected level of difficulty in differentiating
- Regular referrals from Hip clinics
- THR done with no improvement and vice versa
- Thorough clinical examination essential
- Diagnostic injections useful
- THR tends to benefit back pain if both present

# UNCOMPLICATED LOW BACK PAIN

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- A diagnosis based on exclusion of specific pathology
- Generally classified by the duration of the pain
  - Acute: < 1 month
  - Subacute: 1-3 months
  - Chronic: > 3 months

# UNCOMPLICATED LOW BACK PAIN

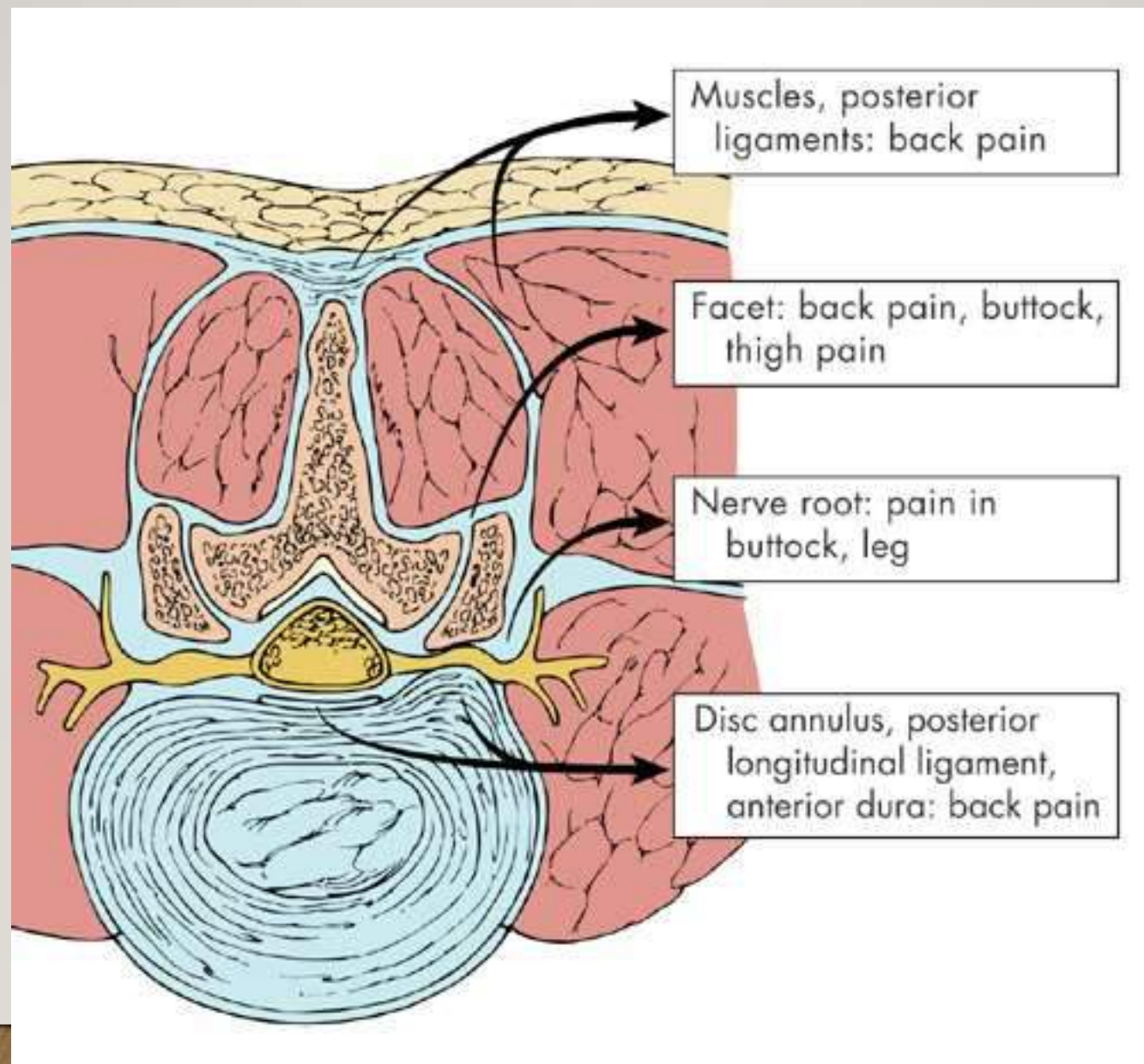
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- Majority (> 85%) of low back pain in primary care
- Acute low back pain
  - Rapid improvement in the first month in most patients
  - High recurrence rate up to 1/3
  - **Chronic low back pain (7-10%)**

# WHAT IS THE ANATOMIC SOURCE OF LBP?

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- Controversial
- Possible sources
  - Discs
  - Facet (Zygapophysial) Joints
  - Sacroiliac Joints
  - Ligaments
  - Muscles





# UNCOMPLICATED LOW BACK PAIN

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- Cannot determine specific anatomic source based on history and exam alone.
- “Lumbar spinal pain of uncertain origin?”
- X ray?
- MRI ?
- Diagnostic Injections ?



# X RAY

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- ❑ Asymptomatic degenerative changes
- ❑ Finding of degenerative disc disease, spondylolisthesis or pars defect does not establish the cause of low back pain.

# MRI

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- Recommended initial imaging study of choice in complicated low back pain
  - Cancer
  - Infection
  - Cauda equina syndrome
  - Severe or progressive neurologic deficit
- Lumbar disc herniation
- Lumbar spinal stenosis

# MRI

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- MRI often shows abnormal findings in asymptomatic patients.
- At age 42, disc bulges in 52% and protrusion in 27% of asymptomatic adults
- After age 60, these findings are even more common.
- Spinal stenosis in 25% of asymptomatic adults over 60 years.

# MRI

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- Indicated for complicated low back pain and specific diagnosis
- How about in uncomplicated LBP?
  - Controversial
  - Auto mechanic analogy? Opening up the hood?

# DIAGNOSTIC INJECTIONS

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- Lumbar Transforaminal ESI (Selective Nerve Root Block)
- Lumbar Medial Branch Blocks
- Sacroiliac Joint Injections
- Lateral Branch Blocks

# DIAGNOSTIC INJECTIONS

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- Identify the pain generator
- Plan long term treatment



# TREATMENT OF UNCOMPLICATED LBP

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- Life Style Changes
  - Diet
  - Exercise
  - Weight control
  - No smoking
- Physical Therapy
- Medications? Opioids?
- Spinal Injections?
- Surgery?

# “YELLOW FLAGS”

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1. Previous history of disability
2. Inconsistent findings
3. Abnormal pain behavior
4. Litigation
5. Work dissatisfaction
6. Attention seeking
7. Preference for prolonged bed rest
8. Depression
9. Chemical dependency
10. History of abuse
11. Family history of chronic pain

# WADDELL'S SIGNS

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1. **Superficial tenderness:** Pain elicited from light touch on the skin
2. **Simulation:** Back pain is produced by maneuvers that should not be painful such as axial loading of the head (1-2 lb) or passive rotation of shoulders and pelvis in the same plane.
3. **Distraction:** A symptomatic response to a test, such as straight- leg-raise, changes when the test is repeated while the patient is distracted.
4. **Regionalization:** Ratchet like “givingway” weakness or non-neuroanatomic numbness
5. **Overreaction:** Disproportionate response to routine examination such as collapsing, grimacing, guarding, groans, tremors or any other type of overreaction.

(Behavioral response to examination, Not a proof of malingering,

> 3 signs suggest the presence of non-organic factors)

# PROGNOSIS

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- **Psychosocial Risk Factors**
  - “Yellow Flags” and Waddell’s signs are psychosocial risk factors of delayed recovery.
  - More predictive of outcome than severity of pain or any exam findings.
- **Duration of Symptoms**
  - The status of patients at 2 months may help predictor the outcome at 12 months.

# SUMMARY – LOW BACK PAIN

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- ❑ Be aware of “Red Flags.”
- ❑ Identify specific diagnosis. (LR, LSS, AS)
- ❑ Uncomplicated LBP is a diagnosis of exclusion.
- ❑ MRI for complicated and specific diagnosis.
- ❑ MRI for uncomplicated?
- ❑ Diagnostic Injections
- ❑ Don't forget the “Yellow Flags.”

# LUMBAR FACET PAIN

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- Clinical Symptoms
  - Predominantly axial pain
  - May have somatic referred pain to legs
  - Generally older patients
- Exam
  - Lumbar paraspinal tenderness
  - Positive facet loading
  - Negative nerve tension tests
  - No focal neurologic deficit



# ANATOMY

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- Synovial joint
- Medial branches from dorsal rami innervate the facet joints.
- L4-5 and L5-S1 levels are most commonly affected.

# ANATOMY

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# ANATOMY

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# LUMBAR FACET PROCEDURES

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- Intra-articular Steroid Injection
- Medial Branch Block
- Percutaneous Radiofrequency Medial Branch Neurotomy