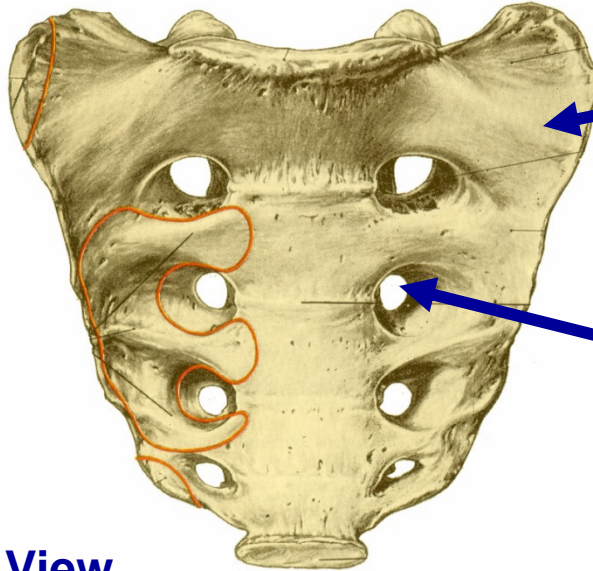


SACRUM = 5 FUSED VERTEBRAE

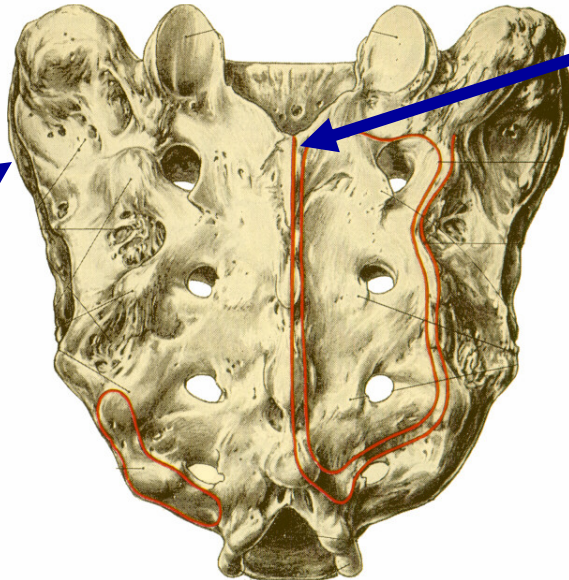
Ant. View



Lateral Mass = fused transverse processes

Anterior and Posterior Sacral foramina = Intervertebral Foramina for sacral spinal nerves

Post. View



Sacro-Iliac Joint

Medial Crest = fused spinous processes

Sacro-Iliac Joint- transmits weight from vertebrae to pelvis (Innominate Bone)

COCCYX = 3-5 FUSED VERTEBRAE



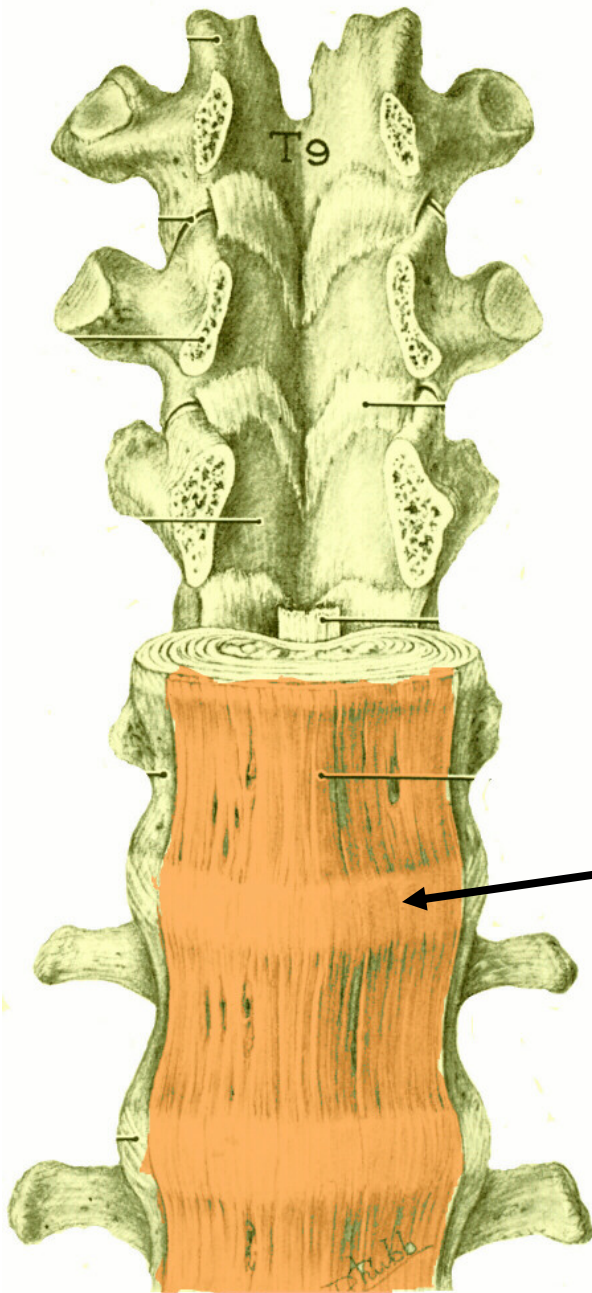
RUDIMENTARY TAIL BONES

C. LIGAMENTS

Adjacent vertebrae held tightly together (protect spinal cord)

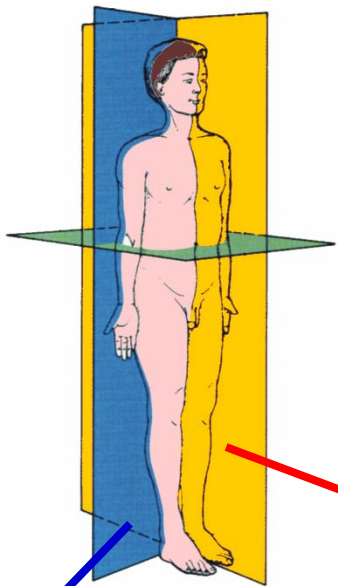
1. ANTERIOR LONGITUDINAL LIGAMENT -
Strong band joins bodies on anterior side

Anterior view



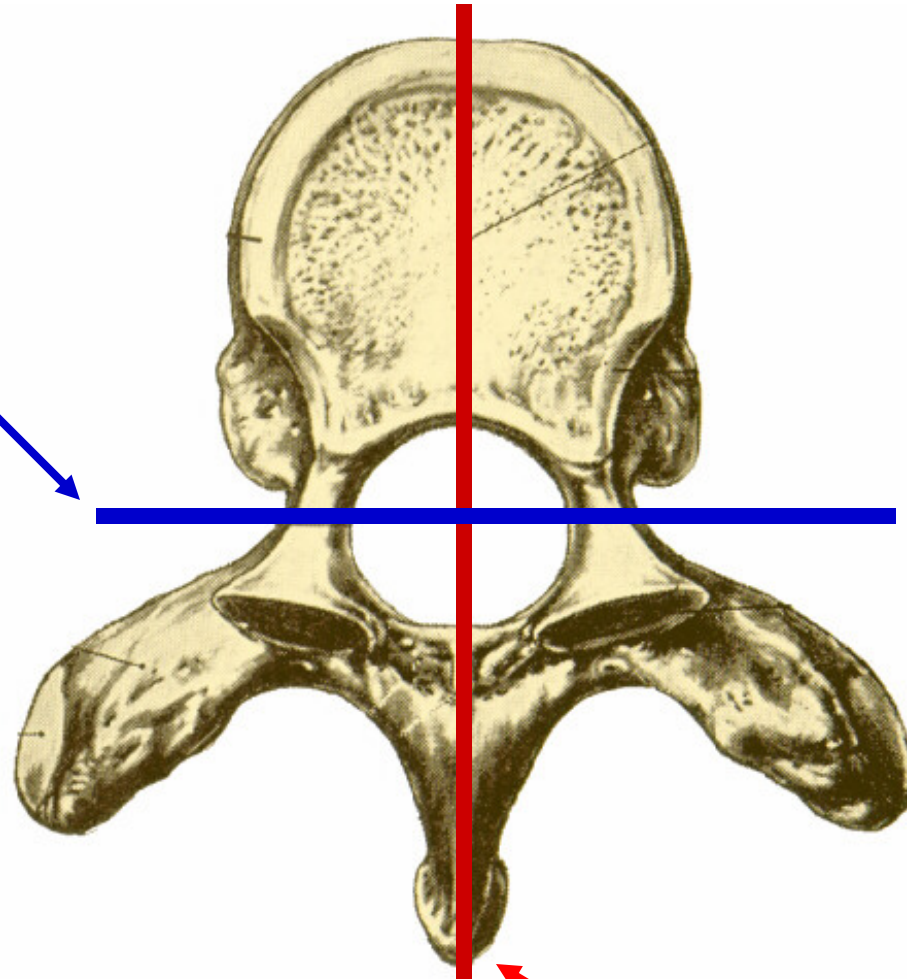
CORONAL SECTION -

through
Vertebral
Canal (view
ligaments as if
standing in
vertebral canal)



Coronal

Sagittal



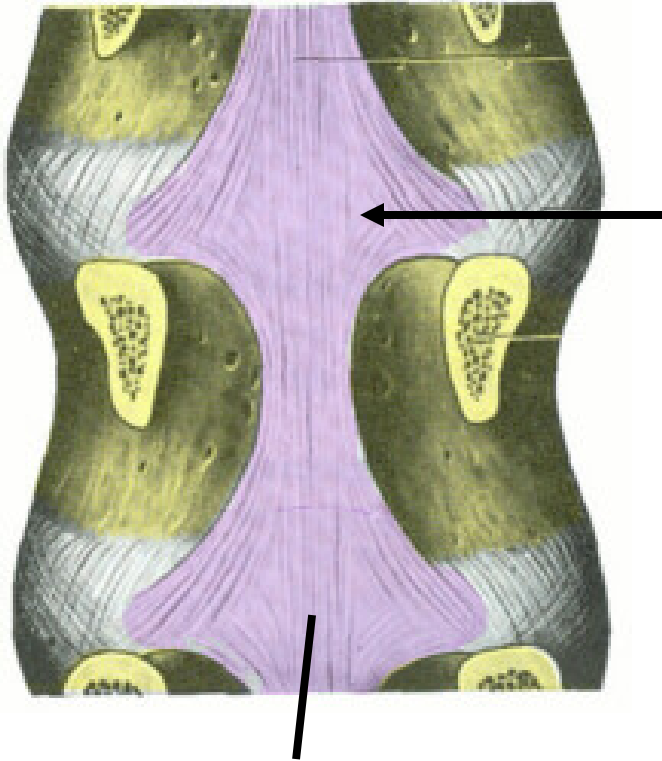
anterior

posterior

SAGITTAL SECTION
actually in median
sagittal plane

VIEW FROM INSIDE VERTEBRAL COLUMN

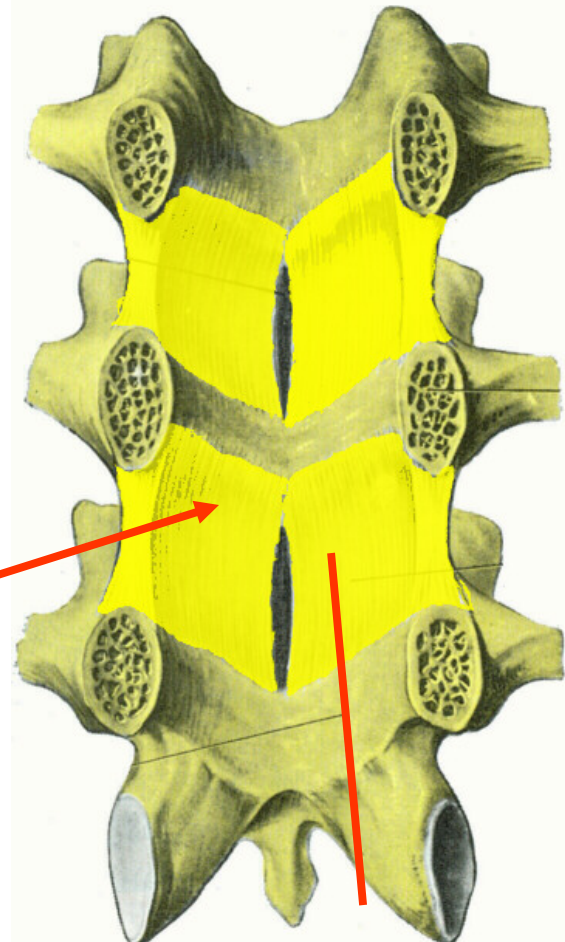
On post. Side of bodies



2. POSTERIOR LONGITUDINAL LIGAMENT- weaker, narrower band (inside vertebral canal)

LOOK ANTERIOR

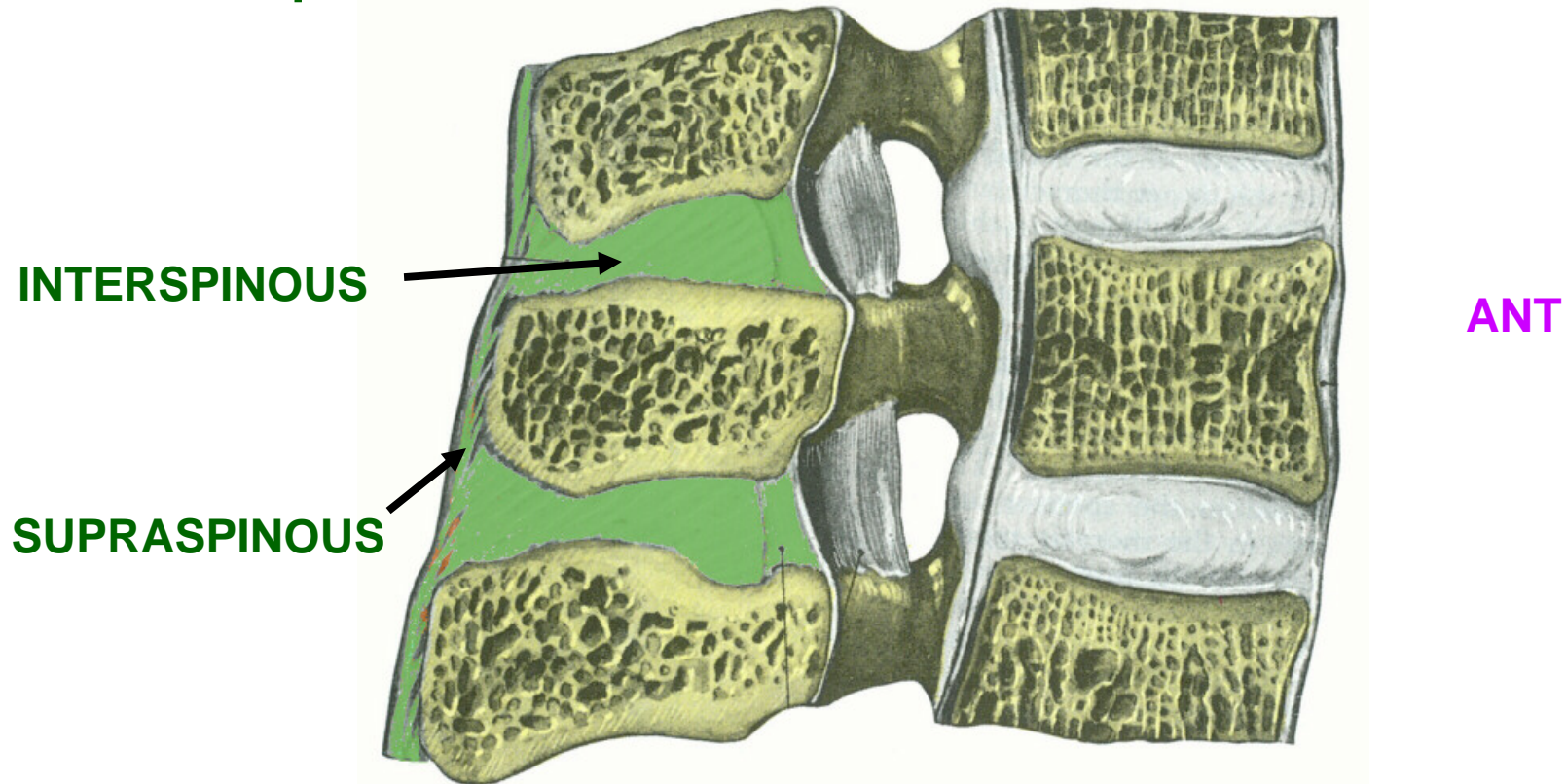
LOOK POSTERIOR



3. LIGAMENTA FLAVA - yellow elastic bands connecting laminae

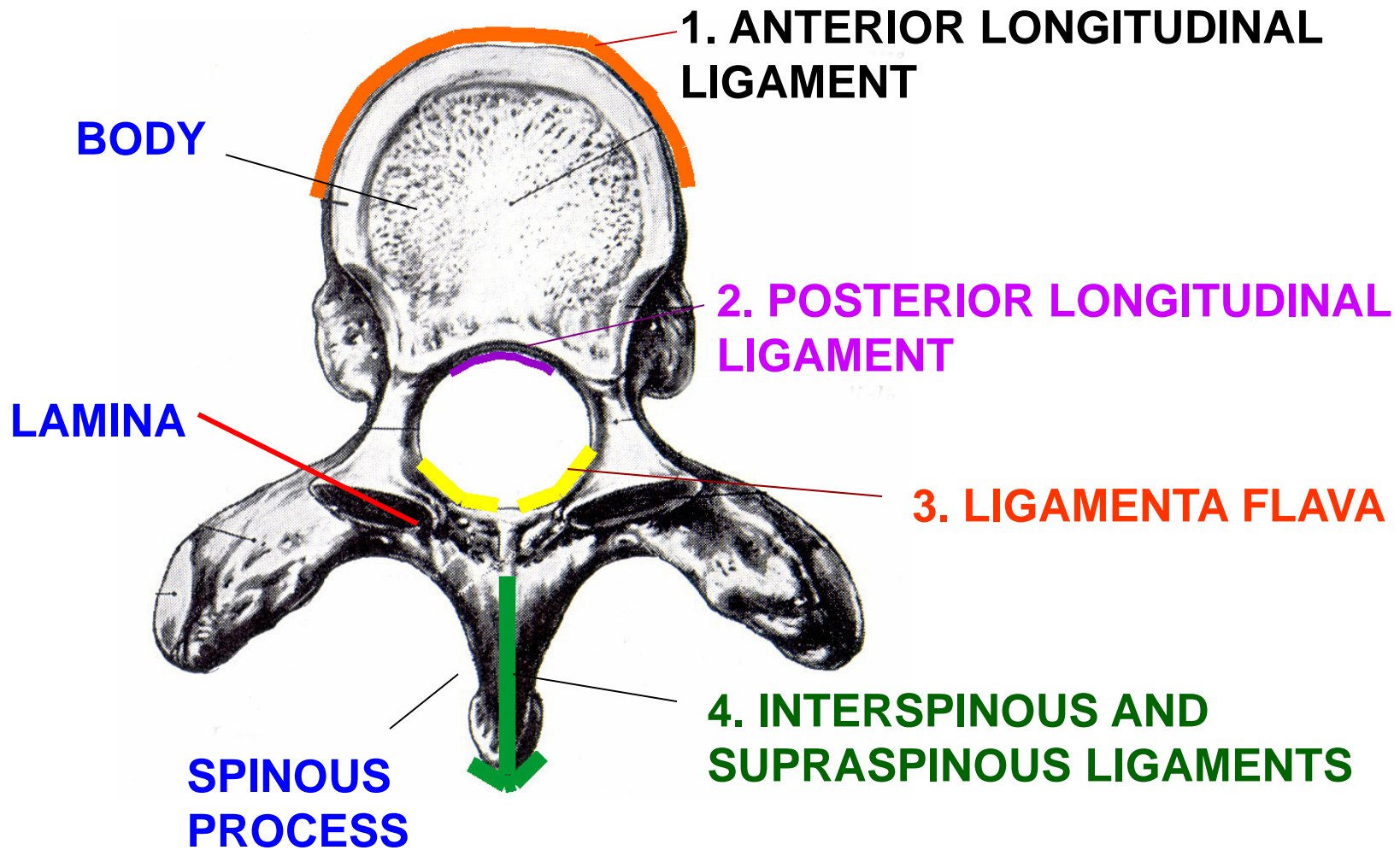
SAGITTAL SECTION

4. INTERSPINOUS AND SUPRASPINOUS LIGAMENTS - connect spines

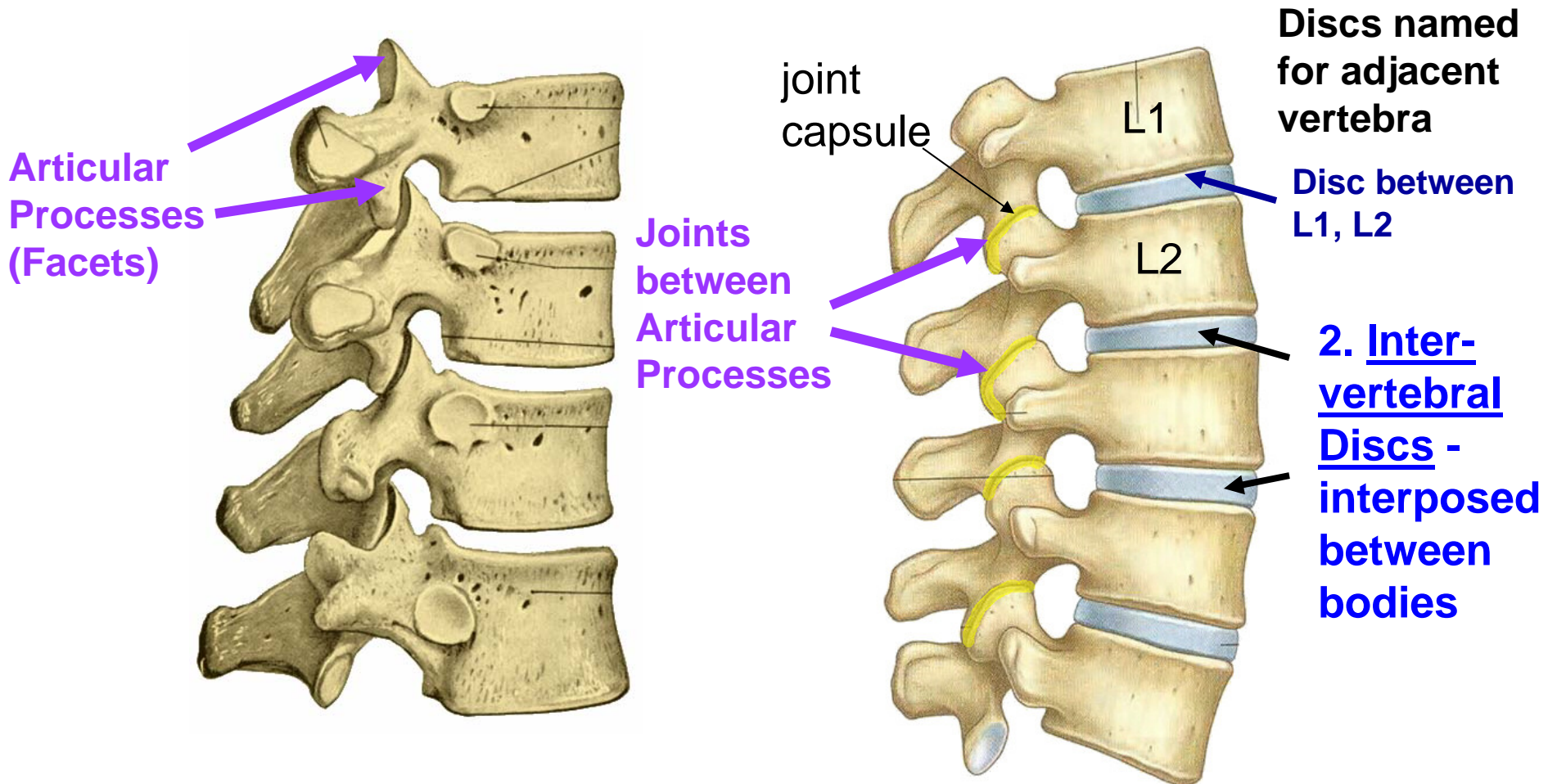


Greatly thickened in cervical region to form **LIGAMENTUM NUCHAE** - from Ext. Occip. Protuberance of skull to C7;
Support Head, Provide muscle attachments

SUMMARY: LOCATION OF LIGAMENTS



D. JOINTS BETWEEN VERTEBRAE



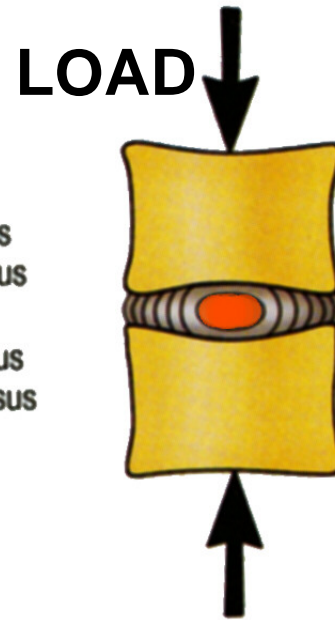
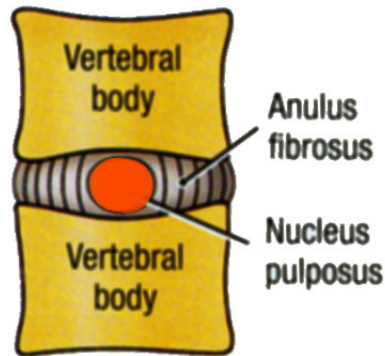
1. Joints between Articular Processes (facets) - Synovial Plane joints that permit Sliding Movements; immobilized in Facet Fusion Surgery

Note: Synovial joints have a connective tissue capsule and synovial fluid inside the capsule; synovial fluid minimizes friction and lubricates the joint

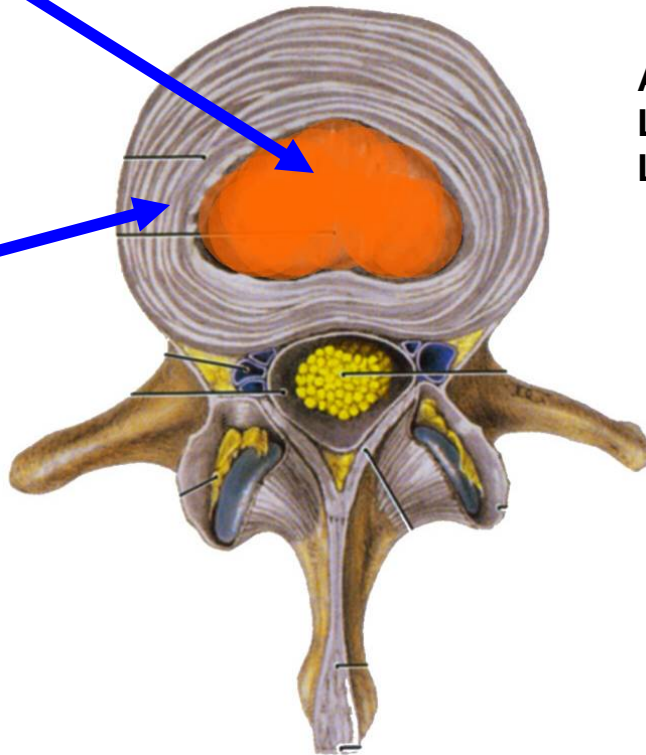
STRUCTURE/ FUNCTION OF INTERVERTEBRAL DISC

a) Nucleus pulposus-
inner
gelatinous
core

b) Anulus fibrosus -
collagen fibers
and
fibrocartilage

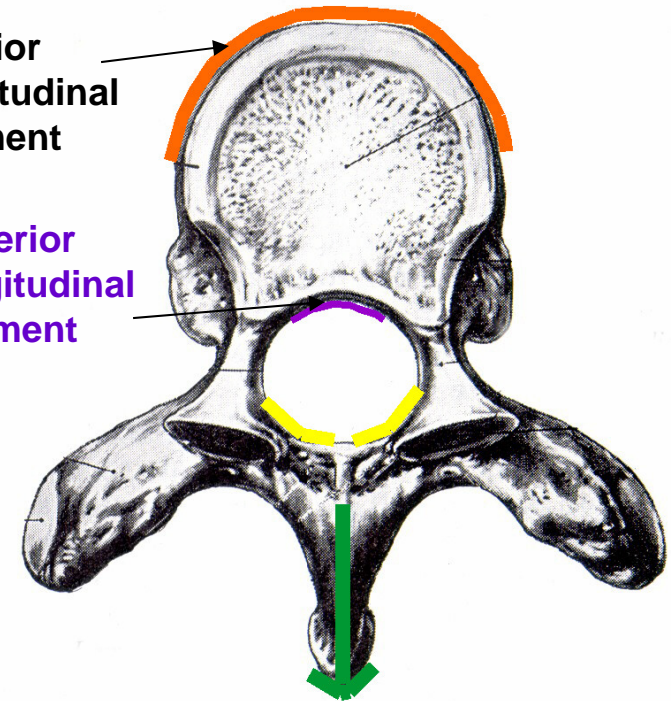


Shock
absorbers; in
young quite
strong;
trauma to
vertebra
produces
fractures

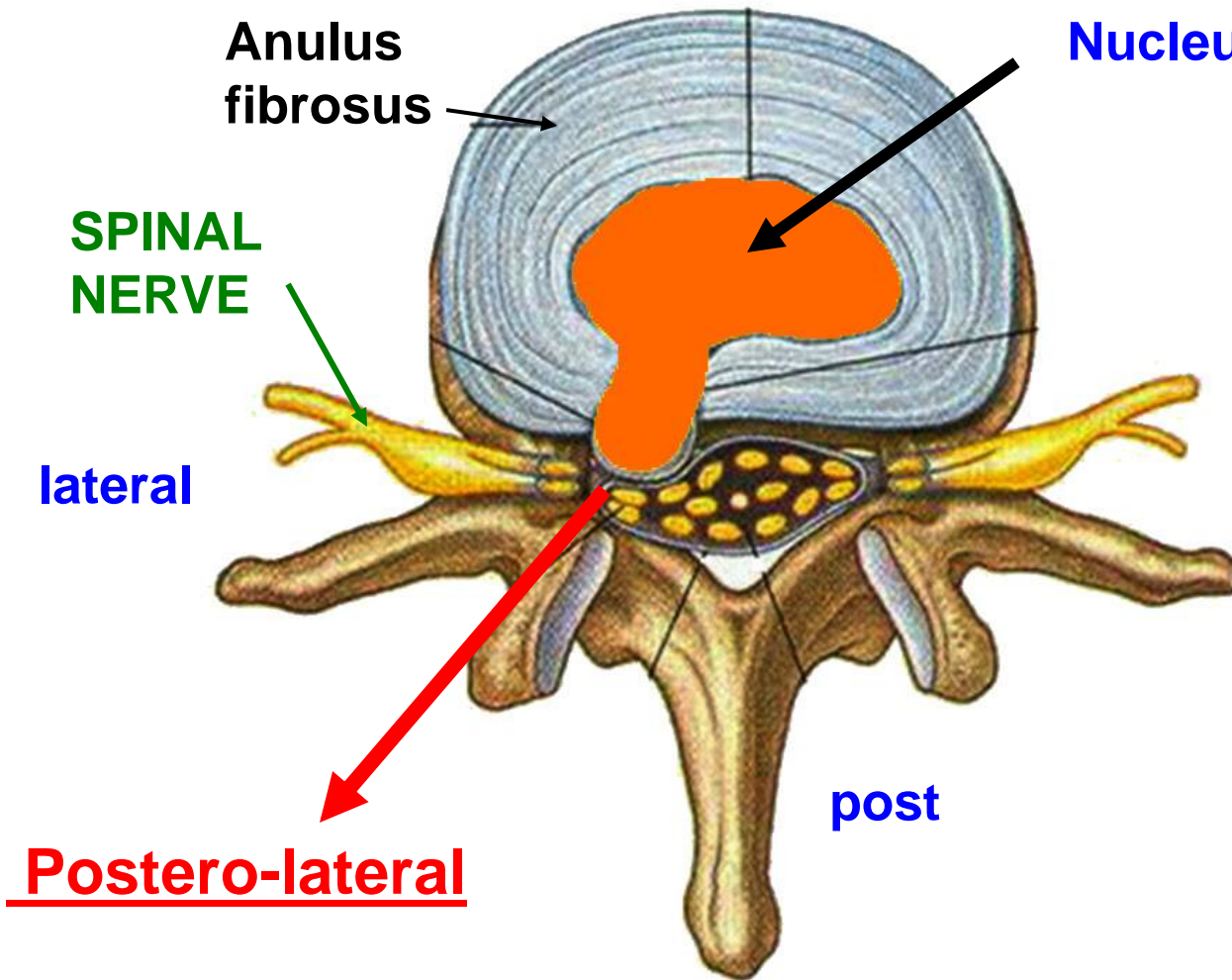


Anterior
Longitudinal
Ligament

Posterior
Longitudinal
Ligament



DAMAGE TO INTERVERTEBRAL DISC



In older people.

1) degenerative changes in anulus fibrosus (start in teens)

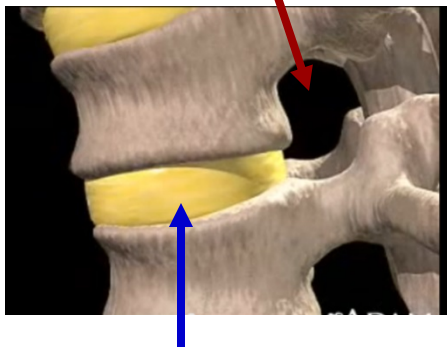
2) strain back can cause herniation of nucleus pulposus = 'Slipped Disc'

Clinical Note: Herniation is typically in a Postero-Lateral Direction, lateral to Posterior Longitudinal Ligament; often L4-L5 or L5-S1; can lead to nerve compression at the intervertebral foramen **

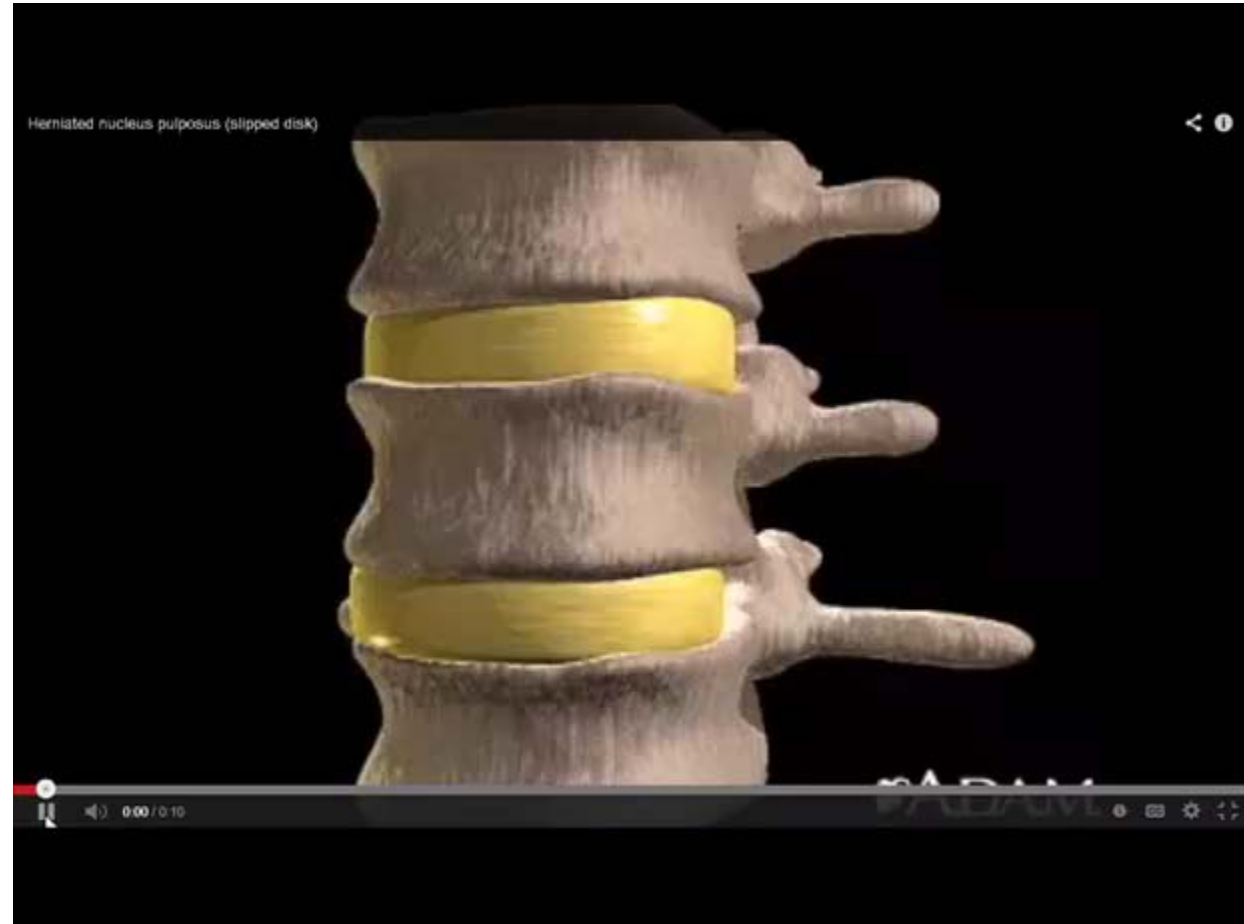
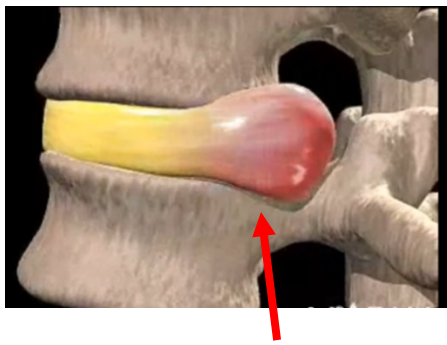
HERNIATION OF NUCLEUS PULPOSUS OF INTERVERTEBRAL DISC

LATERAL VIEW

INTERVERTEBRAL FORAMEN



INTERVERTEBRAL DISC



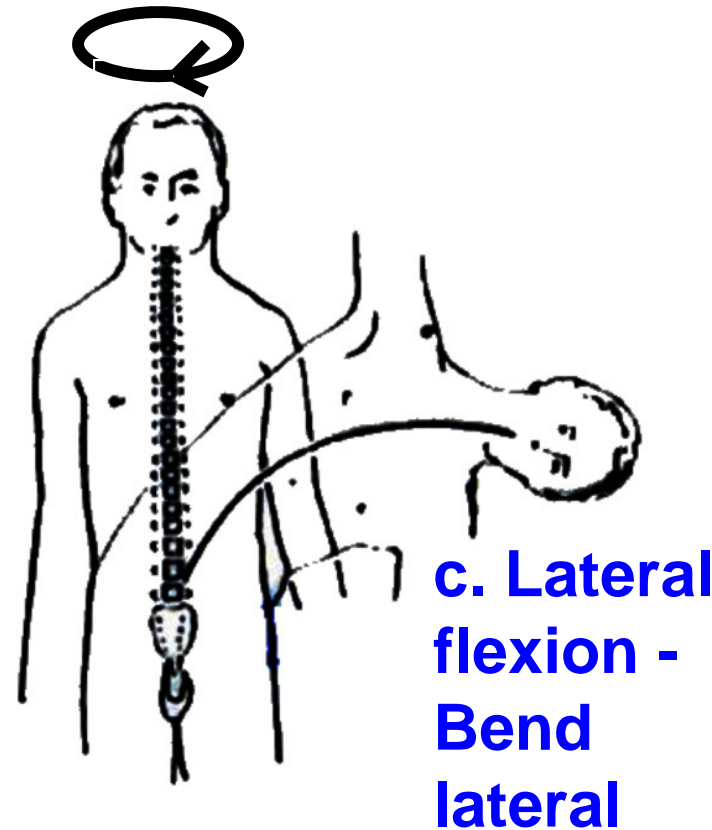
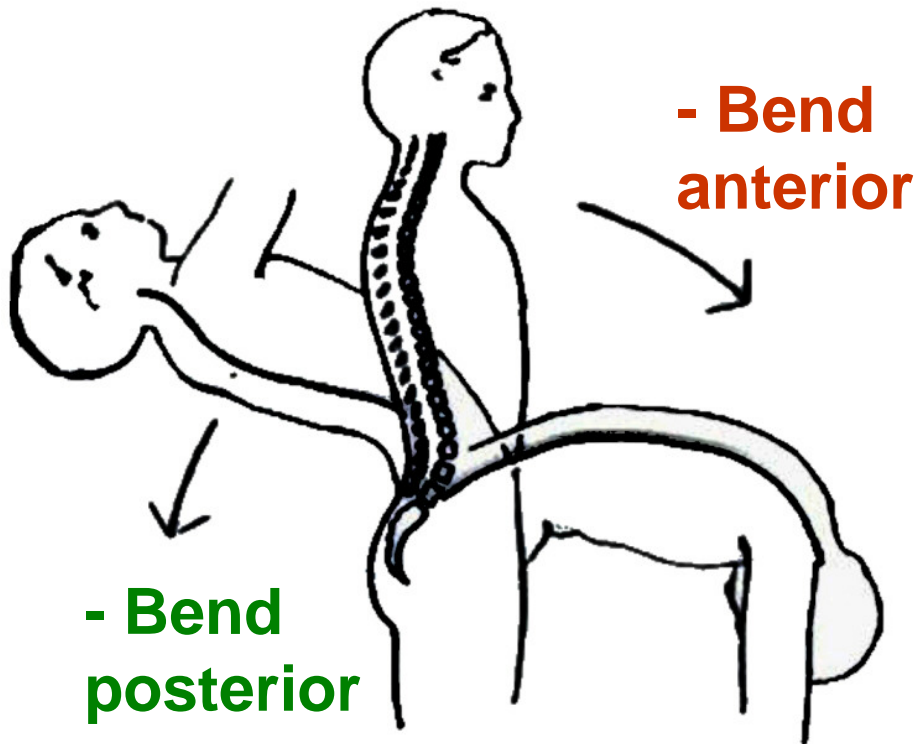
Note: Herniation = displacement of a structure from its normal position.

E. MOVEMENTS OF VERTEBRAL COLUMN

a. Extension

b. Flexion

d. Rotation = rotation about long axis of spinal column



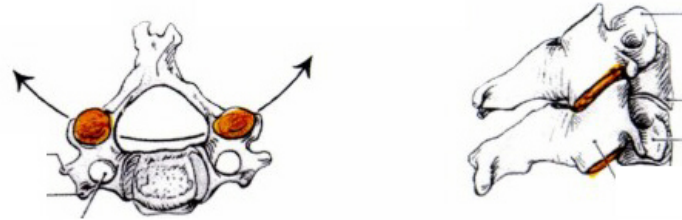
MOVEMENTS OF VERTEBRAE IN DIFFERENT REGIONS-

Determined by orientations of articular facets

a. CERVICAL (C3-C7)-

permit considerable flexion-extension, lateral flexion, rotation - useful - move head

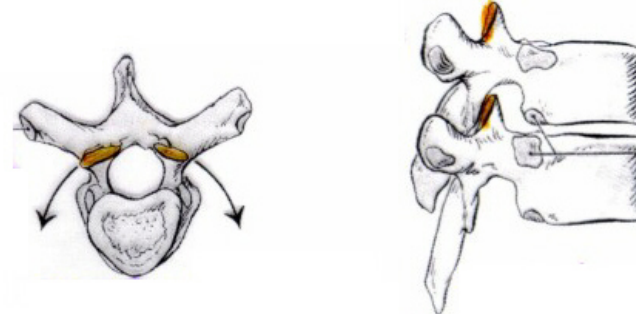
Cervical (C3-C7) - facets angled superiorly and medially



b. THORACIC

permit some rotation - little or no flex-extend (also limited by ribs); useful - no flex down on heart, lungs

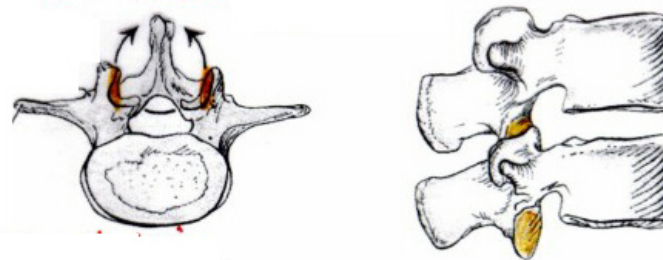
Thoracic - facets in coronal plane



c. LUMBAR

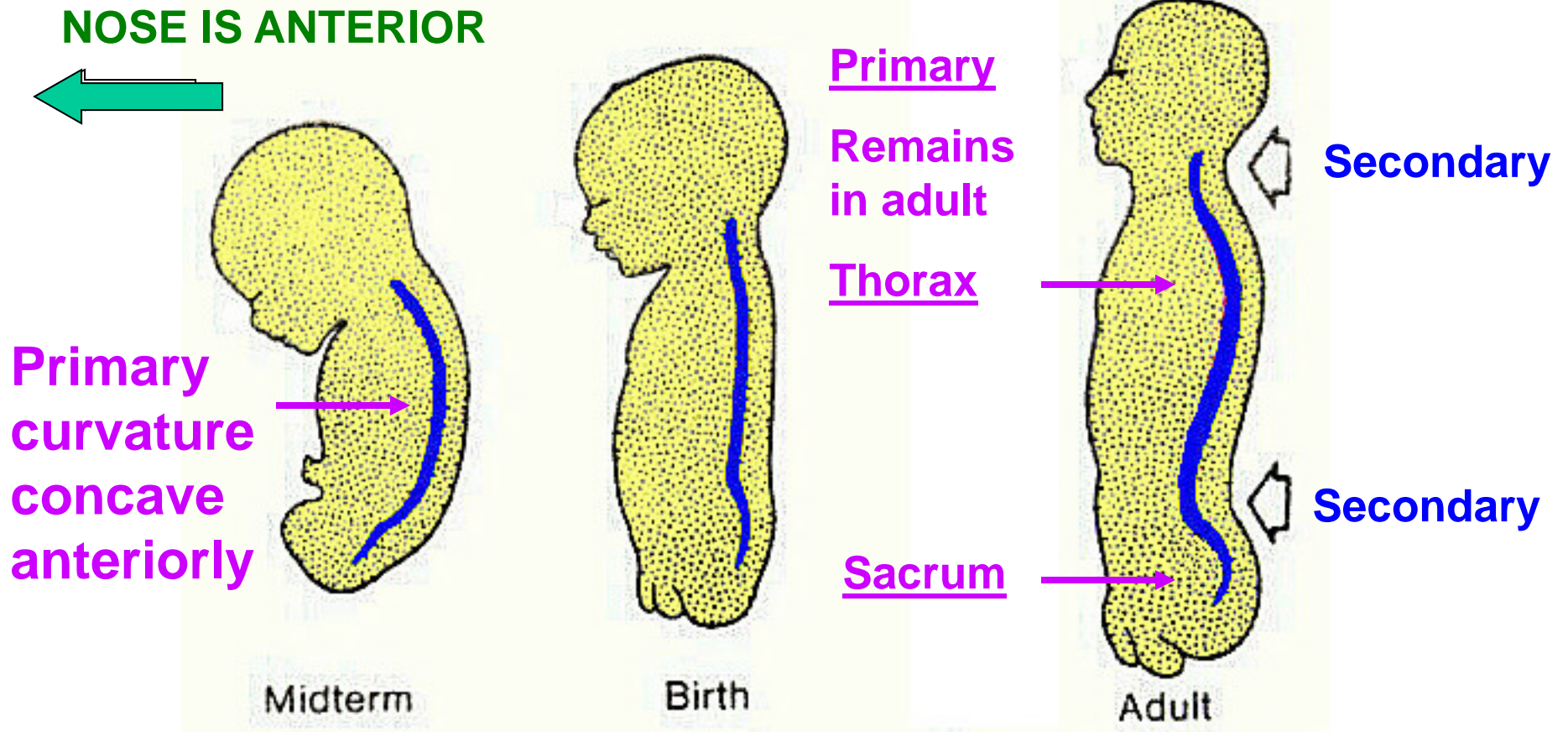
permit flex-extend, little or no rotation; useful - tie shoes; help increase abdominal pressure; dangerous - increase load, pressure on vertebral discs

Lumbar- facets in sagittal plane



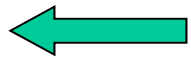
F. SPINAL CURVATURES - some normal, some abnormal

1. Normal Primary curvature - fetal position - curved concave anteriorly



2. Normal Secondary Curvatures- Develop in early childhood

NOSE IS ANTERIOR

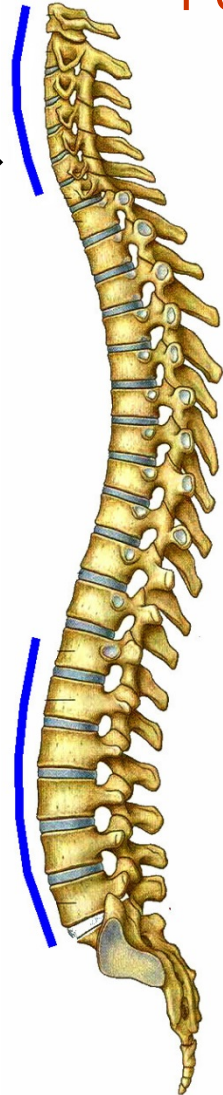


Ant

Post

Cervical
curvature

Lumbar
curvature



a. Cervical curvature - **concave posteriorly** - help support head

b. Lumbar curvature
- **concave posteriorly**
- develops with walking
- helps support trunk, upper body

c. Lateral curvature -
concave to side opposite handedness - helps to carry bags of money

Right handed



3. ABNORMAL CURVATURES

NORMAL

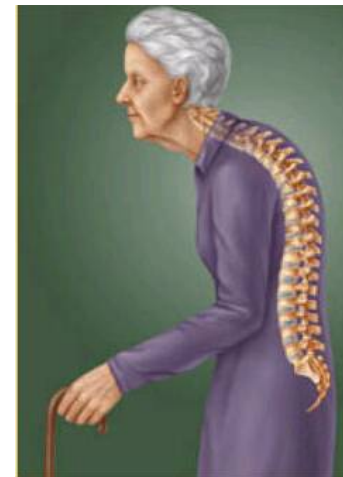


KYPHOSIS



a. **KYPHOSIS** - 'hump' back, exaggerated curvature concave anteriorly

Concave anteriorly

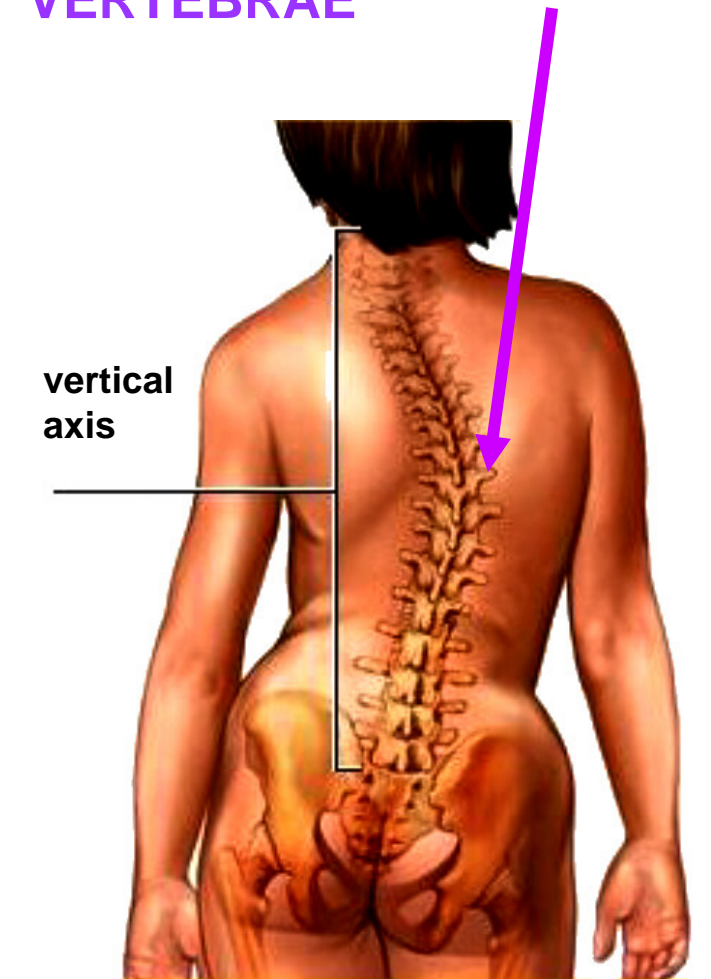


Usually in thorax of elderly

b. SCOLIOSIS - abnormal lateral curvature ('kink' in spine)

PROSECTION IN GROSS LAB: SCOLIOSIS OF LUMBAR VERTEBRAE

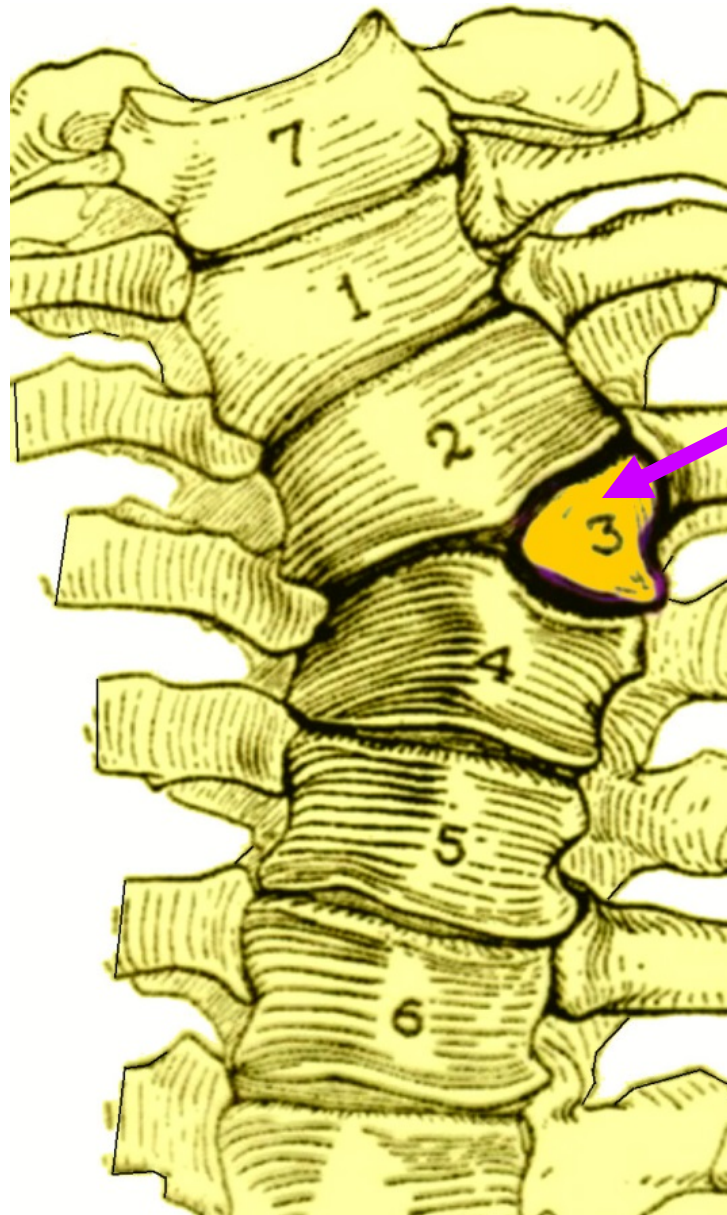
SCOLIOSIS OF THORACIC VERTEBRAE



Skeleton
reconstructed
from CT of
cadaver

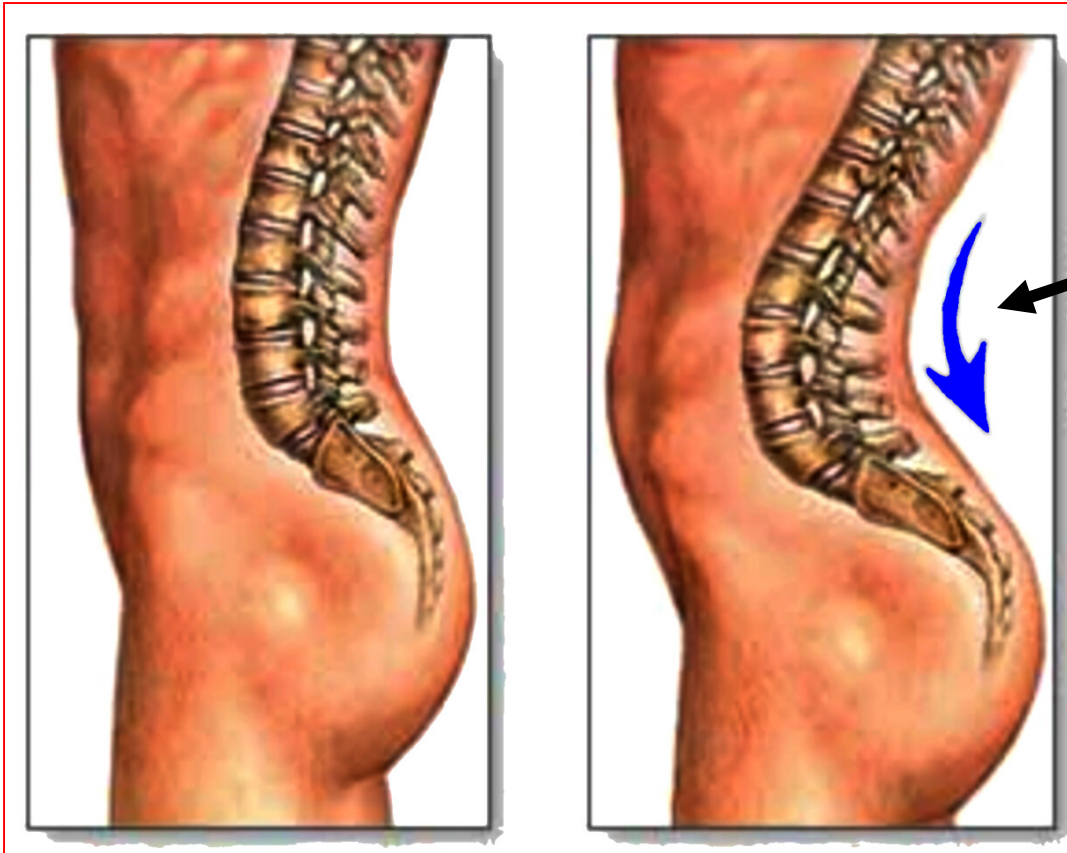


SCOLIOSIS- can be due to 'presence of hemivertebra' - one half of a vertebra fails to develop



**HEMI-
VERTEBRA**

ABNORMAL CURVATURE - LORDOSIS

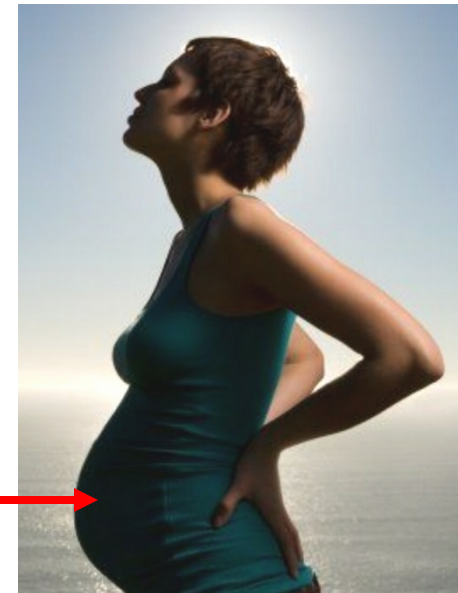


**c. LORDOSIS =
exaggerated
lumbar curvature**

**Concave
posteriorly**



NORMAL IN PREGNANCY



**ABNORMAL
CAUSE -
OBESITY**

**center of mass shifts
anteriorly**



3 SUMMARY CHARTS - CURVATURES, VERTEBRAE, LIGAMENTS

SUMMARY OF SPINAL CURVATURES

	Curvature	Location (Most common)	Cause/Function
Normal			
Primary	Concave Anterior	All of vertebral column; retained in Thoracic, Sacral Regions	
Secondary	Concave Posterior	Cervical, Lumbar Regions	Cervical (hold up head), Lumbar (support body)
Lateral	Concave away from side of handedness	Cervical, Lumbar mainly	Aid in lifting heavy objects (shift center of gravity)
Abnormal			
Kyphosis	Exaggerated Concave Anterior	Often in Thoracic Region	Osteoporosis, etc.
Scoliosis	Exaggerated Lateral	Thoracic, Lumbar most common	Hemivertebra (half of vertebral body does not form)
Lordosis	Exaggerate Concave Posterior	Lumbar (normal in pregnancy)	Obesity



SUMMARY OF FEATURES OF VERTEBRAE

Vertebra	#	Features	Articular Process Oriented	Movements
Cervical	7	Bodies small, Foramina transversaria (small in C7) C1 = Atlas - no body C2 = Axis - dens C7 = Vertebra prominens	Slanted (Superiorly and Medially)	Flex-Extend, Lateral Flex, Rotate
Thoracic	12	Facets for ribs on bodies (heads of ribs), transverse processes (articular tubercles of ribs)	Coronal plane	No Flex-Extend, Small Rotate
Lumbar	5	Large bodies	Sagittal plane	Flex-Extend, No Rotate
Sacral	5	Fused		Normally no movement
Coccygeal	3-5	Fused, rudimentary		No movement