

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Thoracolumbar Spine

Dr. Vohra

OBJECTIVES

At the end of the lecture, students should be able to:

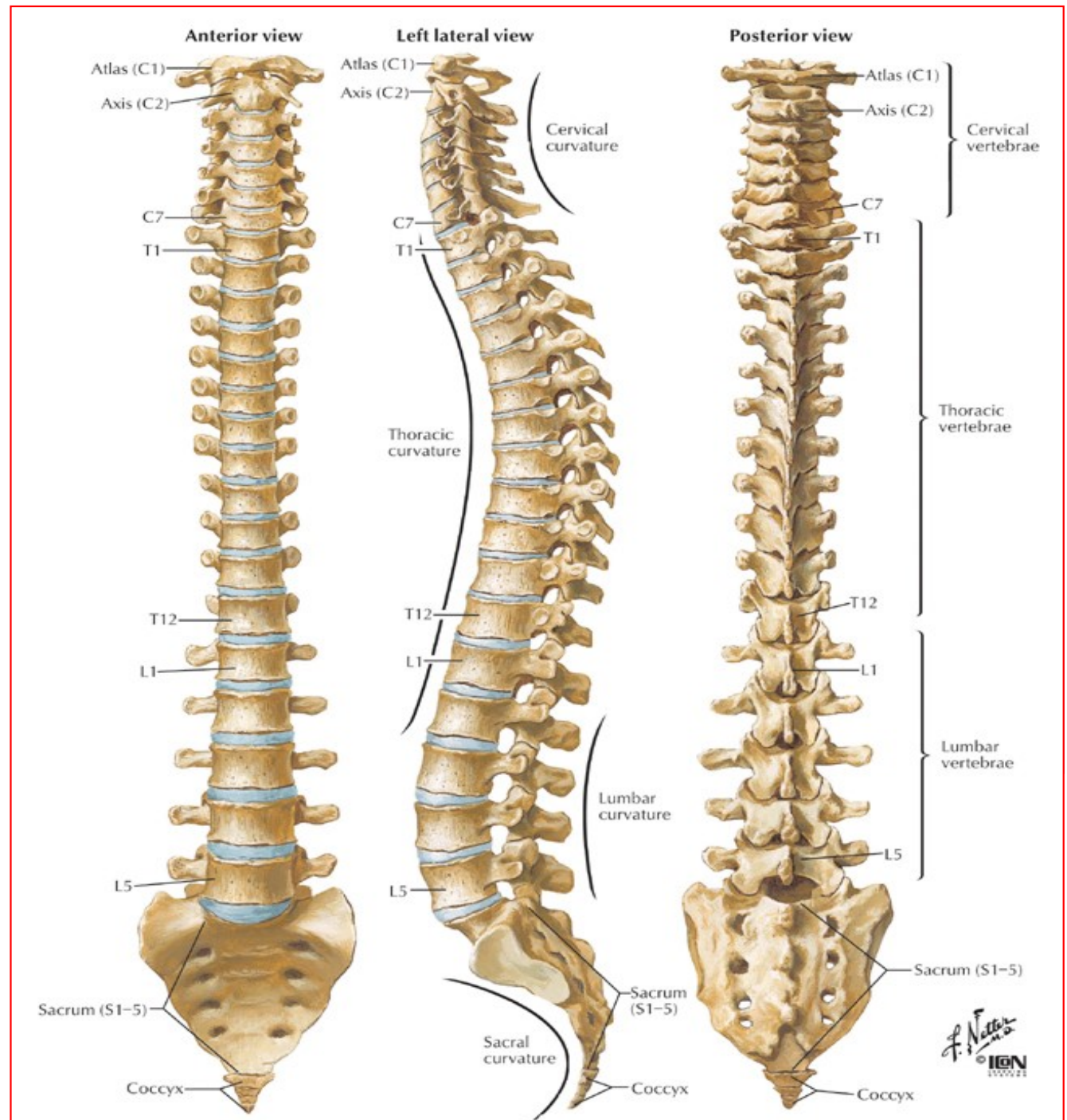
- *Distinguish the thoracic and lumbar vertebrae from each other and from vertebrae of the cervical region*
- *Describe the characteristic features of a thoracic and a lumbar vertebra.*
- *Compare the movements occurring in thoracic and lumbar regions.*
- *Describe the joints between the vertebral bodies and the vertebral arches.*
- *List and identify the ligaments of the intervertebral joints.*

➤ **Note the curvatures in thoracic and lumbar spine.**

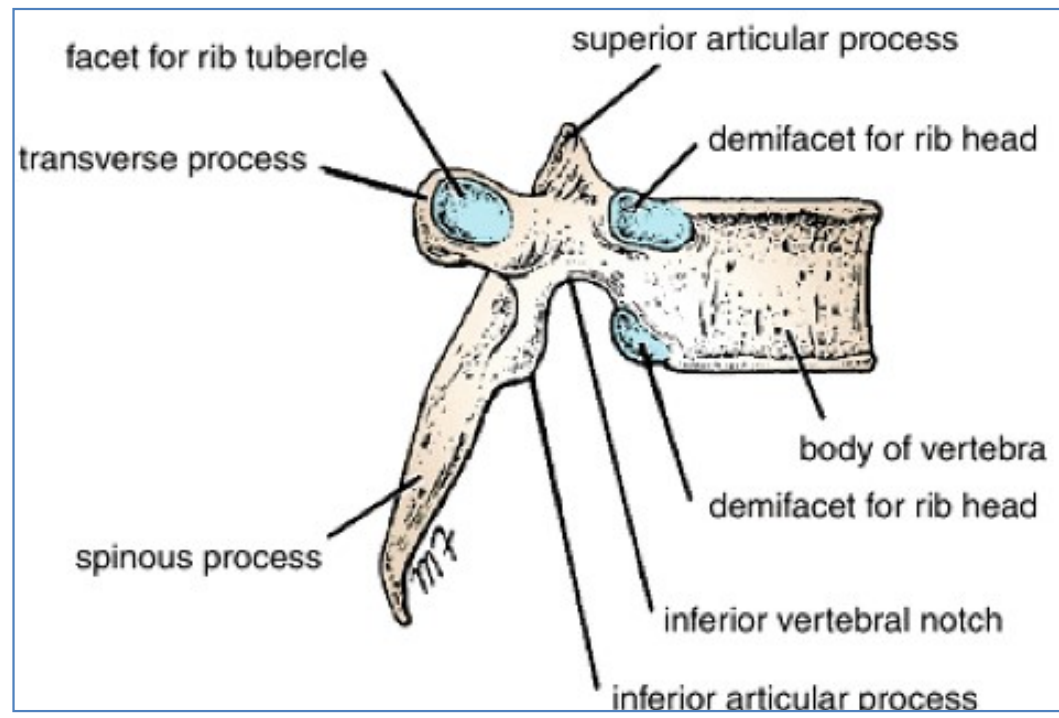
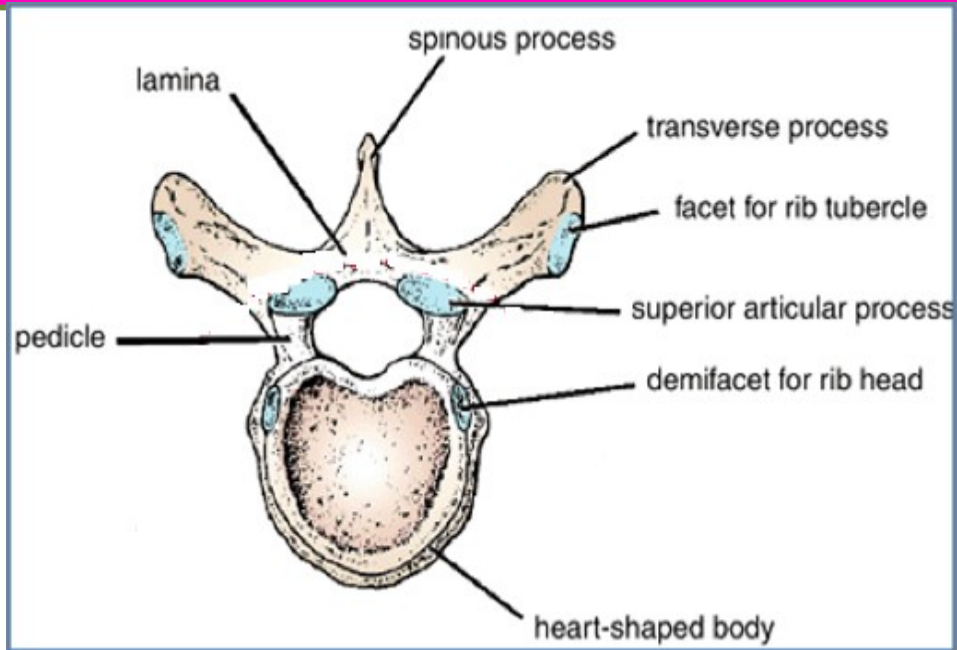
➤ **Curves of vertebral column can be divided into :**

➤ **Primary curves: Thoracic & sacral.**

➤ **Secondary curves: Cervical & lumbar.**



THORACIC VERTEBRAE

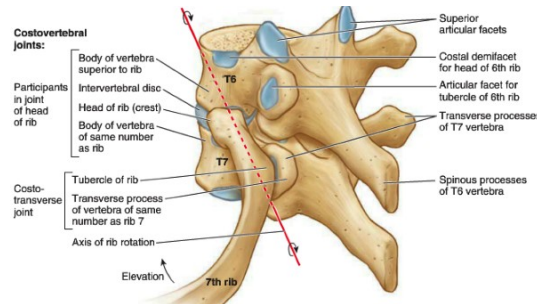


Most **thoracic vertebrae** are typical, have **bodies**, vertebral **arches**, and **seven processes** for muscular and articular connections.

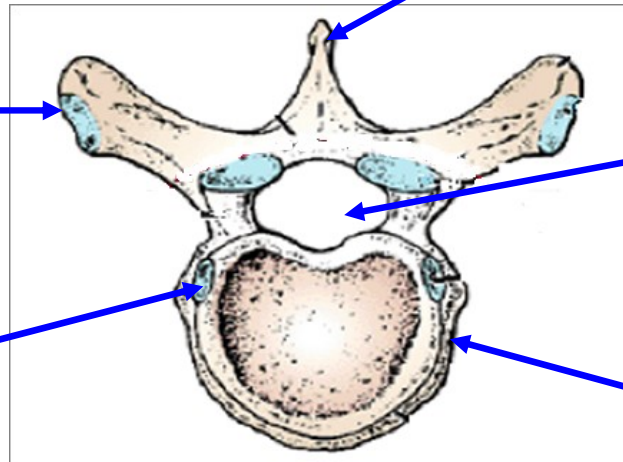
CHARACTERISTICS OF TYPICAL THORACIC VERTEBRA

Costal facets are present **on the transverse processes** for articulation with the **tubercles** of the ribs (T11 and 12 have no facets on the transverse processes).

Costal facets are present **on the sides of the bodies** for articulation with the **heads** of the ribs.



The **spines** are long and inclined downward.



The **vertebral foramen** is small and circular

The **body** is medium size and heart shaped.

The **superior articular processes** bear facets that face **backward** and **laterally**, whereas the facets on the **inferior articular processes** face **forward** and **medially**. The **inferior articular processes** of the **12th vertebra** face **laterally**, as do those of the lumbar vertebrae.

CHARACTERISTICS OF TYPICAL LUMBAR VERTEBRA

The **spinous processes** are short, flat, & quadrangular and project backward.

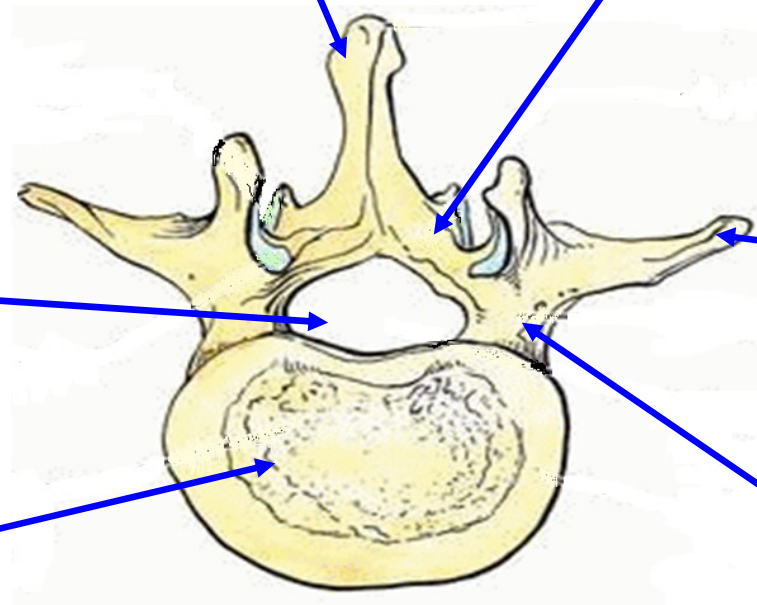
The **laminae** are thick.

The **vertebral foramina** are triangular.

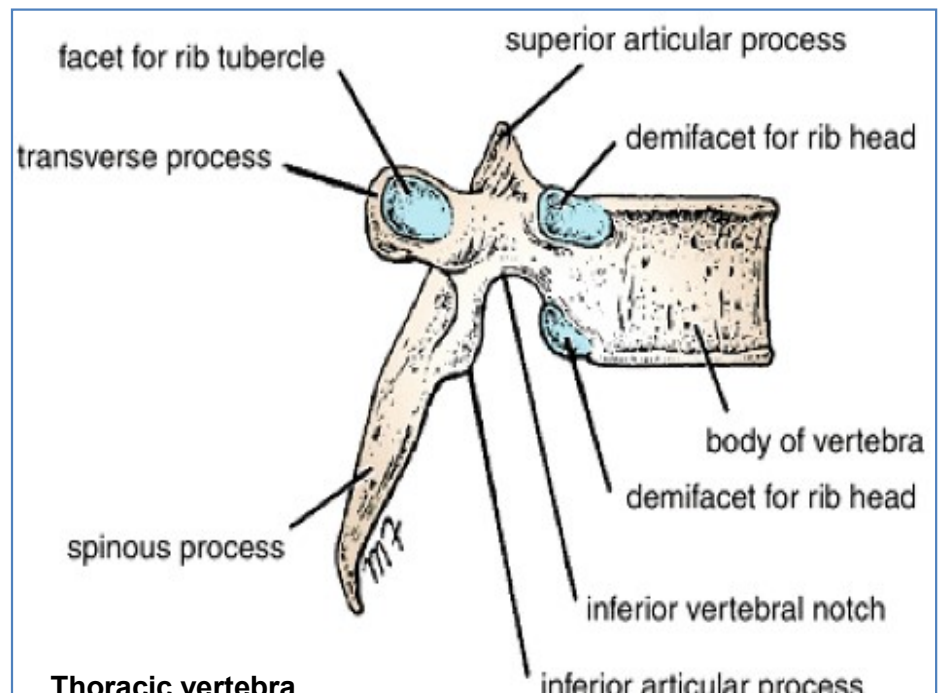
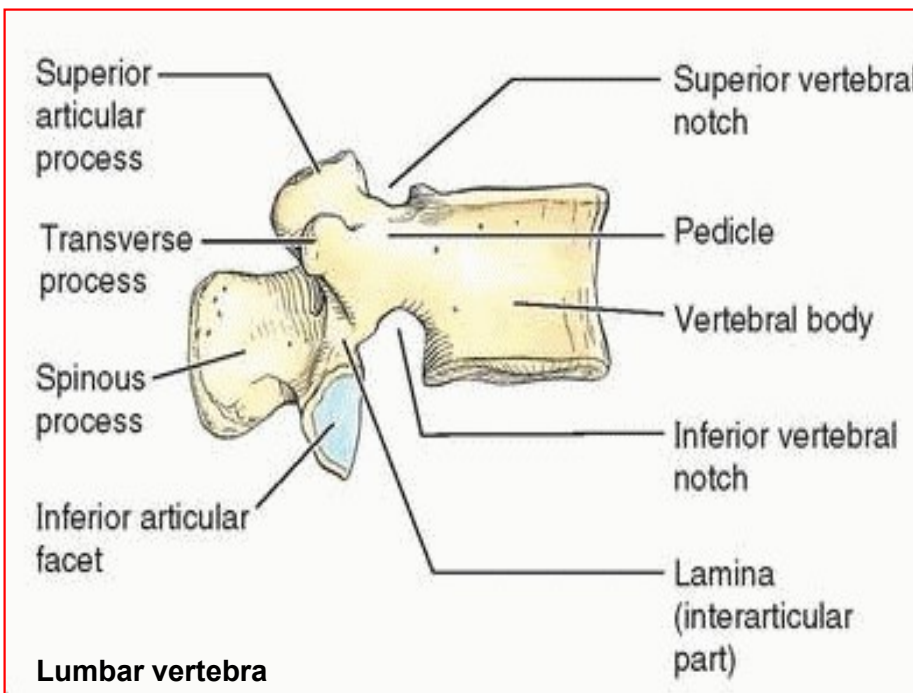
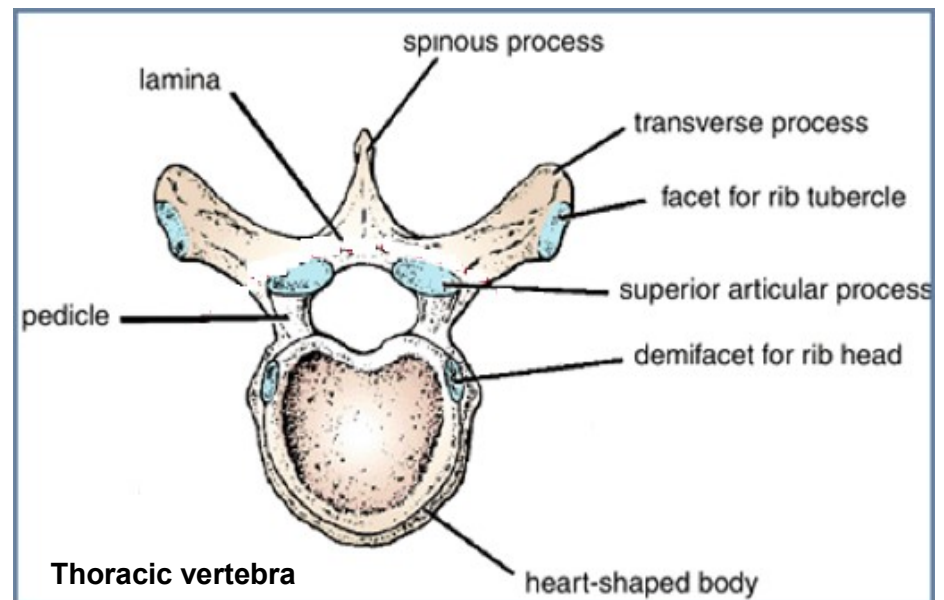
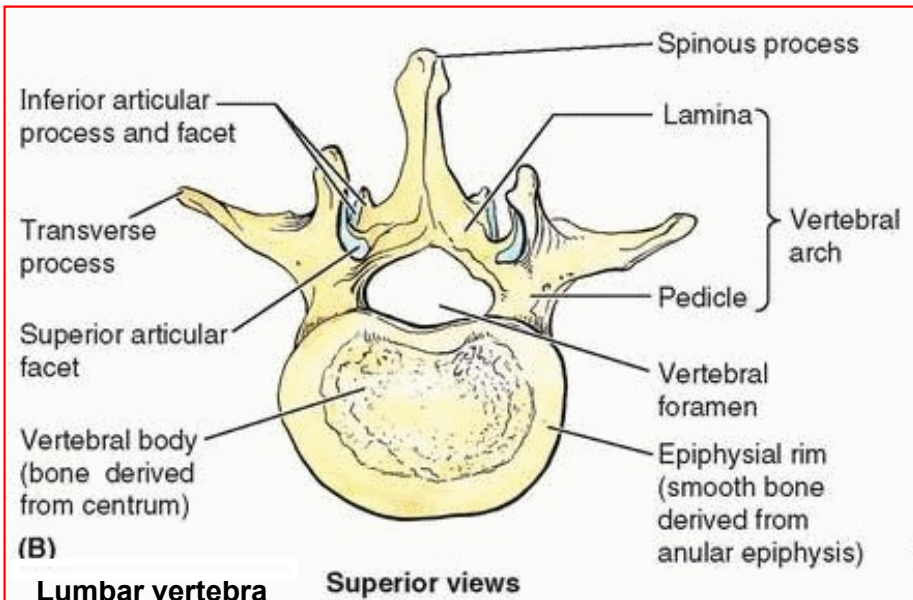
The **transverse processes** are long and slender.

The **body** is large and kidney shaped.

The **pedicles** are strong and directed backward.

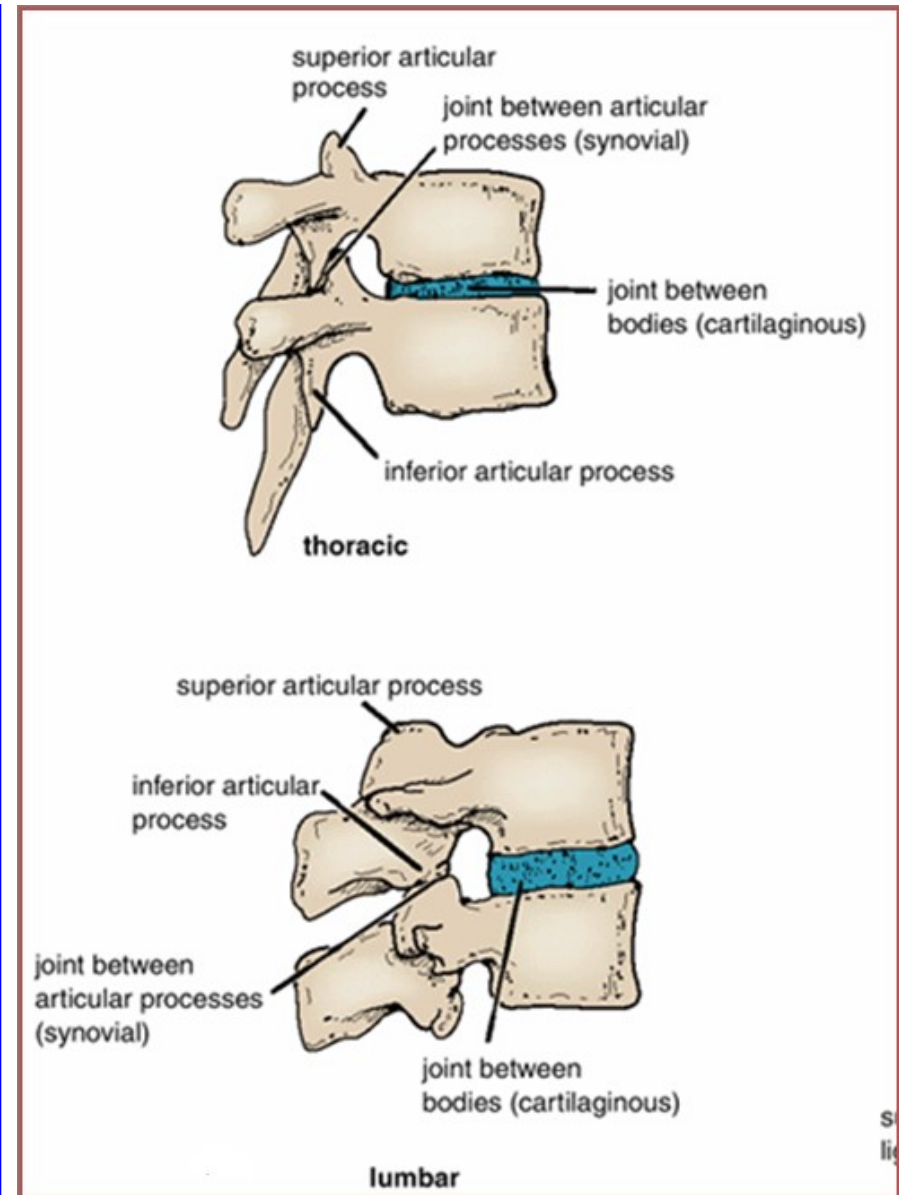


The articular surfaces of the **superior articular processes** face **medially**, and those of the **inferior articular processes** face **laterally**.



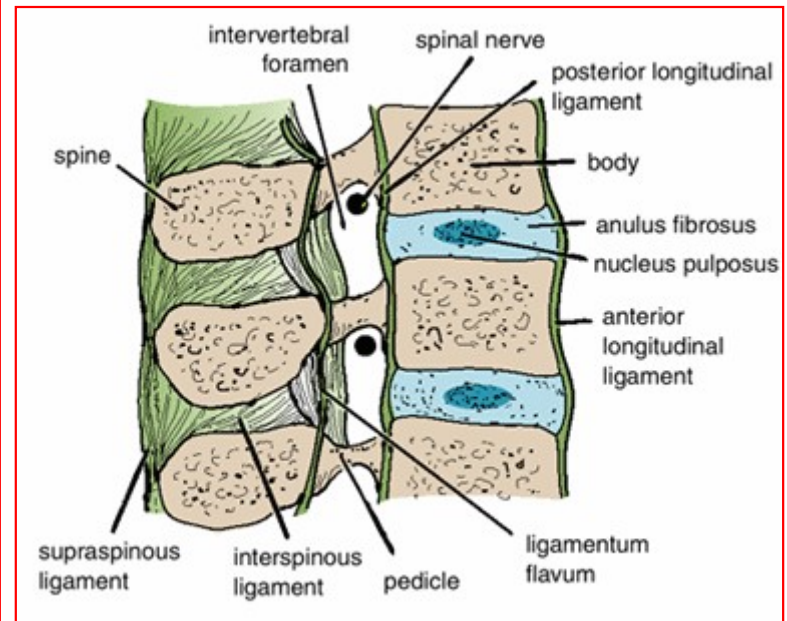
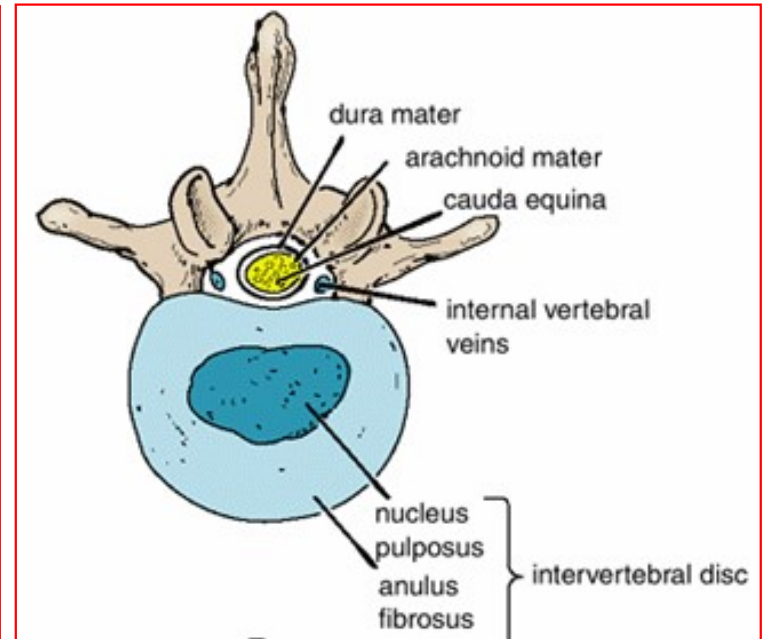
JOINTS BETWEEN TWO VERTEBRAL BODIES

- It is a **cartilagenous** joint.
- The **upper** and **lower** surfaces of the **bodies** of adjacent vertebrae are covered by **thin plates** of **hyaline cartilage**.
- Sandwiched between the plates of hyaline cartilage is an **intervertebral disc of fibrocartilage**
- The **collagen fibers** of the disc strongly unite the bodies of the two vertebrae.



INTERVERTEBRAL DISCS

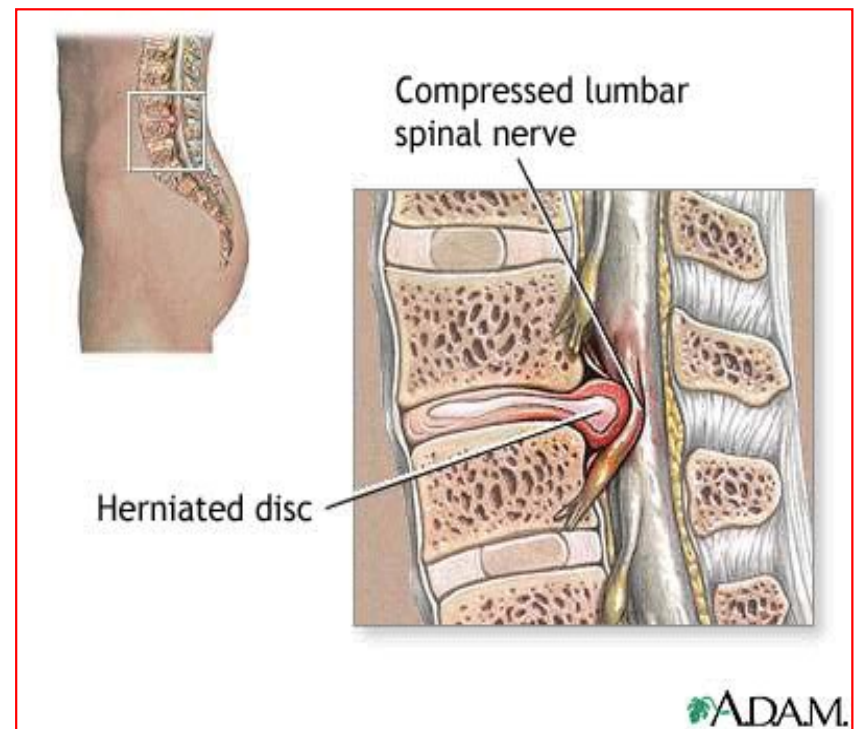
- The intervertebral discs are responsible for **one fourth of the length of the vertebral column**
- They are **thickest** in the **cervical** and **lumbar** regions, where the movements of the vertebral column are greatest.
- **Each disc consists of a:**
 - **Peripheral part, the anulus fibrosus**, composed of fibrocartilage,
 - **Central part, the nucleus pulposus**, a mass of gelatinous material containing a large amount of water, a small number of collagen fibers, and a few cartilage cells.
- **No discs** are found between the first & second cervical vertebrae or in the sacrum or coccyx.



FUNCTION OF THE INTERVERTEBRAL DISCS

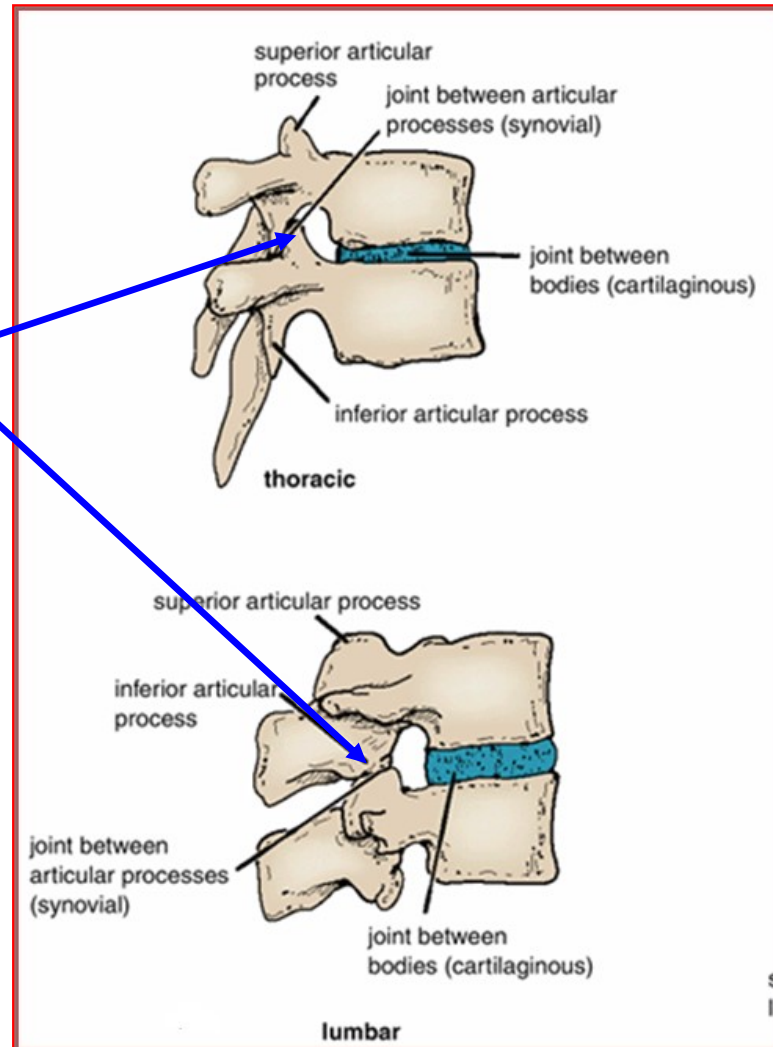
- **Allow** one vertebra to rock forward or backward on another, as in **flexion and extension of the vertebral column**.
- **Serve as shock absorbers** when the load on the vertebral column is suddenly increased, as **when one is jumping from a height**.

- Sometimes, the **annulus fibrosus** ruptures, **allowing the nucleus pulposus to herniate and protrude into the vertebral canal**, where it may press on the spinal nerve roots, the spinal nerve, or even the spinal cord.



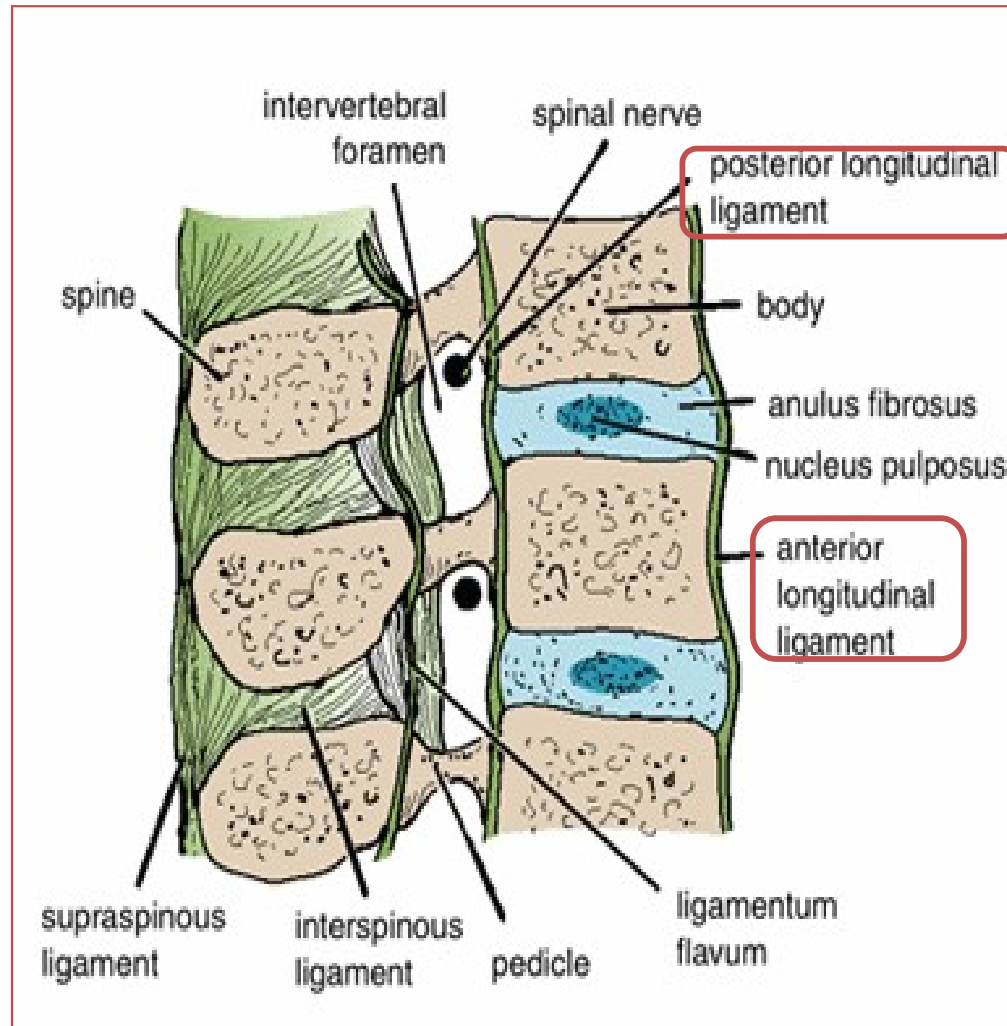
JOINTS BETWEEN TWO VERTEBRAL ARCHES

- Consist of **synovial joints** between the superior and inferior articular processes of adjacent vertebrae.



LIGAMENTS

- The **anterior and posterior longitudinal ligaments** run as continuous bands down the **anterior and posterior surfaces** of the vertebral column **from the skull to the sacrum**
- The **anterior longitudinal ligament** is **wide** and is **strongly** attached to the front and sides of the vertebral bodies and to the intervertebral discs.
- The **posterior longitudinal ligament** is **weak** and **narrow** and is attached to the posterior borders of the discs.



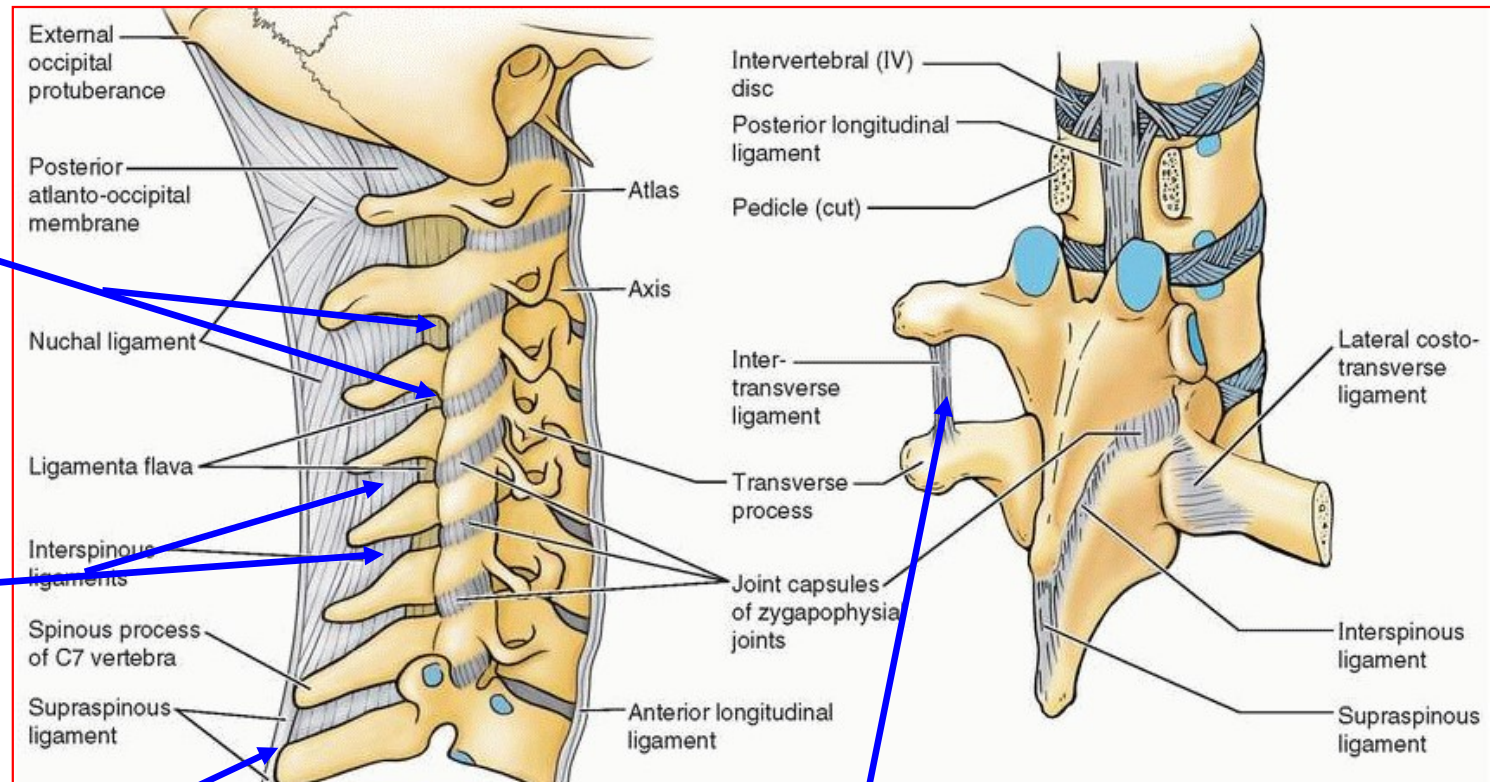
These ligaments **hold the vertebrae firmly together** but at the same time permit a **small amount of movement** to take place between them.

LIGAMENTS

Ligamentum flavum: connects the laminae of adjacent vertebrae

Interspinous ligament: connects adjacent spines

Supraspinous ligament: runs between the tips of adjacent spines



Intertransverse ligaments: run between adjacent transverse processes

MOVEMENTS OF THE THORACOLUMBAR

SPINE

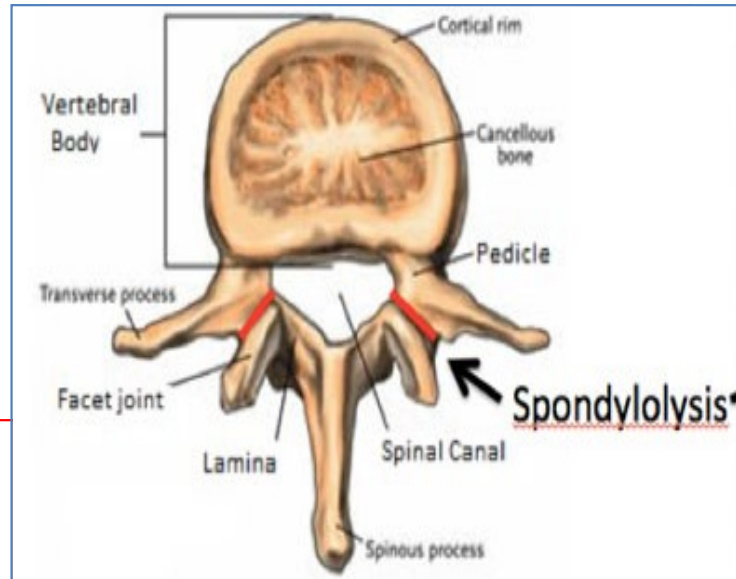
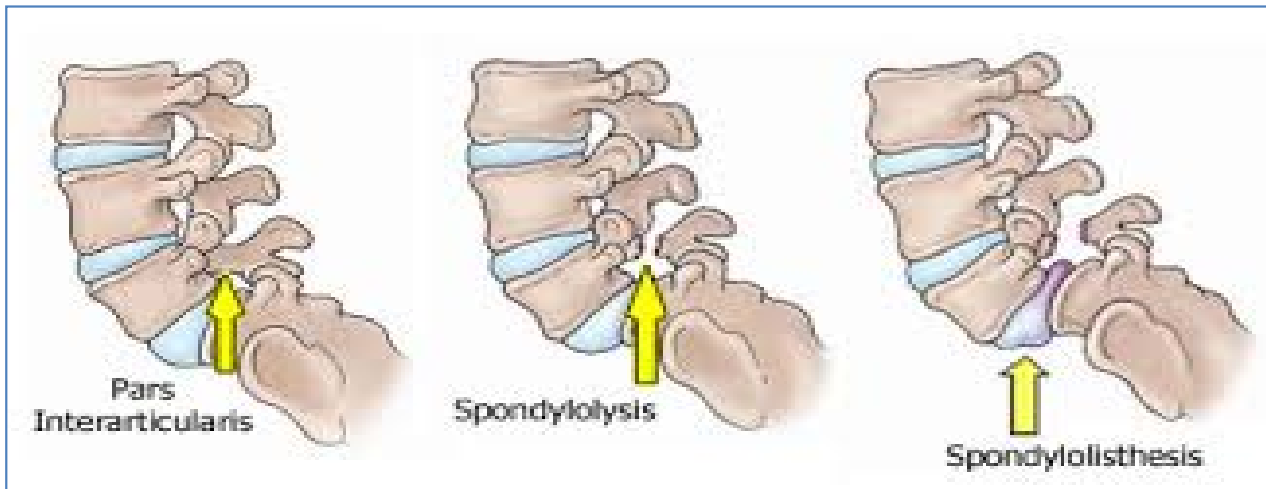
- The following movements are possible on the spine: **flexion, extension, lateral flexion, rotation, and circumduction.**
- **The type and range of movements possible in each region of the vertebral column largely depend on the:**
 - Thickness of the **intervertebral discs** and the
 - Shape and direction of the **articular processes.**
- In the **thoracic region**, the **ribs**, the **costal cartilages**, and the **sternum** severely restrict the range of movement.
- **Flexion, extension and lateral flexion** are extensive in the lumbar regions but **restricted in the thoracic region.**
- **Rotation** is least extensive in the lumbar region.

MUSCLES PRODUCING MOVEMENTS

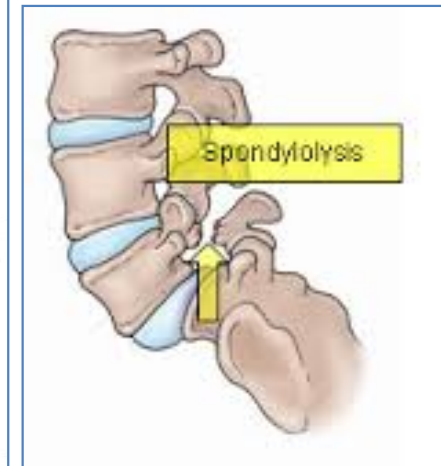
- In the **thoracic region**, rotation is produced by the **semispinalis** and **rotator muscles**, assisted by the **oblique muscles of the anterolateral abdominal wall**.

- In the **lumbar region**:
- **Flexion** is produced by the **rectus abdominis** and the **psoas muscles**.
- **Extension** is produced by the **postvertebral muscles**.
- **Lateral flexion** is produced by the **postvertebral muscles**, the **quadratus lumborum**, and the **oblique muscles of the anterolateral abdominal wall**. The **psoas** may also play a part in this movement.
- **Rotation** is produced by the **rotator muscles** and the **oblique muscles of the anterolateral abdominal wall**.

Vertebra L5

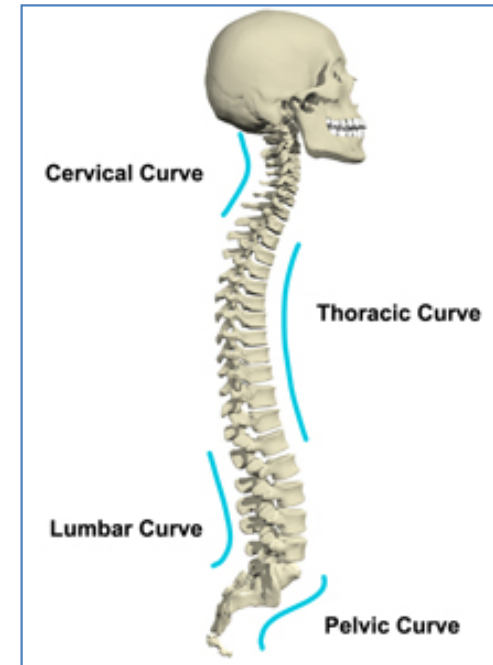


- Is the **largest** of all movable vertebrae.
- Is distinguished by its **massive body** and **thick transverse processes**
- It carries the weight of the whole upper body.
- **The L5 body** is largely responsible for the **lumbosacral angle** between the long axis of the lumbar region of the vertebral column and that of the sacrum
- **Body weight** is **transmitted** from **L5 vertebra** to the base of the **sacrum**, formed by the superior surface of S1 vertebra
- **The fifth lumbar vertebra** is by far the most **common site** of **spondylolysis** (defect in the pars interarticularis of the vertebral arch) and **Spondylolisthesis** (the forward displacement of a vertebra).



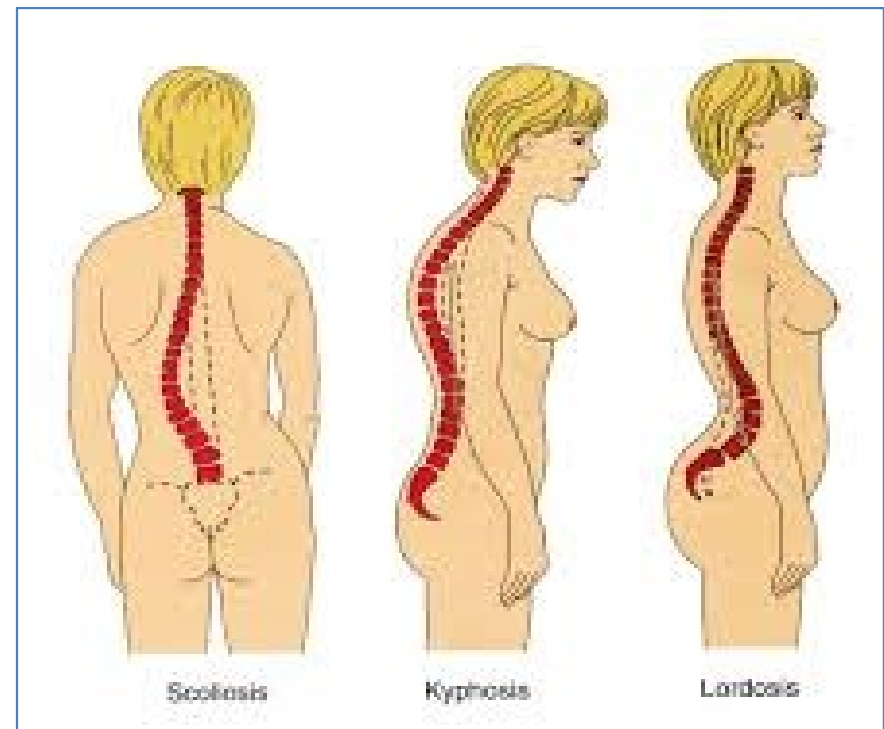
Normal Curvatures in Spine

- Primary (Thoracic & Pelvic)
- Secondary (Cervical & Lumbar)



Abnormal Curvatures of spine :

- Exaggerated Thoracic curvatures (**Kyphosis**)
- Exaggerated lumbar curvature (**Lordosis**)
- Lateral curvature of spine. (**Scoliosis**)



Thank You