

# Evaluation of the Lower Back

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LUMC



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# Epidemiology

- Back pain is the 2<sup>nd</sup> MC symptom seen in physician offices
- 70% of acute LBP improves in 2 wks 90% of cases improve in 4+ wks
- Rates of surgery for LBP 2xs higher than majority of other countries
- Contributes to 25% of disability claims
- Costs 60-80 billion dollars/year



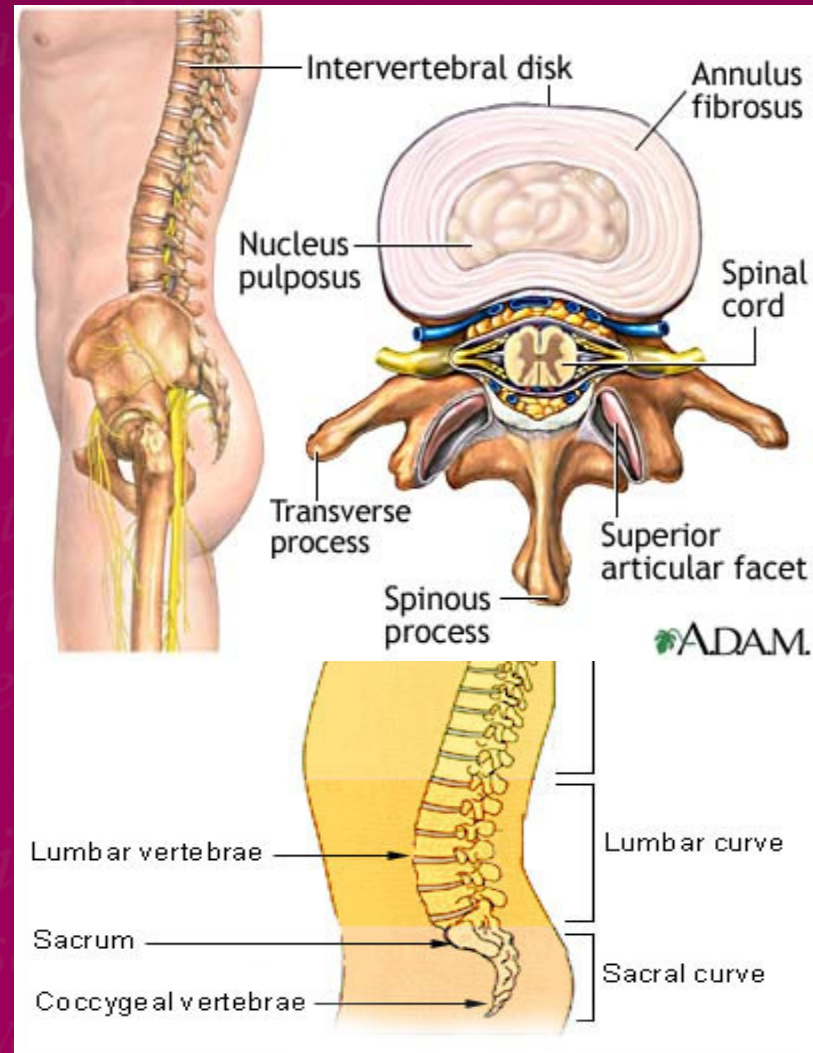
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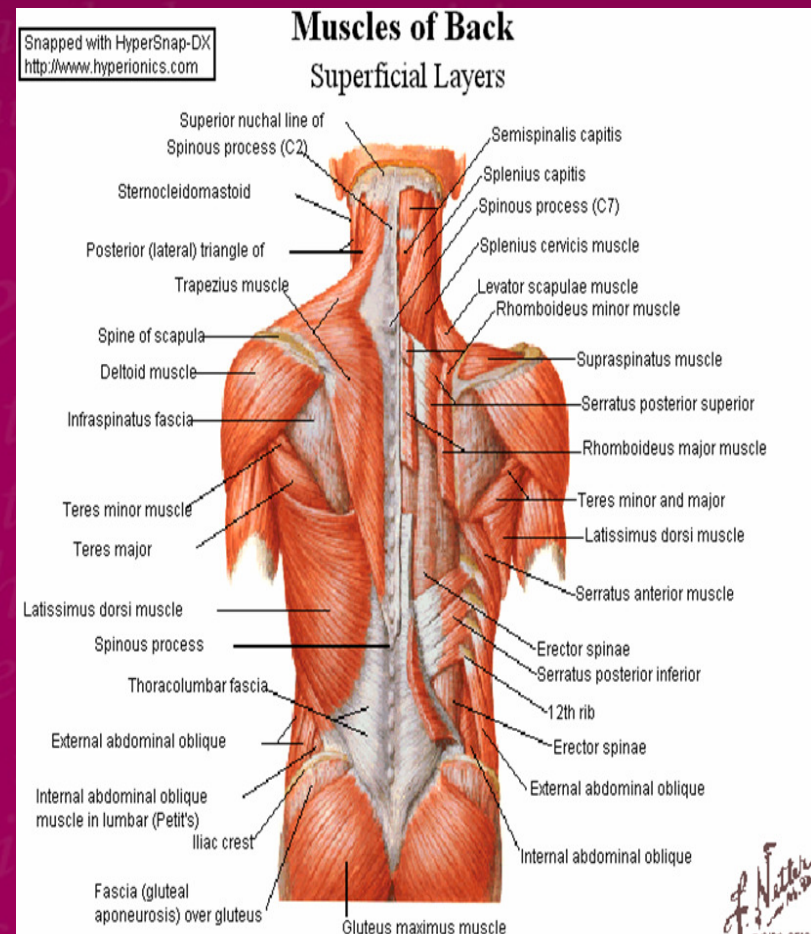
# Anatomy of the Lower Spine

- L1-5
- Components
  - Body
  - Pedicles
  - Facets
  - Lamina
  - Spinous and Transverse Processes
- Sacrum
- Intervertebral Disc
- Spinal Cord
- Spinal Nerve Roots



# Anatomy of the Lumbar Spine

- Superficial
  - Latissimus Dorsi
- Deep
  - Erector Spinae (iliocostalis, longissimus)
  - Quadratus Lumborum
  - Iliopsoas



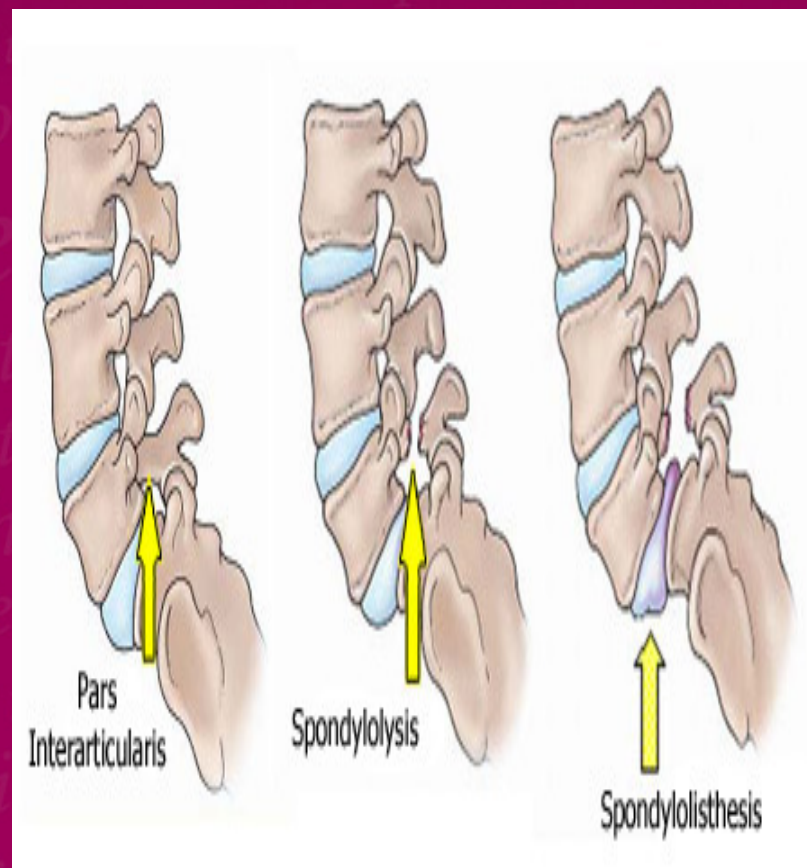
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# S's of the Spine

- Spondylolysis
  - Stress fx pars interarticularis
  - Scottie dog lesion
- Spondylolisthesis
  - Slippage of one vertebral body over another
- Scoliosis
  - curvature of the spine
- Spinal stenosis
  - Narrowing of spinal canal

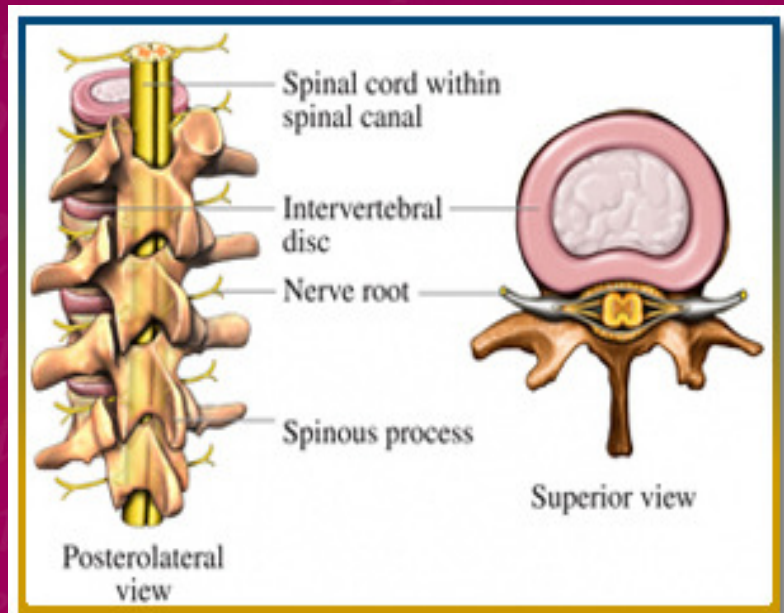


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# Sources of Pain

- **Intervertebral Disc-** may cause 85% LBP
  - Disc degeneration part of aging
  - Rim Lesion: starts in inner part of annulus fibrosis and progresses peripherally
  - Maximum stress in position of forward flexion plus lateral bending



**The intervertebral discs act as "shock absorbers" for the spine**

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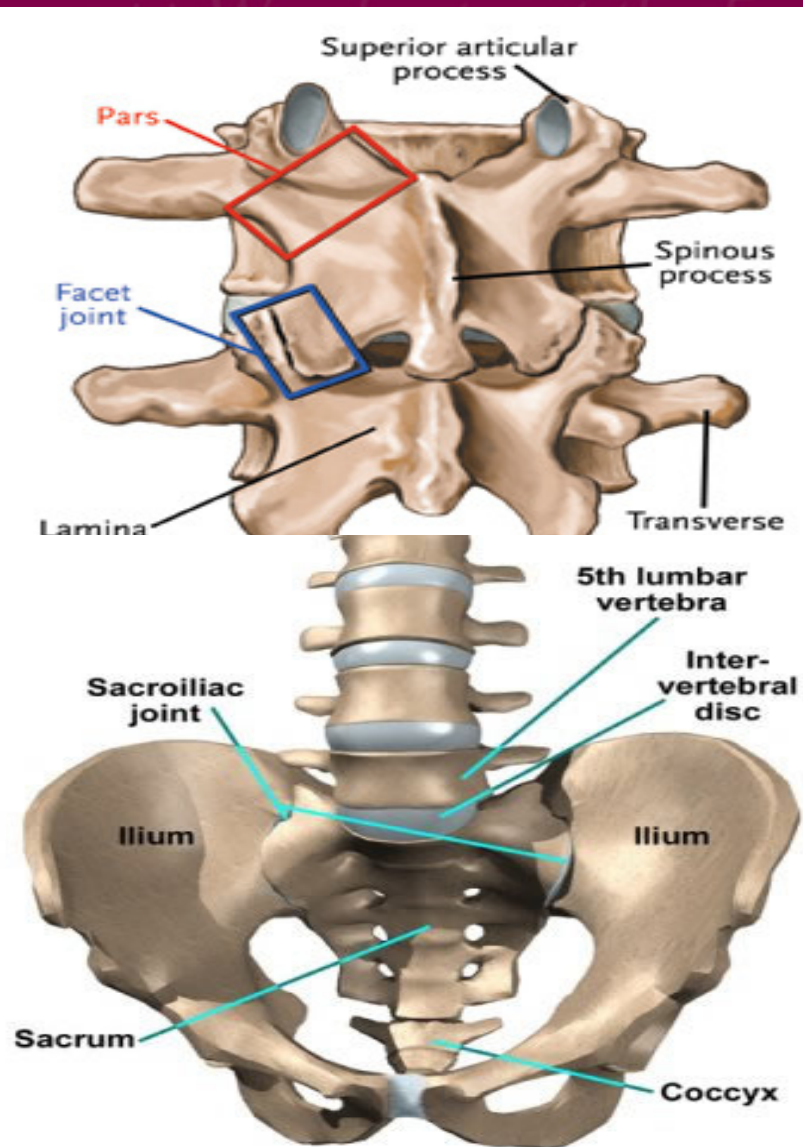
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# Sources of Pain

- **Facet joints**
  - Disc degeneration stresses supp structures
  - Loss of joint space at facet joints
  - Narrowing intervertebral foramina
  - Spinal stenosis
- **Sacroiliac joint**
  - 1 to 3 degrees of rotation and translation
  - SI joint can cause pain



# History

- History of pain
- Location
- Onset (acute, insidious, chronic)
  - Acute (<6 weeks)
  - Insidious/subacute (6-12 weeks)
  - Chronic ( months/years)



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# History

- Aggravating factors
  - Sitting, standing, lying
  - Flexion versus extension
  - Cough, sneeze, valsalva
  - Exercise
  - Work
- Alleviating factor (grocery cart sign in SS)

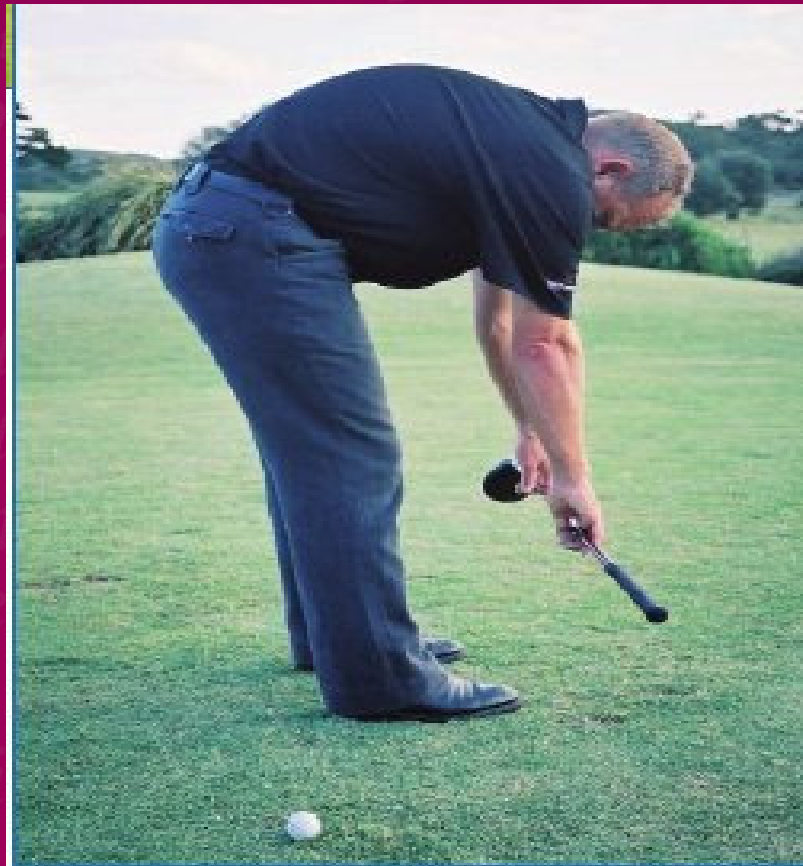


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# History

- Flexion based
- Discogenic
- Lumbar radiculopathy



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# History

- Extension based
  - Spondylolysis
  - Spondylolisthesis
  - Spinal Stenosis
  - Facet Syndrome



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# History

- Either
  - Mechanical LBP
  - Myofascial
  - DDD (osteoarthritis)
  - Sacroiliac joint



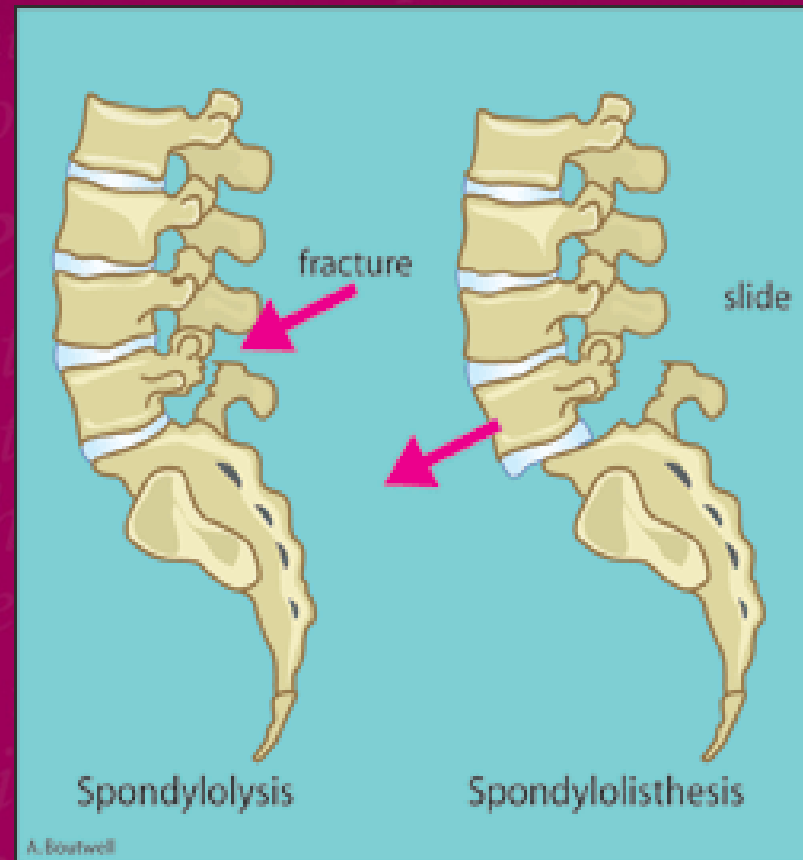
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# Age <20

- Spondylolysis (pars interarticularis stress fracture)
- Spondylolisthesis
- Scoliosis
- Muscle
- SI joint



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# Age 20-50

- Mechanical
- Muscle strain
- Disc herniation
- Sacroiliac joint
- Facet syndrome



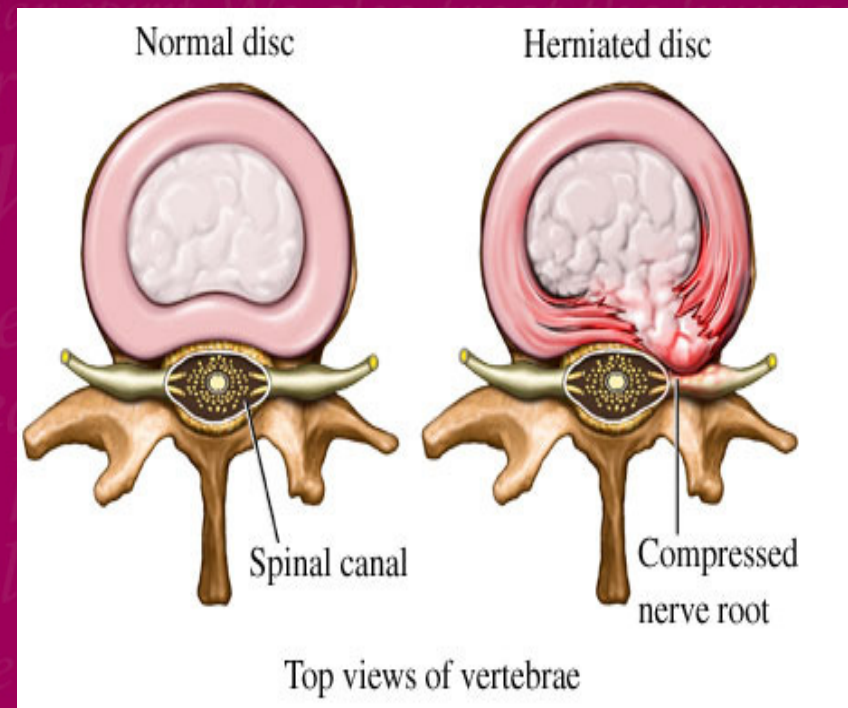
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Age > 50

- Disc Herniation
- Mechanical
- Spinal Stenosis
- Osteoarthritis
- Facet arthrosis
- Compression fracture



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# Red Flags

- Major trauma
- History of cancer
- Fever, weight loss
- Immune suppressed
- Neuropathy
- Recent bacterial infection, IVDA



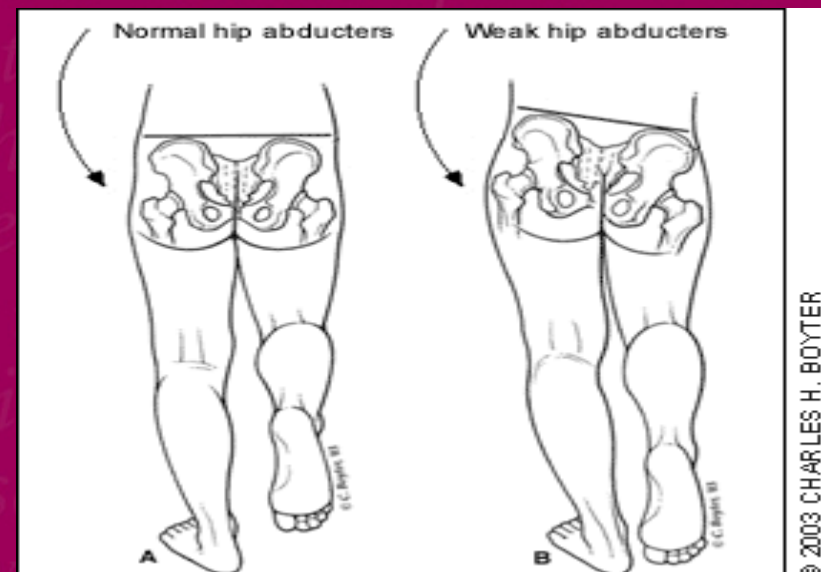
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# Physical Exam-Standing

- ROM
  - Flexion/Extension
  - Side bending
  - Rotation
  - SI joint and paraspinal muscle tenderness
  - Iliac crest height
  - Trendelenburg test
  - Heel/toe walk
  - Gait
  - Single leg extension
  - Single leg hop



# Physical Exam-Sitting

- Deep tendon reflexes
- Sensation testing
- Babinski
- Sitting straight leg raise
- Slump test
- Strength testing
  - quadriceps, hamstring, hip flexor



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# Physical Exam-Supine

- Straight leg raise
  - Positive: posterior leg pain below the knee with the hip flexed at 60 degrees
  - Negative: rules out surgically significant disc herniation in 95% of cases
- Hamstring flexibility
- Hip ROM
- Hip flexor flexibility
- ITB flexibility



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# Physical Exam

- Range of Motion
  - Flexion: 40 degrees
  - Extension: 15 degrees
  - Lateral Bending: 30 degrees
  - Rotation: 45 degrees



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# Neurologic exam

- **Gait**

- Heel (L5)

- Tip Toe (S1)

- **Strength tests**

- L1,L2: Hip flexion (Psoas, rectus femoris)

- L2,3,4: Knee extension (Quadriceps)

- L2,3,4: Hip adductors (adductors and gracilis)

- L5: Ankle/toe dorsiflexion (Anterior tibialis, EHL)

- L5: Hip abductors (gluteus medius)

- S1: Ankle plantarflexion (gastroc/soleus)

- S1: Hip extensors (Hamstrings, glut max)



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# Neurologic Exam

- Deep tendon reflexes

- Knee (L4)

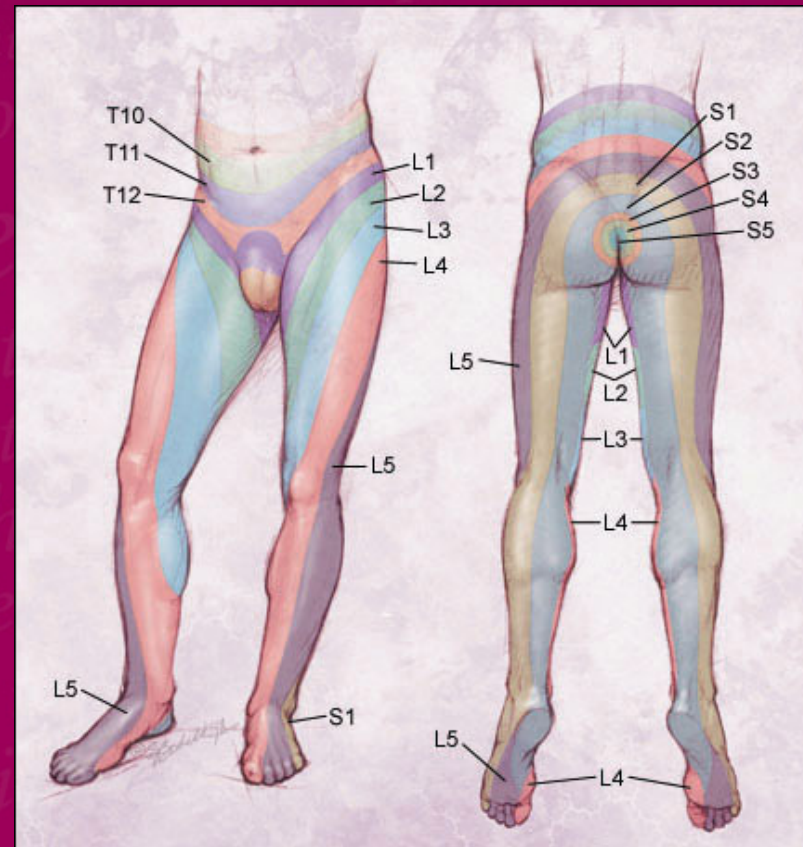
- Achilles (S1)

- Sensation

- L4: Medial Foot

- L5: Dorsal Foot

- S1: Lateral Foot



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# Provocative Maneuvers

- One leg hyperextension/Stork testing

-tests for spondylolysis



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# Provocative Maneuvers

- SLR or Slump test (Supine or seated)
  - Checks L5-S2 radicular symptoms
  - neural tension
  - pain below knee <70 degrees flexion aggravated by dorsiflexion suggestive



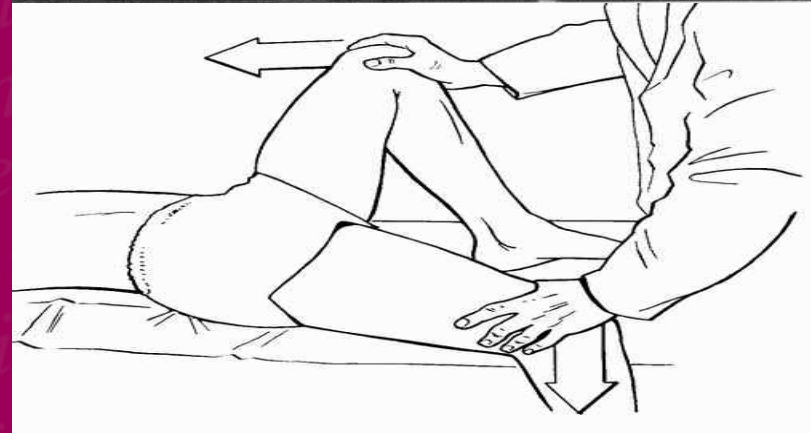
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# Provocative Maneuvers

- FABER's
  - Hip or SI joint
  - Pain in groin or anterior thigh indicative of hip dysfunction
- Gainslen's
  - Stresses both SI joints



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# Guidelines for Imaging

- No Red Flags
- Acute pain: symptomatic treatment for 4 wks, then reevaluate; image if pain continues
- Sub acute pain: Pain > 4 wks; failed symptomatic treatment-Image
- Chronic pain: None, unless change in sx



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# Imaging Recommendations

Possible cause	Features on H & P	Imaging	Additional studies
Cancer	Wt loss Age >50 >4-6 wks H/O cancer	Xray  MRI	ESR
Vertebral infection	Fever IVDA Rec. infxn	MRI	ESR/CRP
Ankylosing spondylitis	Stiffness Young	Xray	HLA-B27 ESR/CRP



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# Imaging Recommendations

Possible cause	Features on H & P	Imaging	Additional studies
Cauda equina syndrome	Urinary ret Fecal incont Saddle anes	MRI	None
Comp. fx	osteoporosis Steroid use Older age	Xray	None
Severe/prog neuro deficits	Progressive motor weakness	MRI	Consider EMG/NCV



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# Imaging Recommendations

Possible cause	Features on H & P	Imaging	Additional studies
Herniated disc	Sxs >4 wks back pain + leg pain in L4, L5 or S1 dermat	MRI	Consider EMG/NCV
Spinal stenosis	Sxs >4 wks leg pain relieved by flexion	MRI	Consider EMG/NCV



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# Treatment


- Pharmacologic
  - NSAIDs-mild pain relief, anti-inflammatory
  - Tylenol-mild to moderate pain relief
  - Narcotics-if above fails, moderate to severe pain
  - Muscle relaxants-acute spasm
- Physical therapy
  - Based on diagnosis
  - Flexion based: Williams flexion exercises
  - Extension based: McKenzie exercises; centralize pain

Department of Physical Medicine and Rehabilitation  
Makati Medical Center

## EXERCISES FOR THE LOWBACK


### WILLIAM'S FLEXION EXERCISES

☐ 1. PELVIC TILTING




Flatten your back.  
hold for \_\_ seconds  
repeat \_\_ times

☐ 4. PARTIAL SIT UP




Lie on your back with your knees bent and feet flat on the mat. Raise your head and shoulder off the mat. hold for \_\_ seconds  
repeat \_\_ times

☐ 2. ALTERNATE KNEE TO CHEST




Bring one knee to your chest while keeping the other leg straight. Hold for \_\_ seconds lower foot on mat and repeat on the other leg. Repeat \_\_ times

☐ 5. STRAIGHT LEG RAISING




Raise one leg as high as you can. Hold for \_\_ seconds repeat \_\_ times same for the opposite leg

☐ 3. SIMULTANEOUS KNEE TO CHEST



Bring both knees to your chest. hold for \_\_ seconds repeat \_\_ times

☐ 6. WALL SLIDES



Stand with your back against the wall, feet apart. Slowly bend your knee. Hold for \_\_ seconds repeat \_\_ times



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# Treatment

- Avoid bed rest
- Heat/cold
- Massage therapy
- Spinal manipulation (OMT)
- Proper lifting techniques
- Ergonomics (chair support, desk level)
- Acupuncture



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# Common Diagnoses

- **Herniated nucleus pulposus**

- History:** Flexion based, radicular pain

- PE:** +SLR; neurologic (changes in reflexes)

- Rx:** Meds (Nsaids, steroids, narcotics)

- PT-McKensie extension exercises (centralize pain)

- Epidural steroid injections for leg pain

- Surgical Decompression



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# Spondylolysis/listhesis

- History-repetitive hyperextension (gymnasts, divers)
- PE- +stork test
- Rx-limit hyperextension
  - Rest for 12 wks
  - Brace: if still symptomatic with rest after 2-4 wks
  - PT: flexion based exercises, spine stabilization



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# Mechanical LBP

- History-stiffness in all planes
- +/- trauma
- PE-inflexibility
- spasm of paraspinals
- normal PE otherwise
- Rx
- Nsaids/muscle relaxants
- PT: core strengthening/posture/back mechanics

## THE MECHANICS OF LIFTING

### *How Your Back Works*

You may know that back injuries are the most common type of industrial accident. That's because no matter what our jobs, we are constantly using our backs—to support our bodies, to bend, sit, twist, stand, even to lie down. All of these activities put stress on our backs, but at no time are our backs more vulnerable to injury than when we're lifting. Understanding how your back works while lifting can help you avoid unnecessary strain and potential injury.

#### Back Basics


Your back is made up of moveable bones (called vertebrae) and shock-absorbers (called discs) between each vertebra. These structures are supported by ligaments and muscles that help keep the back aligned in three balanced curves. (You know your back is aligned correctly when your ears, shoulders, and hips are in a straight line.) When your back's three curves are not in balance, there is a greater likelihood of both back pain and injury.

#### Lifting Mechanics

When you lift, it's important to keep your back in balance. If you bend at your waist and extend your

upper body to lift an object, you upset your back's alignment and your center of balance. You force your spine to support the weight of your body *and* the weight of the object you're lifting. This situation is called "overload." You can avoid overloading your back by using good lifting techniques. For example, when you bend at the knees and hug the object close to you as you lift, you keep your back in alignment and let the stronger muscles in your thighs do the actual "lifting." You do not have to extend your upper body and are able to maintain your center of balance.

#### Safe Lifting

Safe lifting means protecting your back (and yourself!) while you lift. Before you lift anything, think about the lift—Can you lift it alone? Do you need help? Is the load too big or too awkward? When you do lift, be sure to bend at your knees, hug the load close to your body, and raise yourself up with the strong muscles in your thighs. Remember never to twist while lifting—instead, move one foot at a time in the direction where you want to go and then turn with your leg muscles. Above all, safe lifting means keeping your back in balance and avoiding overload. When you know how your back works, it's easier to understand how you can protect it. 



**UNSAFE LIFT**  
If you bend at your waist and extend your upper body to lift an object, you upset your back's alignment and your center of balance.



**SAFE LIFT**  
If you bend at the knees and hug the object close to you, your back stays balanced and the muscles in your legs do the lifting.

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# Sacroiliac Joint

- History-twisting
- +/- trauma
- Vague back or pelvic pain
- PE
- Normal ROM, neuro
- No pain above L5
- +FABER/Gainslen
- Rx-Nsaids
- PT: core strengthening
- OMT
- SI joint injections



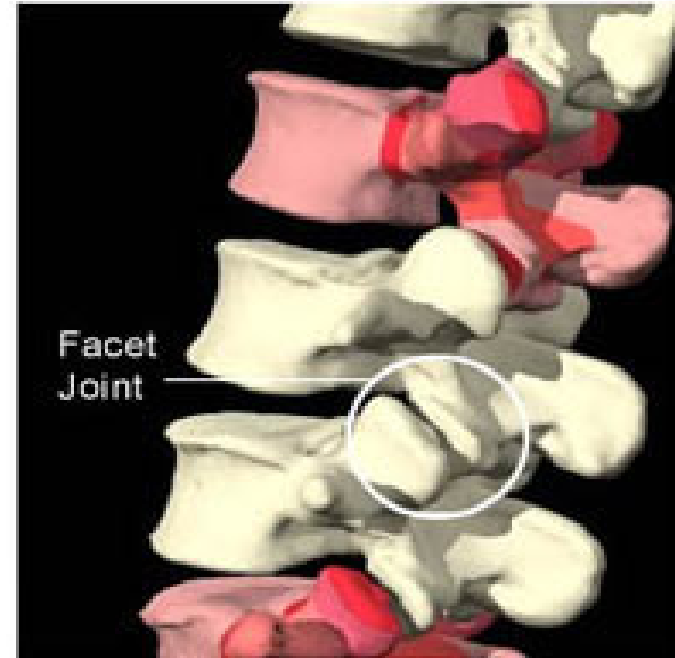
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# Facet syndrome

- History-insidious
  - pain w/extension and lateral rotation
- PE
  - pain over affected areas w/extension, rotation
  - Nml neuro, provocative testing
- Rx
  - Nsaids
  - PT: spinal stabilization, flexion based exercises
  - Facet injections

Left Facet Joints of the Lumbar Spine



Interactive Spine 2000 Primal Pictures Ltd.



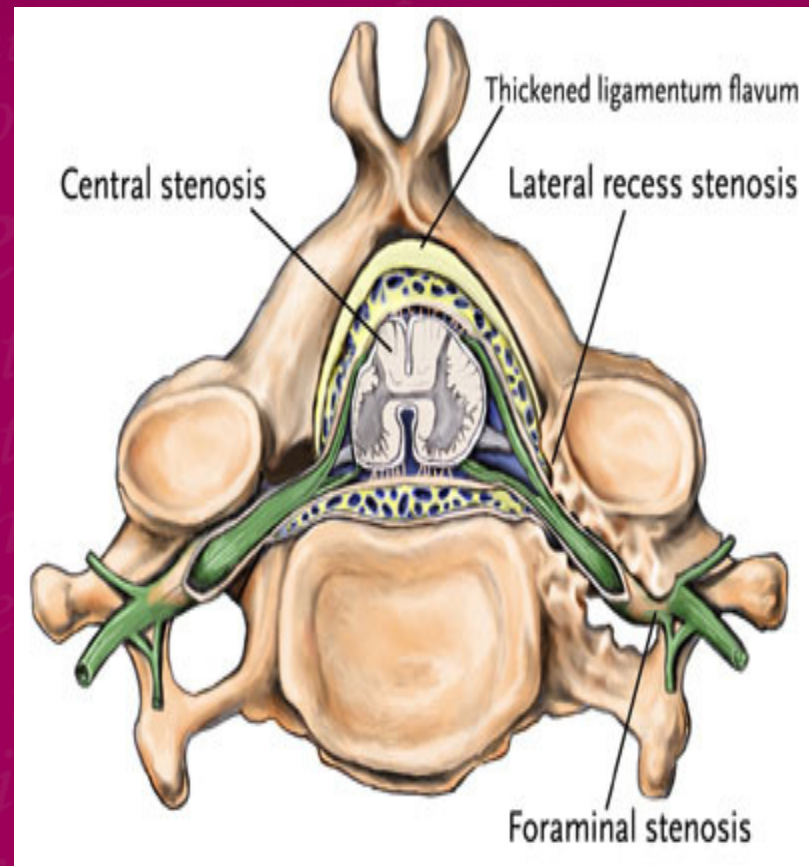
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# Spinal Stenosis

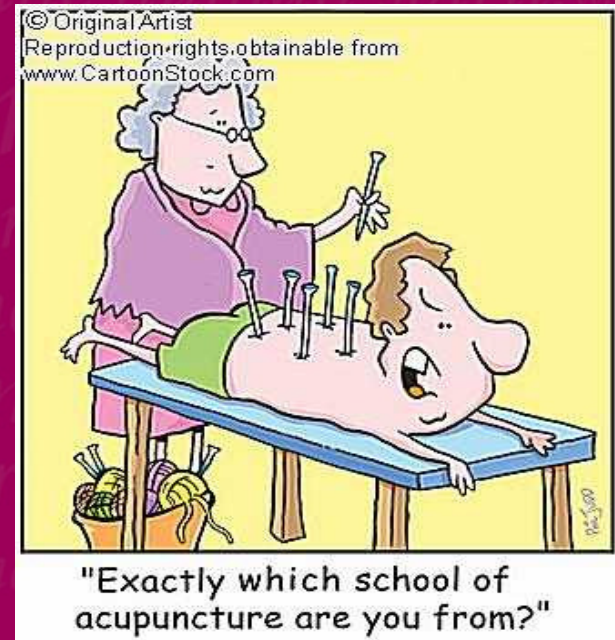
- History-Pain in neutral or with extension
  - Worse w/ standing and activity
- PE- Walk forward flexed position
  - +/- neuro exam
- Rx-Nsaids/steroids
  - PT: Flexion based
  - Transforaminal injections
  - Decompression



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# What is the evidence on acupuncture for LBP?



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## Acupuncture for acute non-specific low back pain: A pilot randomised non-penetrating sham controlled trial

- Kennedy et al. Comp Therapies in Medicine 2008
- Efficacy of acupuncture compared to placebo needling in treatment of acute LBP for pain and fxn
- Double blinded RCT of 48 pts w/ LBP<12 wks
- 12 treatments over 4-6 week period
- No difference in function between groups
- Significant difference in pain at 3 month follow up (30 point difference on VAS)
- Rx group taking significantly fewer tablets of pain control medicine than control at end of Rx (from 4 to 1 tablets/day)
- Future high powered studies need to be done for better conclusions



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# German Acupuncture Trials for Chronic Low Back Pain

- Haake et al. Archives Internal Medicine 2007
- Multi-center double blinded RCT of 1162 patients
- Hx chronic LBP for mean of 8 years
- Ten 30 minute sessions of acupuncture or sham acupuncture or conventional therapy (combo of drugs, PT, exercise)
- 6 months-response rate 47.6% in Rx group, 44.2% in sham group, 27.4% in conventional group
- LBP improved after treatment for at least 6 months
- Efficacy was almost twice that of conventional therapy



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# Acupuncture for low back pain (Review)

- Furlan et al. Cochrane 2005
- Effects of acupuncture for Rx of non-specific LBP
- 35 RCTs; 3 trials for acute LBP
- Chronic LBP-more effective for pain relief than no or sham treatment up to 3 months
- Also more effective in improving short term function
- Ave pain reduction 32% in Rx group vs 23% w/sham therapies and 6% with no treatment
- No firm conclusions about efficacy in acute LBP
- Not more effective than other conventional and alternative treatment
- Evidence that acupuncture plus conventional therapies relieves pain and improves function better than conventional therapies alone



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# Thank you!

## Questions?



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**McHUMOR.com** by T. McCracken



"It's an old high school foot ball injury."



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