

The Aging Spine

Updates in Diagnosis and Treatment

Alekos Theologis, M.D.

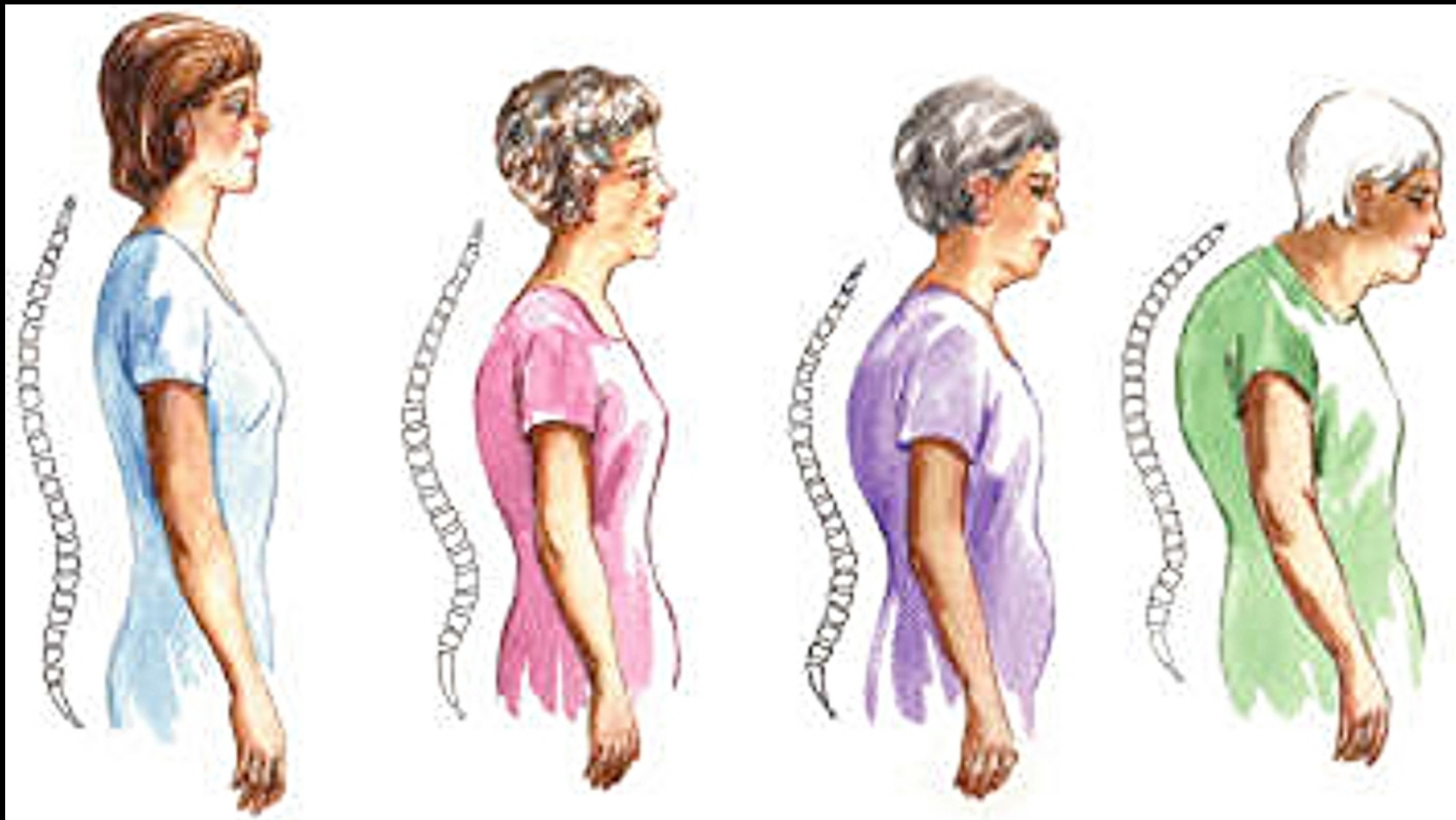
Assistant Professor - Spine Surgeon

Department of Orthopaedic Surgery

University of California - San Francisco (UCSF)

4.18.19

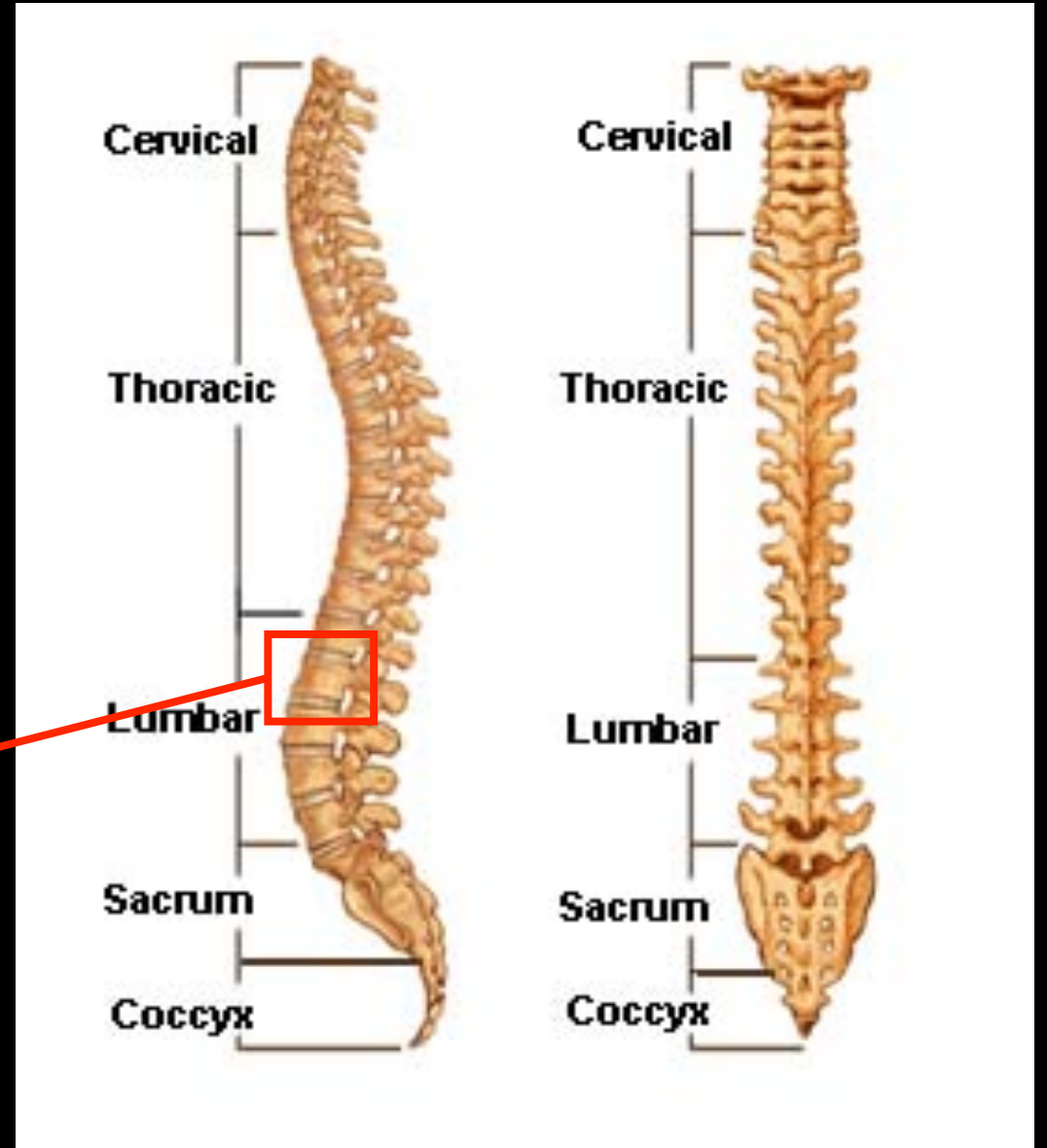
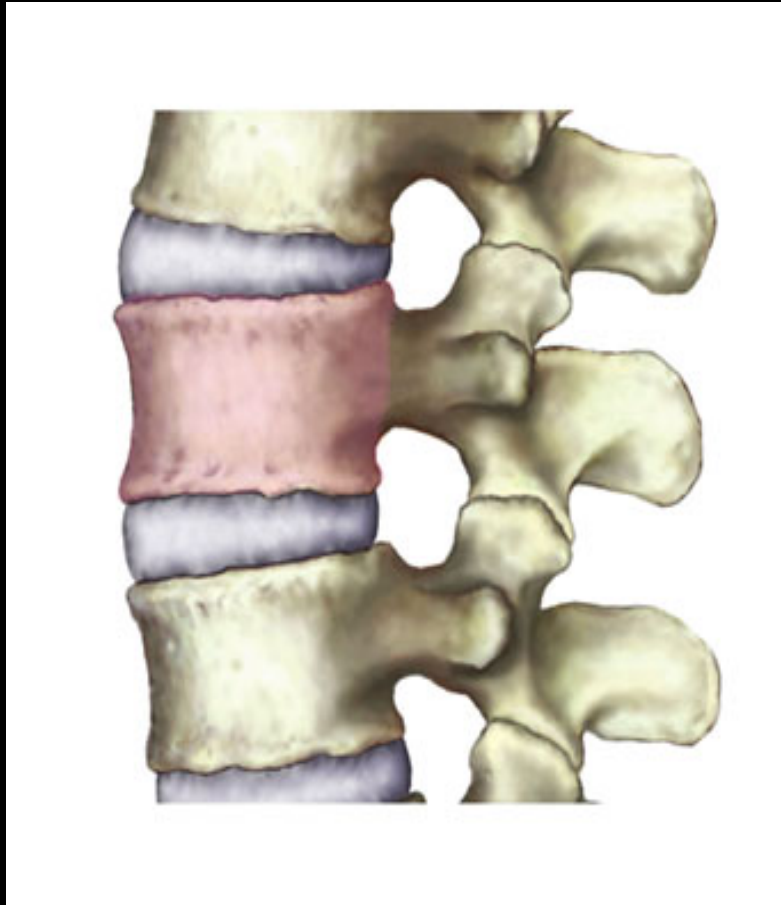




Goals

- 1,000-foot overview
- Describe spinal etiologies of back and neck pain
- Clarify treatment options:
 - Degenerative disc disease
 - Kyphosis and scoliosis
 - Osteoporosis

Defining Normality

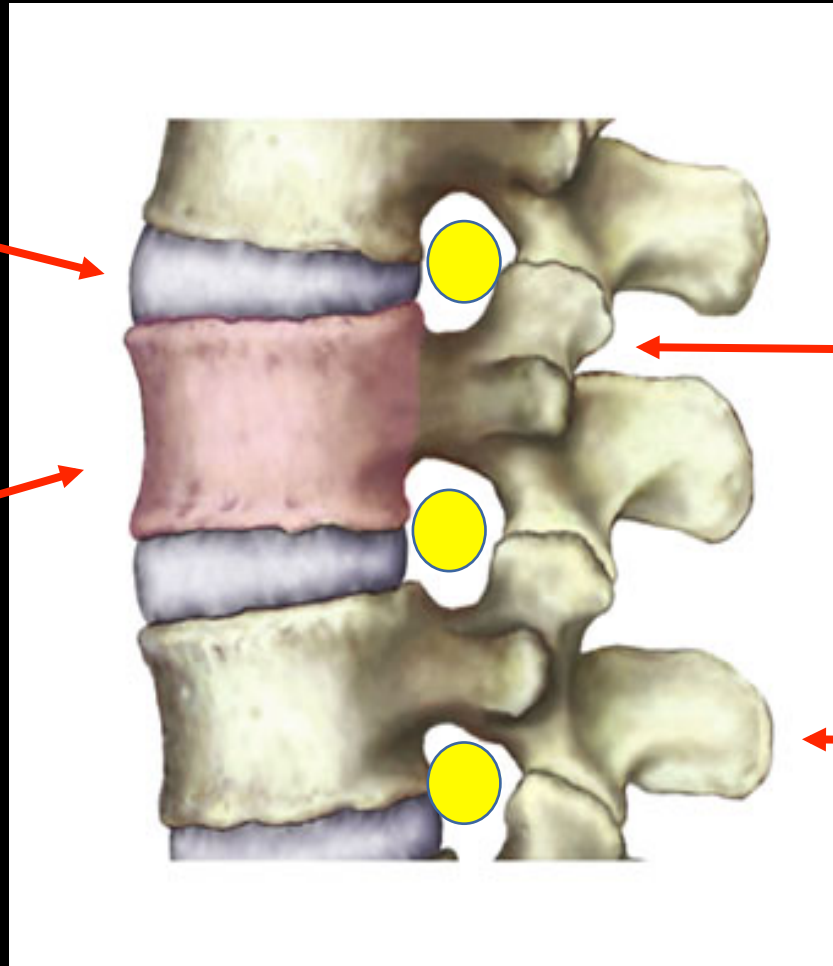


Vertebral segment

Disc



Vertebral
Body



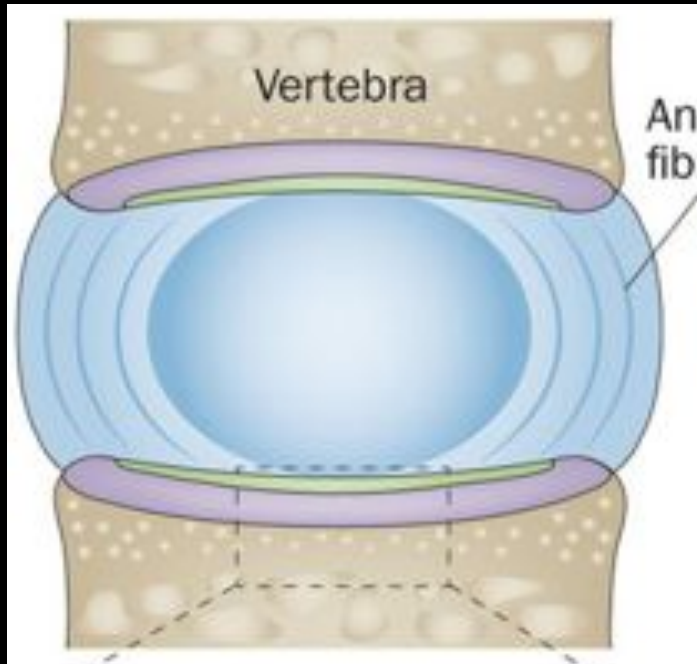
Facet
Joints



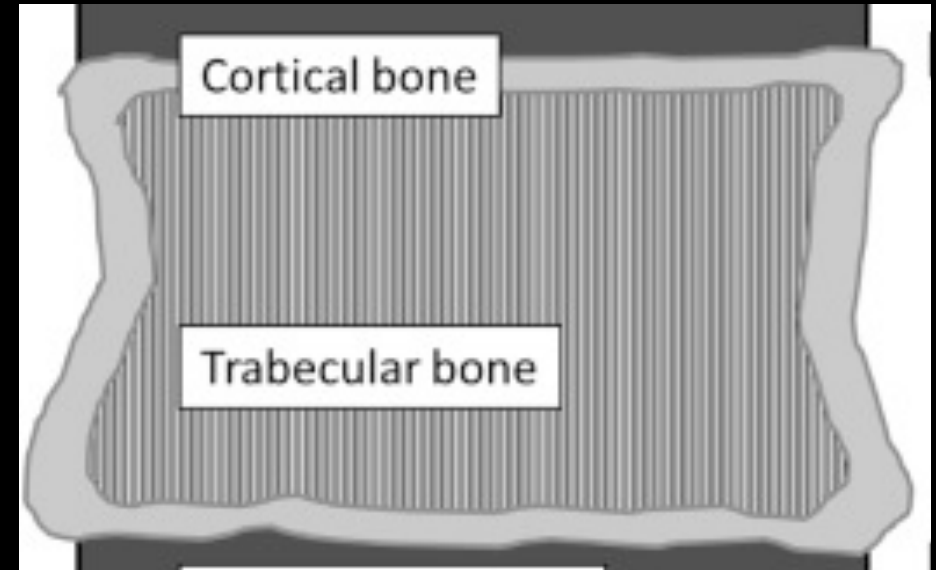
Spinous
process

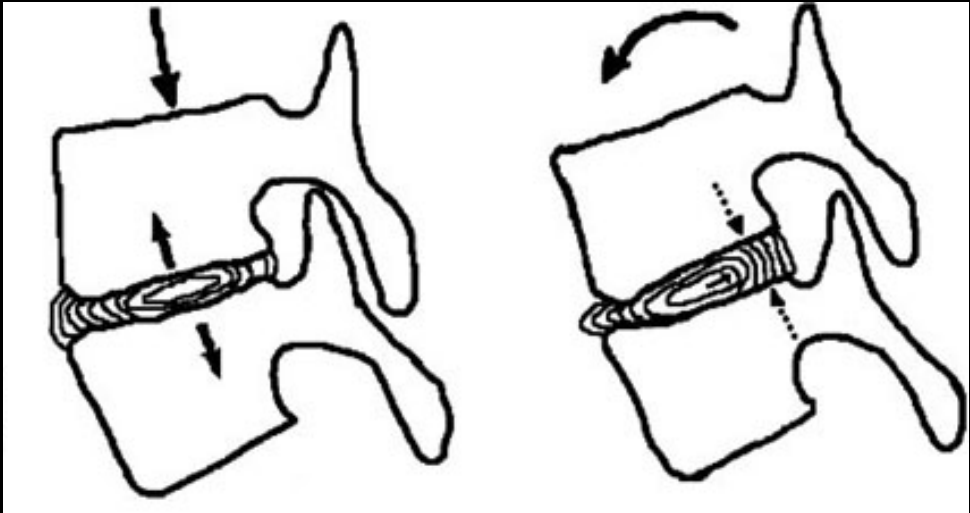
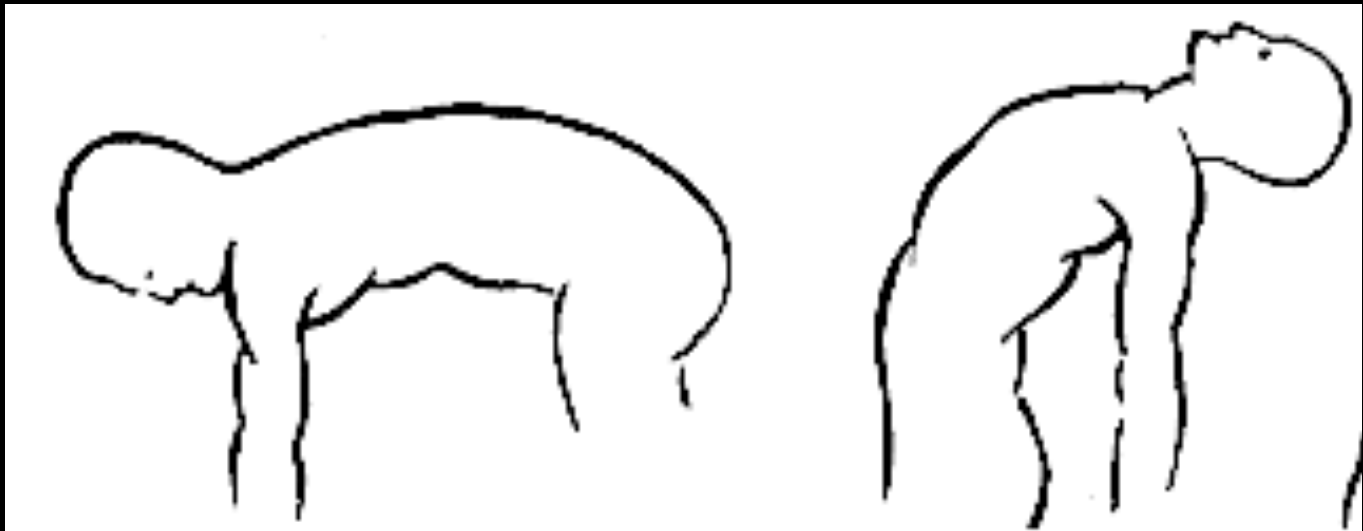


Intervertebral Disc

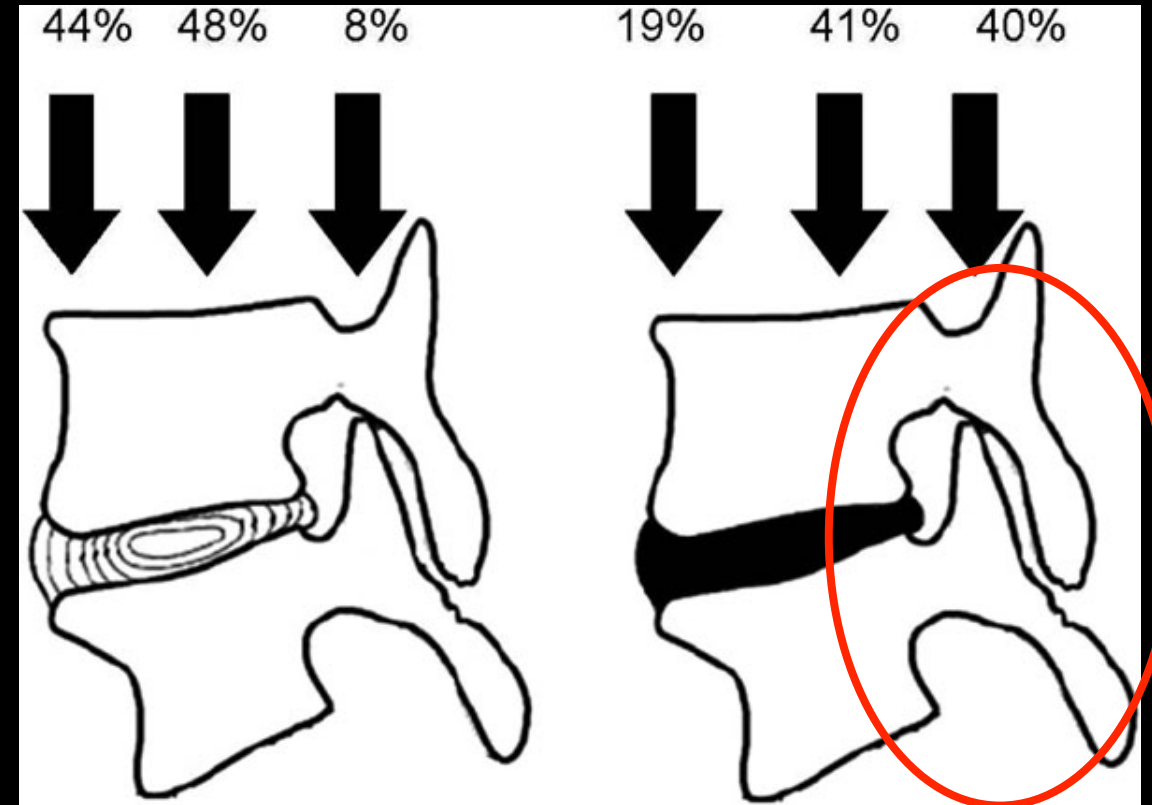
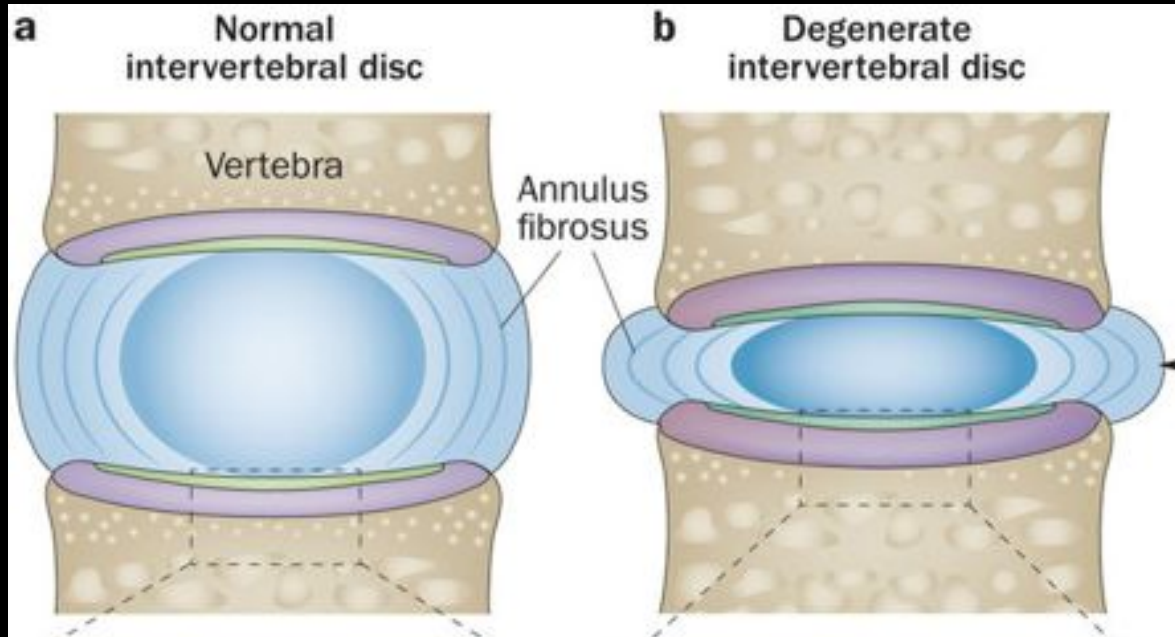


Vertebral Body





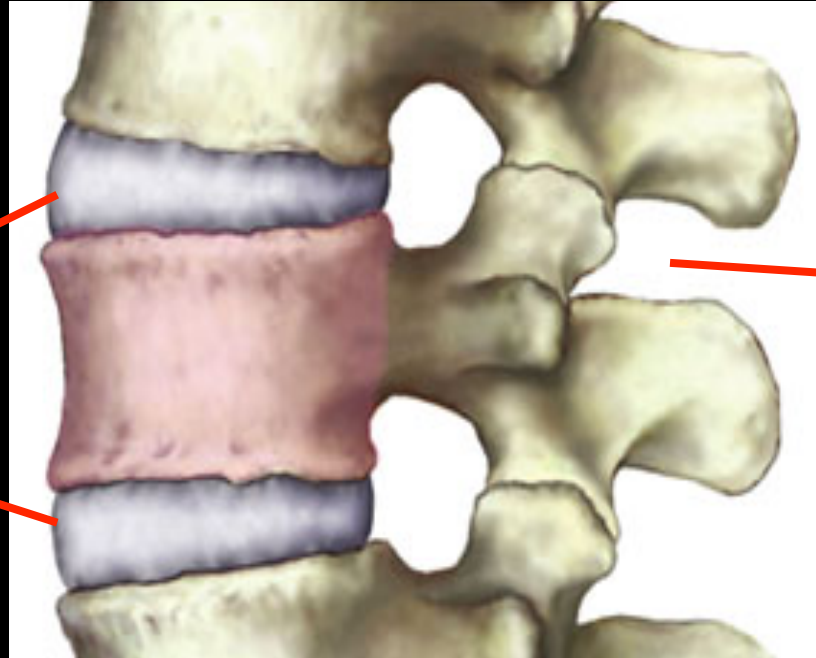
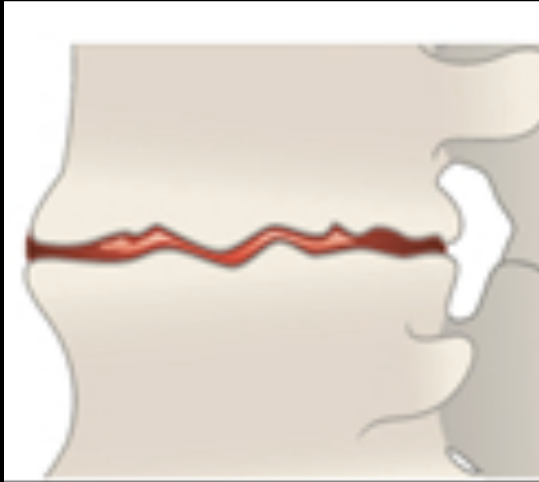
Aging → Degeneration of Disc



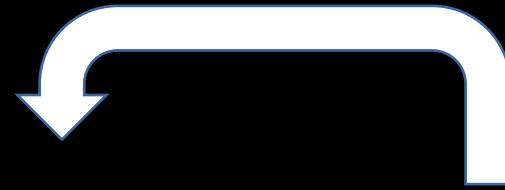
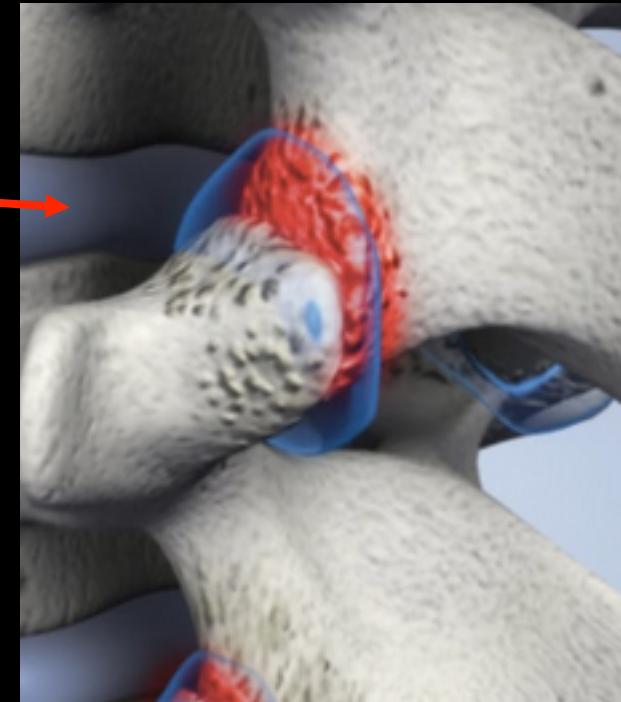
- Loses water and becomes rigid
- Loses volume
- Loses nutrients

A Vicious Cycle

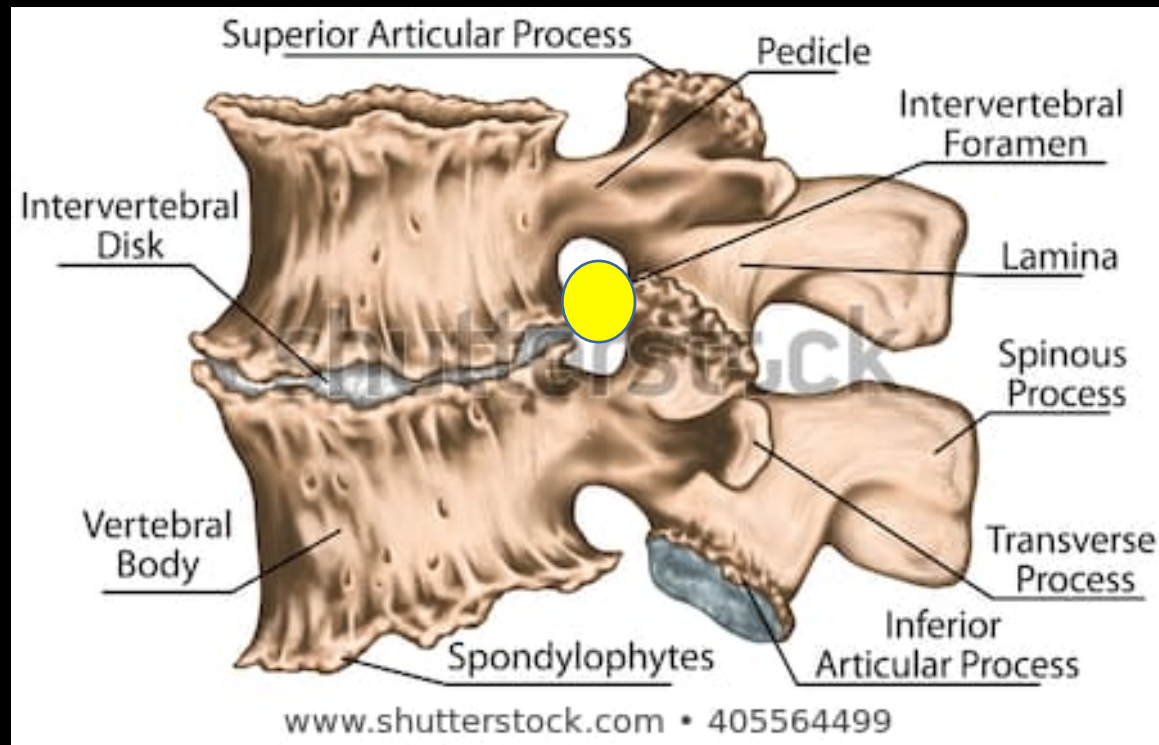
Degenerated
Disc Disease



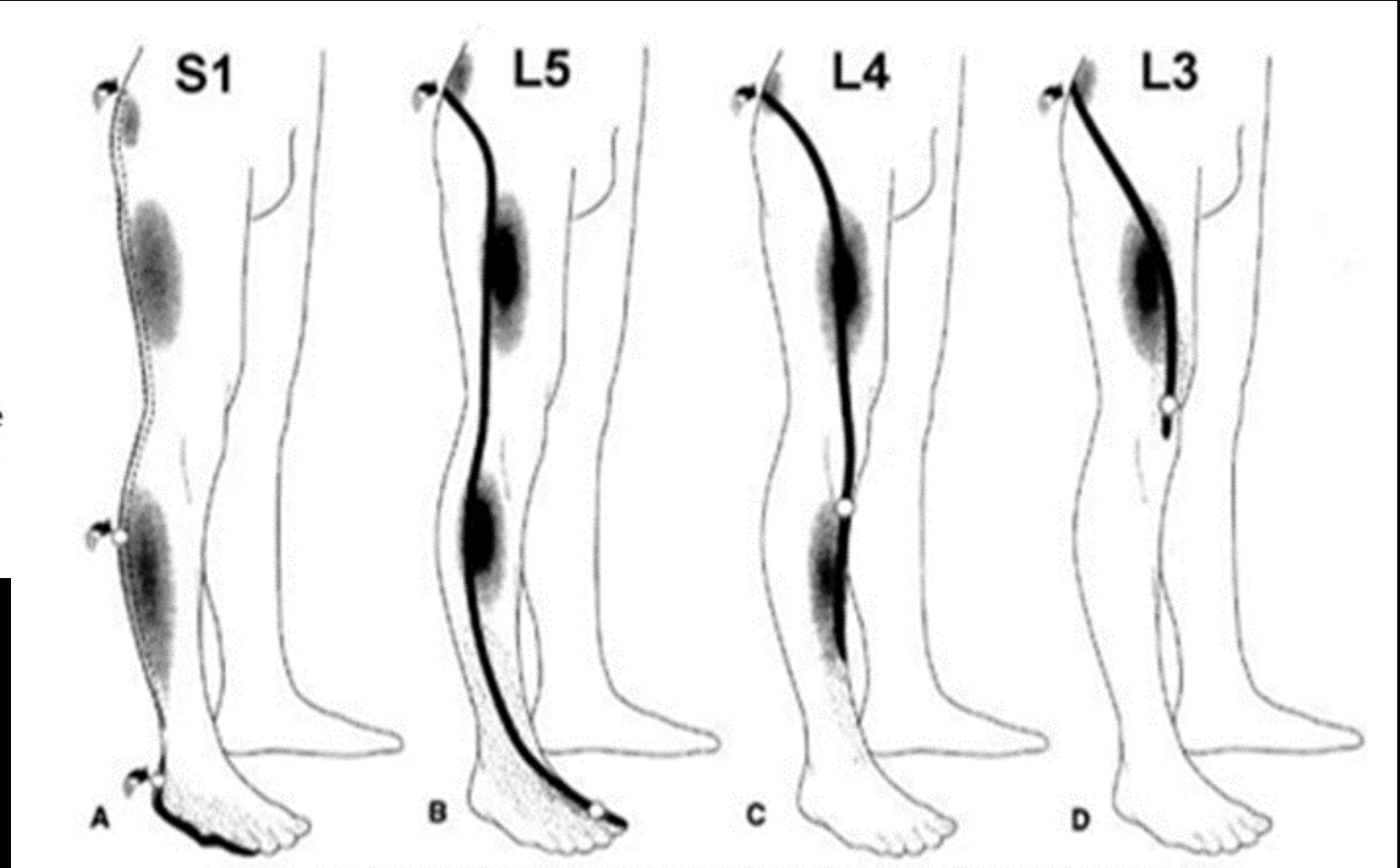
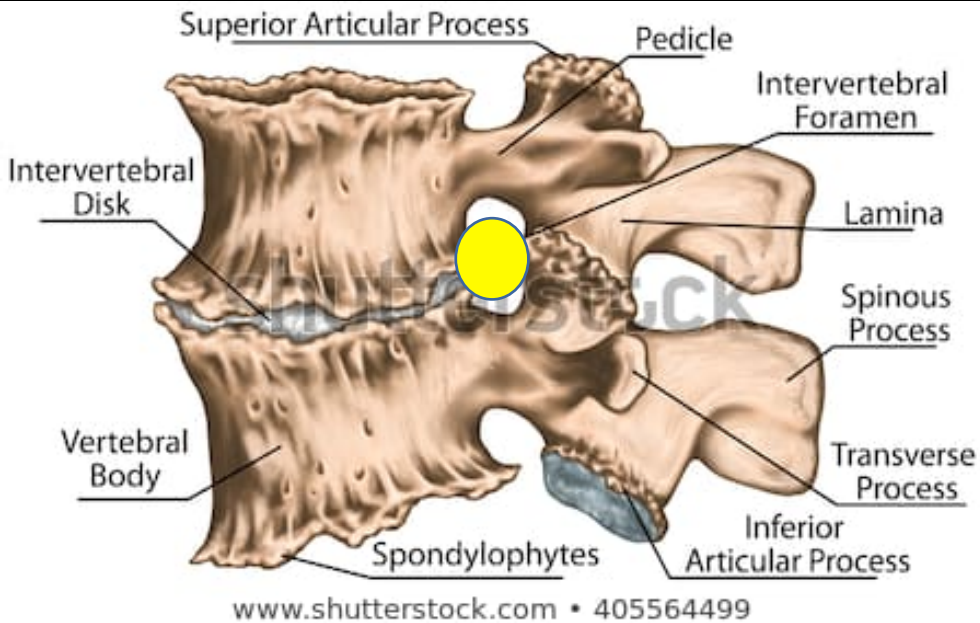
Facet Joint
Arthritis



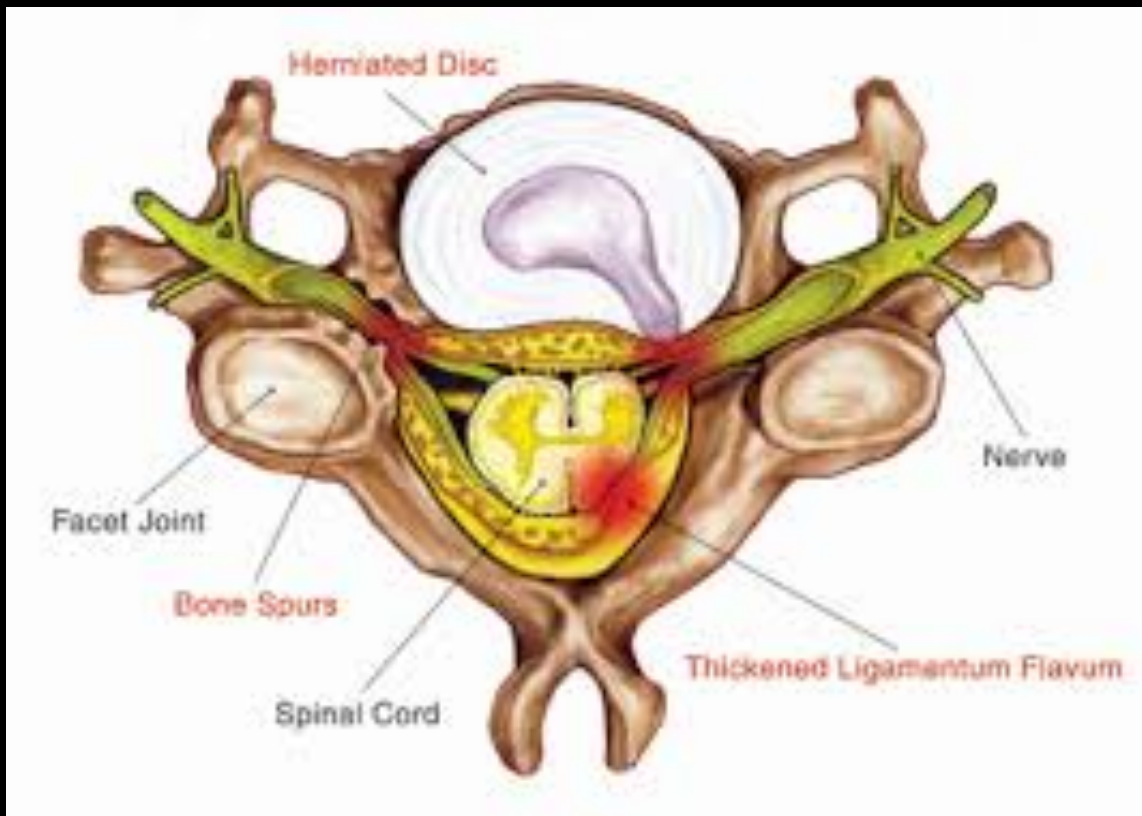
Spinal etiologies of back and neck pain



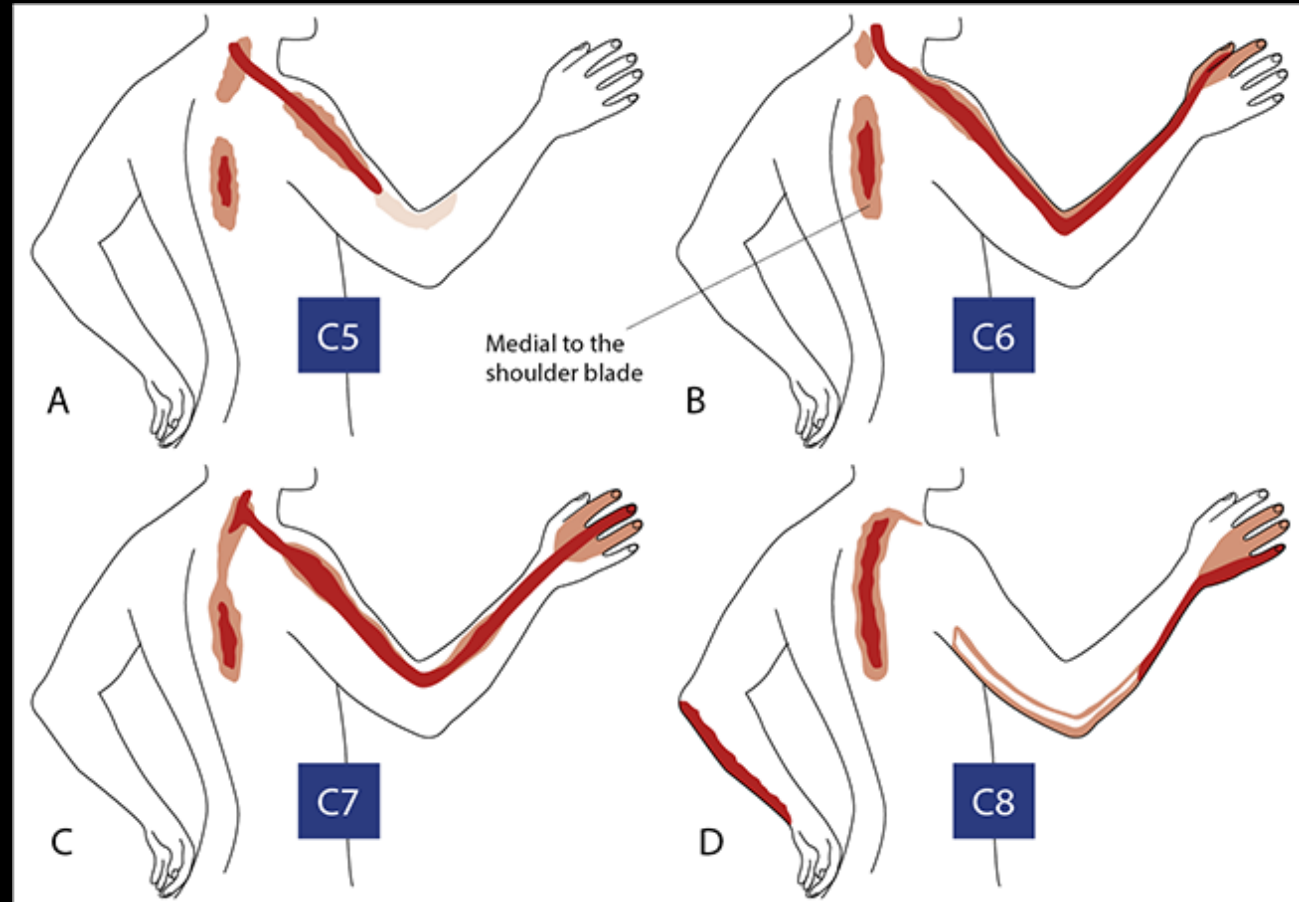
Neurologic Consequences of the Aging Spine



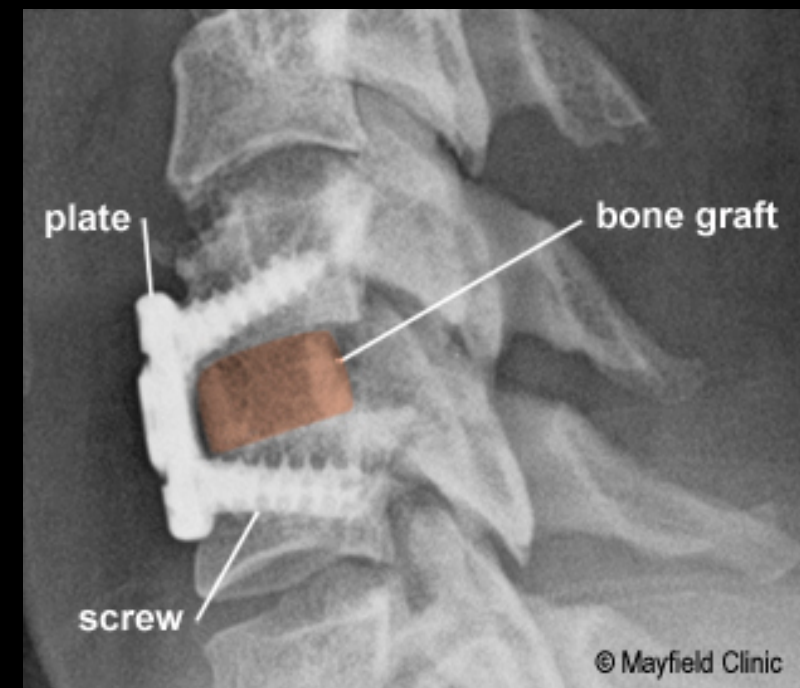
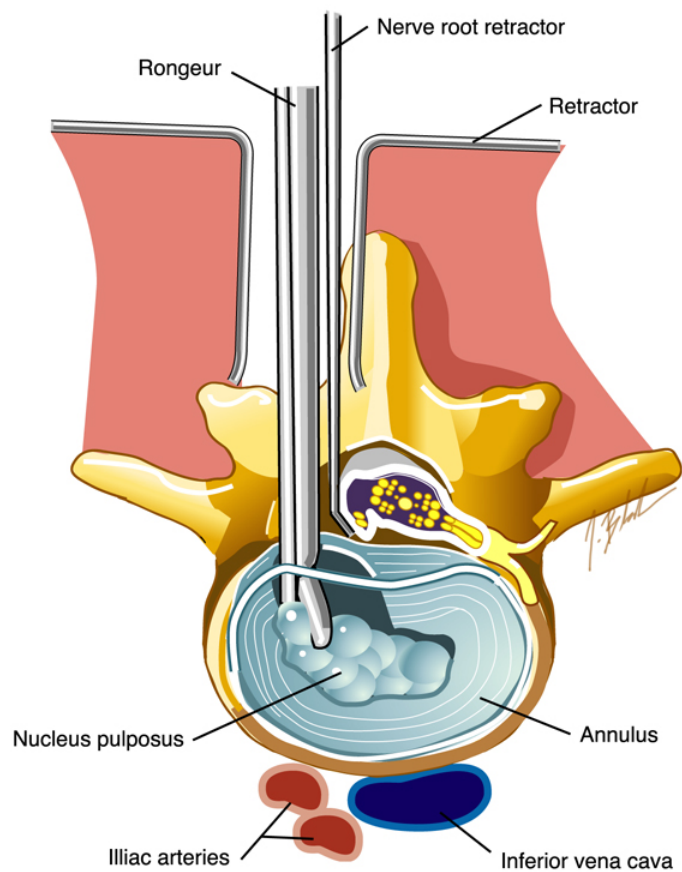
**Radiculopathy ~
Pain in 1 leg**



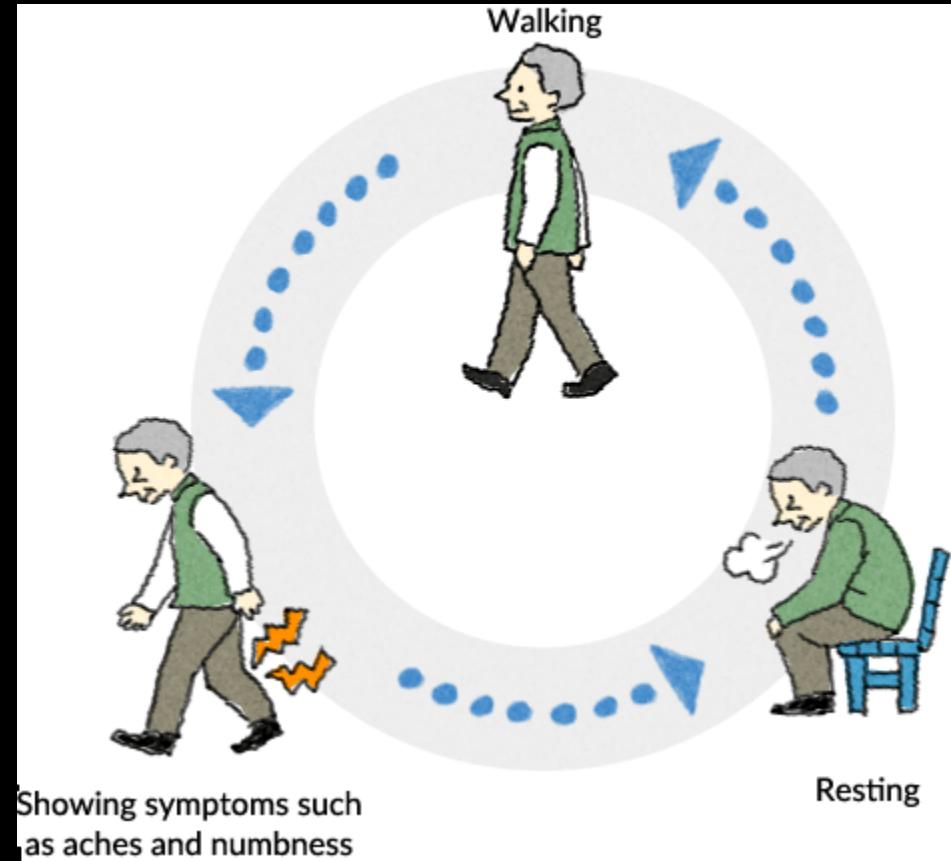
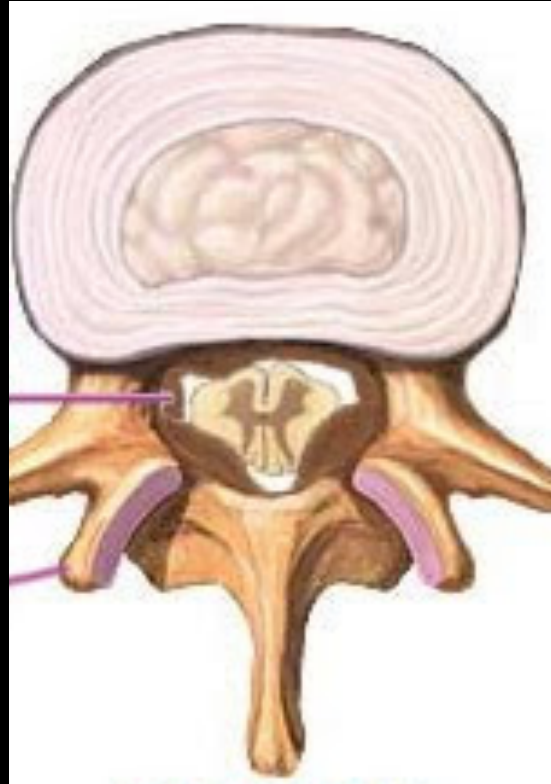
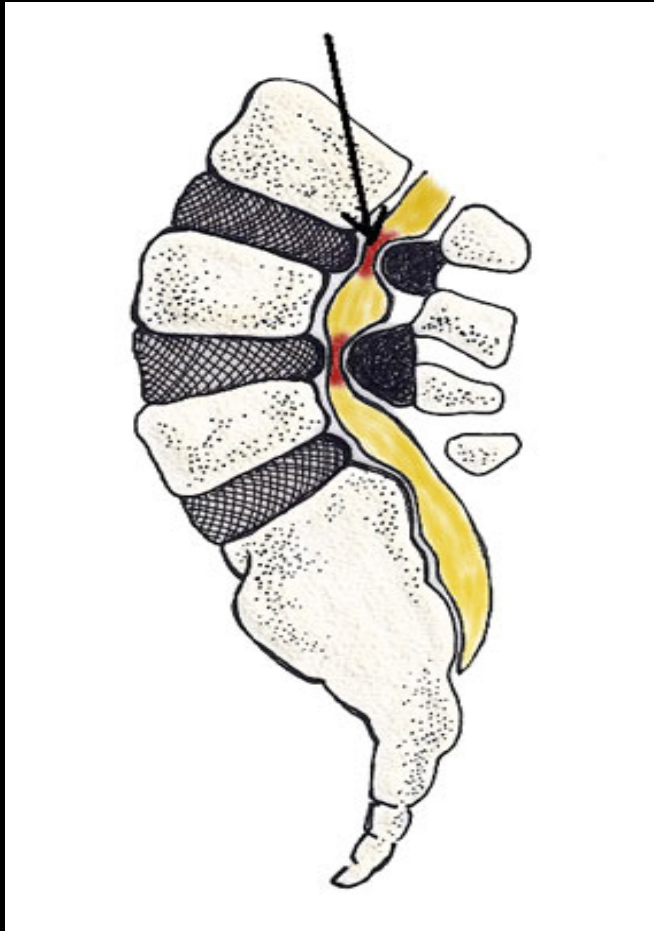
Radiculopathy ~ Pain in 1 arm



Discectomies

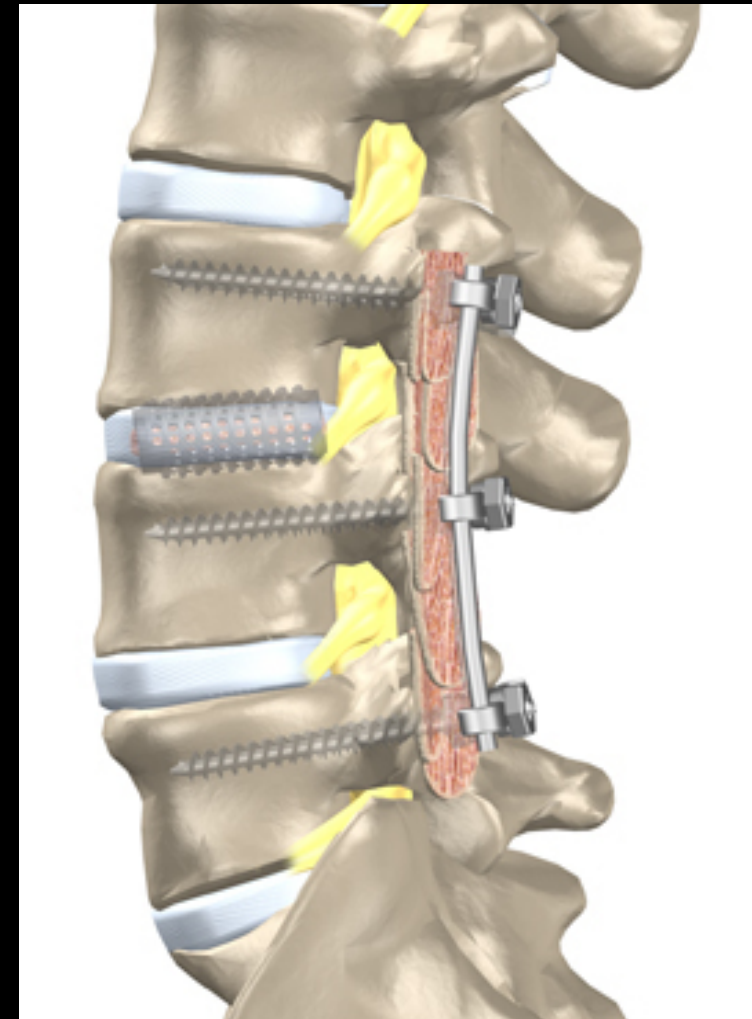
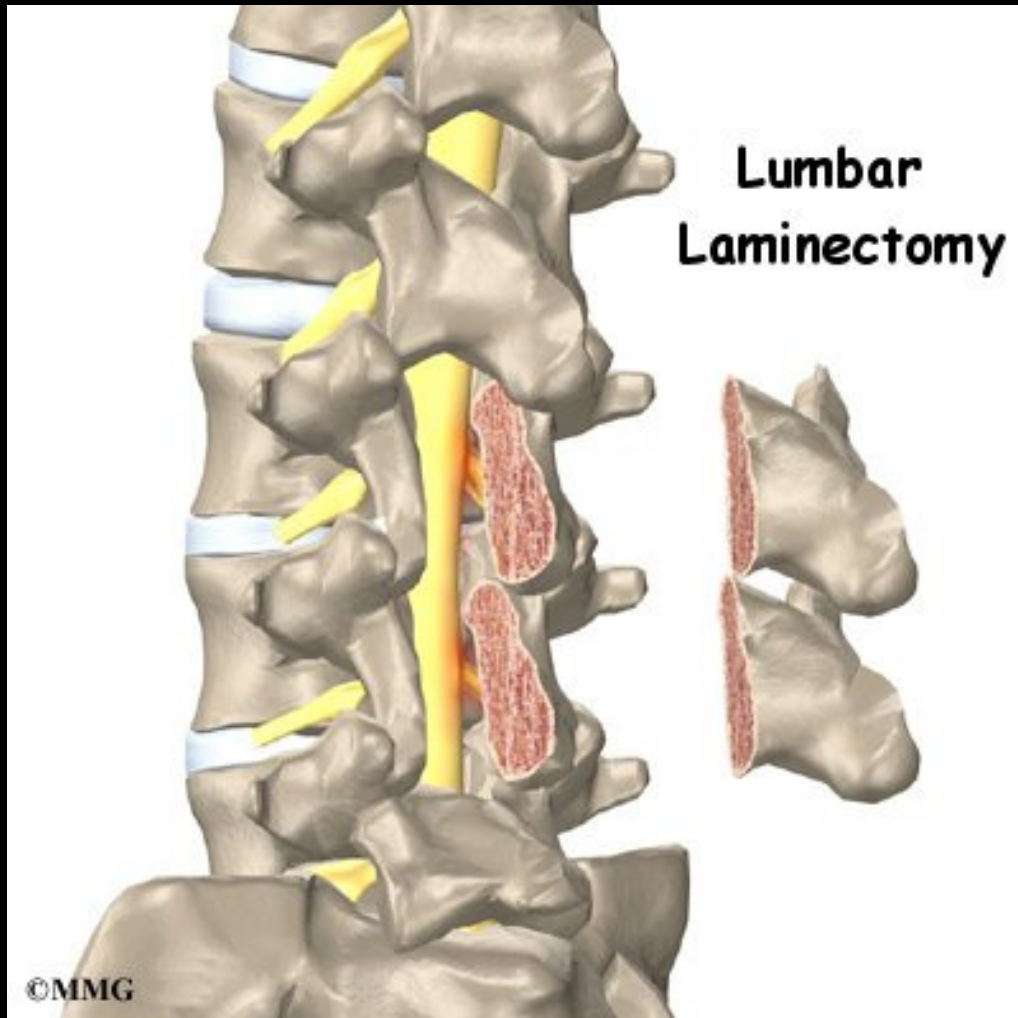


Central stenosis

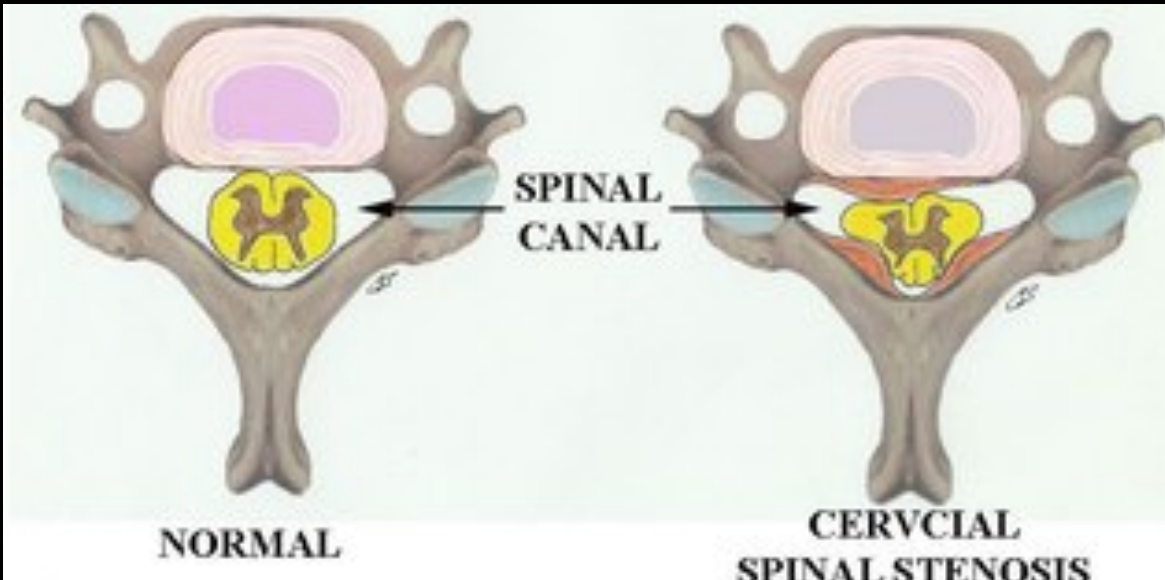


Neurogenic Claudication

Laminectomy +/- Instrumentation & Fusion



Cervical Myelopathy

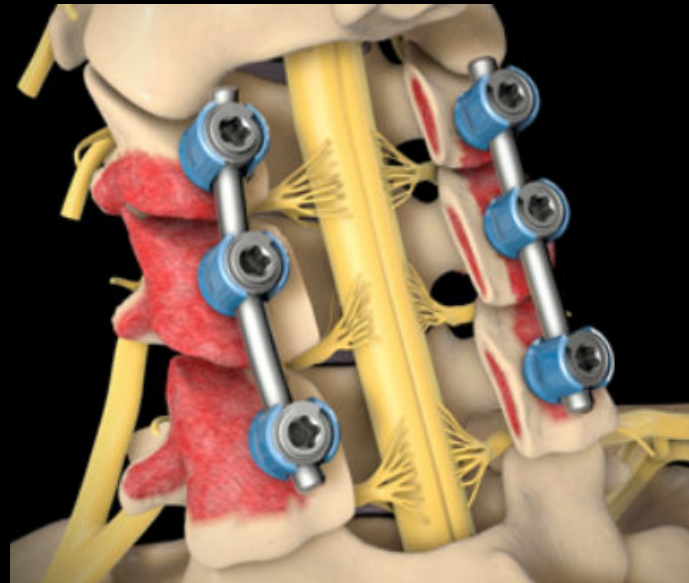
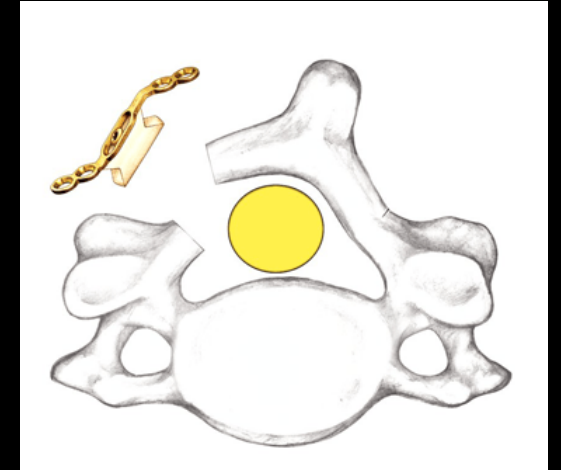
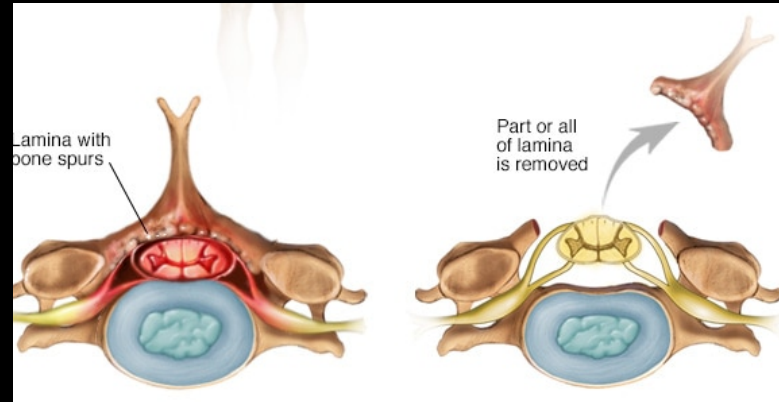
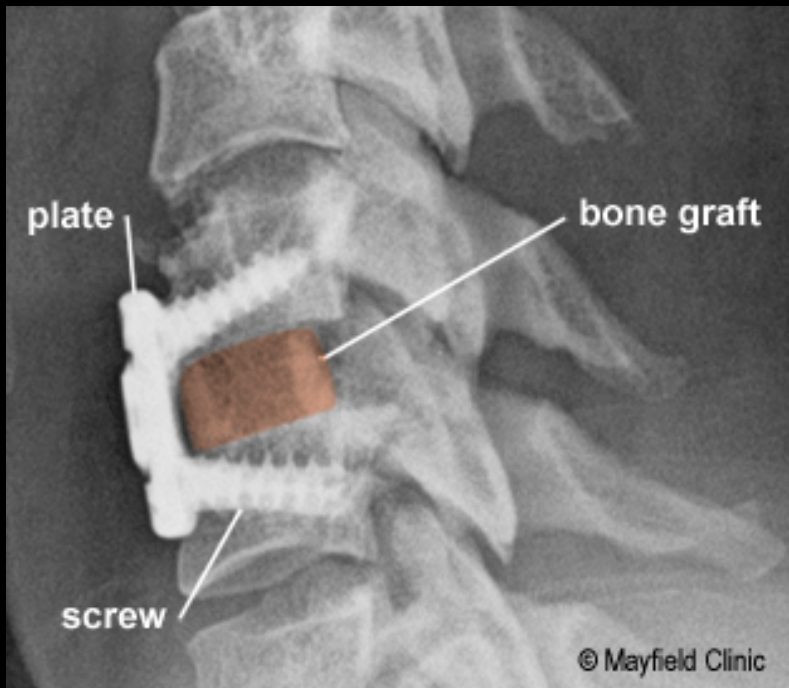


Symptoms	
Tingling/numbness in fingers, hands & arms	Imbalance / Poor coordination / Clumsiness
Difficulty grabbing objects	Loss of fine motor skills (coins, writing)

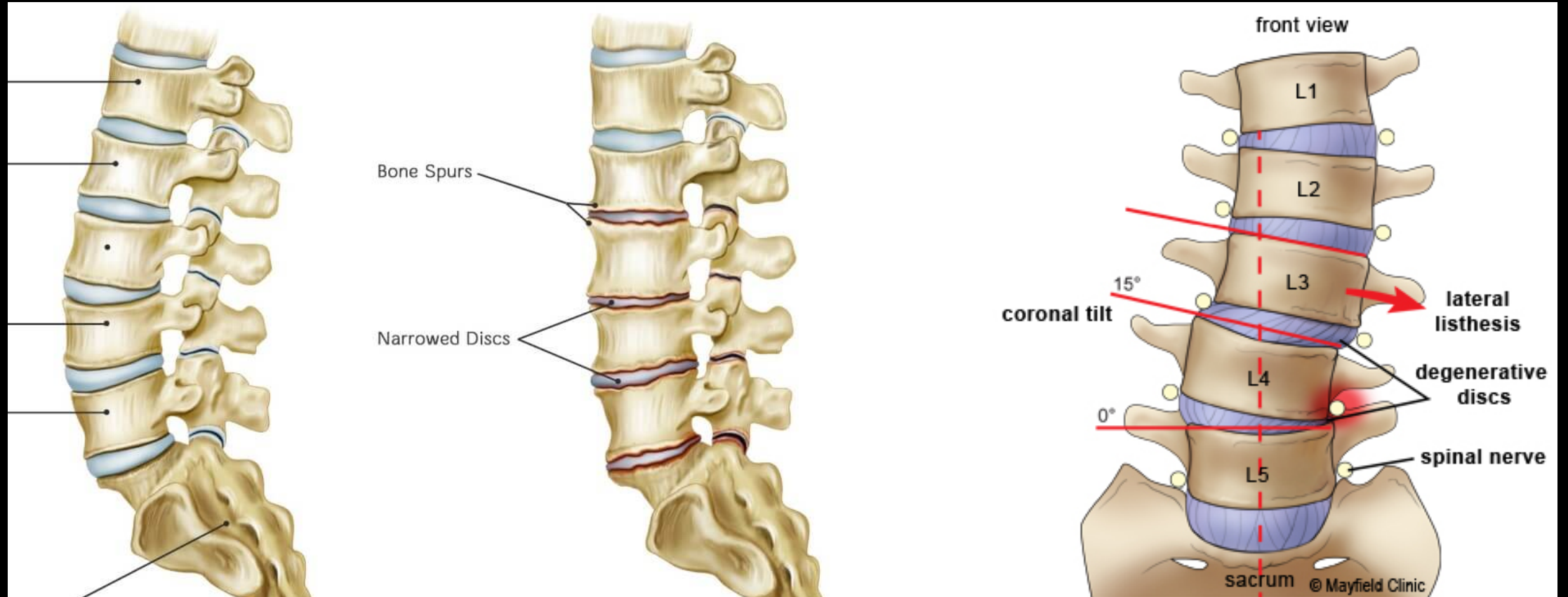
ACDF

Laminectomy/ Fusion

Laminoplasty



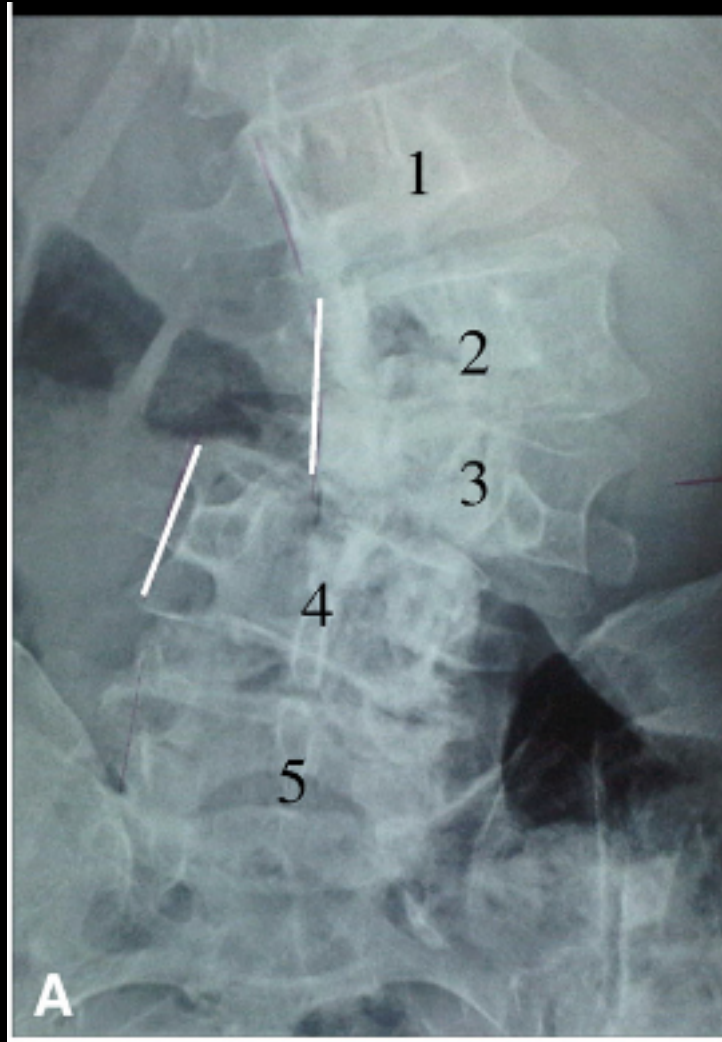
Other Consequences of Multi-Level Degenerative Disc Disease



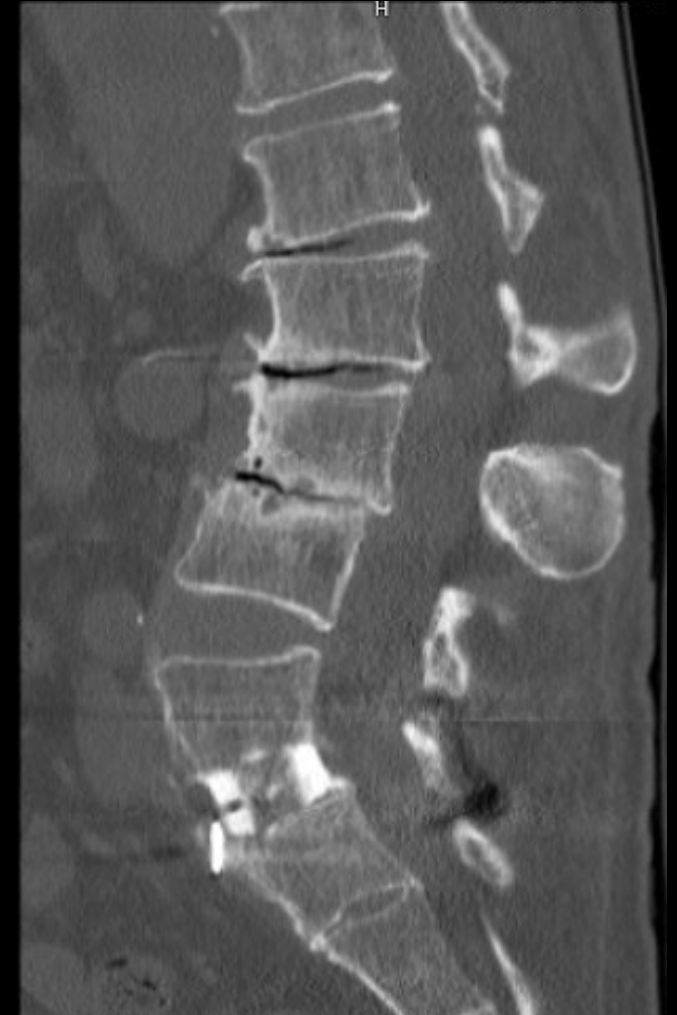
Flatback

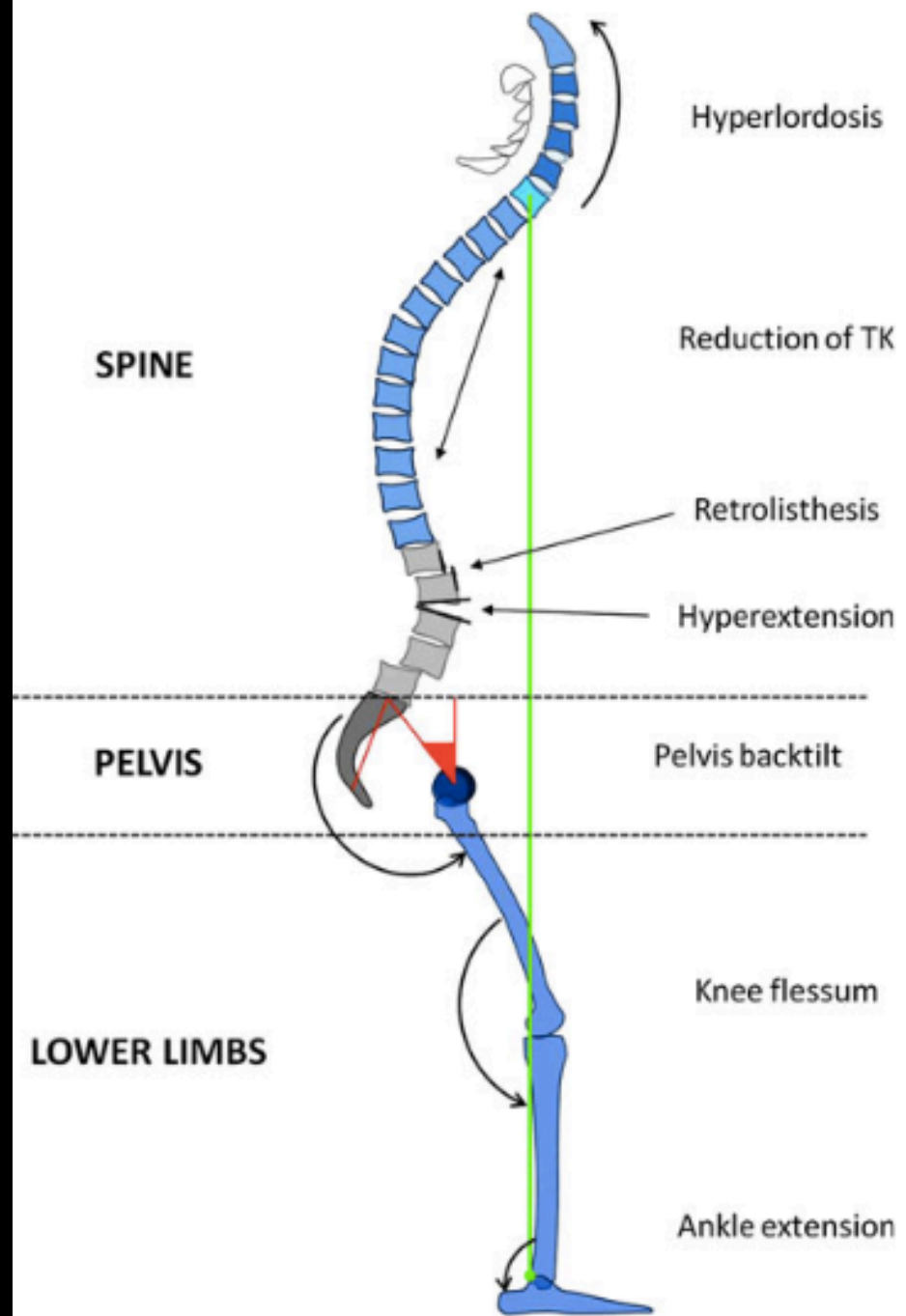
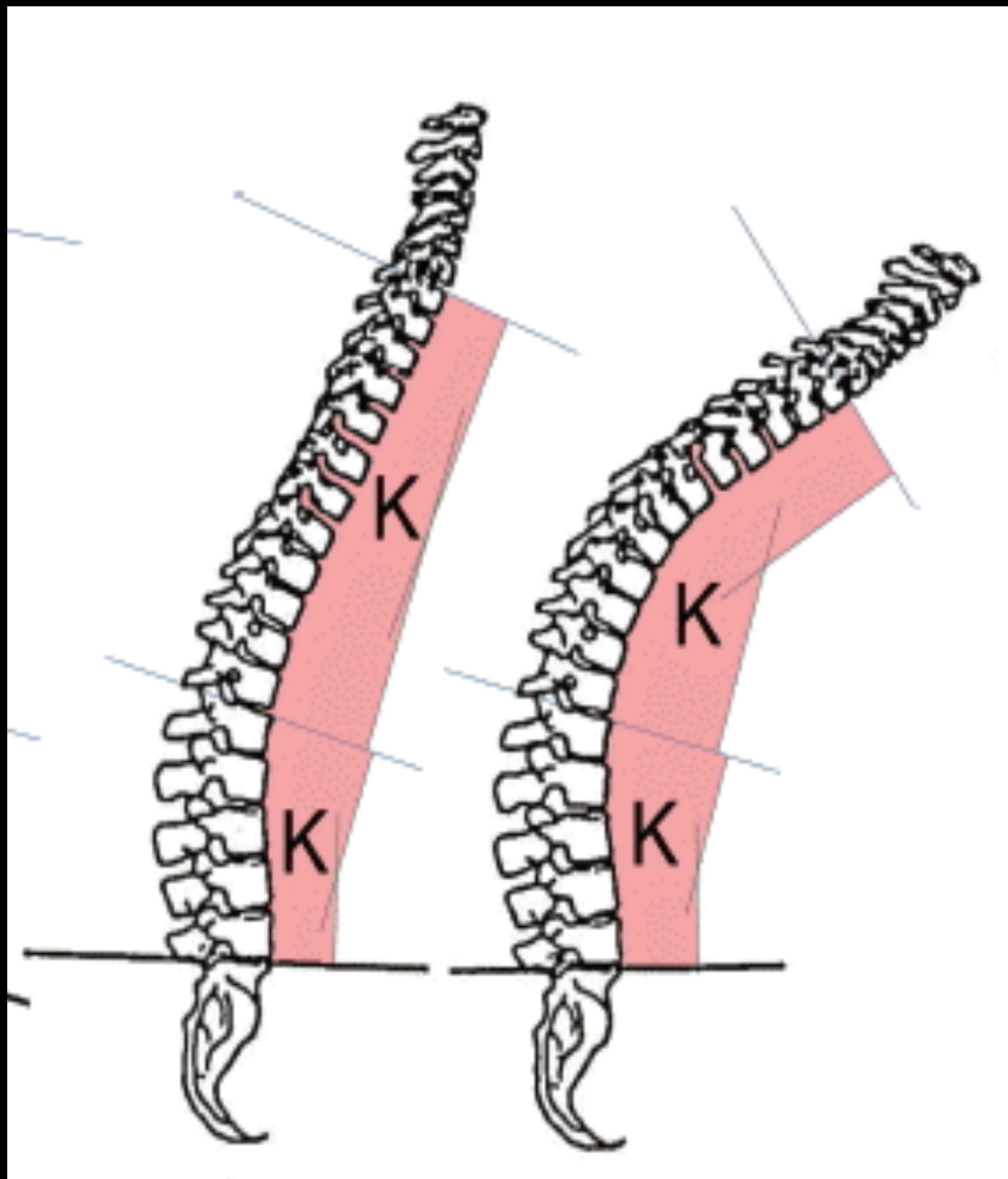
Scoliosis

Scoliosis

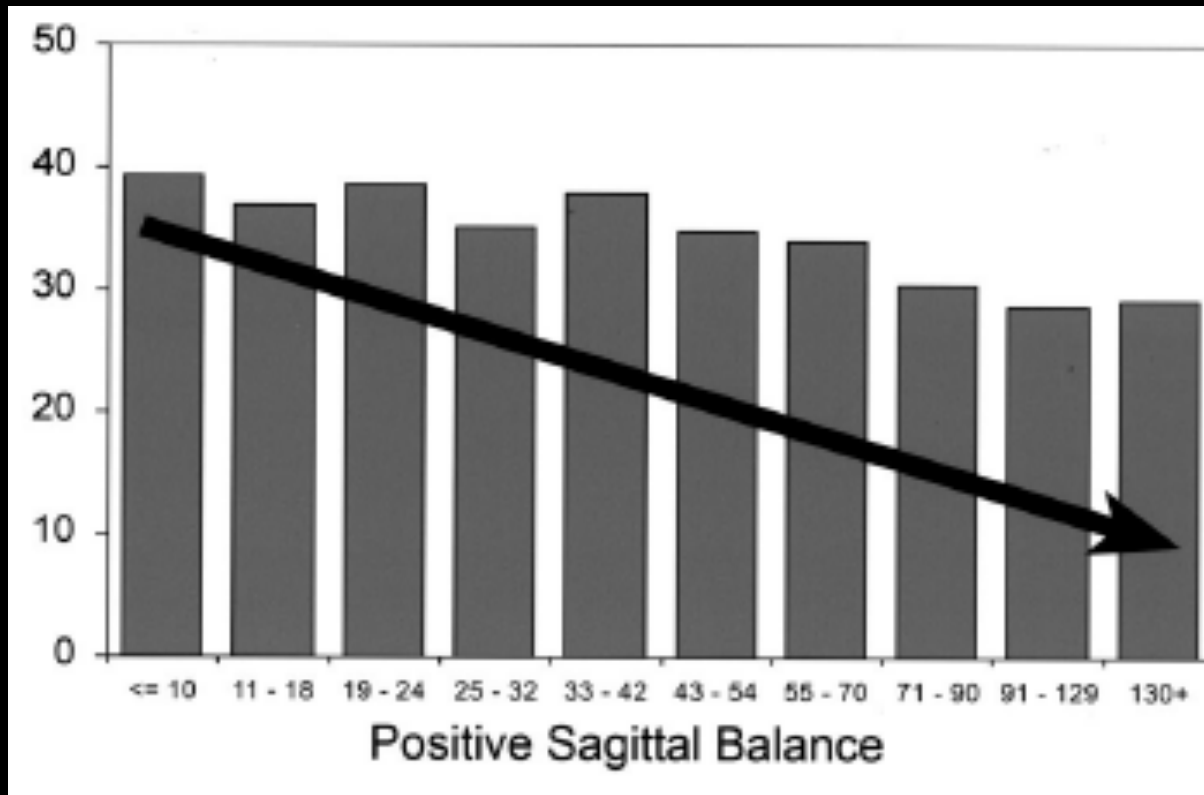


Kyphosis (loss of height and leaning forward)

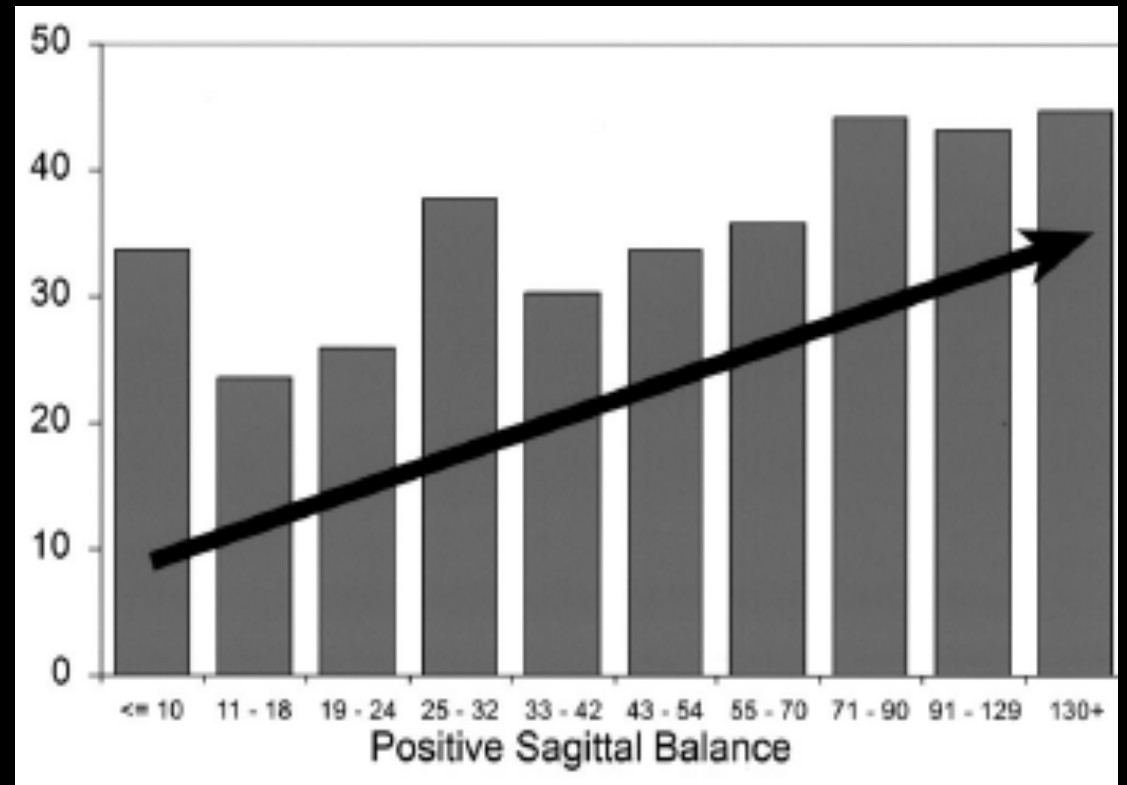




General Function

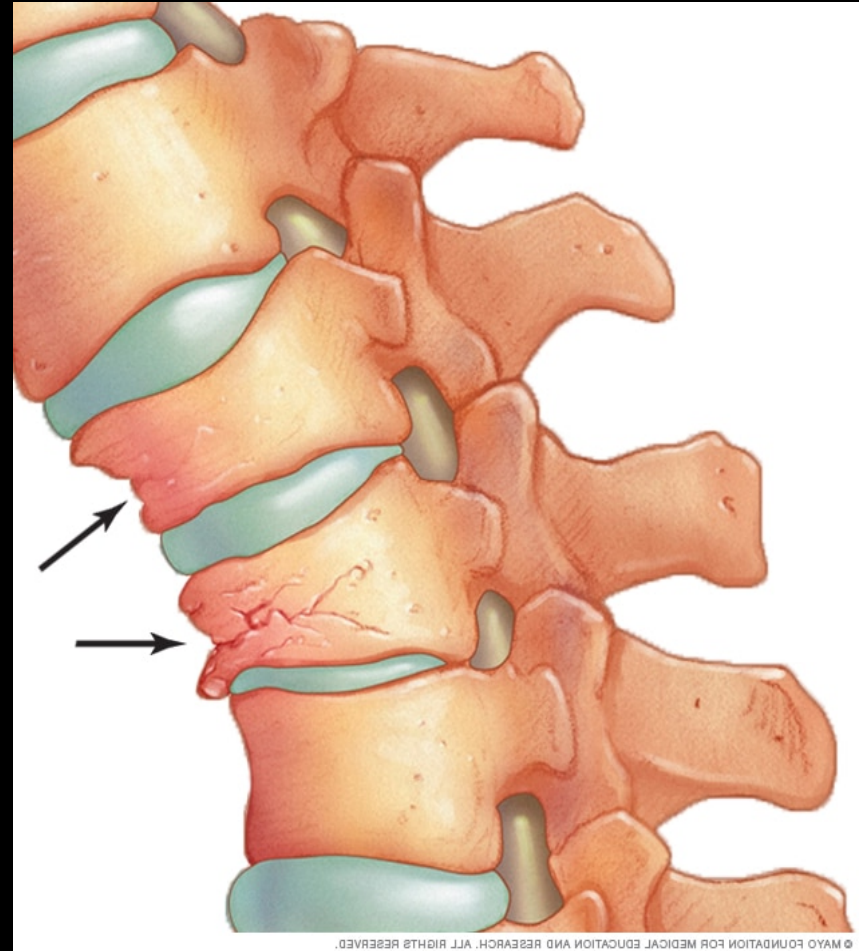


ODI

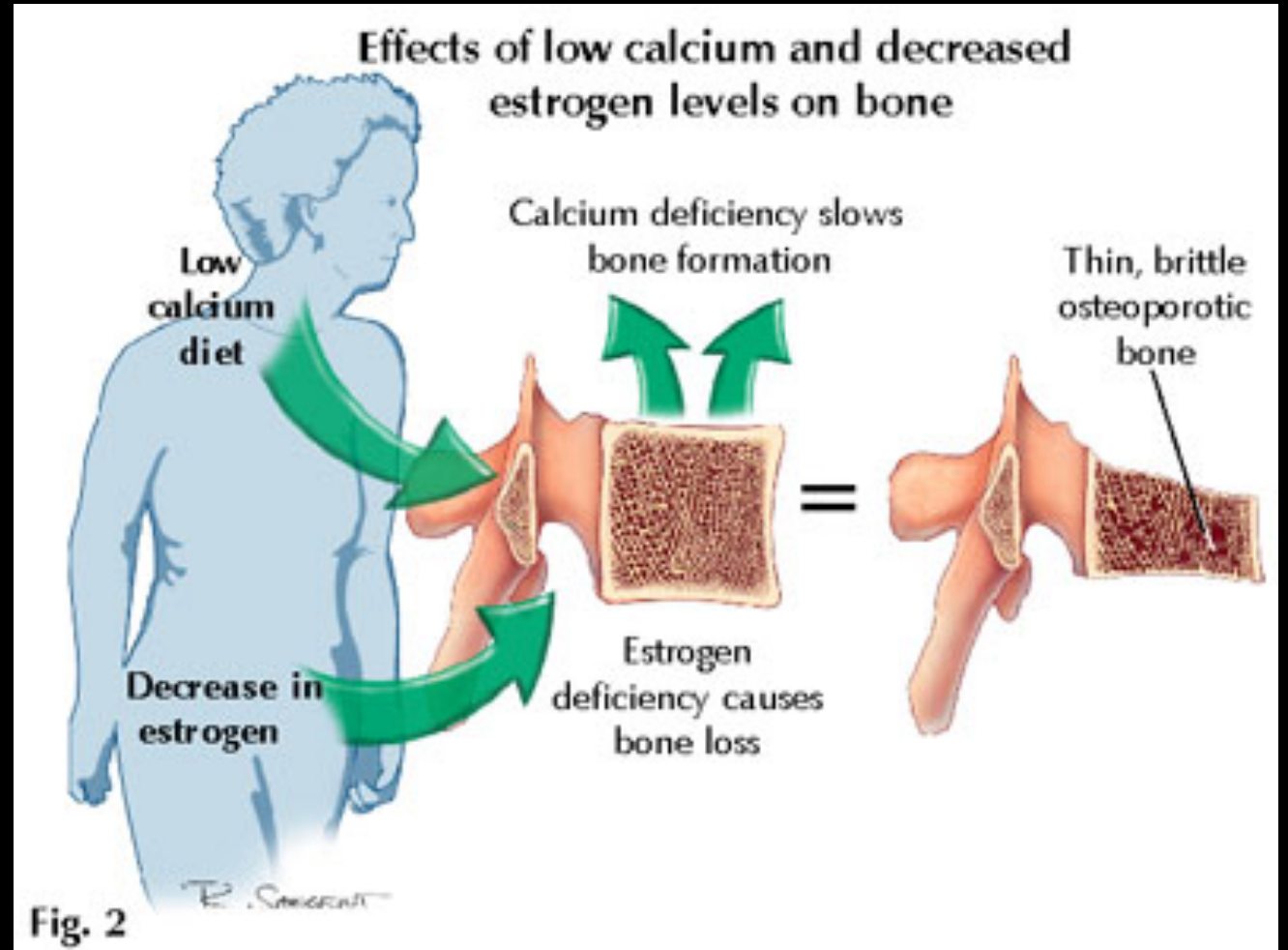
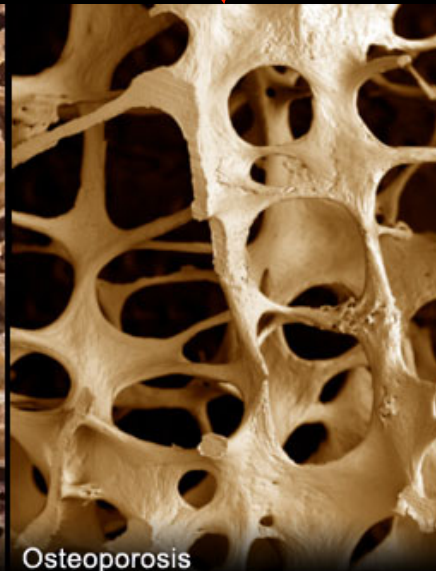
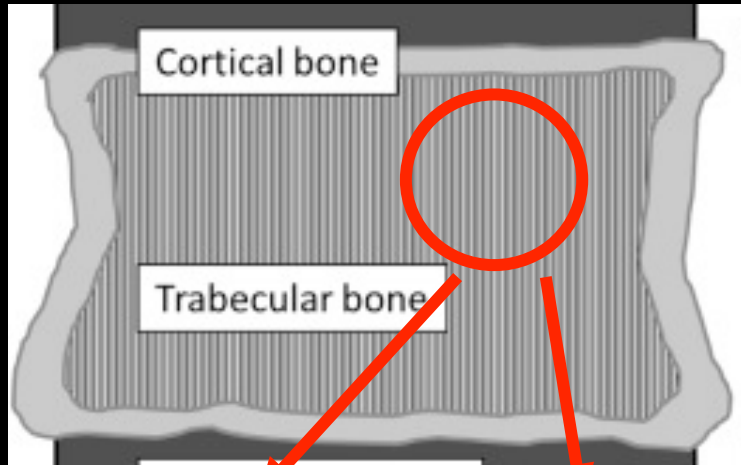


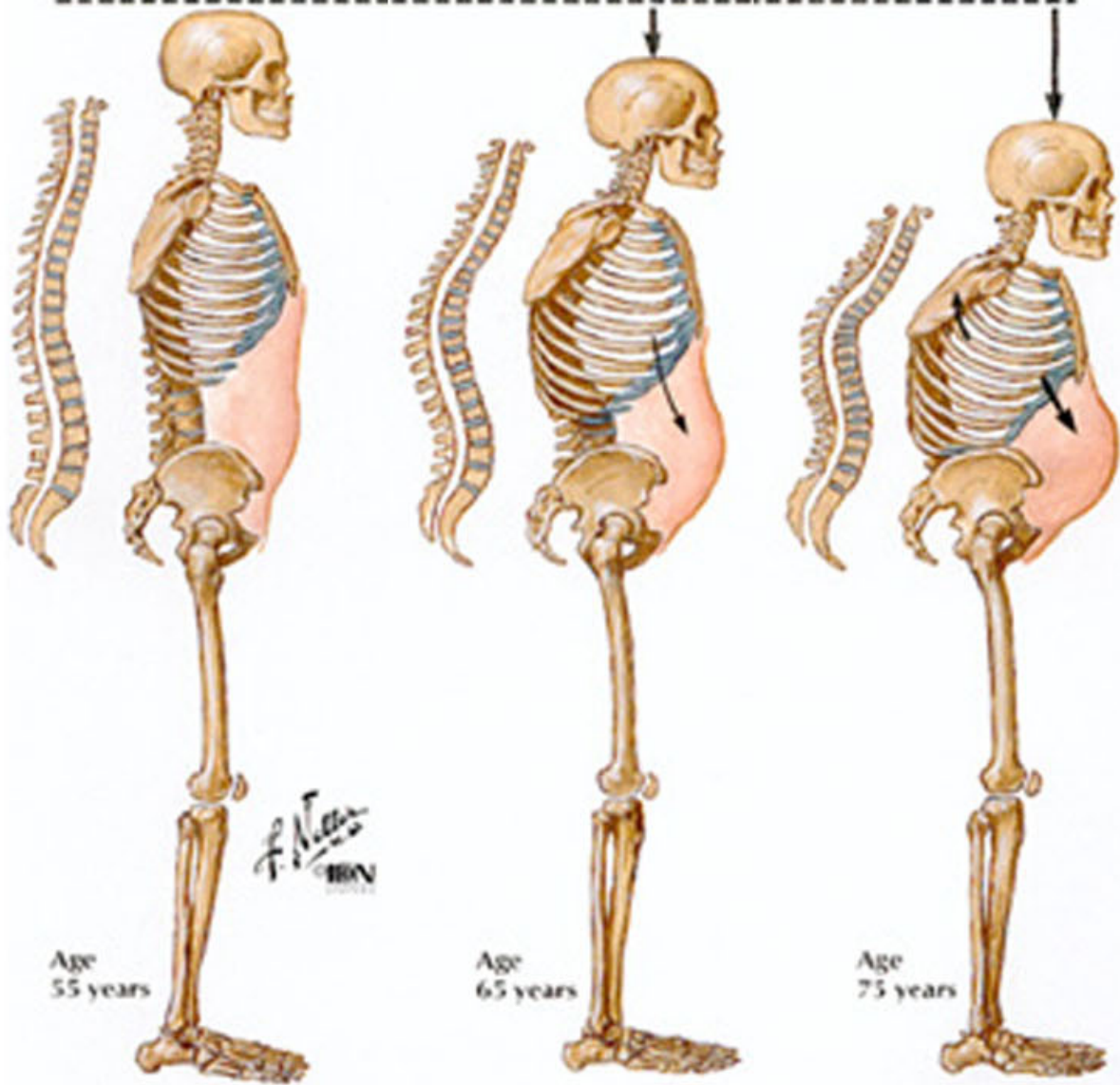
Other Causes of Kyphosis with Aging

- Compression Fractures

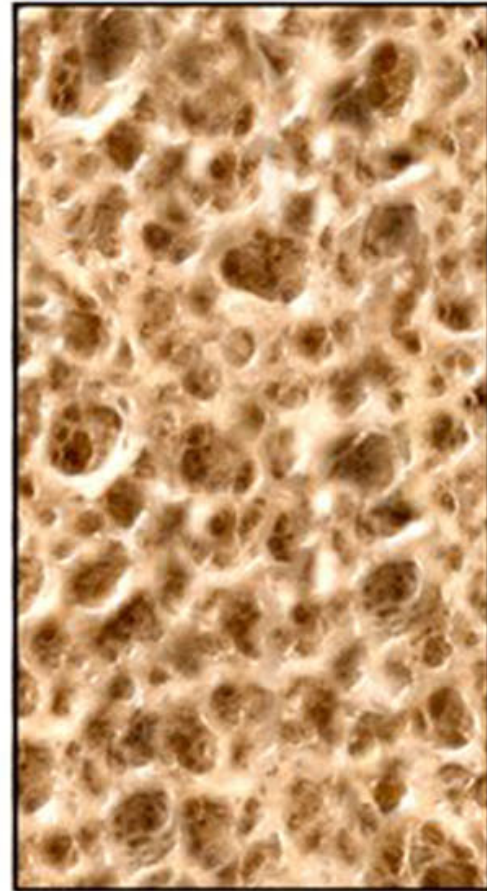


Osteoporosis

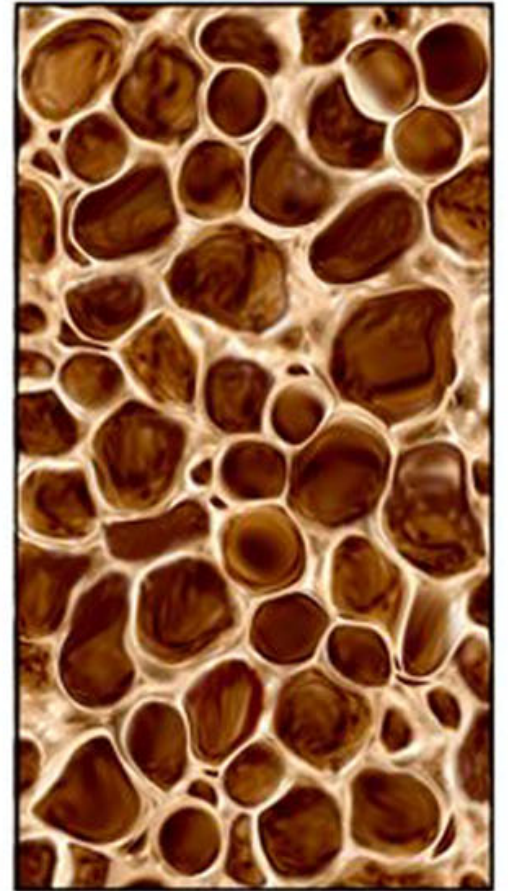




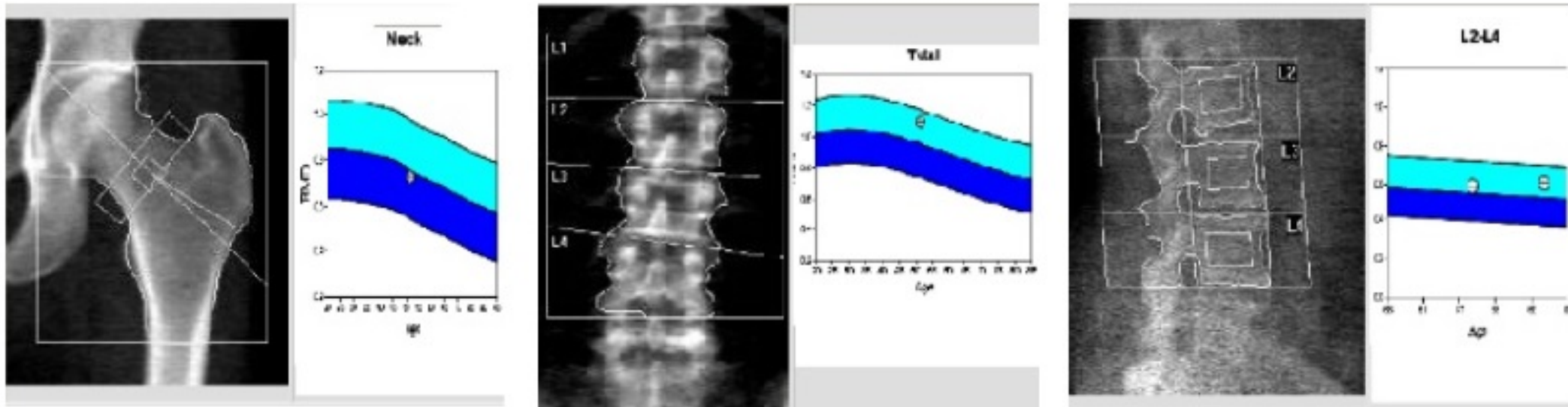
Normal bone matrix



Osteoporosis



DXA (DEXA) Scan



T-Score

Up to -1

-1 to -2.5
"Osteopenia"

Less than -2.5
"Osteoporosis"

Diet changes
(Calcium/VitD)

Drug
Treatment

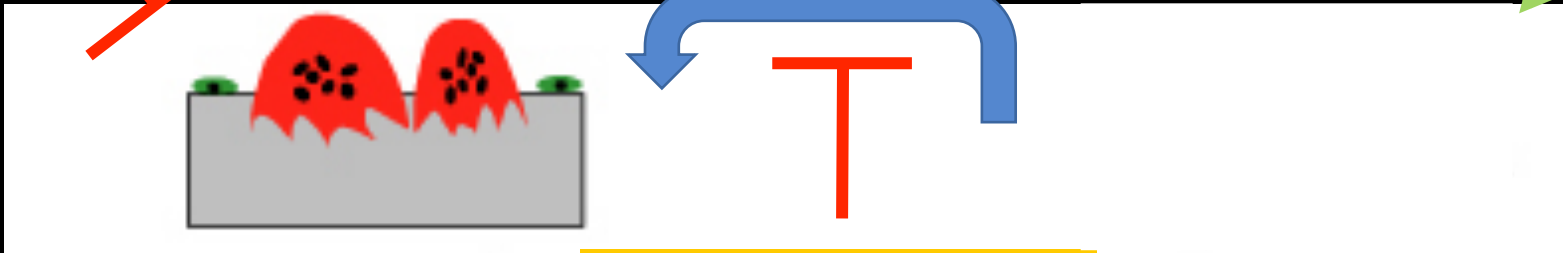
Anti-Resorption

Bisphosphonates



Stimulation

**Anabolic (Forteo)
Pro-estrogen**



**Denosumab
(RANK-ligand inhibitor)**

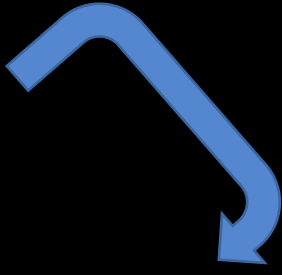
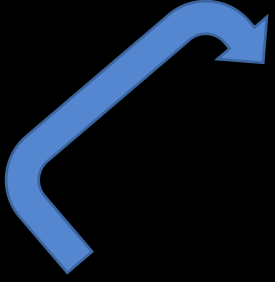
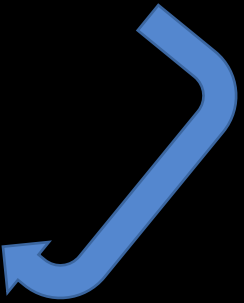
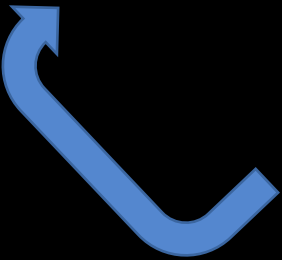


Table 1

Efficacy of various anti-osteoporotic drugs in fracture prevention and spine BMD gain

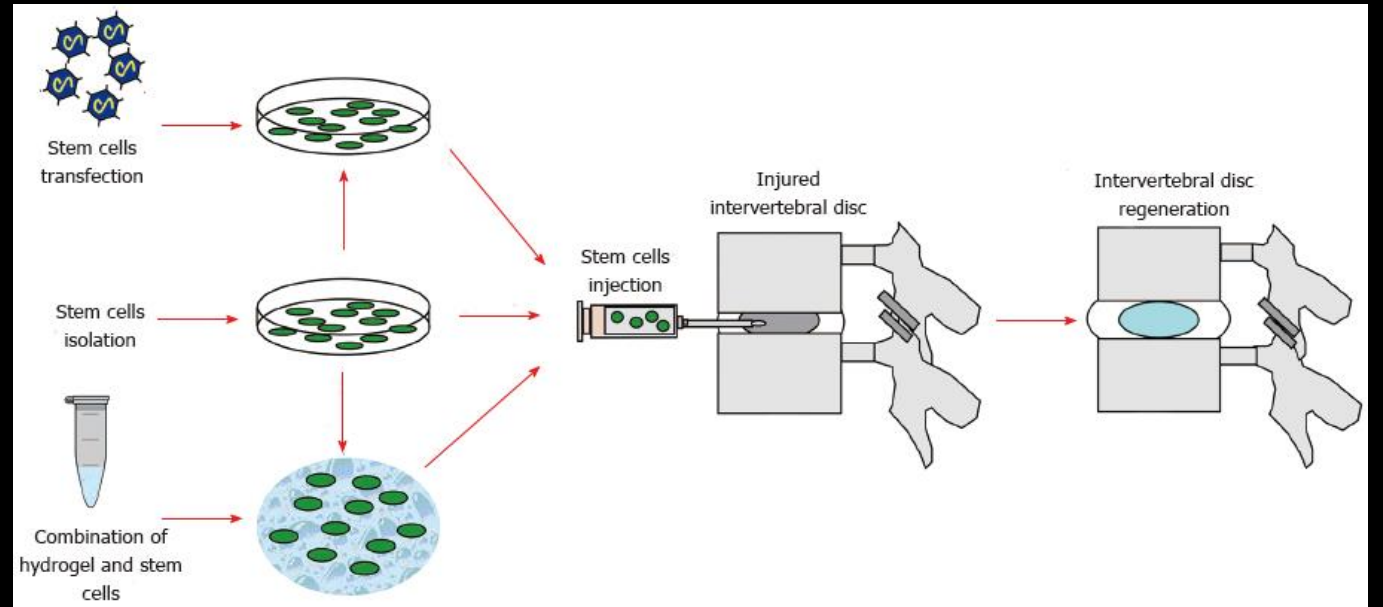
Drugs	Spine BMD gain (%) / fracture reduction (%)
Bisphosphonates	
Alendronate	5-7/ 30-45
Ibandronate	4-6/ 32-43
Risedronate	5-7/ 30-45
Zoledronate	6-9/ ~ 70
Denosumab	3-6/ 55-70
Raloxifene (SERM)	1.2-3/ 30-40
Estrogen	3-5/ 35
Calcitonin	1-1.5/ 20-30
Anabolic	
Teriparatide	10-15/ 50-65
Strontium Ranelate	2-4/ 20-35



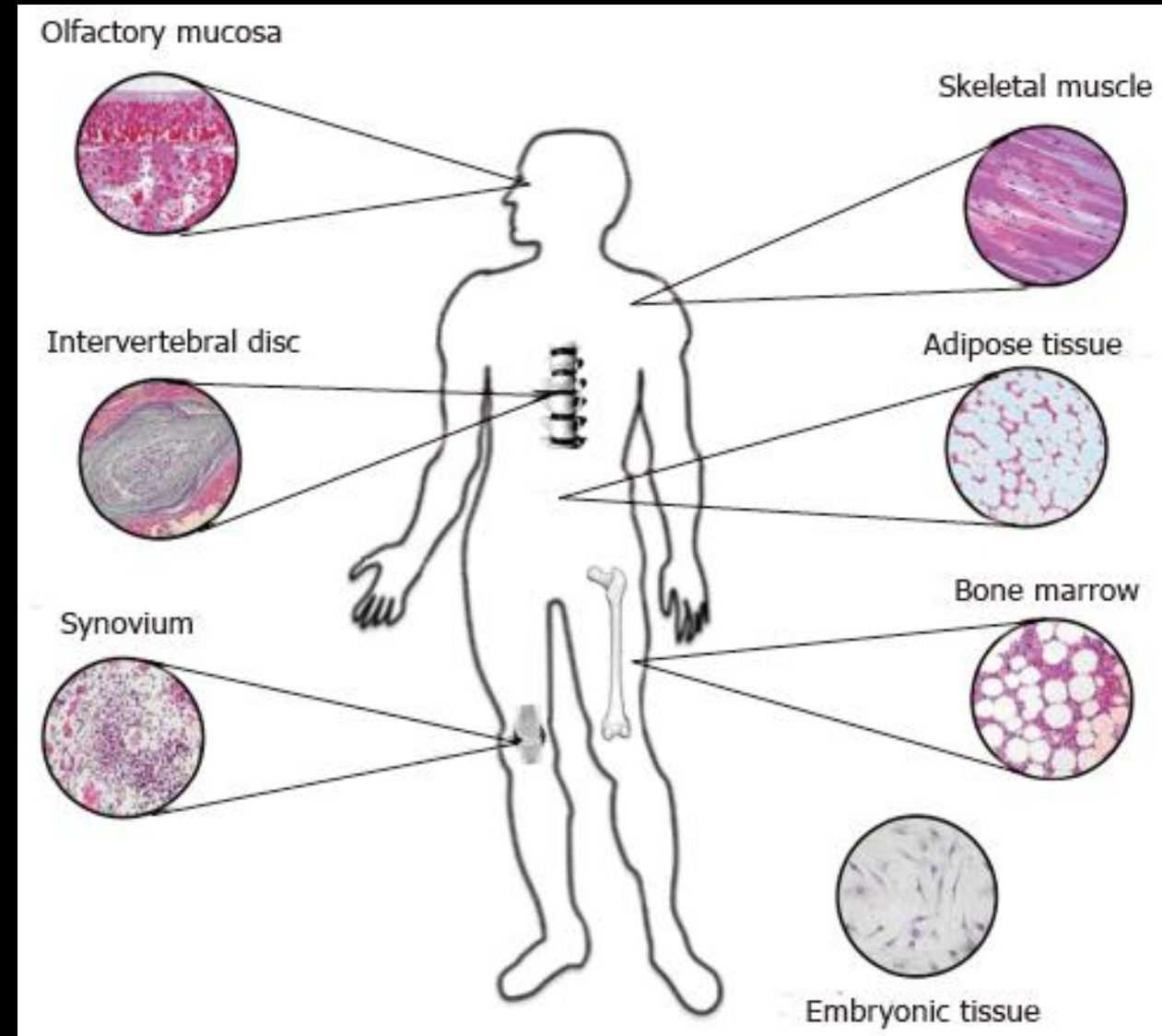
Prevention?

Prevention of Disc Degeneration?

- Healthy diet
- Minimize weight gain
- Good body mechanics
- Stem Cells?



Sources of Stem Cells



Efficacy?



Questions

