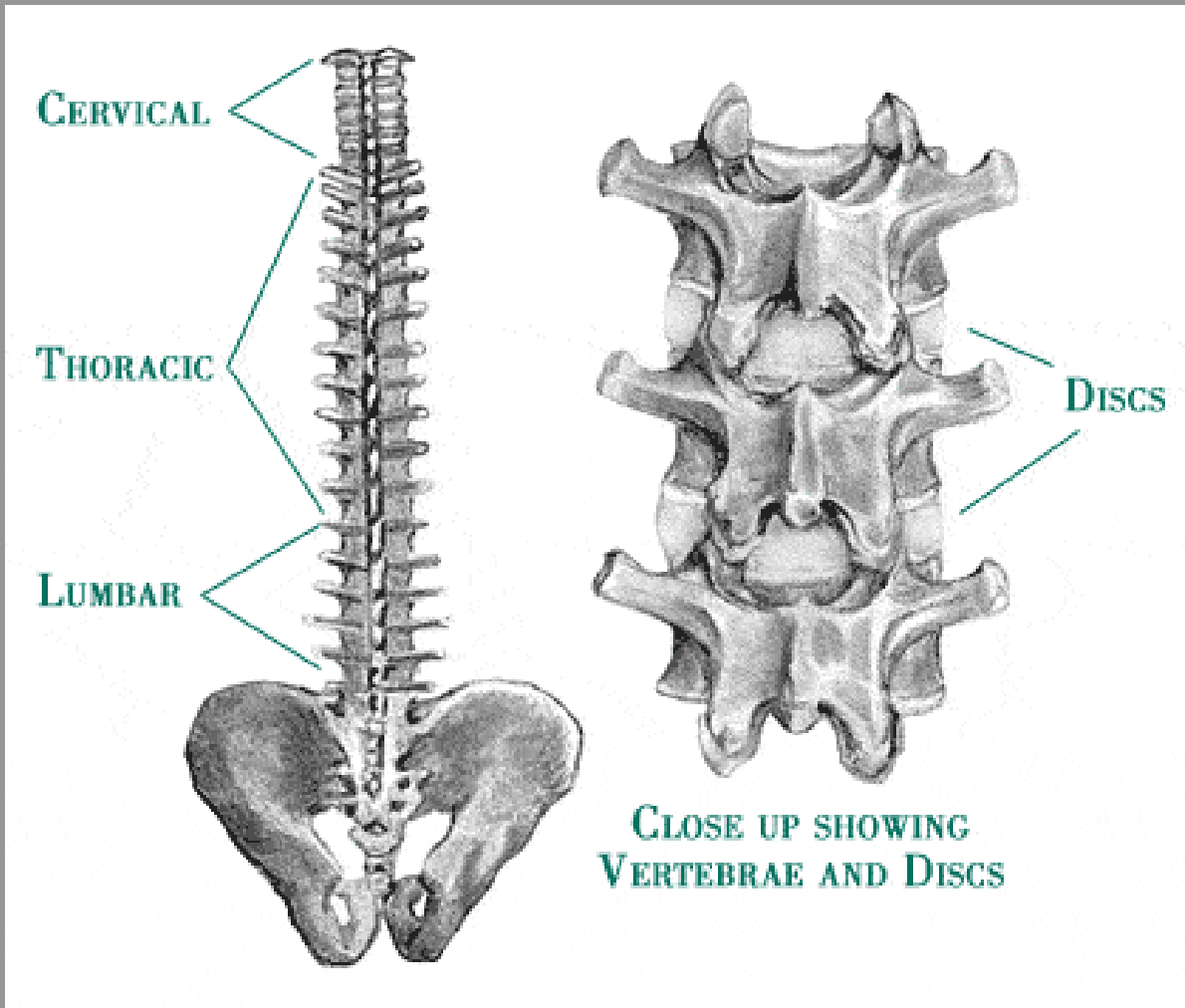


**Spondylolysis and spondylolisthesis.  
Congenital anomalies of the spine.  
Scheurmann's disease and its treatment.  
Degenerative changes of the spine. Spinal  
stenosis. Disc generation and prolapse.  
Sciatica. Ankylosing spondylitis.**



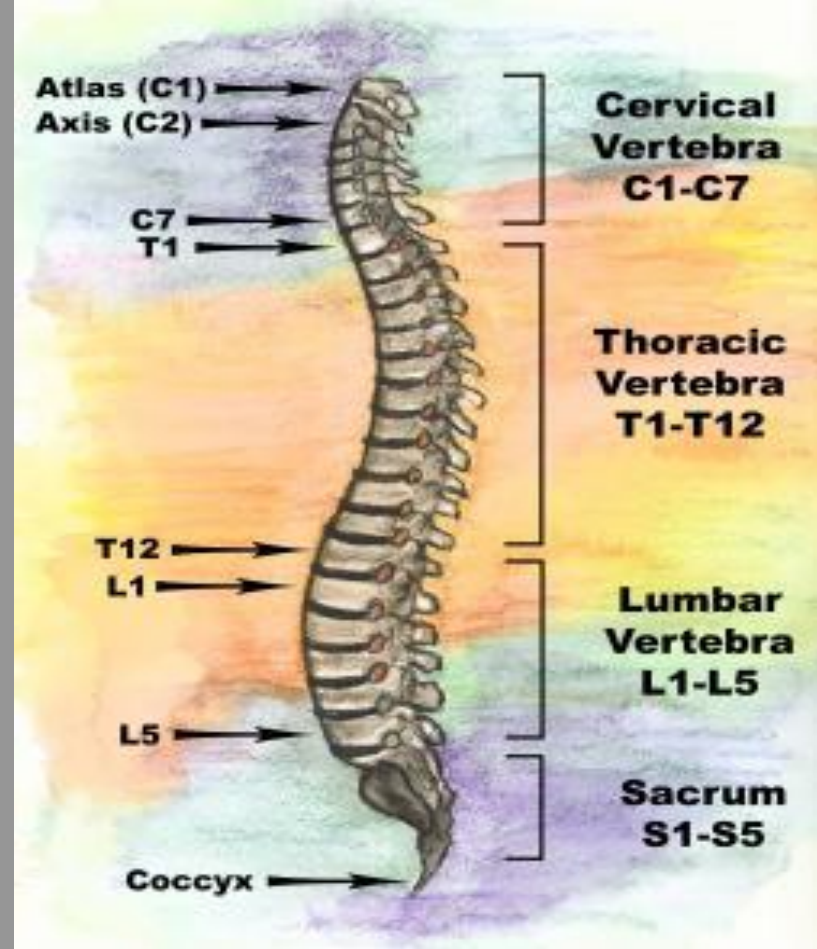
**University of Debrecen  
Department of  
Orthopaedic Surgery**

# Anatomy



# Vertebrae

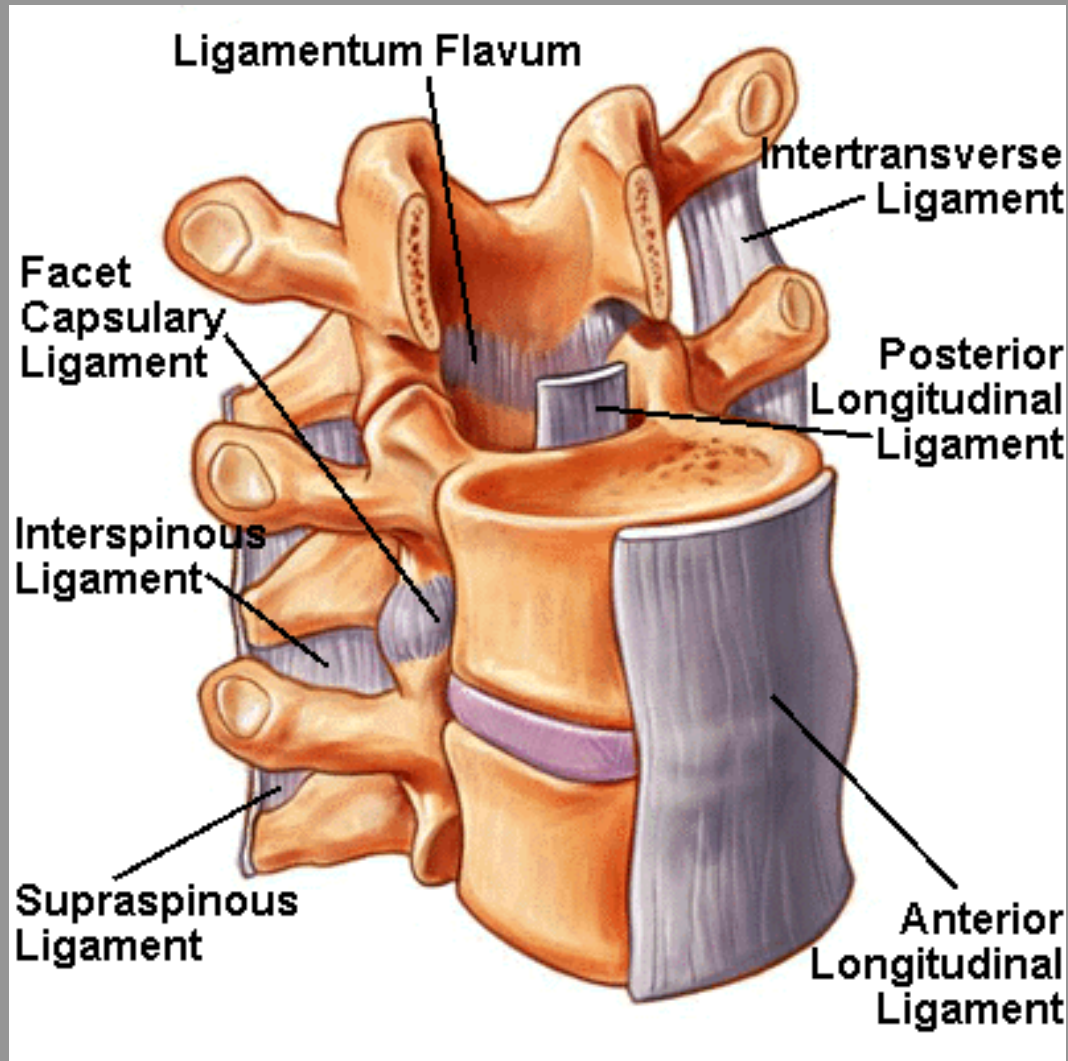
- 7 Cervical
- 12 Thoracic
- 5 Lumbar
- 5 Sacral
- 4-6 Coccygeal
- Same structure, but different localisation, shape and function!
- Anatomical – functional segment



# Joints of the vertebrae

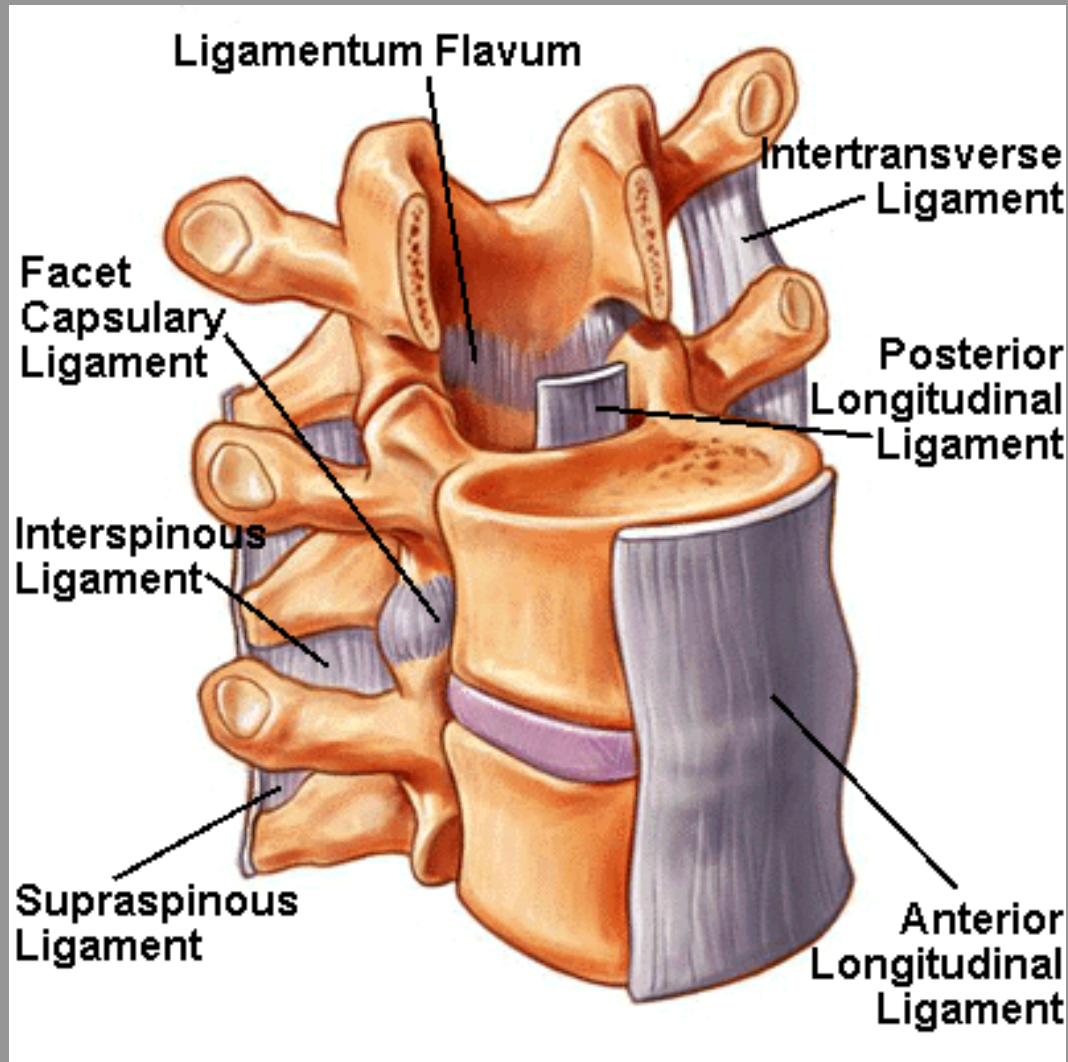
ALL JOINT TYPES CAN BE FOUND

- SYNDESMOSIS (ligamentous)
- SYNCHONDROSIS (fibro cartilage)
- SYNOSTOSIS (bone)
- REGULAR JOINT (joint capsule, hyalin cartilage, synovial membrane, synovial fluid)



# SYNDESMOSIS

- Anterior and posterior longitudinal ligament
- Yellow ligament
- Interspinous ligament
- Intertransversal ligament

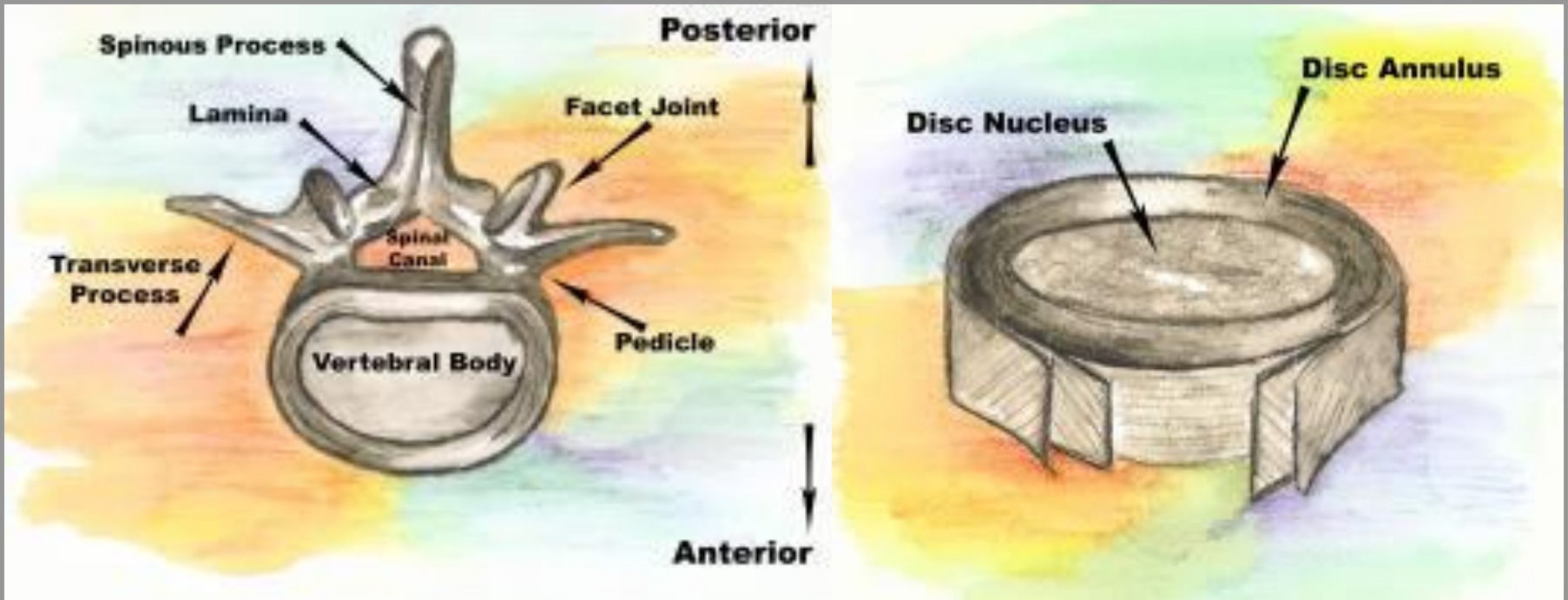




# SYNCHONDROSIS

## INTERVERTEBRAL DISC

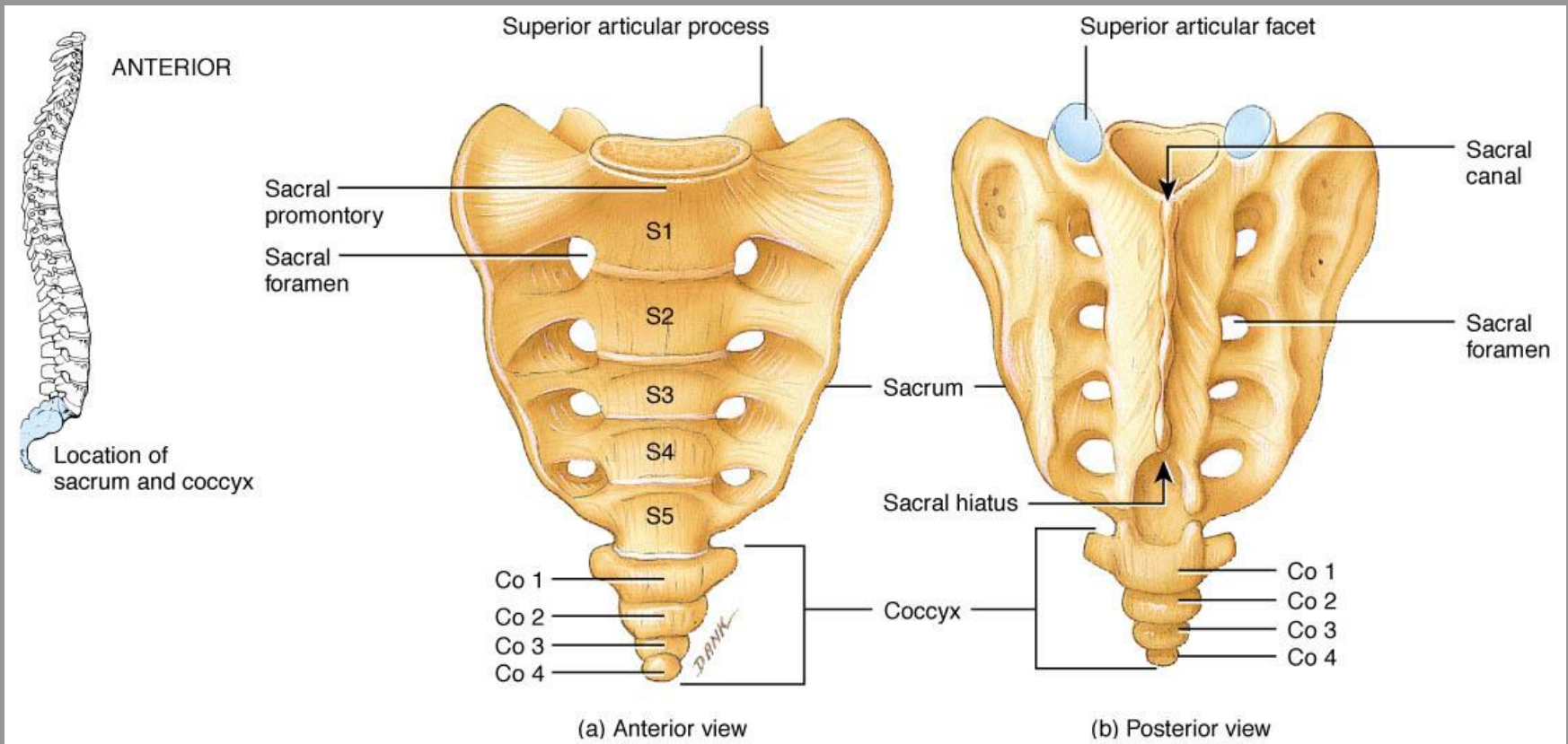
(anulus fibrosus, nucleus pulposus)





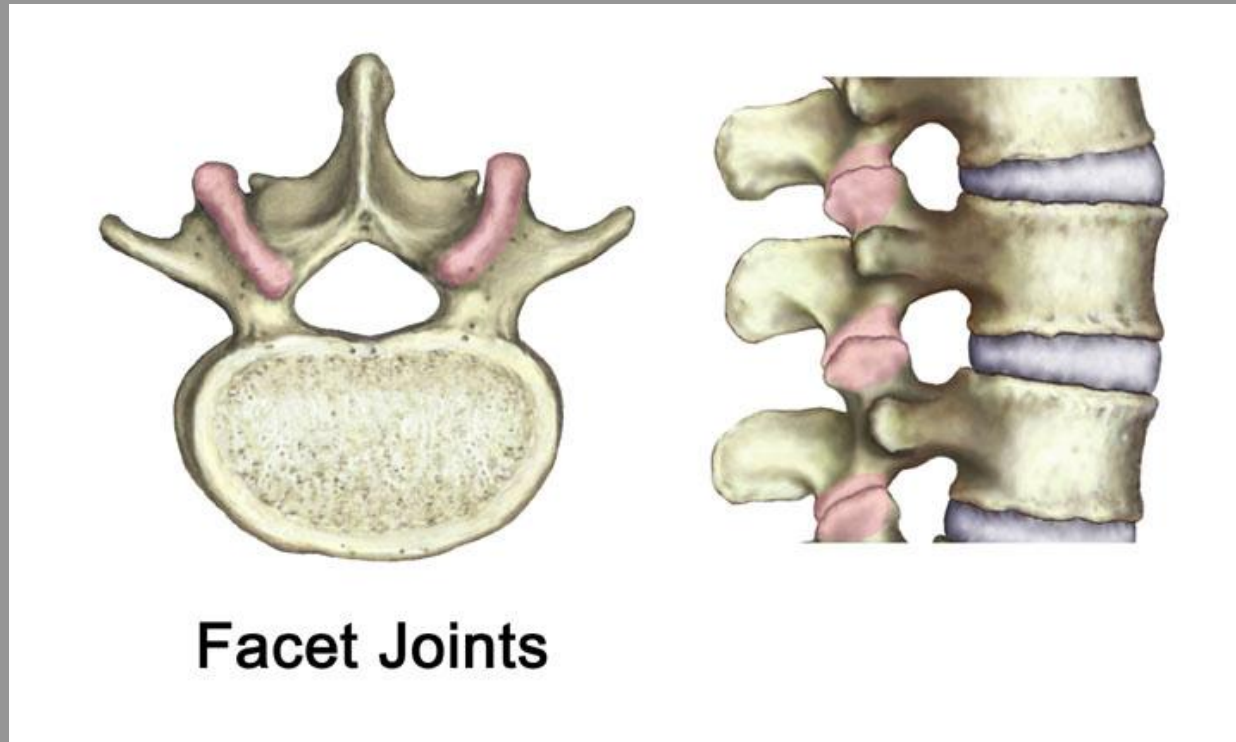
# SYNOSTOSIS

## SACRUM

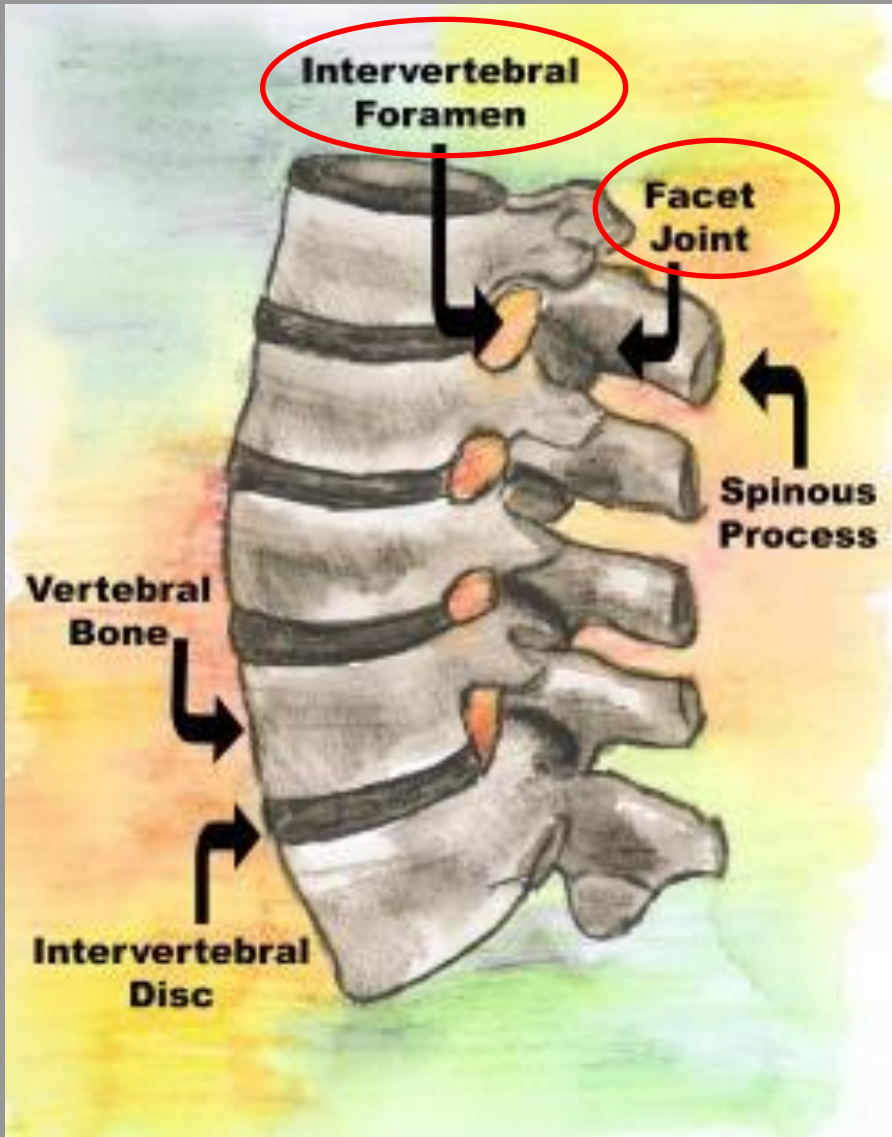


# REGULAR JOINTS

## FACET JOINTS



Joint capsule, hyaline cartilage, synovial membrane and fluid!



# Movements of the spine

- Anteflexion
- Retroflexion
- Lateralflexion (left and right)
- Torsion (left and right)
- Pairs of vertebrae –anatomical and functional segment

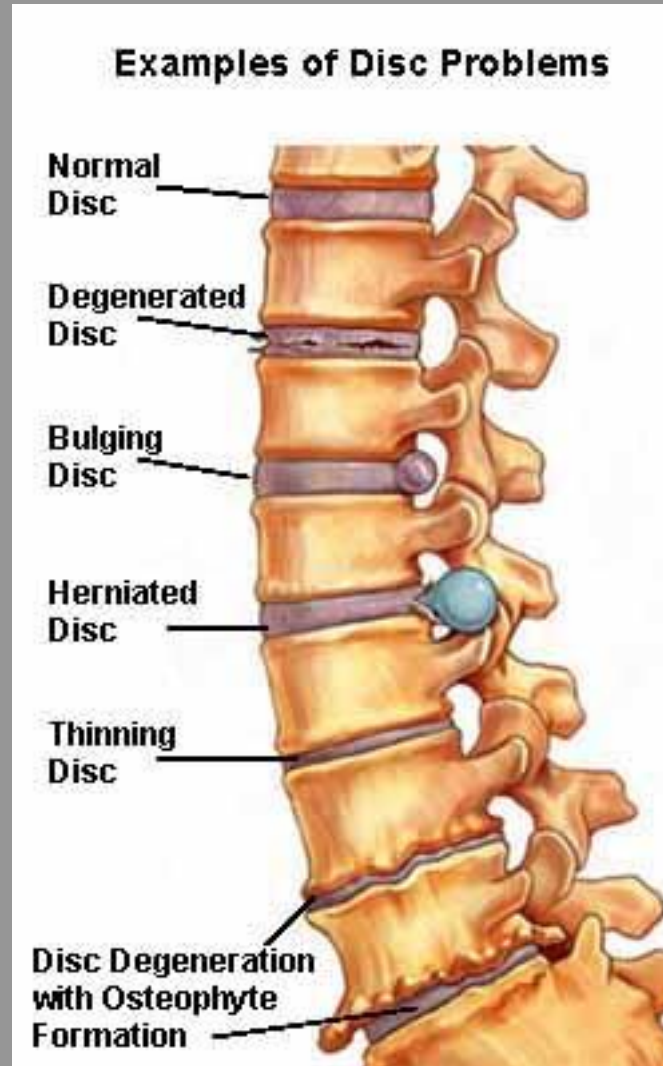
# Functions of the vertebral disc

- Stability - Stabilizing role  
(Keeps the ligaments tight by keeping the distance between the vertebrae constant)
- Flexibility - Buffer role.

# Degenerative changes

- **CAUSE:** disc prolapse and protrusion.
- Disc flattening causes pain.
- Bone growth at the edge of the vertebrae
- Stability of spine – tension of ligaments
- „Vicious cycle”.

# Degenerative changes

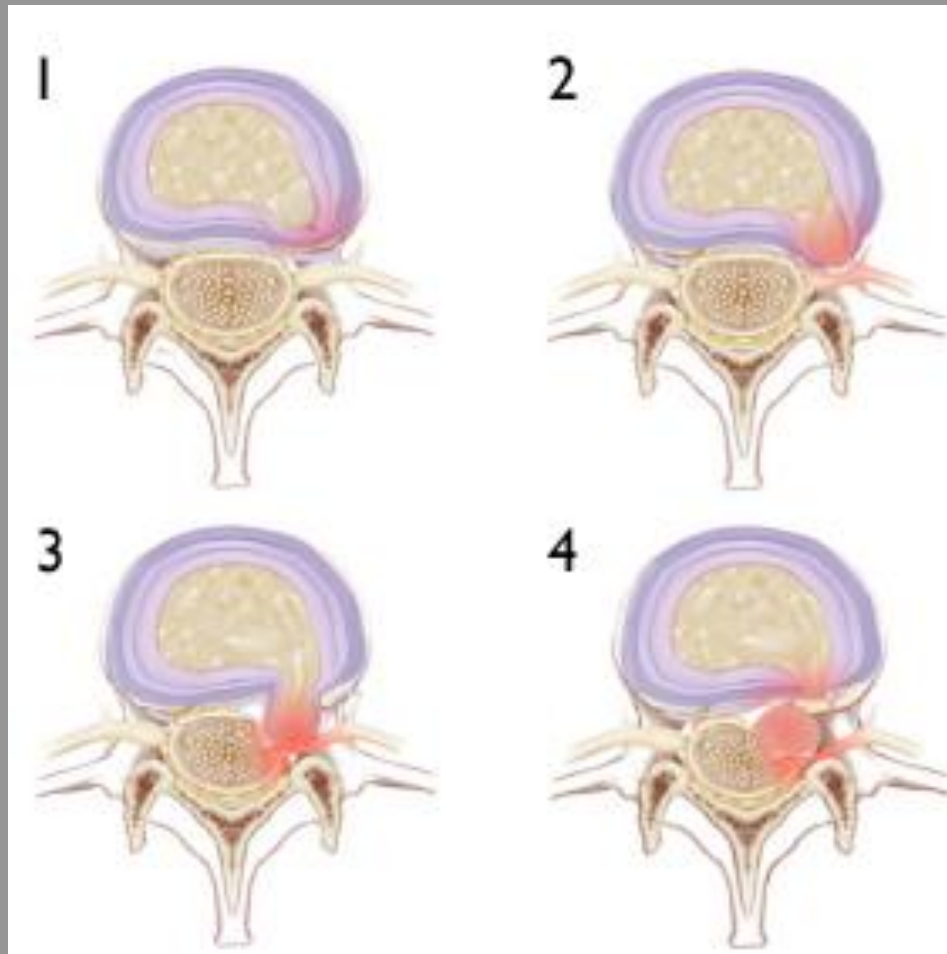




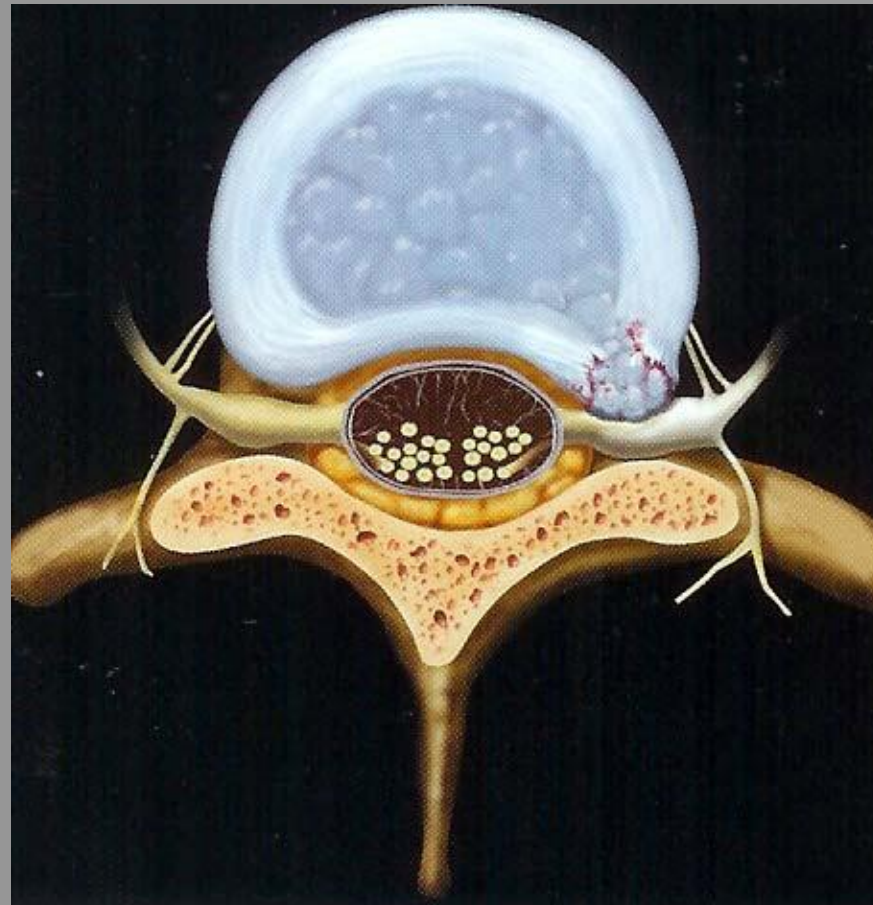
# DISEASES OF THE VERTEBRAL DISCS

- PROTRUSION -anulus fibrosus intact
- HERNIA -anulus fibrosus not intact - nucleus pulposus leaks out
- RUPTURED HERNIA- small amount nucleus pulposus leaks out and loses connection with remaining

# RUPTURED HERNIA



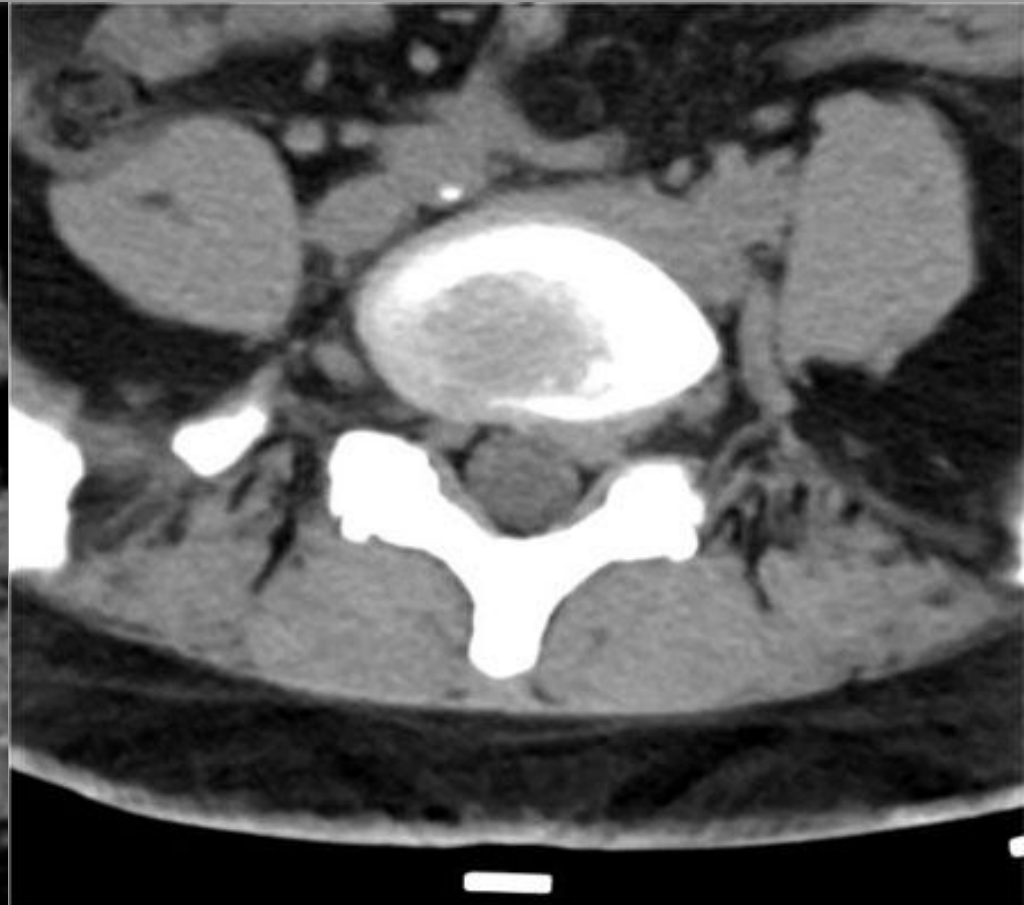
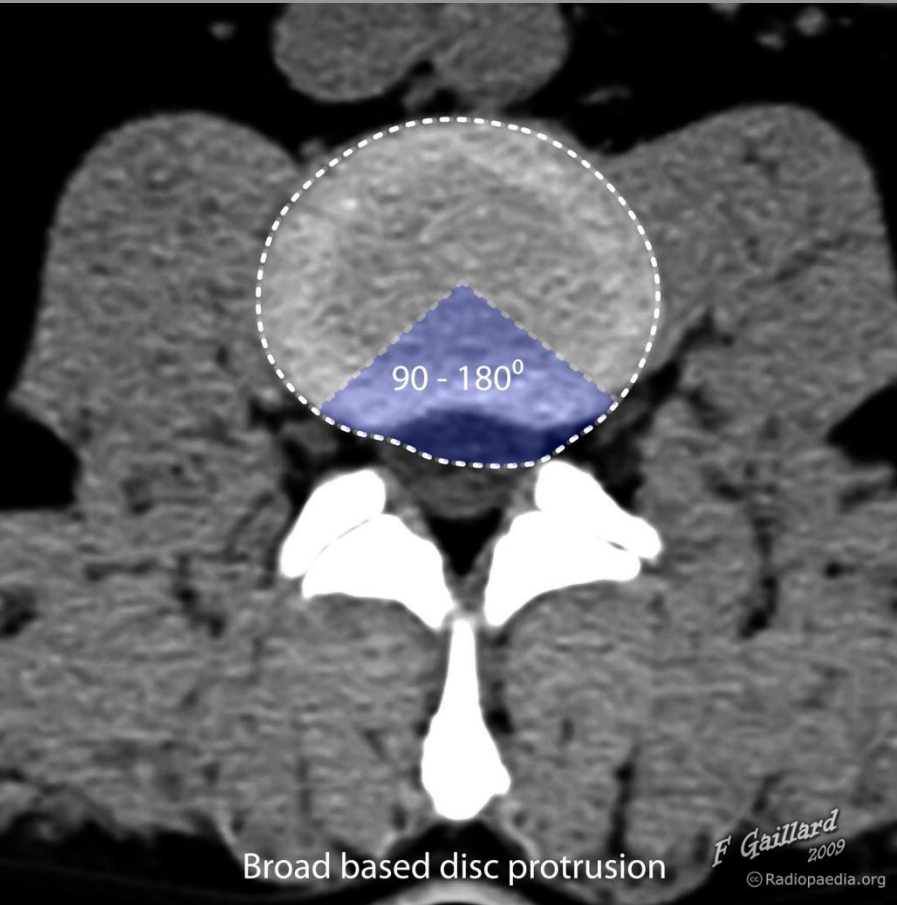
# Foraminal herniation



# Foraminal herniation

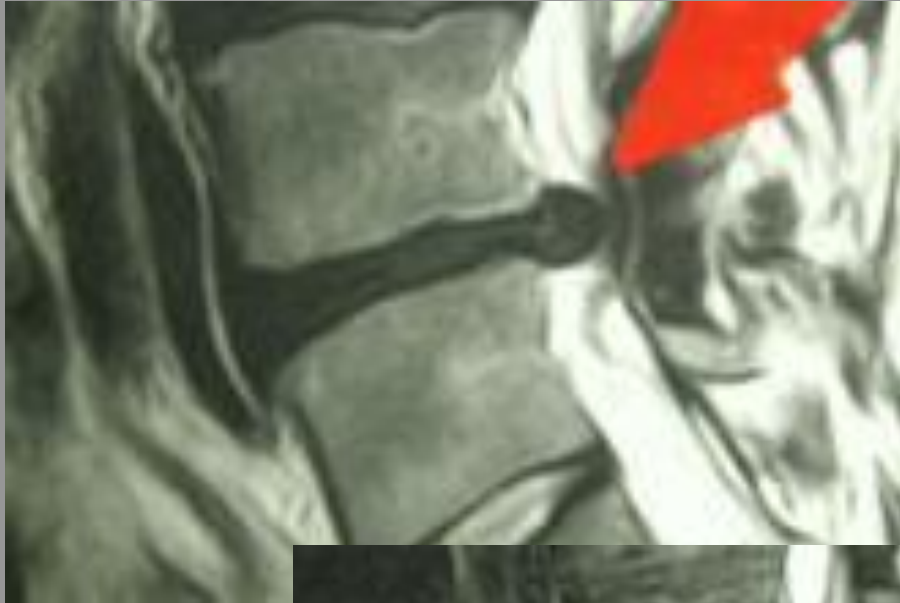


# Imaging





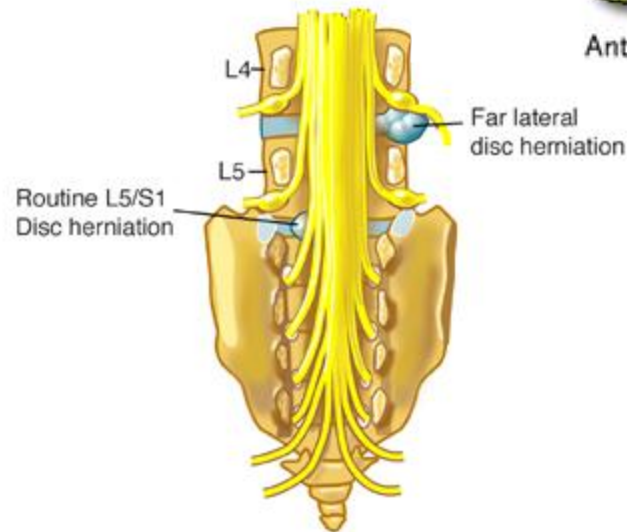
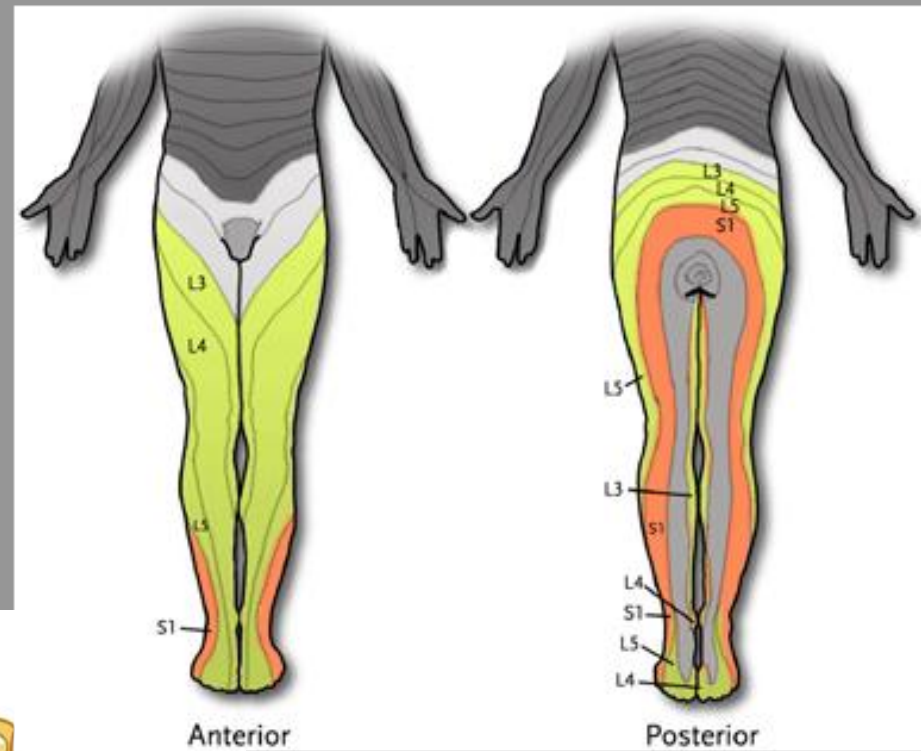
# Imaging



# Symptoms

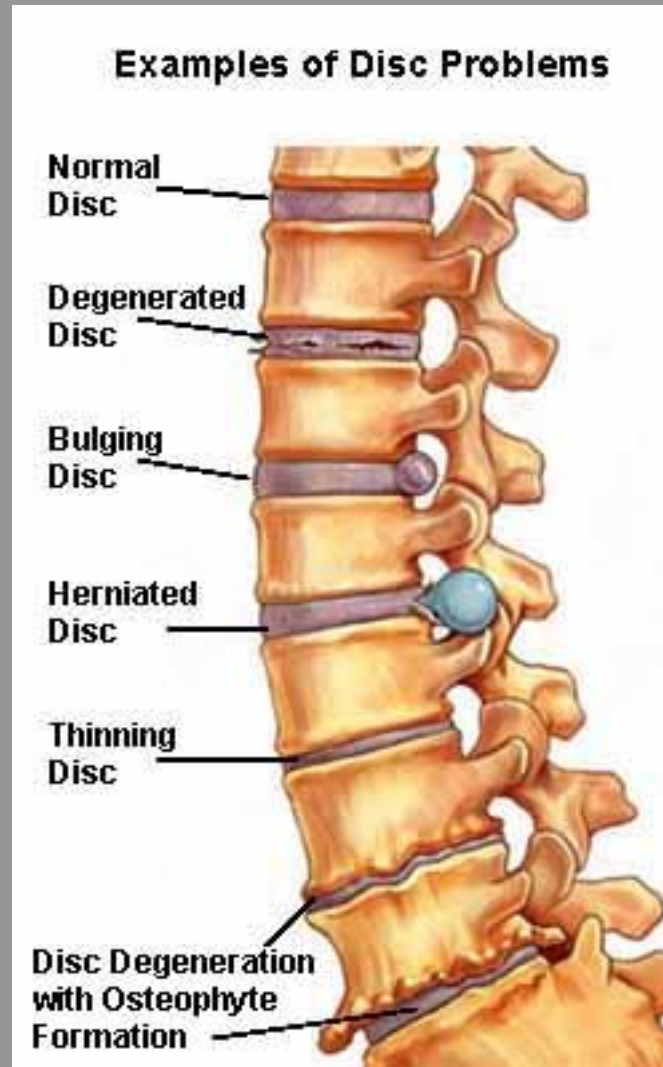
L4-L5 – 90%

L5 and S1 symptoms





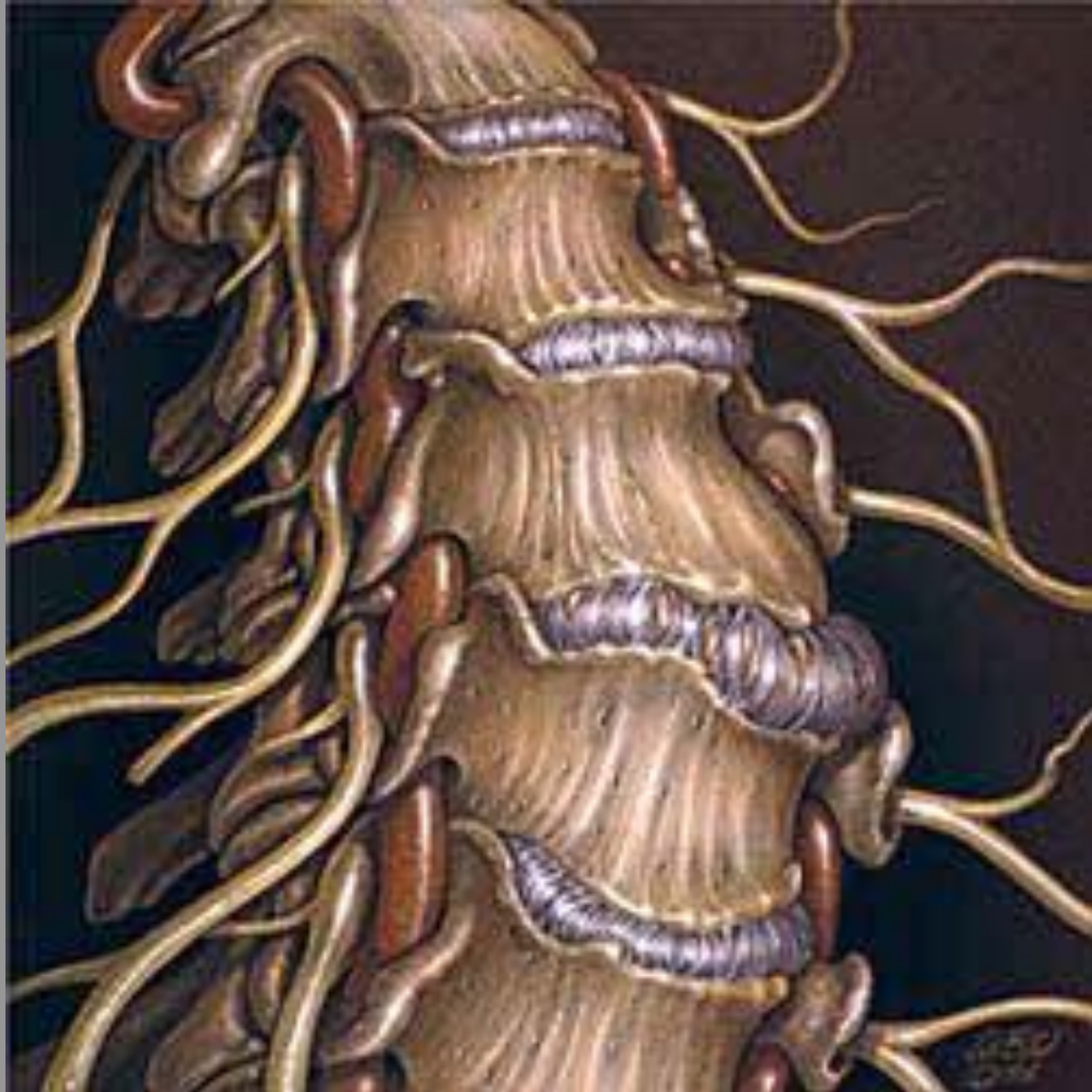
# Degenerative changes



# Definition

- SPONDYLOSIS: degenerative changes between two vertebral bodies with spondylophyte formation.
- SPONDYLARTHROSIS: degenerative changes in the facet joints between two vertebrae.

# Spondylosis





Copyright Keith Kasnot 2004

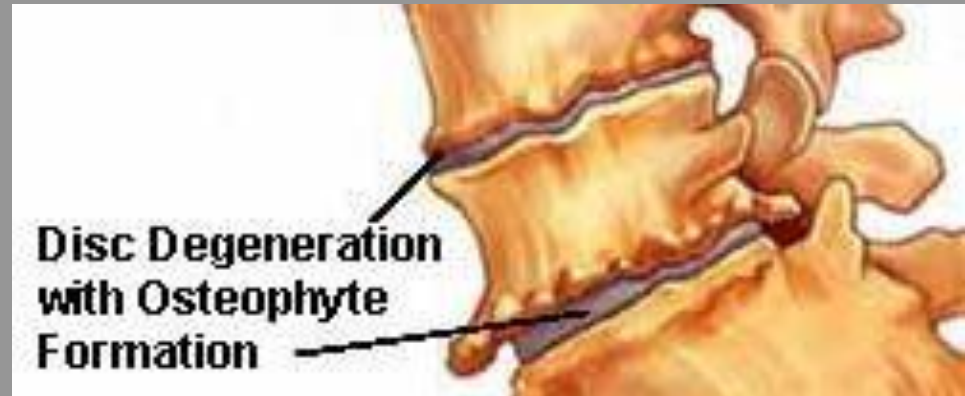


# CLINICAL SIGNS (lumbago)

- The mobility of the affected vertebrae decreases
- The affected area is tender
- The spinous processes are sensitive to touch
- Spastic paravertebral muscle
- Antalgic posture
- Pain on axial loading

# CLINICAL SIGNS (sciatica)

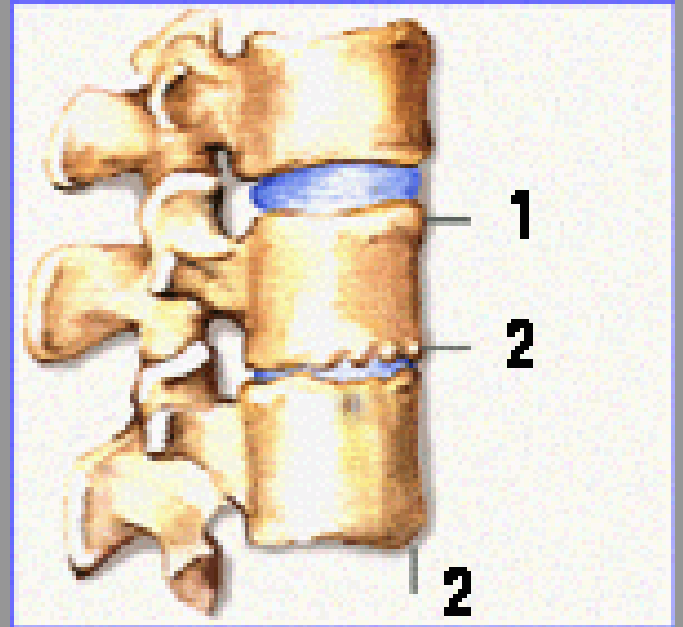
- The mobility of the affected vertebrae decreases
- The affected area is tender
- The spinous processes are sensitive to touch
- Spastic paravertebral muscle
- Antalgic posture
- Pain on axial loading
- **+ SIGNS OF NERVE ROOT IRRITATION!!!(radiating pain, sensory loss, paresis, reflex difference)**





# RADIOLOGICAL SIGNS

- Decreased intervertebral space.
- Degenerative bone deposits on the edge of the vertebrae (spondylophytes).
- Degenerative facet joint changes.
- Stenosis of intervertebral foramen
- Spinal stenosis.

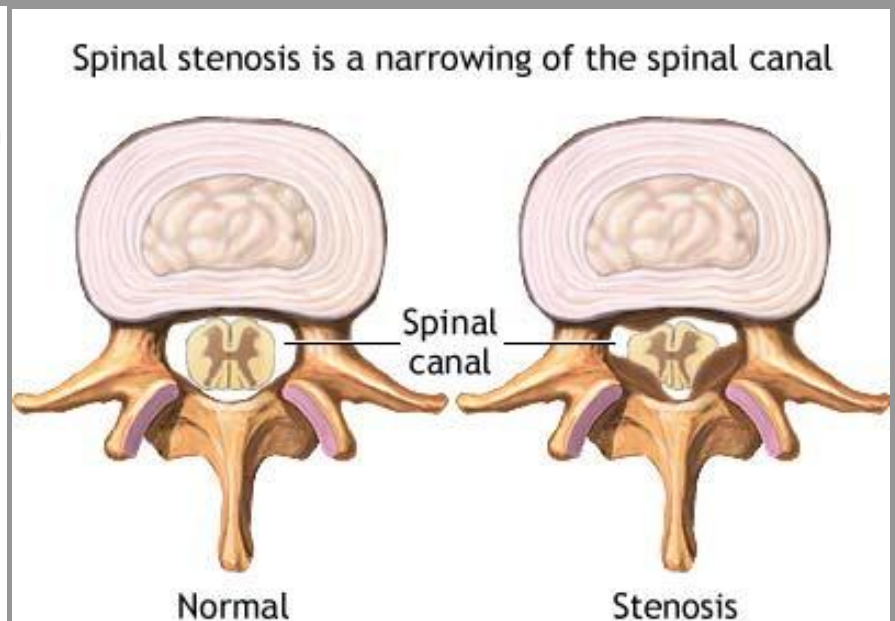
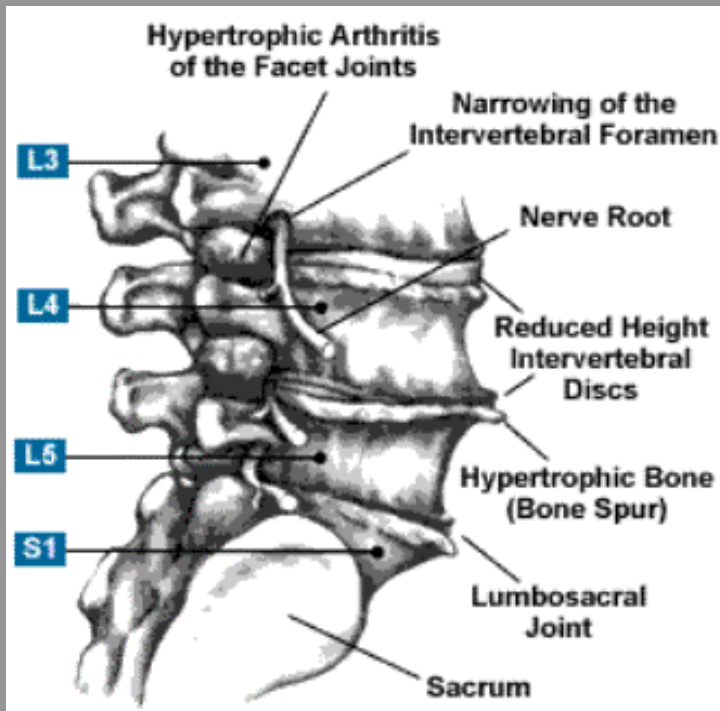


# TREATMENT

- BEDREST (IN KYPHOSIS)
- PHYSICOTHERAPY
- NSAID, MUSCLE RELAXANTS!!
- LOCAL STEROID
- BRACE
- SURGERY: stabilization, discectomy, etc.

# Spinal stenosis

- Narrowing of the spinal canal causing ischemia in the cauda equina.
- reason: spondylophyte, facet joint arthrosis, discus hernia...etc.



# Spinal stenosis

- Symptoms: Pain during standing or walking radiating into the lower extremities, which disappears after sitting or bedrest= neurologic claudication.
- Treatment:conservative (see above) or surgical decompression

# Ankylosing spondylitis

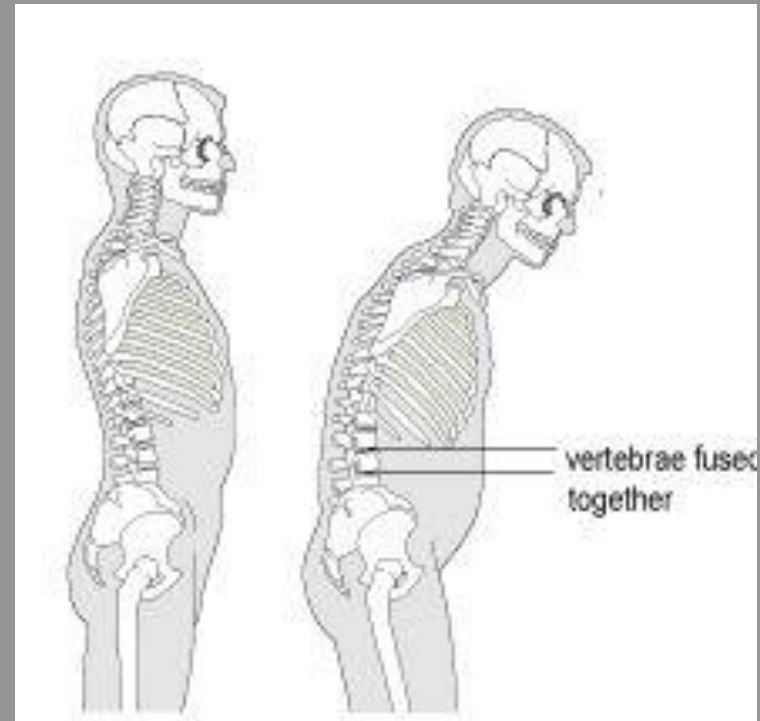
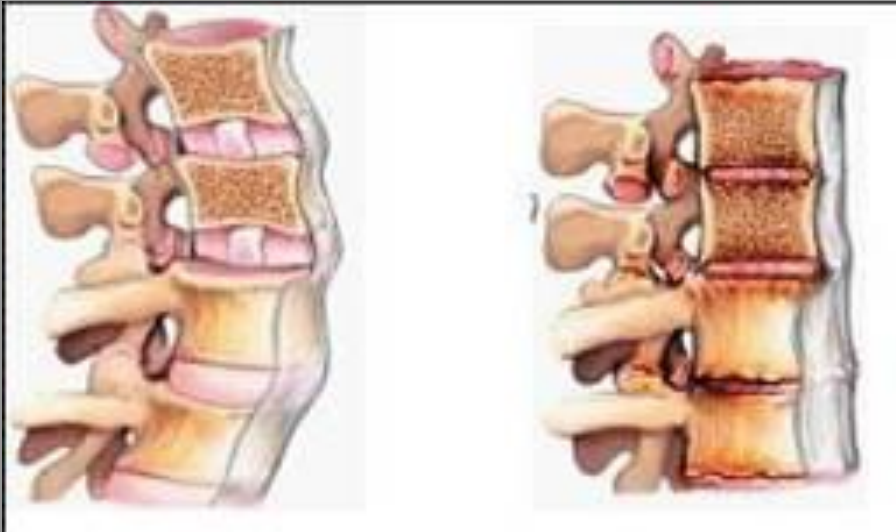
## Bechterew's disease



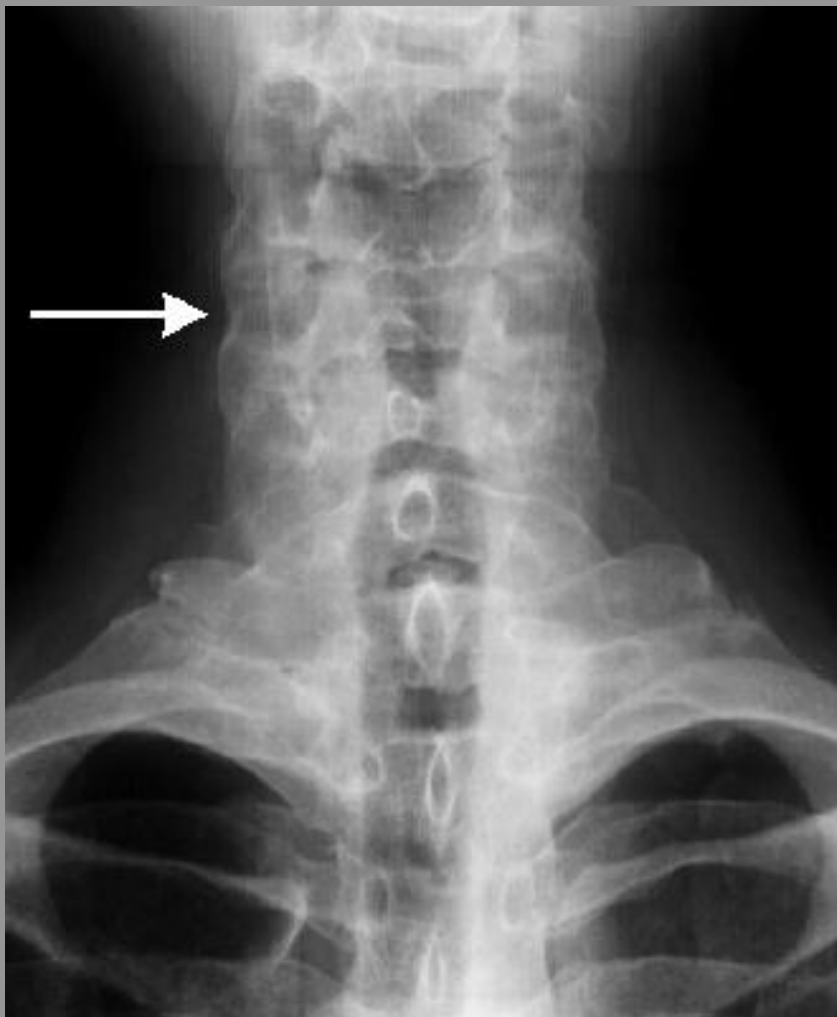
# Ankylosing spondylitis

## Bechterew's disease

- Chronic inflammation of the entire spine and sacroiliac joints, which is characterized by calcification of ligaments and joint capsules (regular joints!)



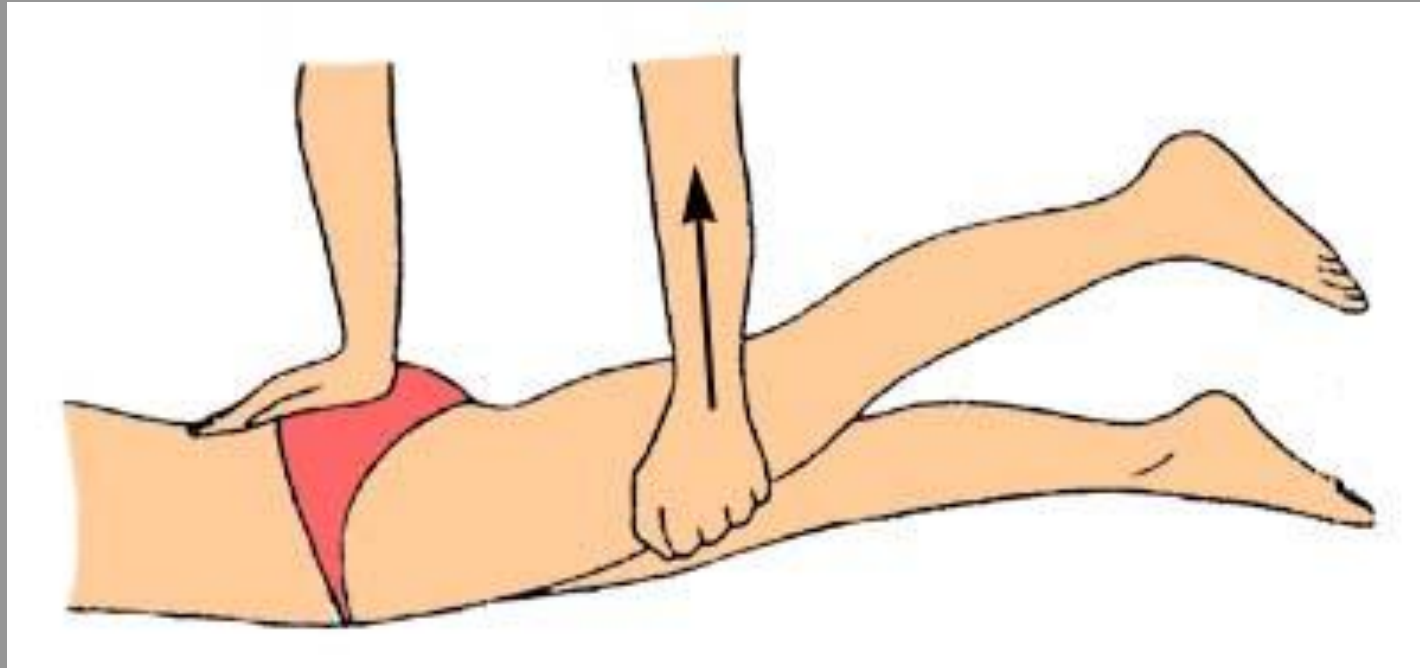




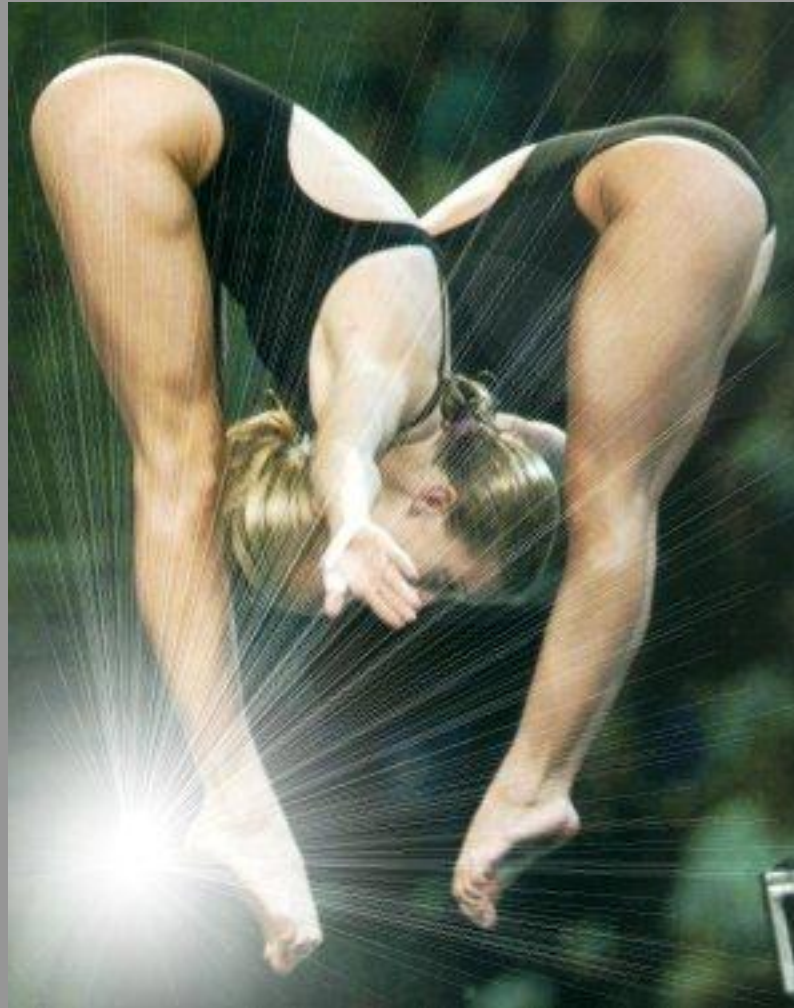




# Mennel test



# Spondylolysis, spondylolisthesis

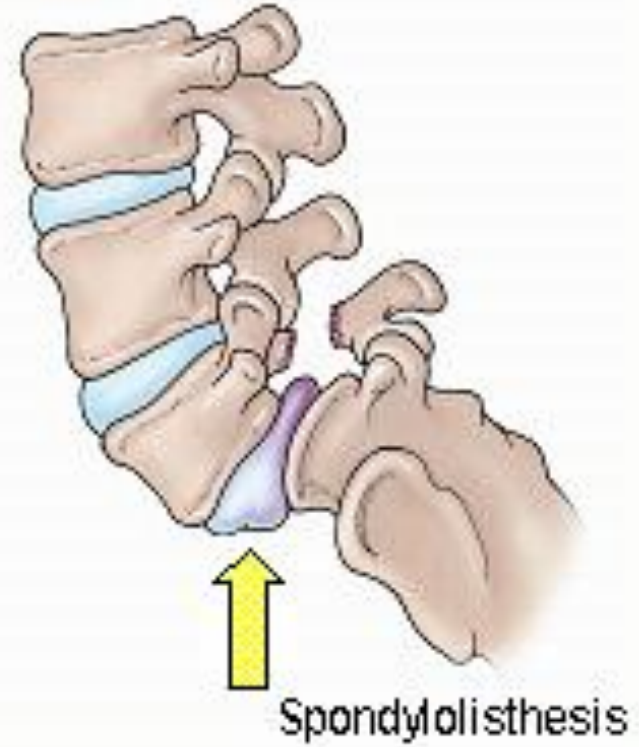
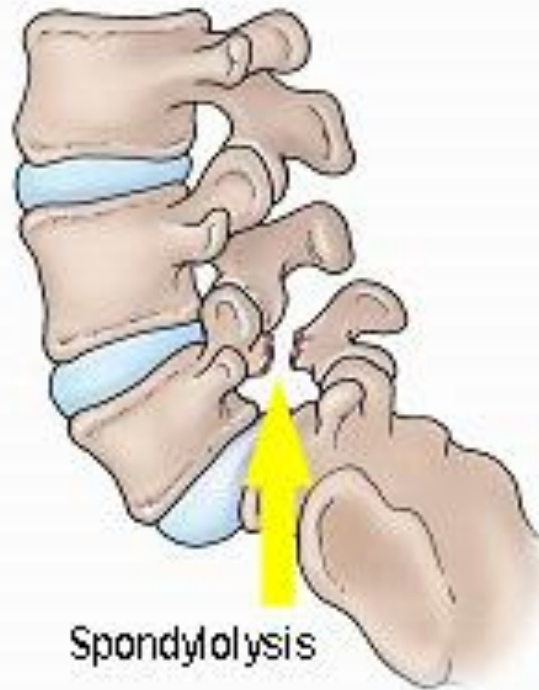
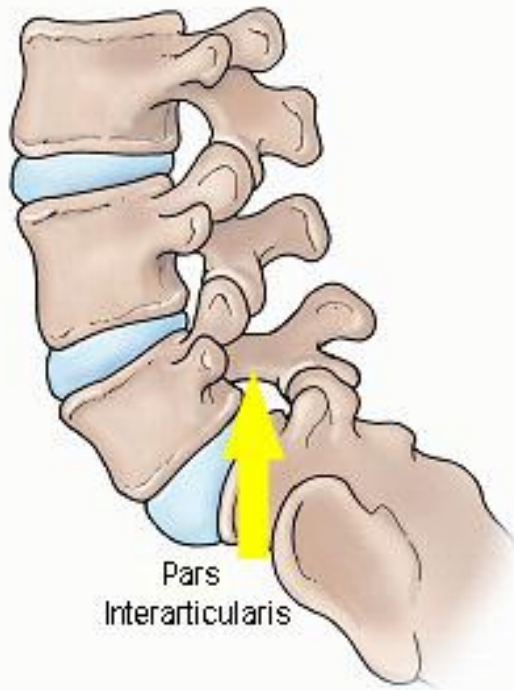


**Spondylolysis** - a defect in the pars interarticularis of the vertebral arch

**Spondylolisthesis** - is the forward or backward displacement of a vertebra







# Meyerding Classification



Normal



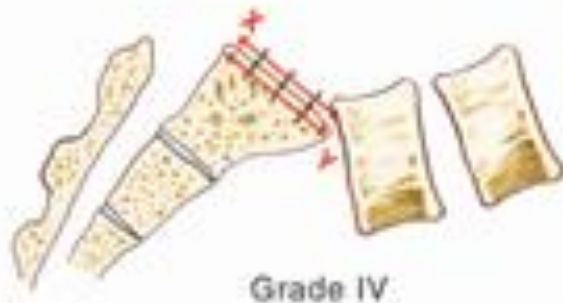
Grade I



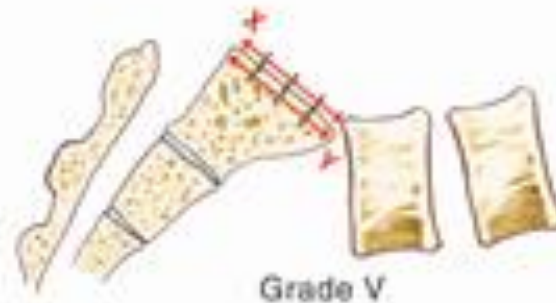
Grade II



Grade III

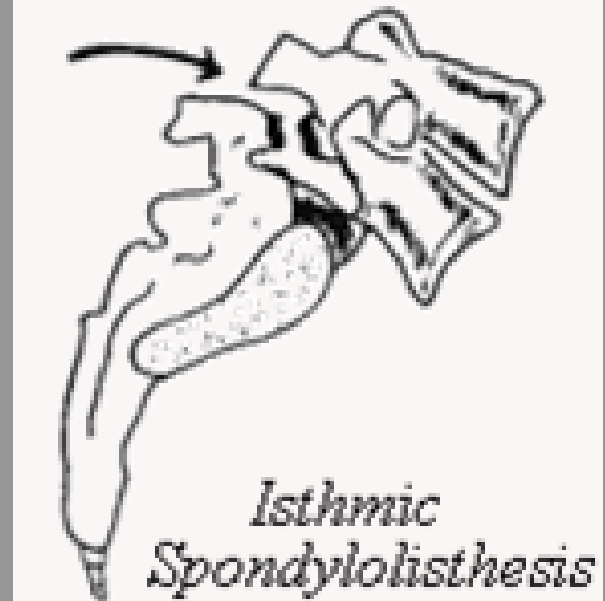
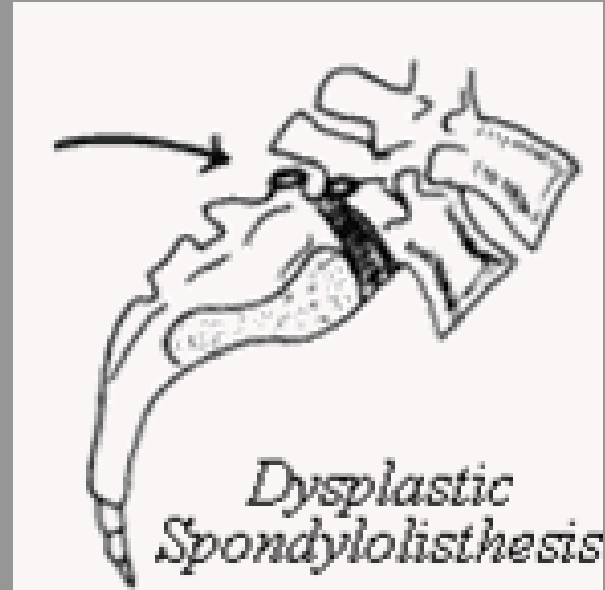


Grade IV

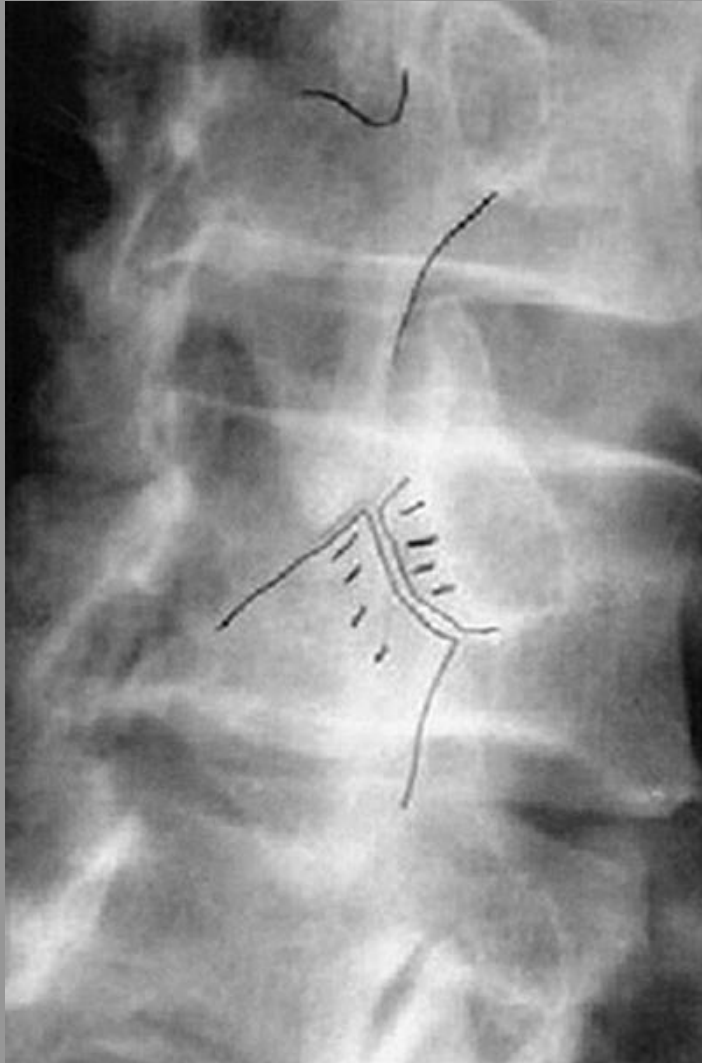


Grade V

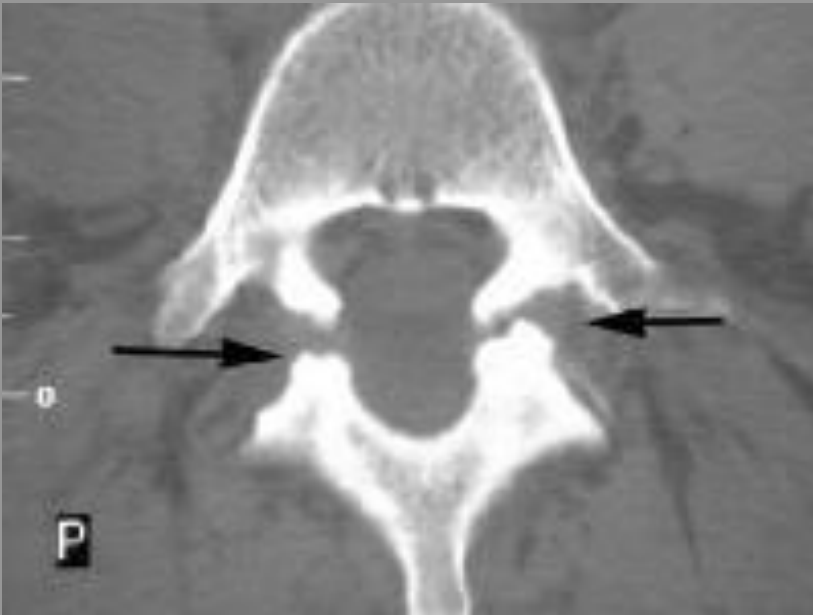
# Wiltse Classification



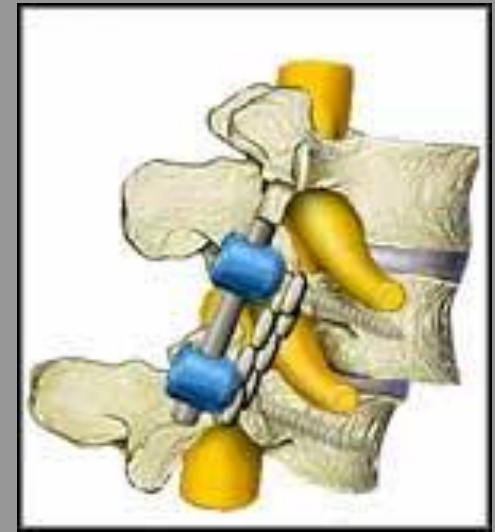
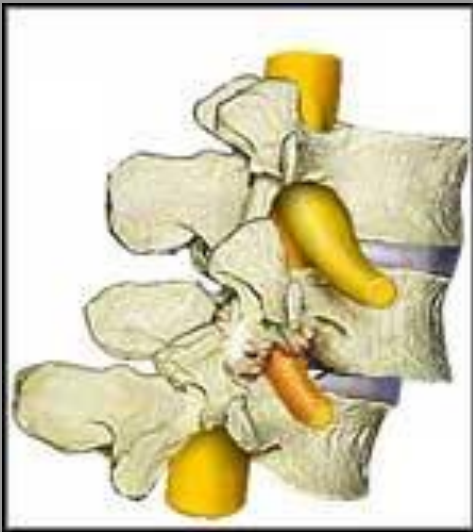
# Imaging – Dittmar view



# Imaging – CT



# Treatment





# Disorders of segmentation

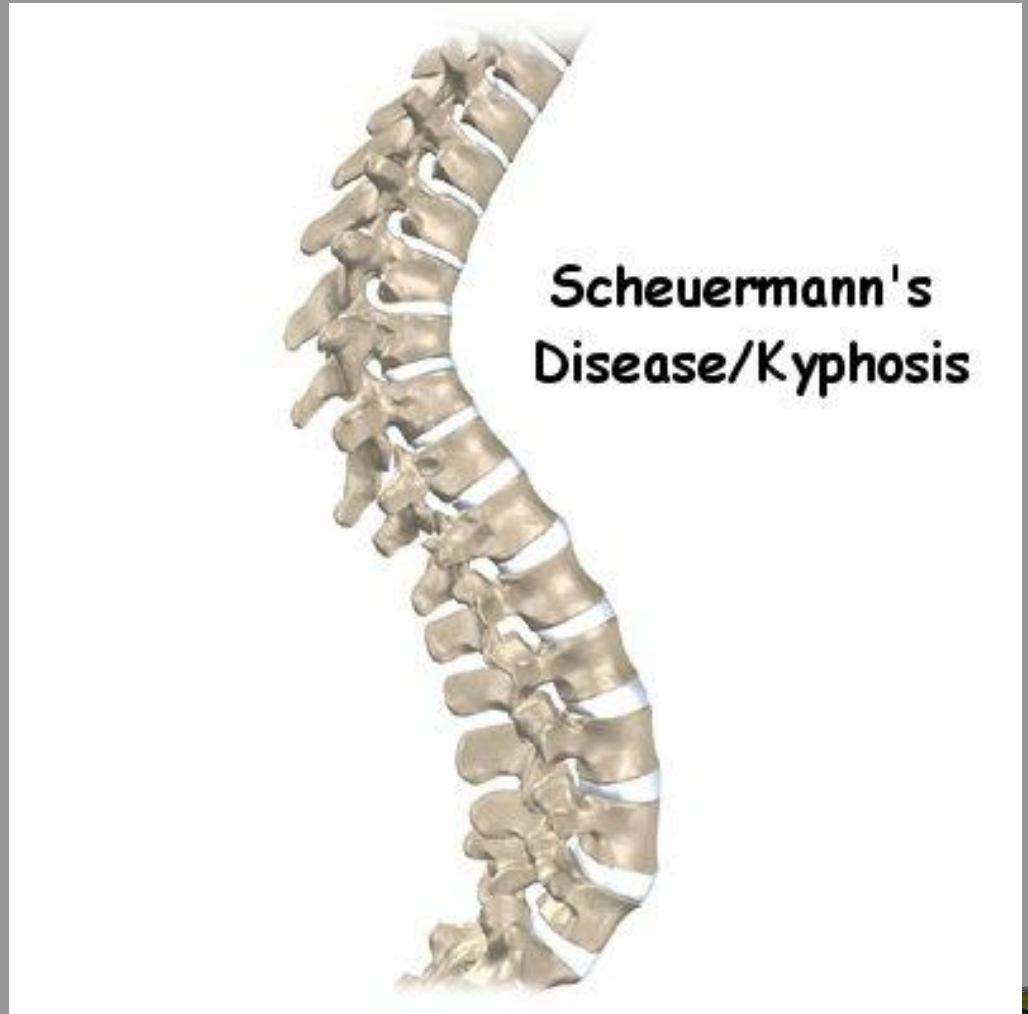


**Sacralisation** – partial or total fusion of fifth lumbar vertebra and sacrum.

**Lumbarization** – lack of the fusion inside the sacrum.

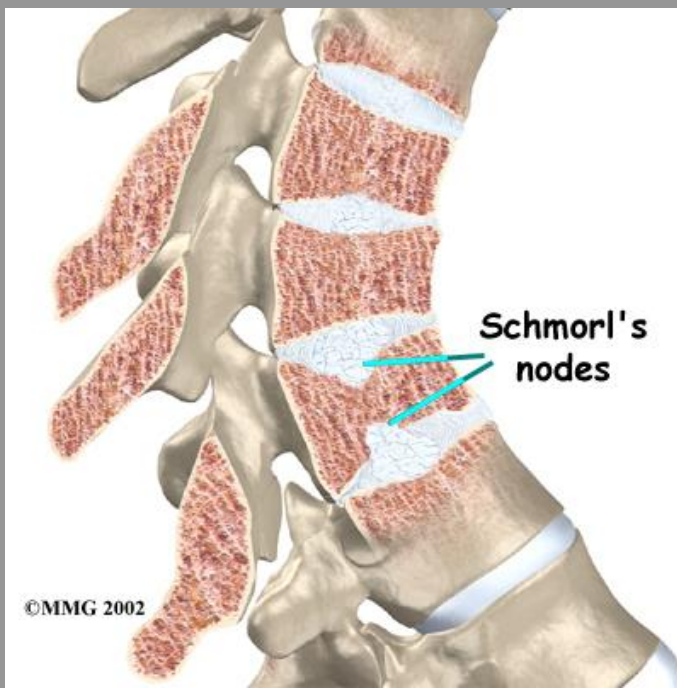






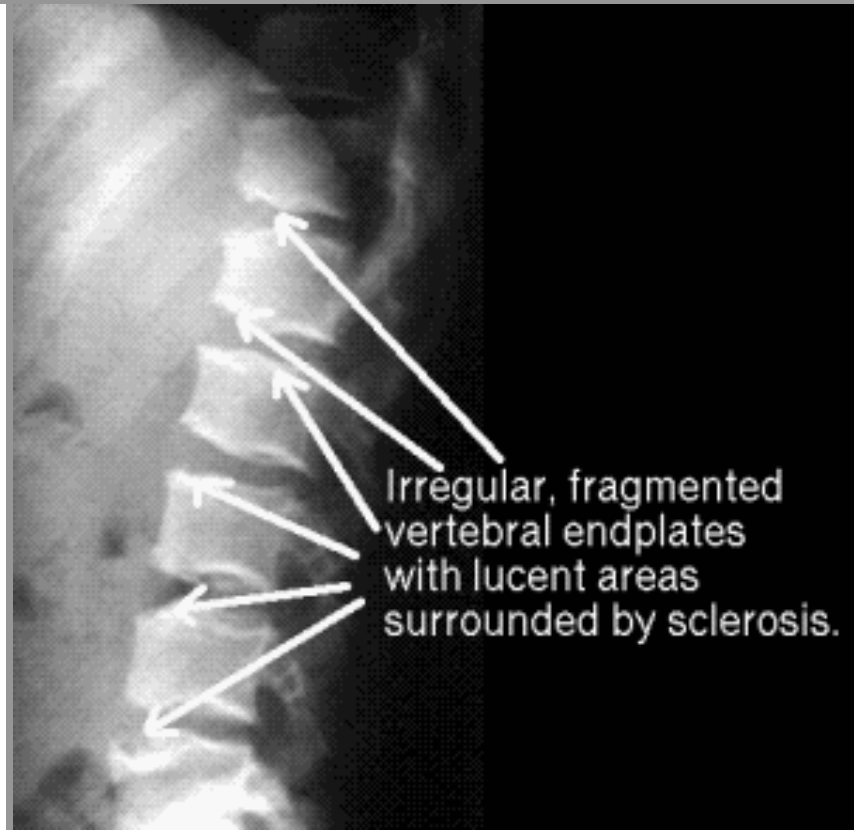
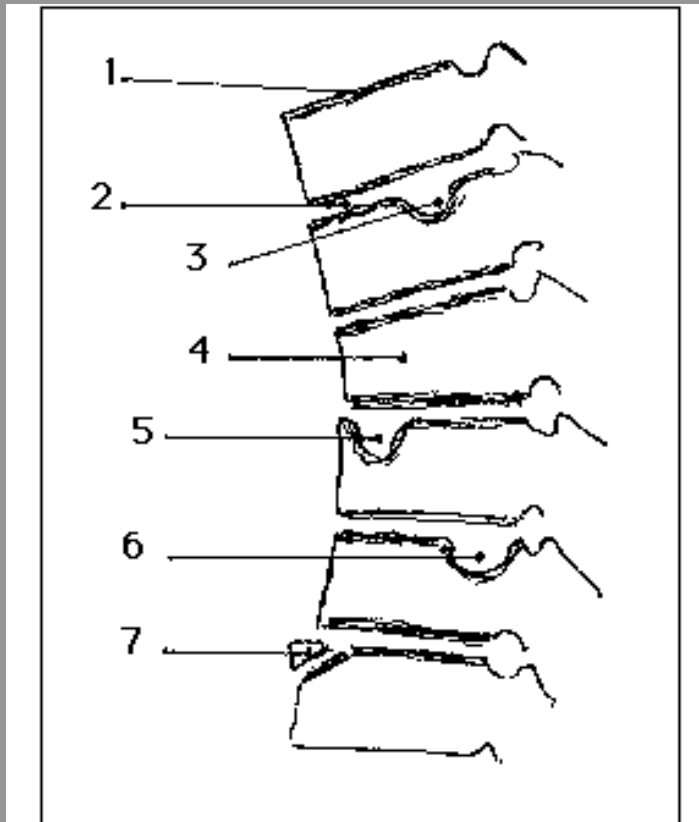
# Scheuermann disease

- Juvenile osteochondrosis
- 10% occurrence in adolescence
- Blood supply problems to the end plate results in disc herniation -SCHMORL- nodes



# Imaging

- X-RAY: uneven endplate, Schmorl nodes, increased kyphosis, anterior wedging of vertebrae.



# Imaging

MRI



# Scheuermann disease

## CLINICAL SIGNS:

- fixed increased thoracic kyphosis
- centre descend from V-VII to VII-IX

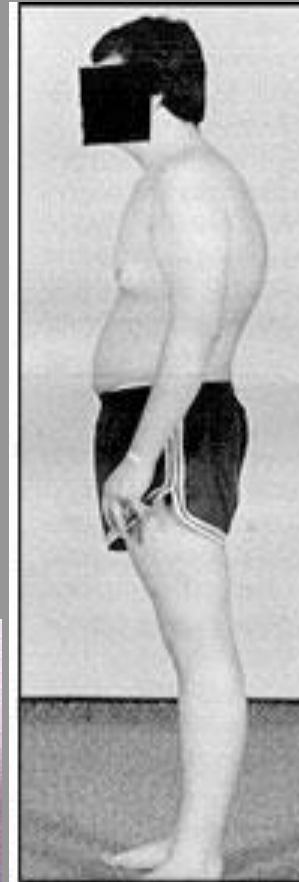


FIGURE 1A:  
Scheuermann's Kyphosis:  
Note increased Thoracic  
Kyphosis and forward  
thrust of head and neck.

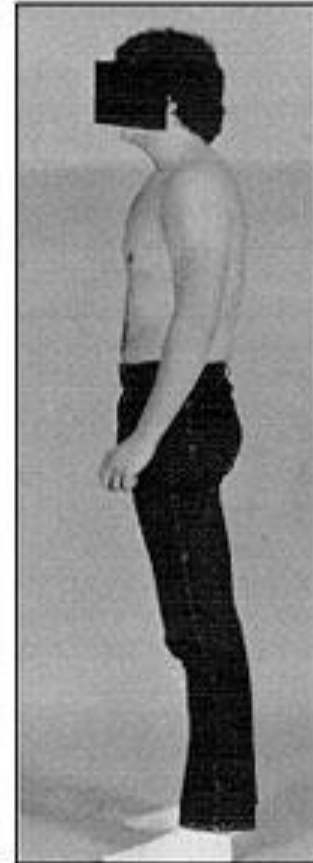
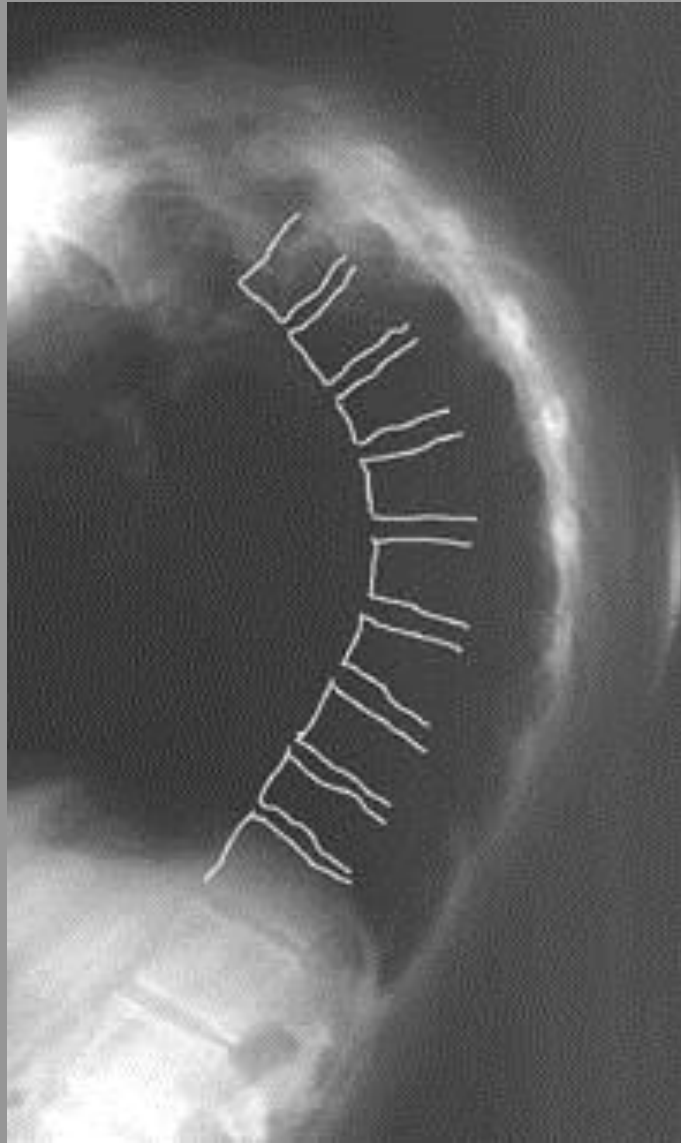


FIGURE 1B: Note  
improvement in thoracic  
kyphosis and forward  
thrust of head following  
surgical correction and  
fusion.



# Treatment



**Thank you for your attention!**