

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Thoracolumbar Spine

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OBJECTIVES

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

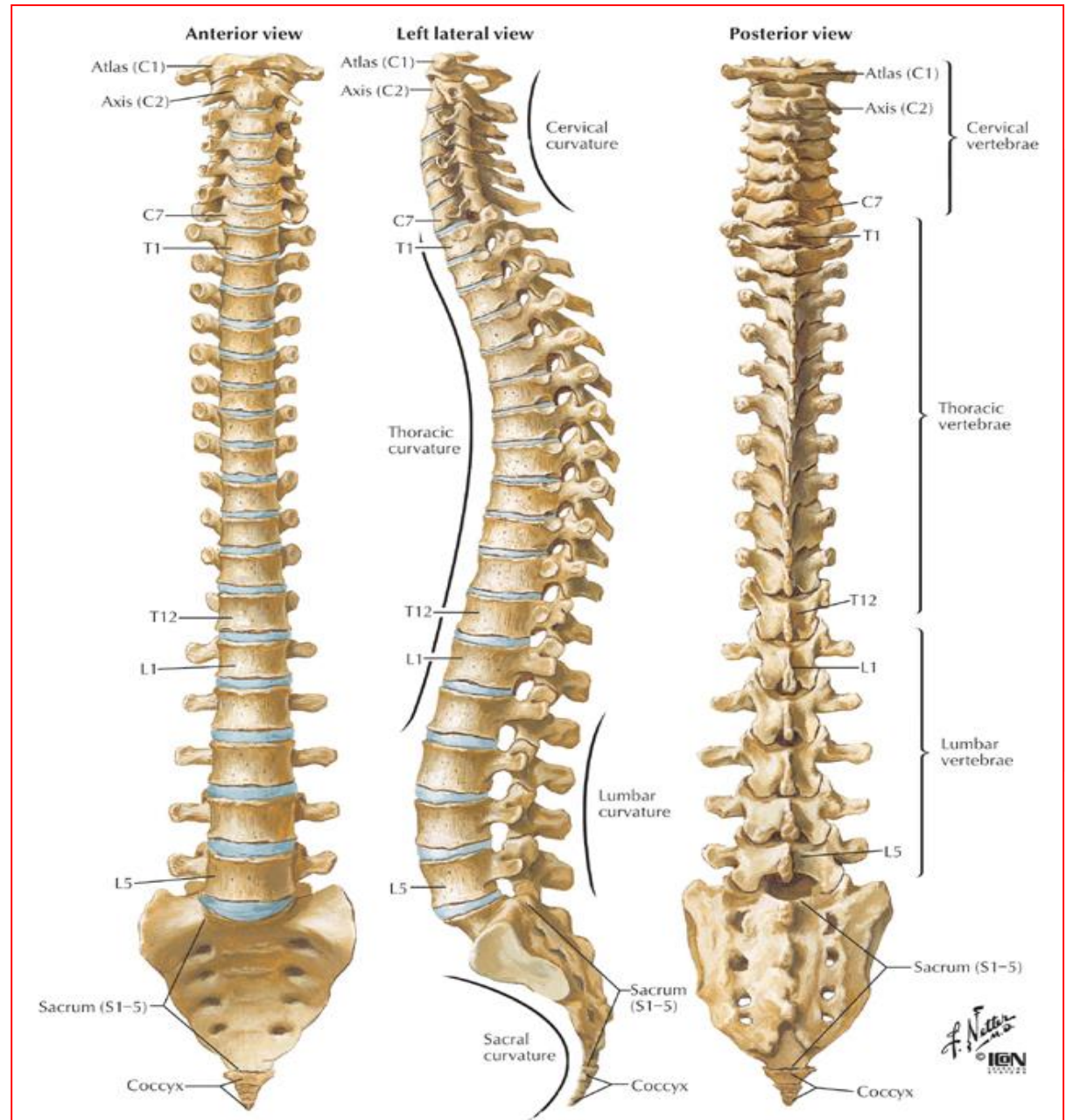
- *Distinguish the thoracic and lumbar vertebrae from each other and from vertebrae of the cervical region*
- *Describe the characteristic features of a thoracic and a lumbar vertebra.*
- *Describe the joints between the vertebral bodies and the vertebral arches.*
- *Compare the movements occurring in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

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

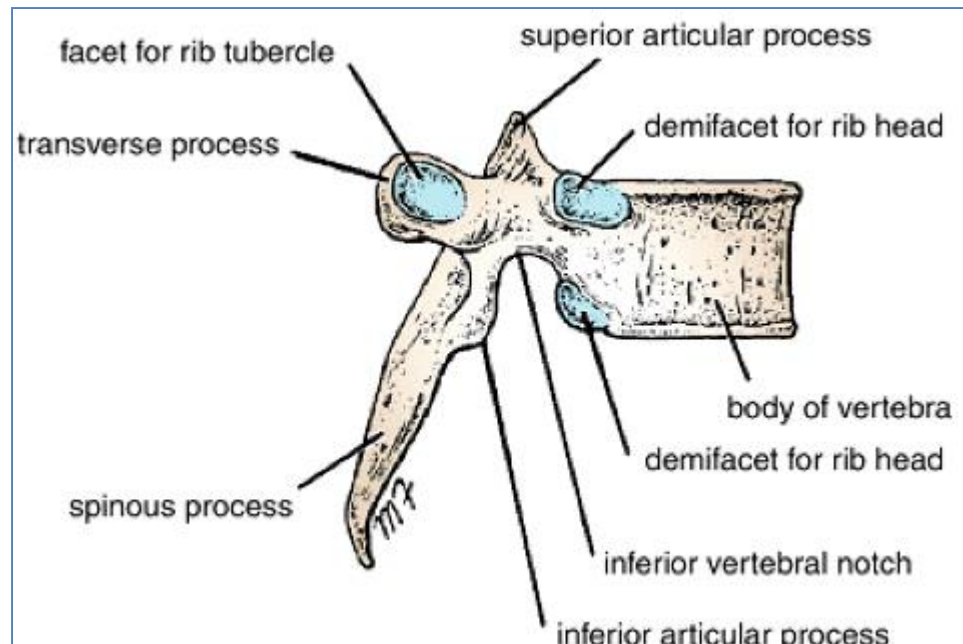
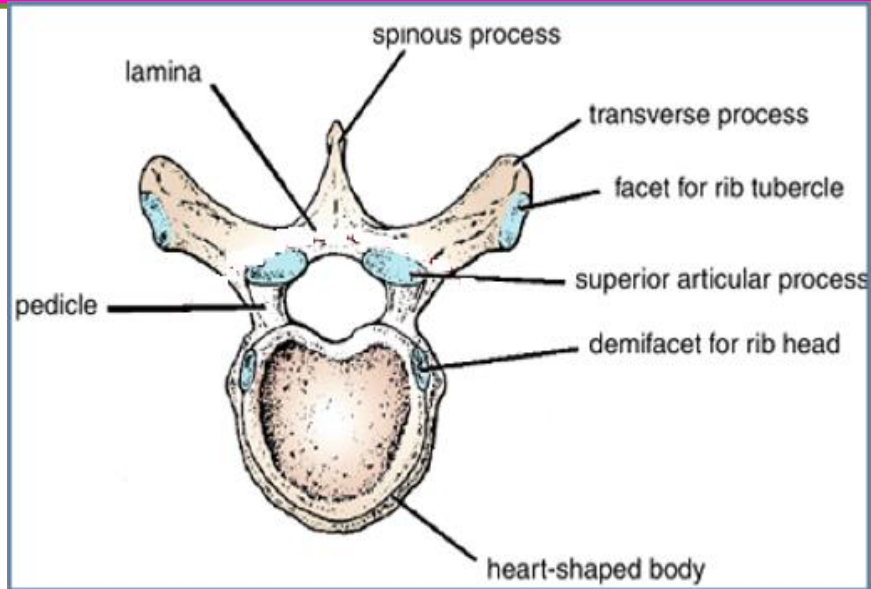
➤ **Curves of vertebral column can be divided into :**

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

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



THORACIC VERTEBRAE

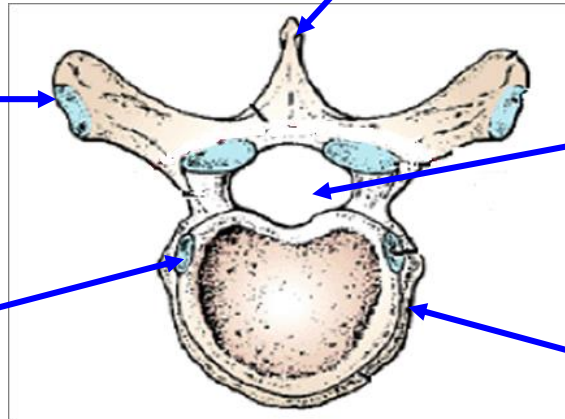


Most **thoracic vertebrae** are typical, have **bodies**, vertebral **arches**, and **seven processes** for muscular and articular connections.

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.

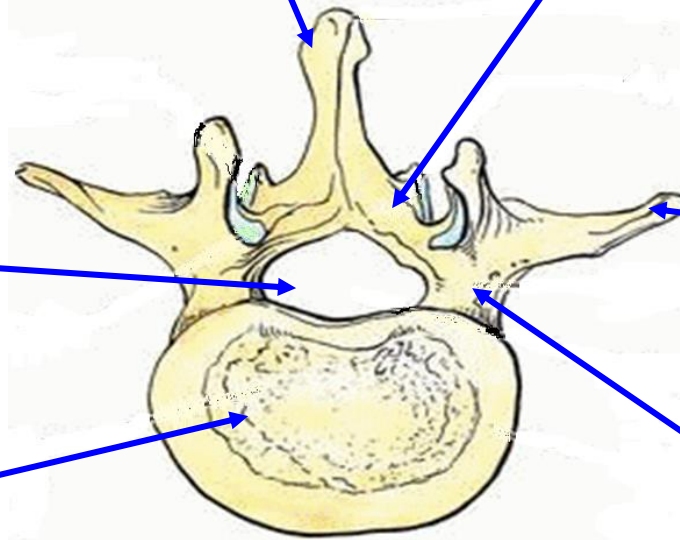
The **laminae** are thick.

The **vertebral foramina** are triangular.

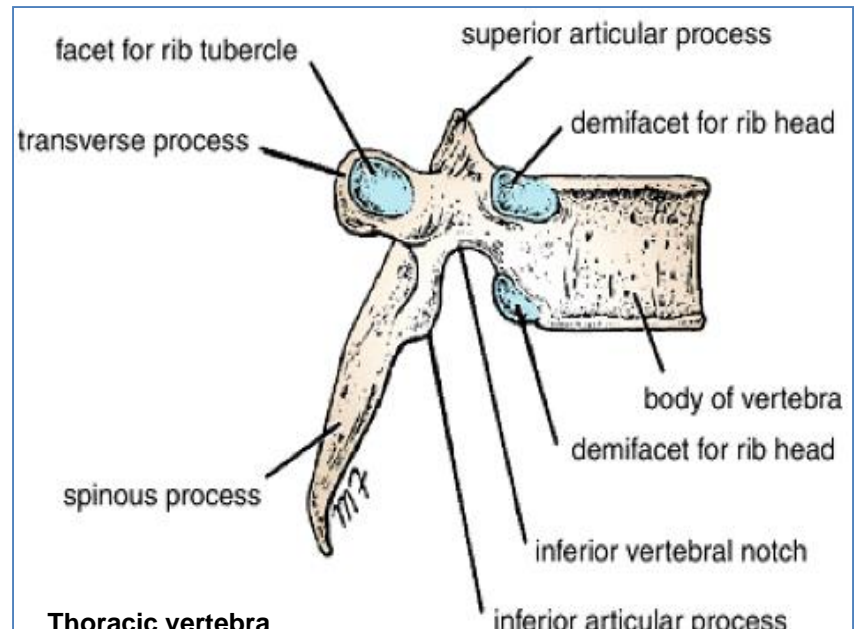
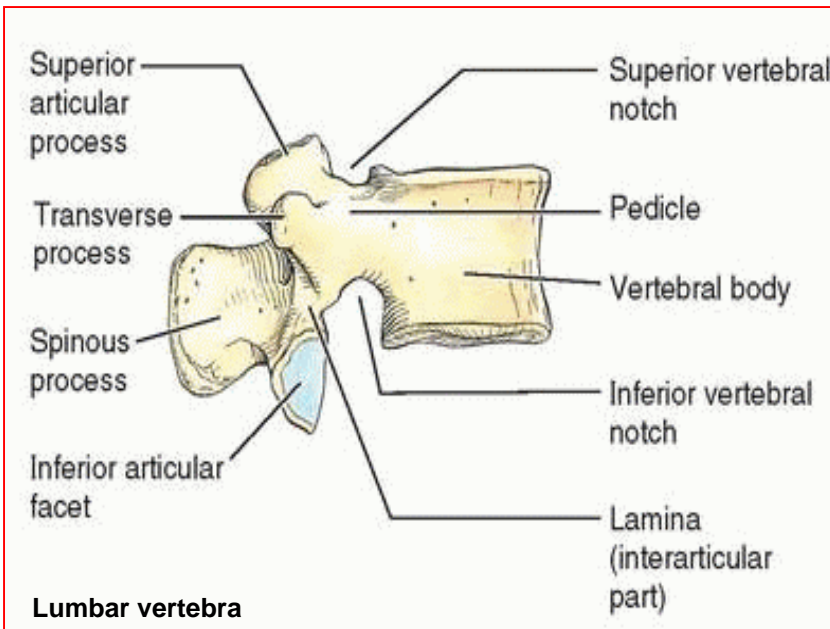
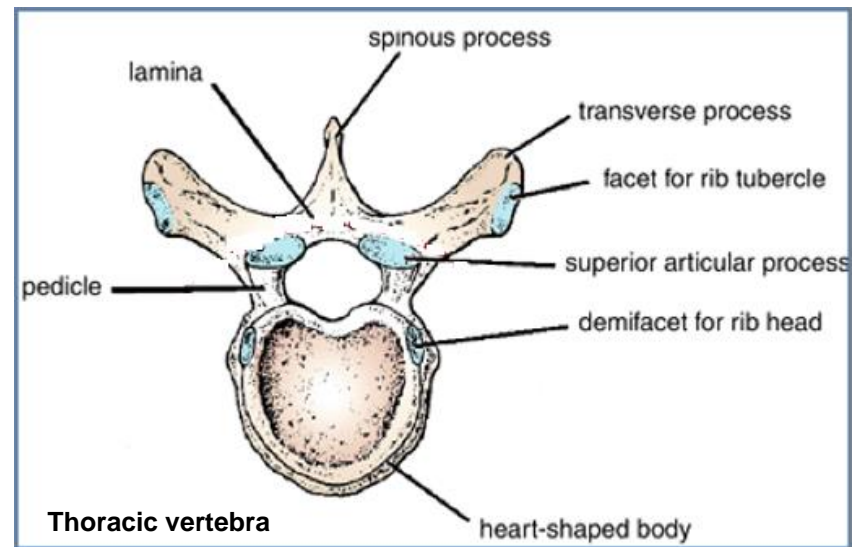
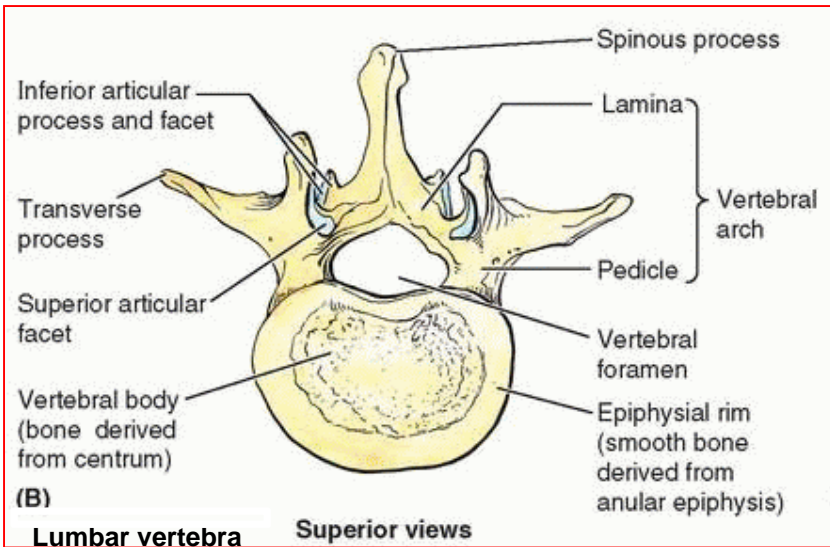
The **transverse processes** are long and slender.

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

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

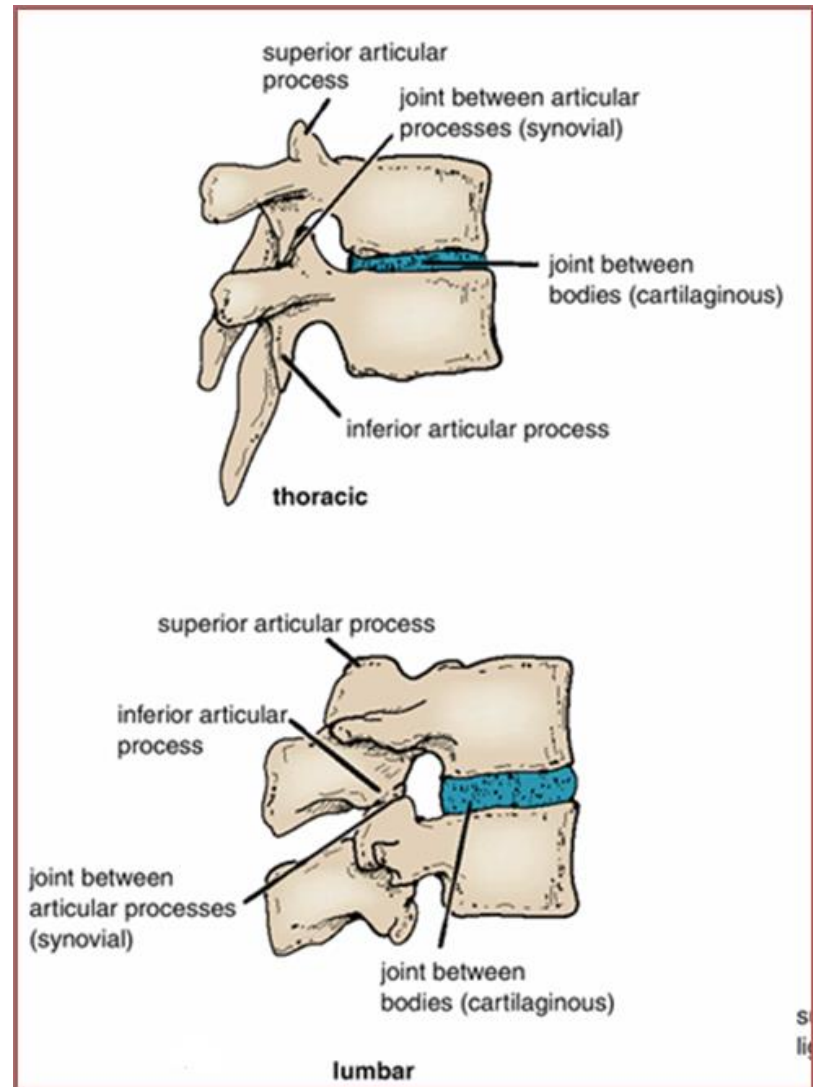


The articular surfaces of the **superior articular processes** face **medially**, and those of the **inferior articular processes** face **laterally**.



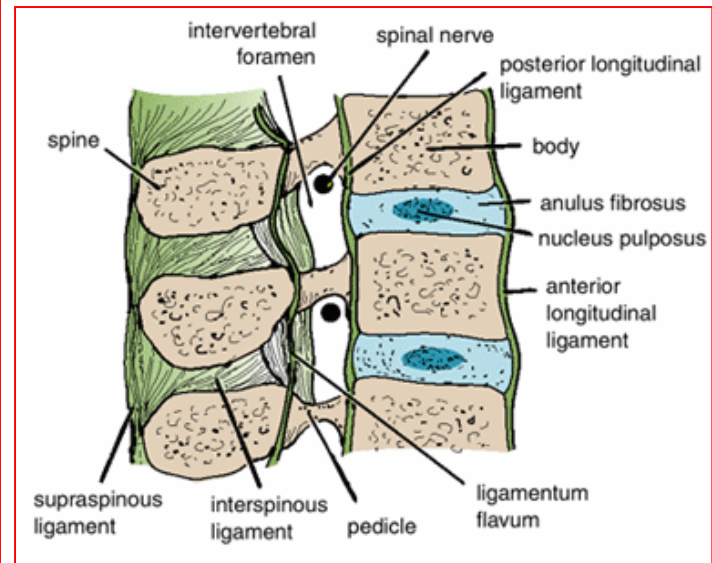
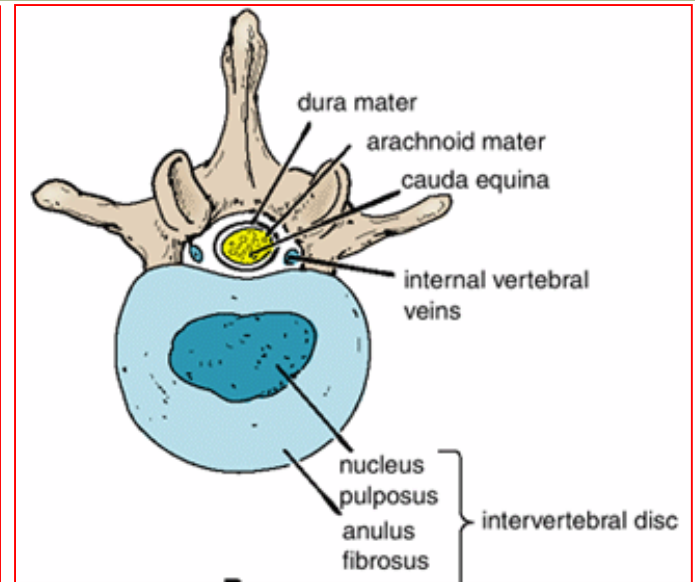
JOINTS BETWEEN TWO VERTEBRAL BODIES

- 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

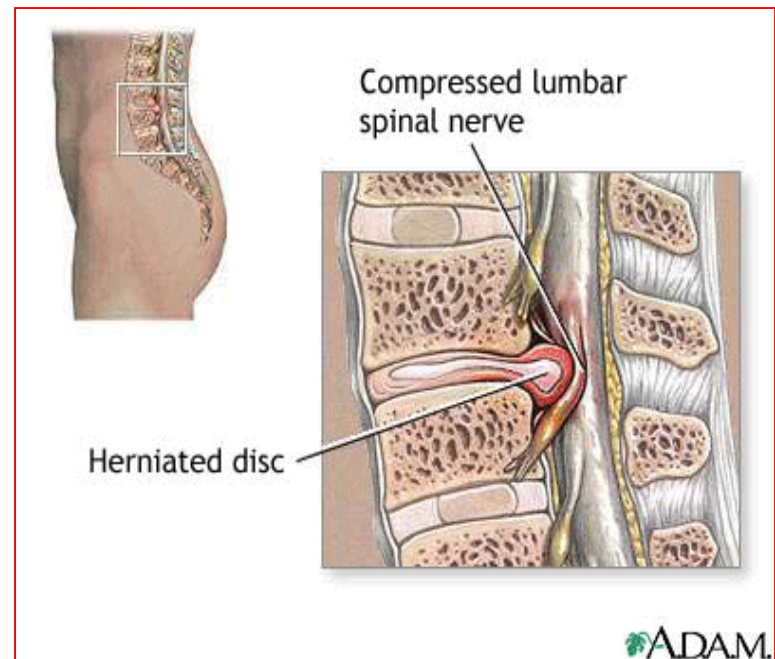
- The intervertebral discs are responsible for **one fourth of the length of the vertebral column**
- They are **thickest** in the **cervical** and **lumbar** regions, where the movements of the vertebral column are greatest.
- **Each disc consists of a:**
 - **Peripheral part**, the **anulus fibrosus**, 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

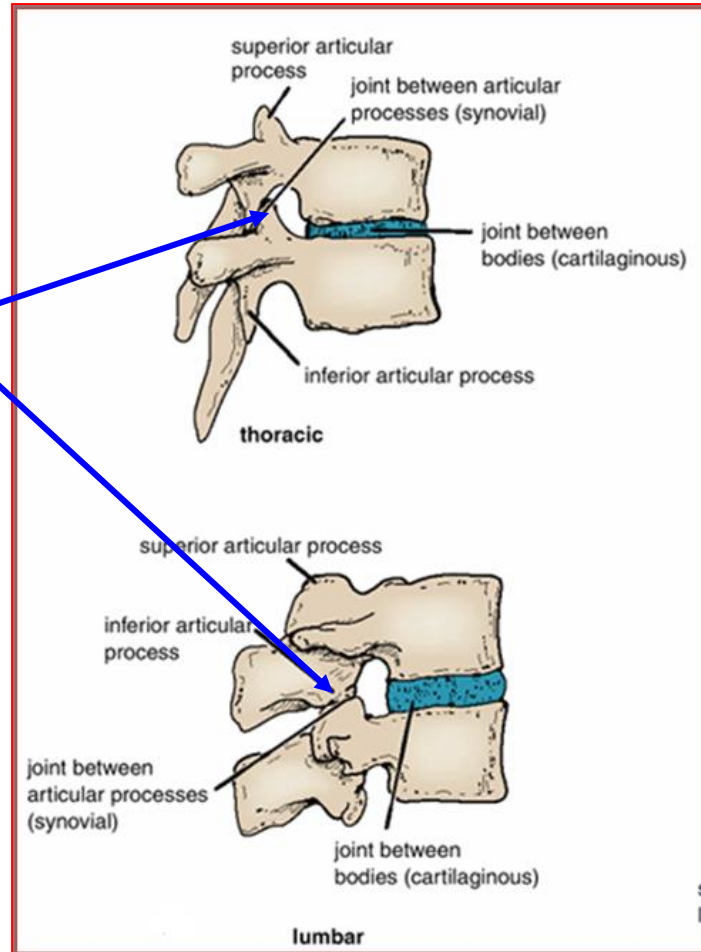
- **Allow** one vertebra to rock forward or backward on another, as in **flexion and extension of the vertebral column**.
- **Serve as shock absorbers** when the load on the vertebral column is suddenly increased, as **when one is jumping from a height**.

- 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.



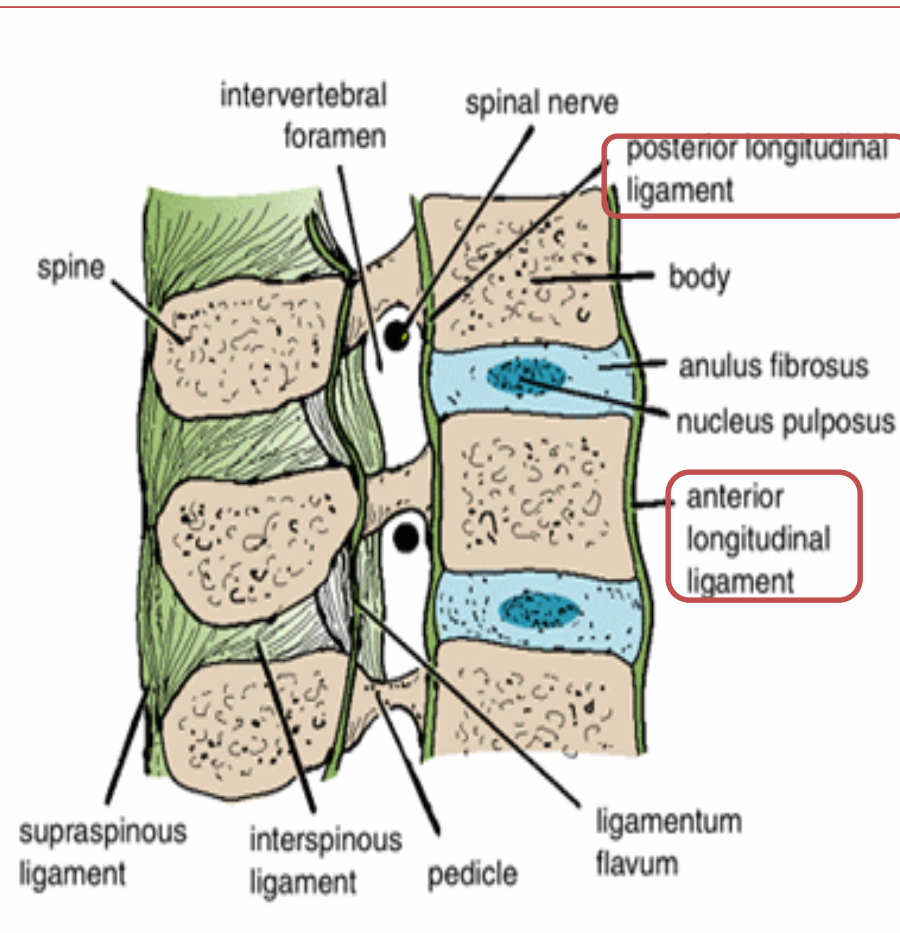
JOINTS BETWEEN TWO VERTEBRAL ARCHES

- 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.



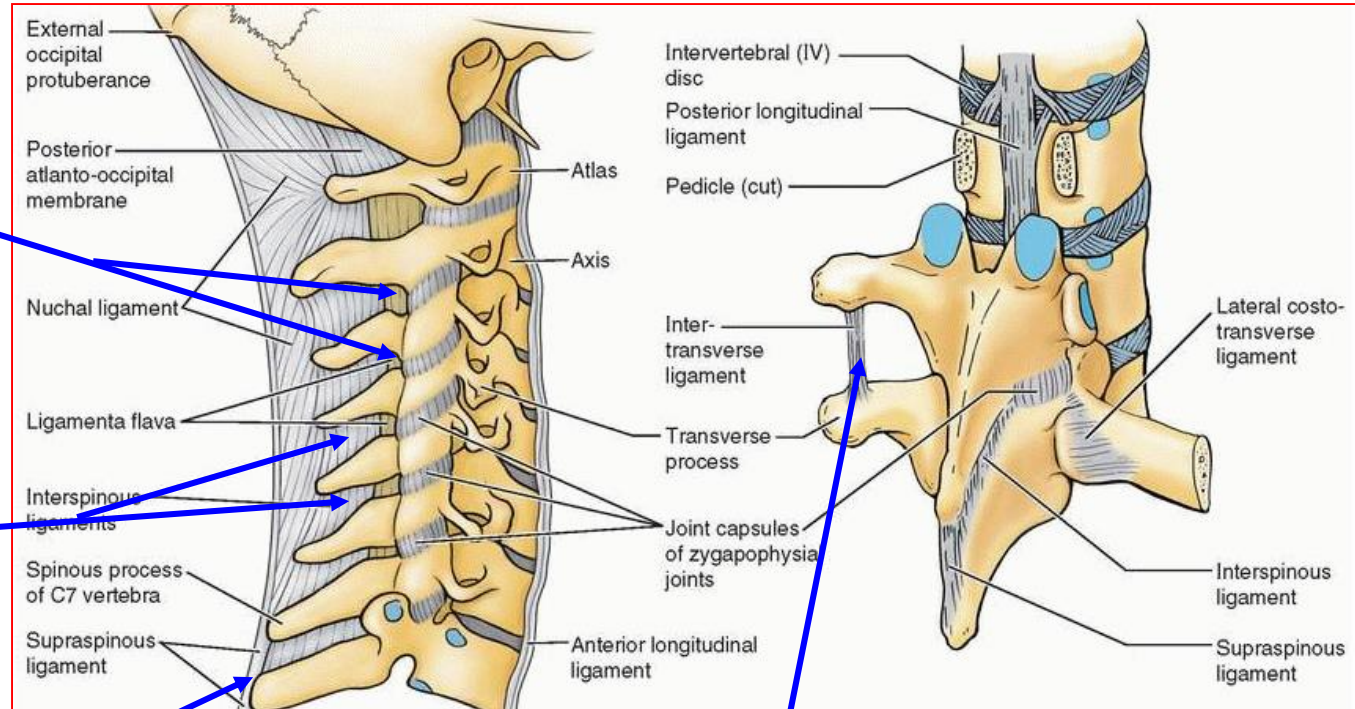
These ligaments **hold the vertebrae firmly together** but at the same time permit a **small amount of movement** to take place between them.

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

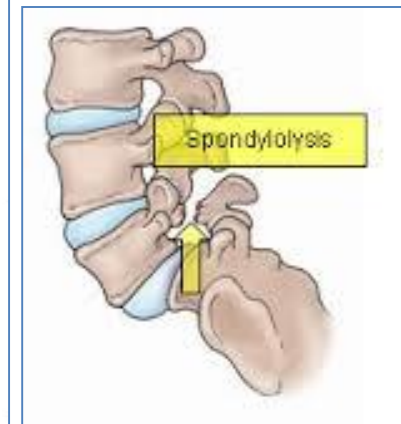
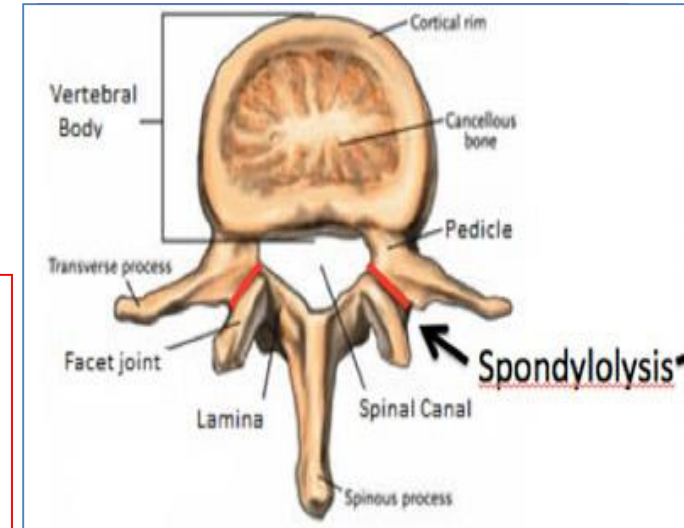
- The following movements are possible on the spine: **flexion, extension, lateral flexion, rotation, and circumduction.**
- **The type and range of movements possible in each region of the vertebral column largely depend on the:**
 - Thickness of the **intervertebral discs** and the
 - Shape and direction 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).

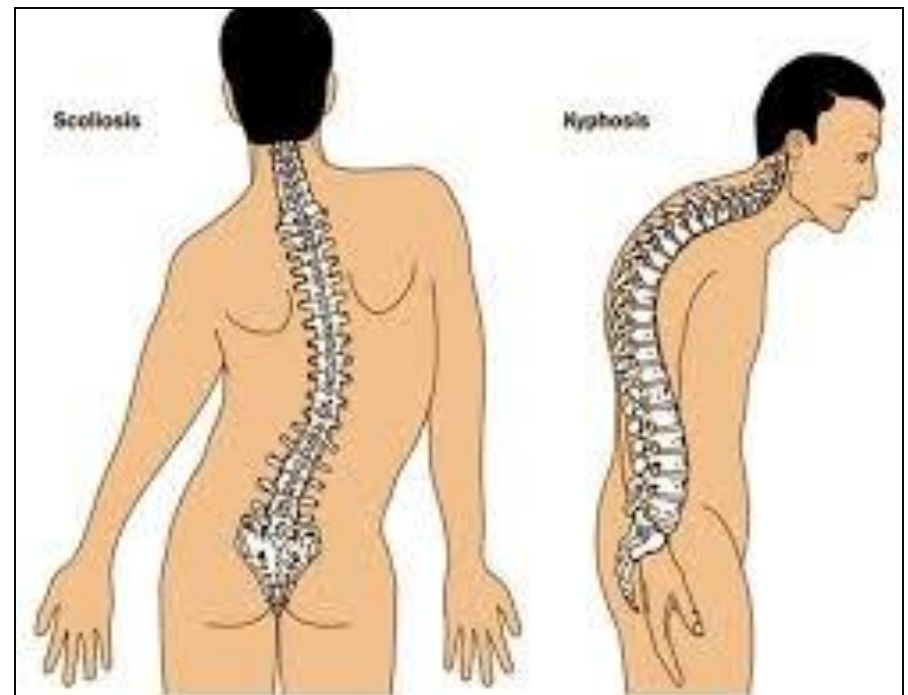
Normal Curvatures in Spine

- 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

Question 1

1. Which one of the following contributes in lordosis of the spine ?


a. Exaggerated cervical curvature.

b. Exaggerated thoracic curvature.

c. Exaggerated lumbar curvature. 

d. Lateral curvature.

Question 2

2. Which one of the following ligaments connects the laminae of adjacent vertebrae ?
- a. Supraspinous.
 - b. Interspinous.
 - c. Intertransverse.
 - d. Ligamentum flavum. 

Question 3

3. Which one of the following muscles specifically contributes in lateral flexion of lumbar spine ?

a. Semispinalis.

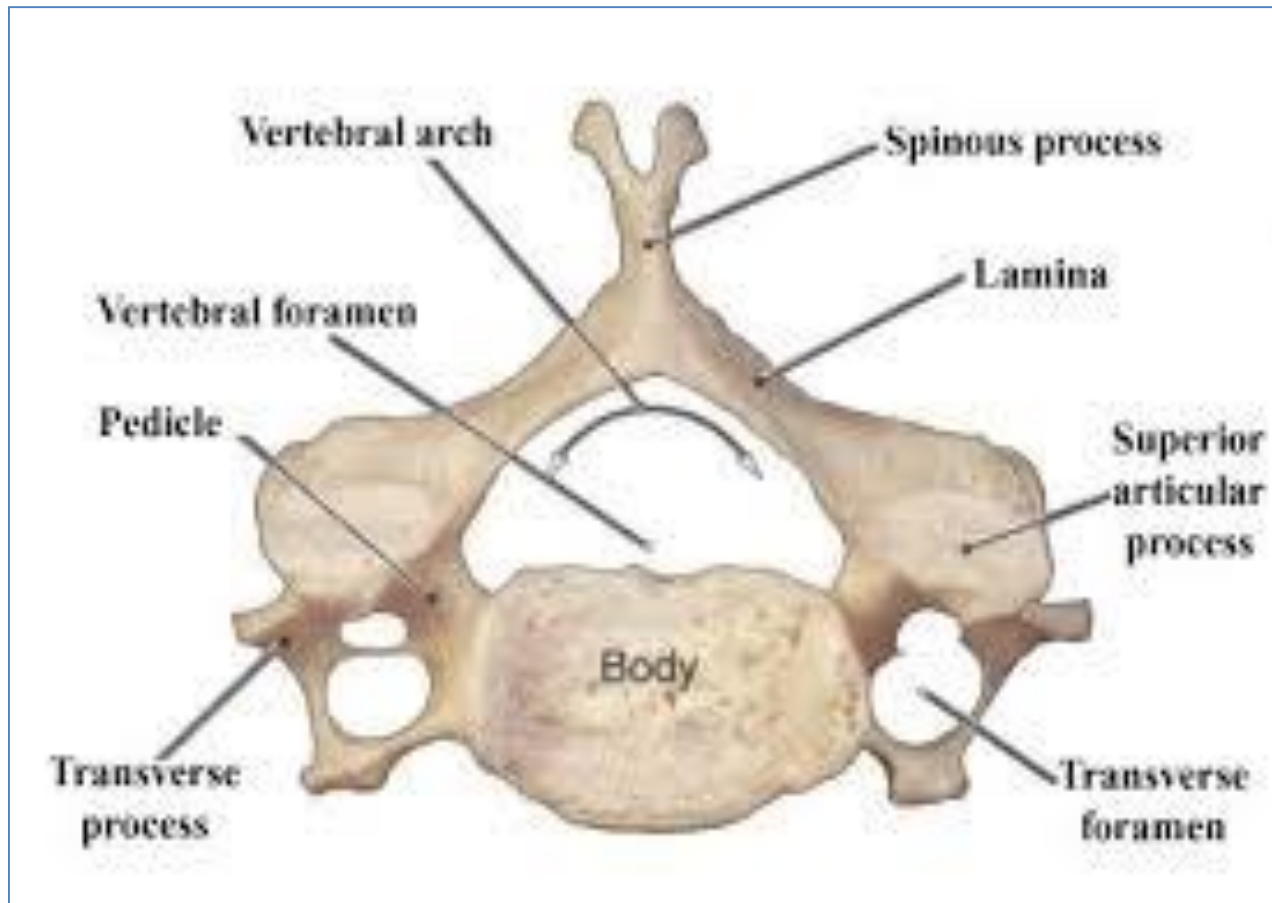


b. Quadratus lumborum.

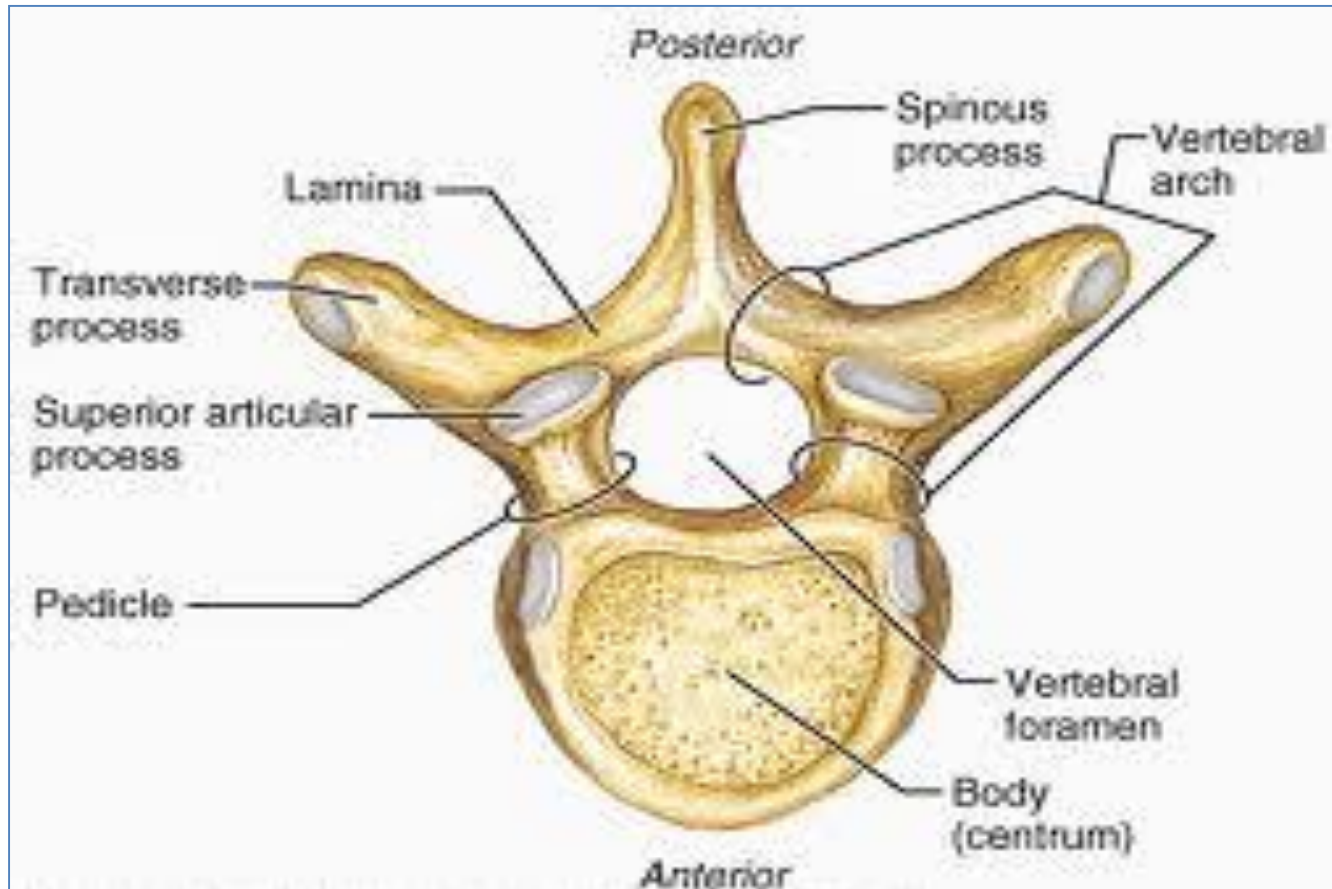
c. Psoas major.

d. Rectus abdominis.

Cervical



Thoracic



Lumbar

