Life is 10% what happens to you and 90% how you react to it.

Charles R. Swindoll

Musculoskeletal Block

ANATOMY

team 435

COLOR CODES

- IMPORTANT NOTES
- EXTRA NOTES
- DEFINITION

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.*

Thoracolumbar Spine

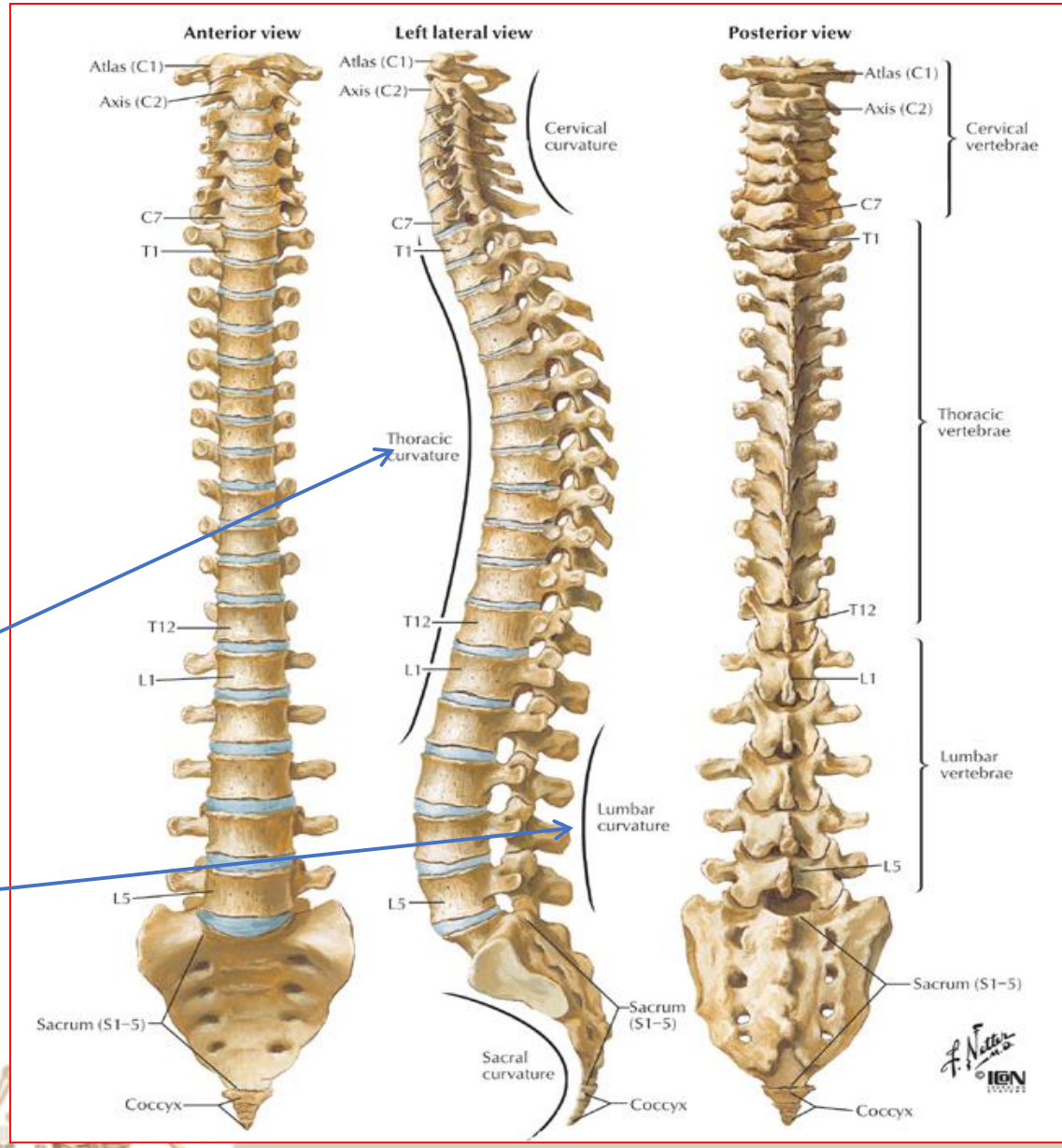
Curves of the vertebral column can be divided into:

- Primary Curves:

Thoracic & Pelvic

- Secondary curves:

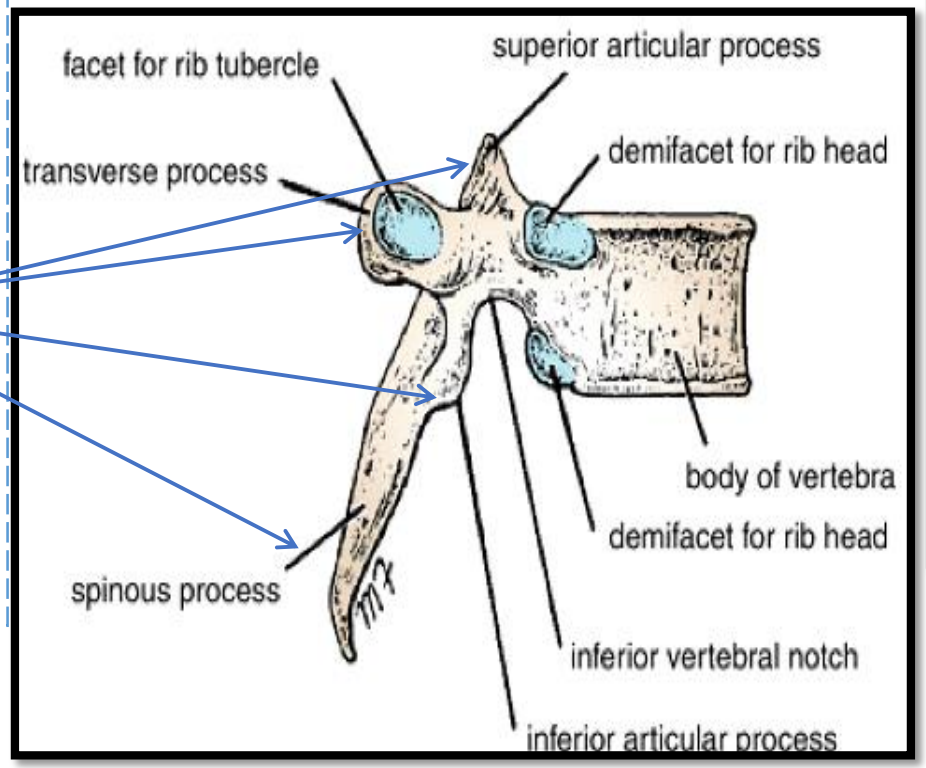
Cervical & Lumbar

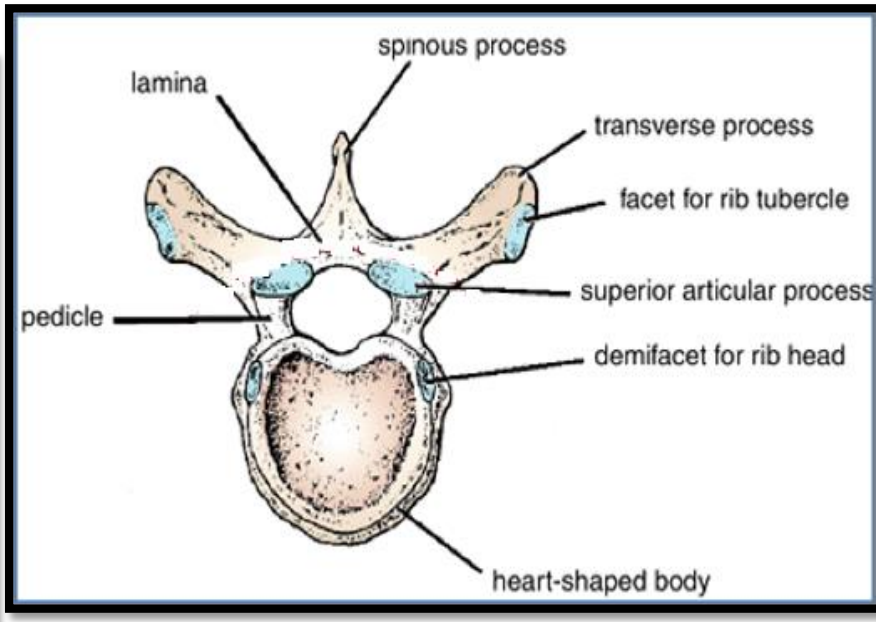


Note: The curvatures in Thoracic and lumbar spine.

Thoracic vertebrae

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





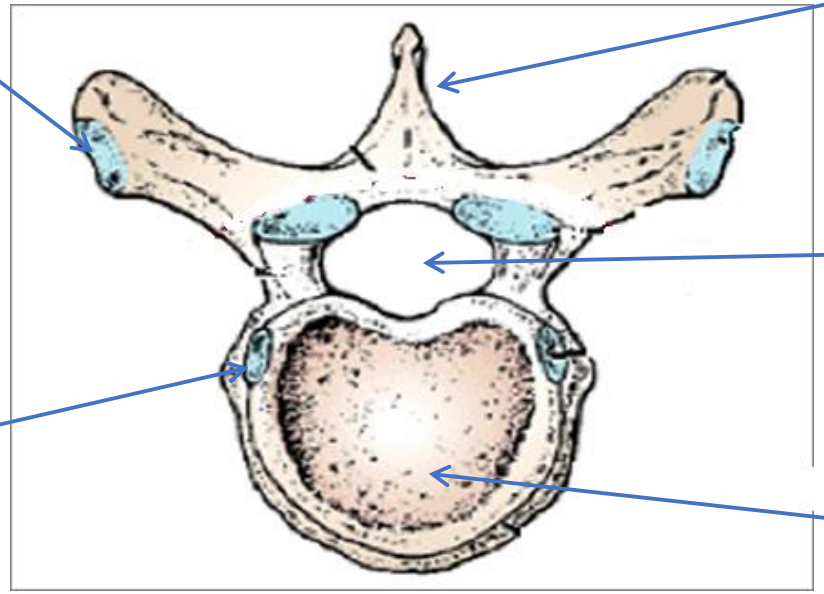
2 Transverse process
2 Superior articular process
2 inferior articular process
1 Spinous process

Note: A “typical” vertebra is made up of an anterior vertebral body and a posterior vertebral arch, more or less the same to the rest. While the “atypical” vertebrae such as the 2 found in cervical region defy the norm.

Characteristics of Thoracic vertebrae

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 process**).

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



The spines are long and inclined downwards.

The vertebral foramen is small and circular.

The body is medium size and heart shaped.

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

Process : A pointy projection
Facet : Small flat surface

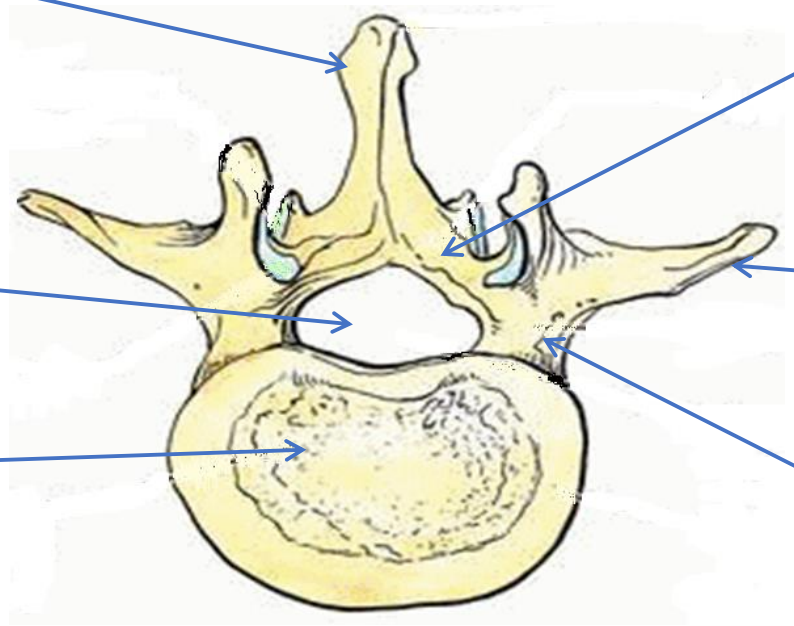
Tubercles : a small rounded projection

Characteristics of typical lumbar vertebra

The Spinous process are short, flat, and quadrangular and project backwards.

The vertebral foramina are triangular.

The body is large and kidney shaped.



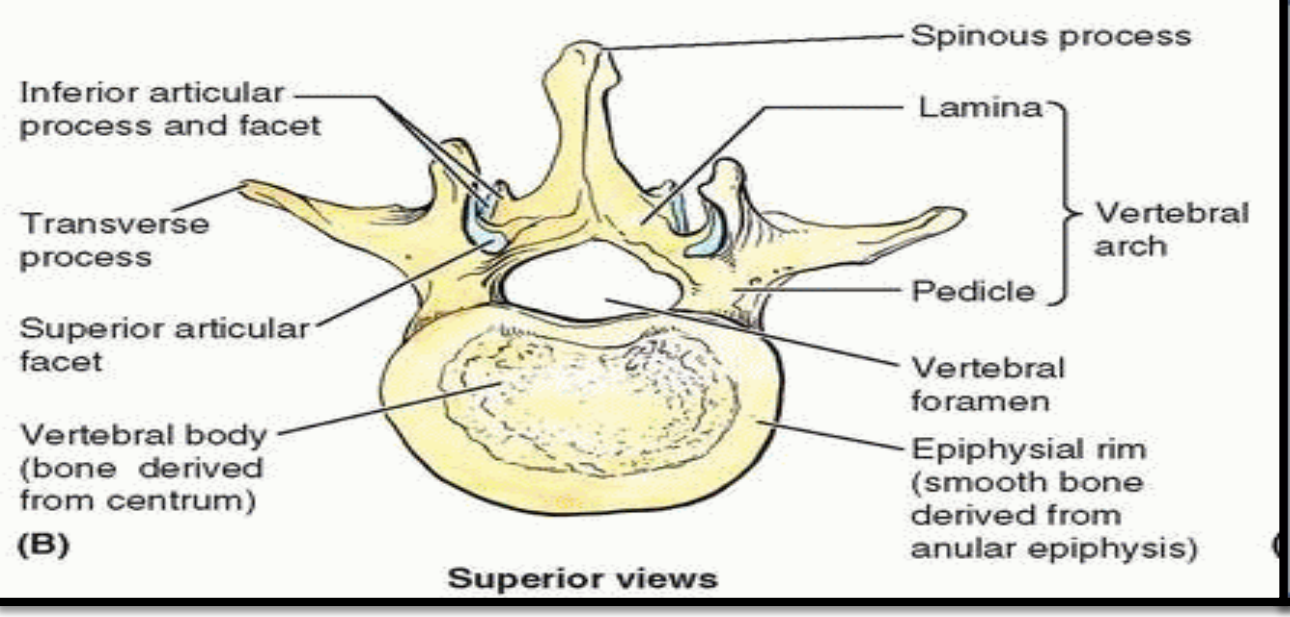
The laminae are thick .

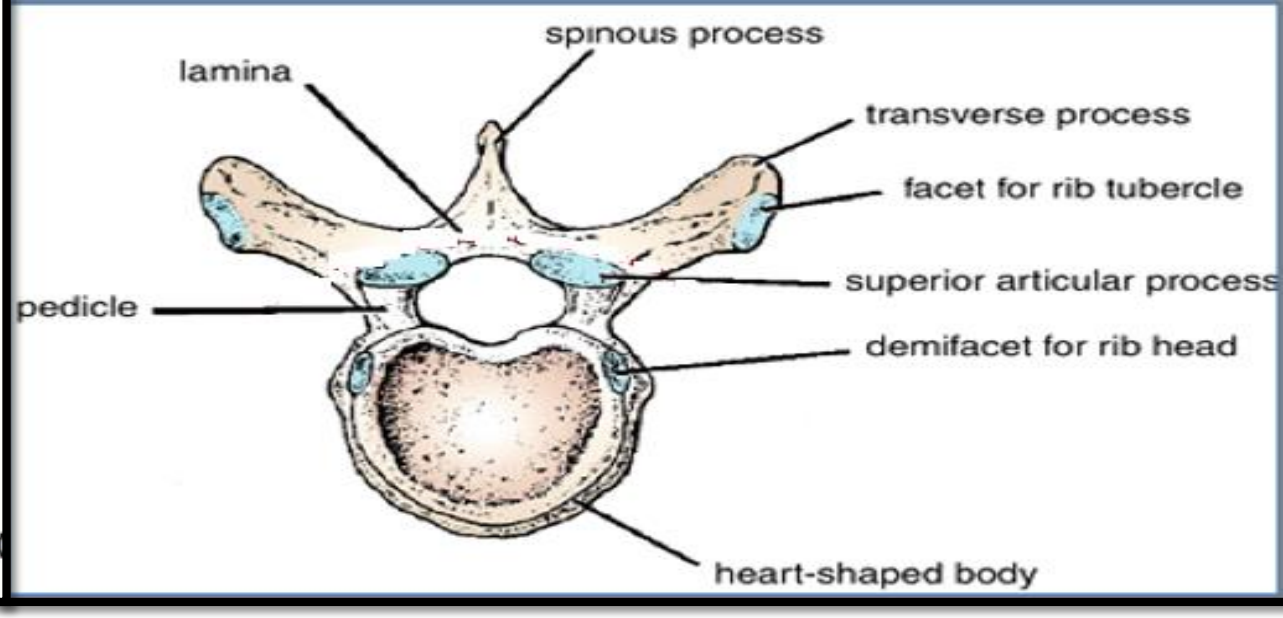
The transverse process are long and slender.

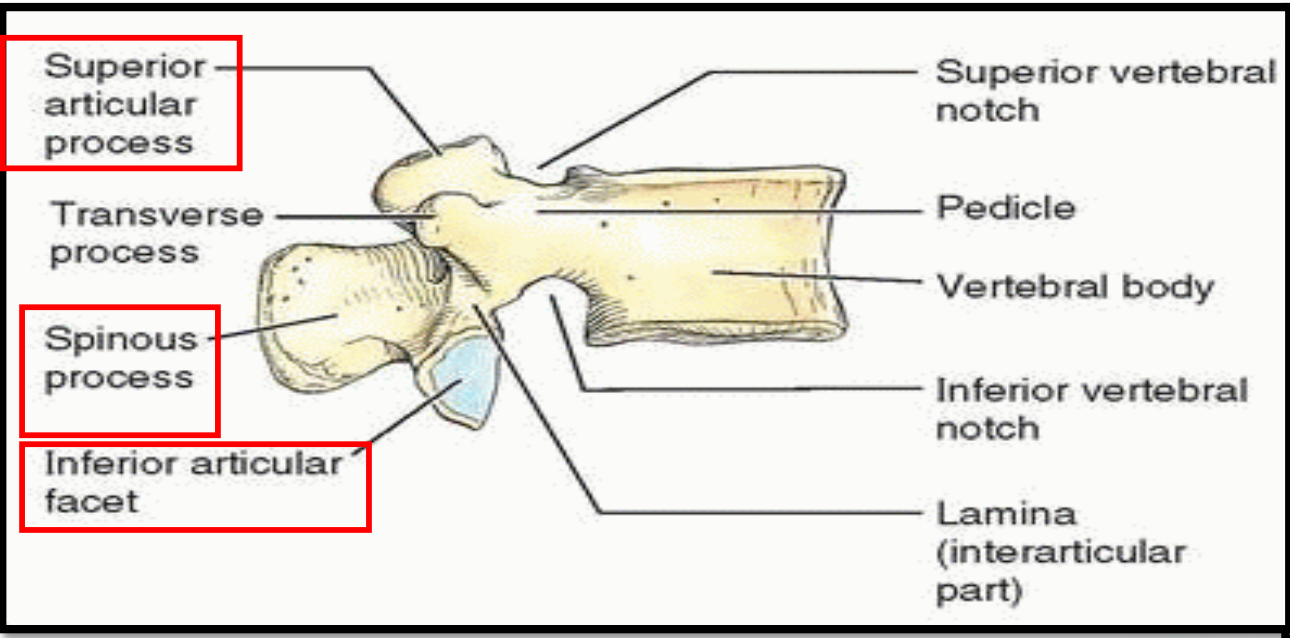
The Pedicles are strong and directed back wards.

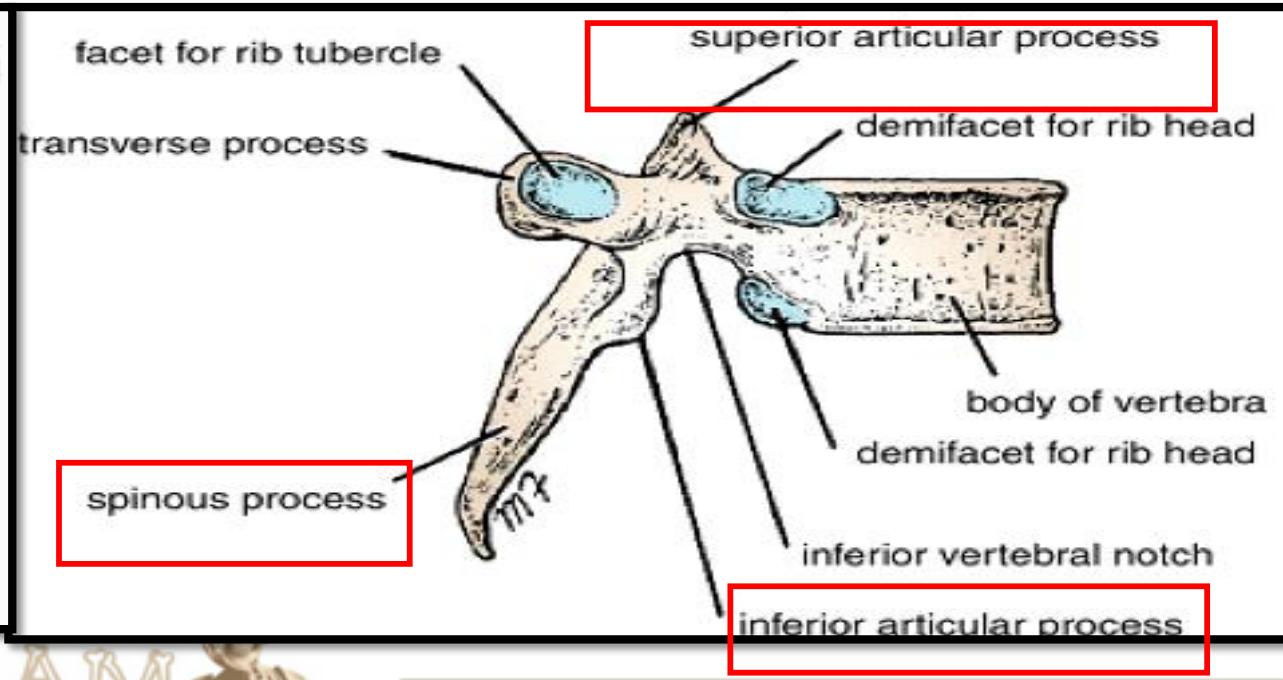
The articular surfaces of the **superior articular processes** face medially, and those of the **inferior articular processes** face laterally.

Foramen : opening or hole.
Slender : Thin









Now compare between and notice the major differences between the two.

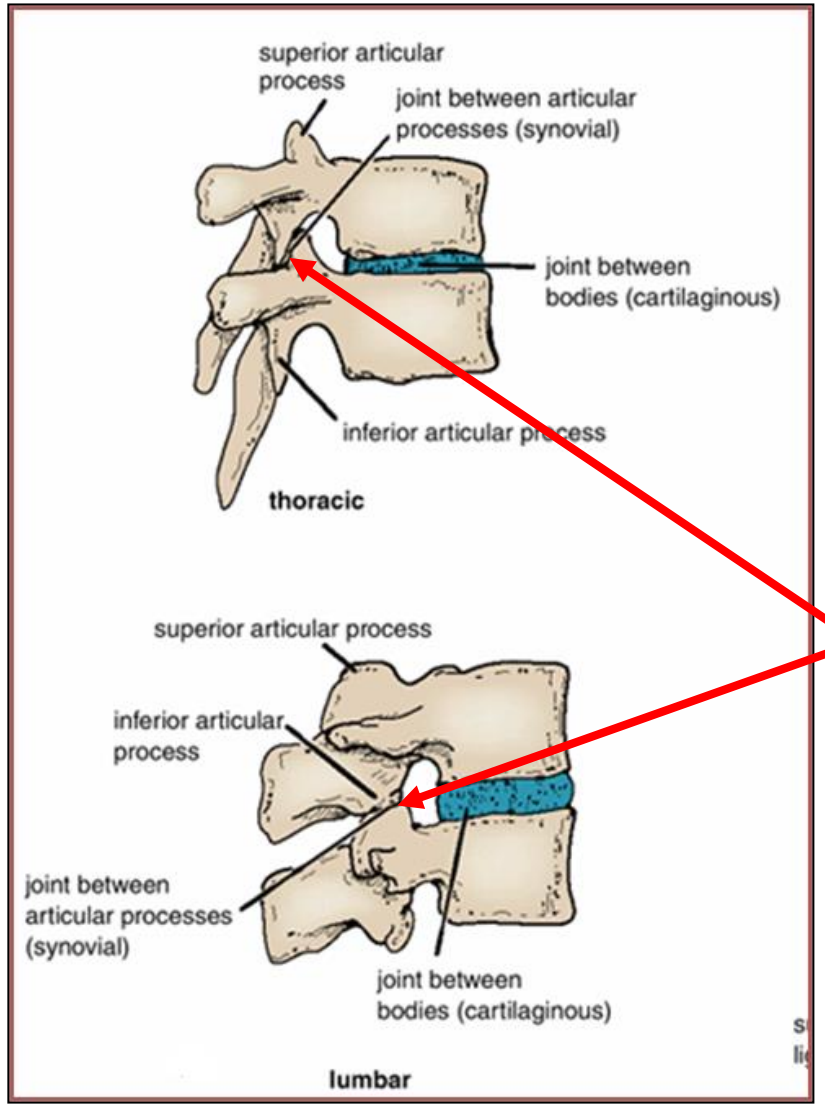
JOINTS BETWEEN TWO VERTEBRAL BODIES:

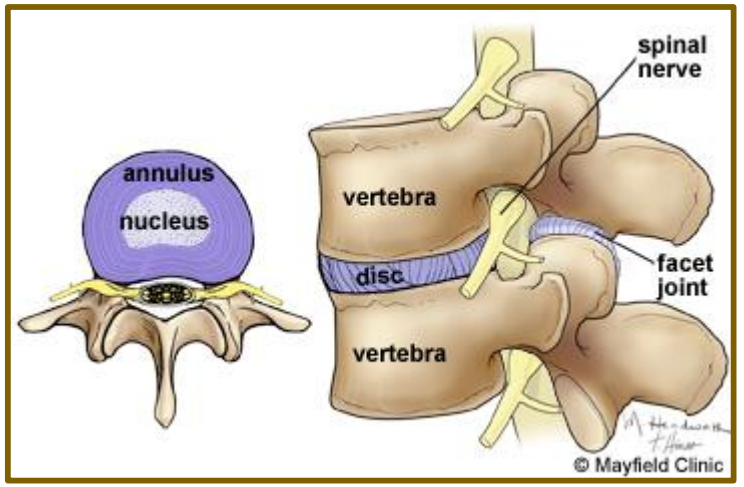
1-It is a **cartilaginous** joint.غضروفي

2-The **upper** and **lower** surfaces of the **bodies** of adjacent vertebrae are covered by **thin plates hyaline cartilage.**

3- Sandwiched between the **plates of hyaline cartilage** is an **intervertebral** disc of **fibrocartilage** .

4- **collagen fibers** of the disc strongly unite the bodies of the two vertebrae.



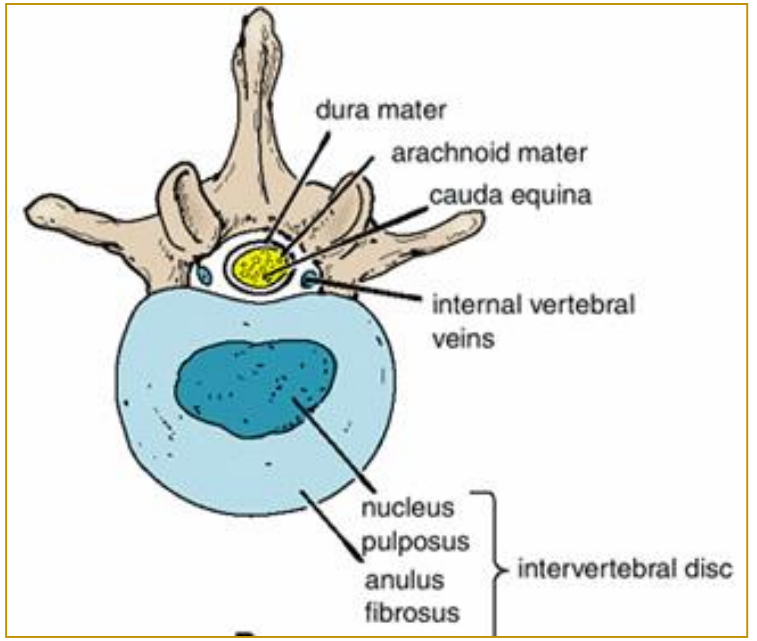


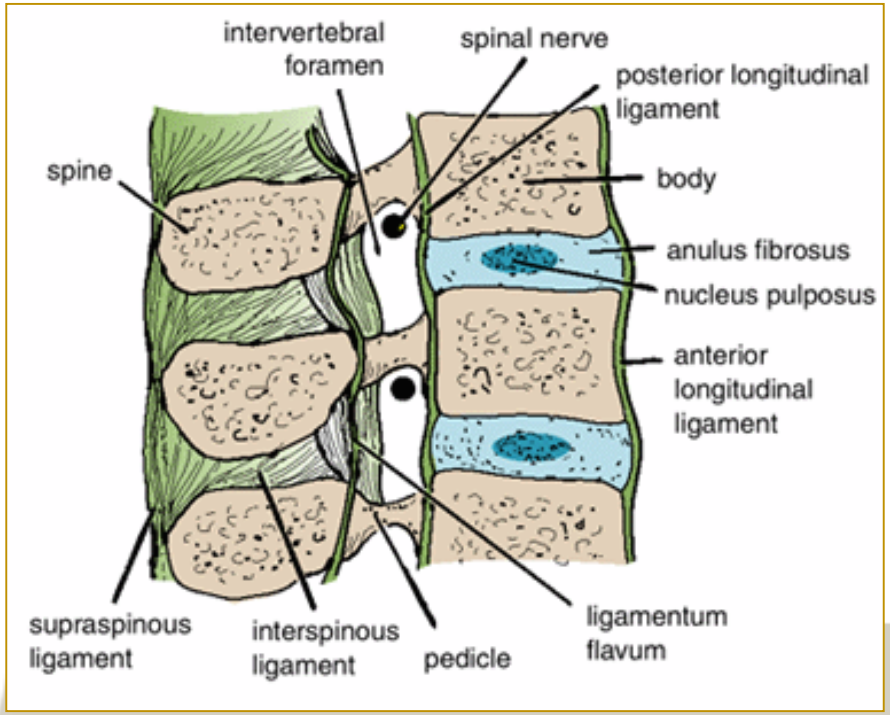
JOINTS BETWEEN TWO VERTEBRAL ARCHES:

Consist of synovial joints between the **superior** and **inferior articular processes** of adjacent 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 unlike the thoracic region which is LESS THICK and has less movement .
- **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** between the first & second cervical vertebrae or in the sacrum or coccyx.

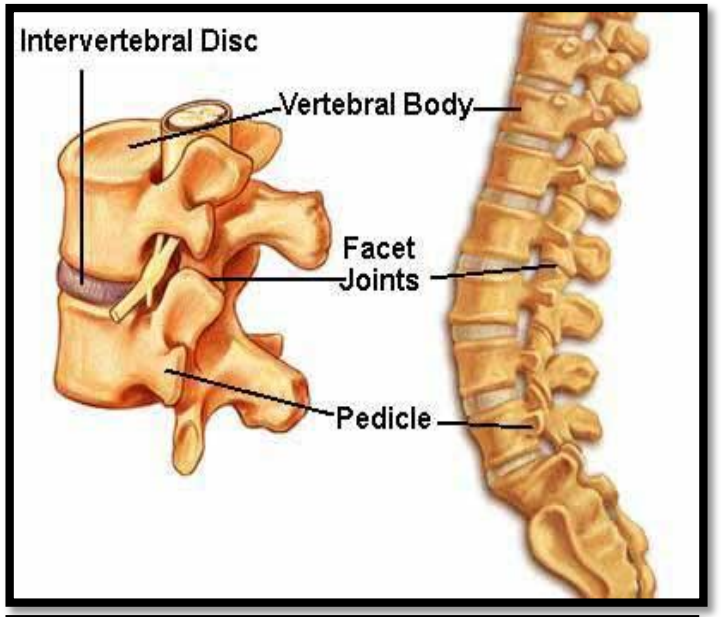




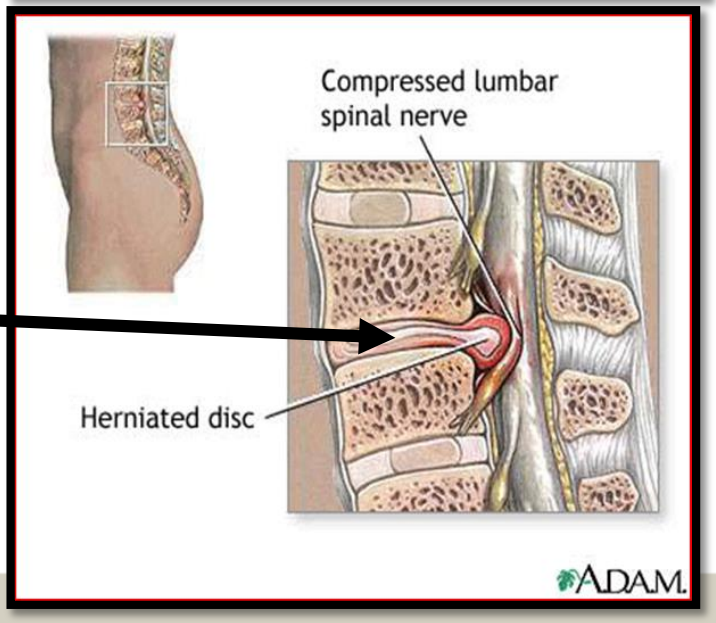
FUNCTION OF THE INTERVERTEBRAL DISCS:

1-Allow vertebra to rock forward or backward on another like **flexion and extension of vertebral column.**

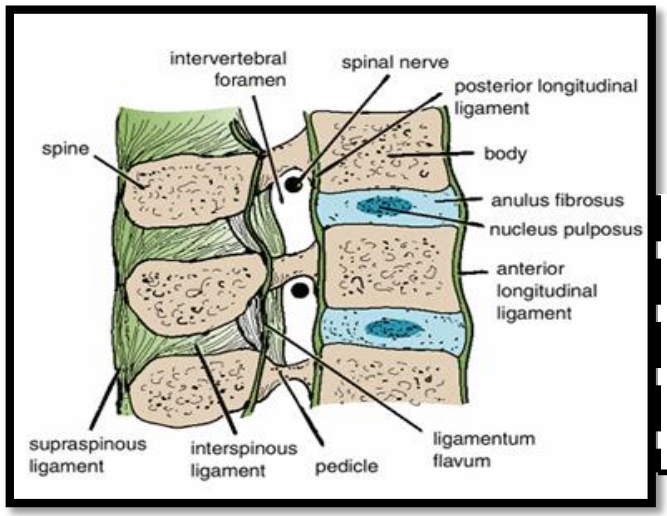
2- **Serve as shock absorbers** when the load on the vertebral column increased, as **when one is jumping from a height.**



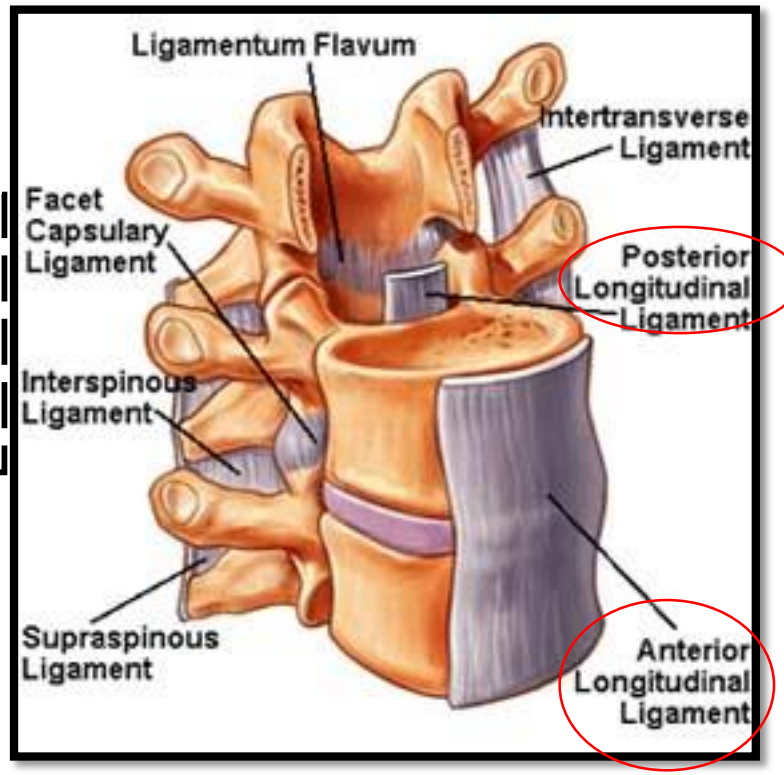
Sometimes, the **annulus fibrosus** ruptures, **allowing the nucleus pulposus to herniate and protrude into the vertebral canal**, where it may press on spinal nerve roots, spinal nerve, or even spinal cord.



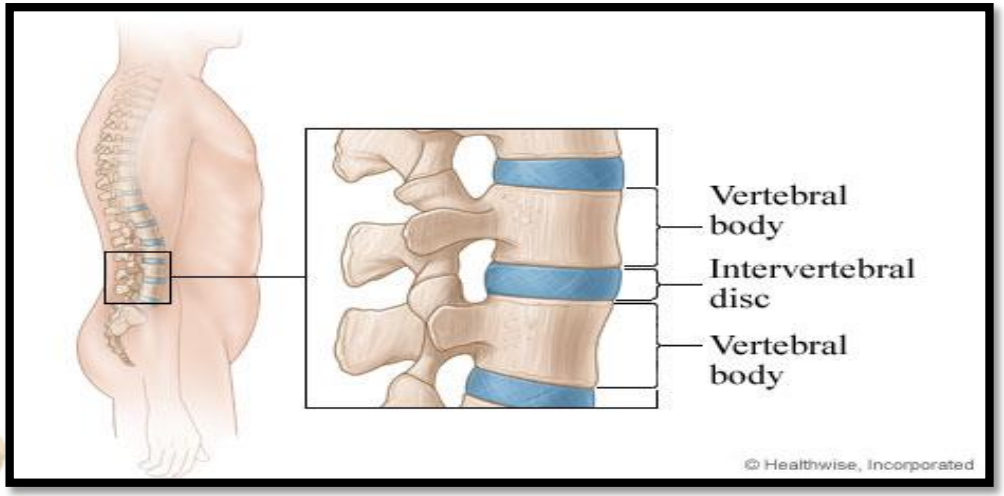
LIGAMENTS



•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	The posterior longitudinal ligament
wide and strongly	weak and narrow
attached to the front and sides of the vertebral bodies and to the intervertebral discs.	attached to the posterior borders of the discs



Ligaments;

hold the vertebrae firmly together

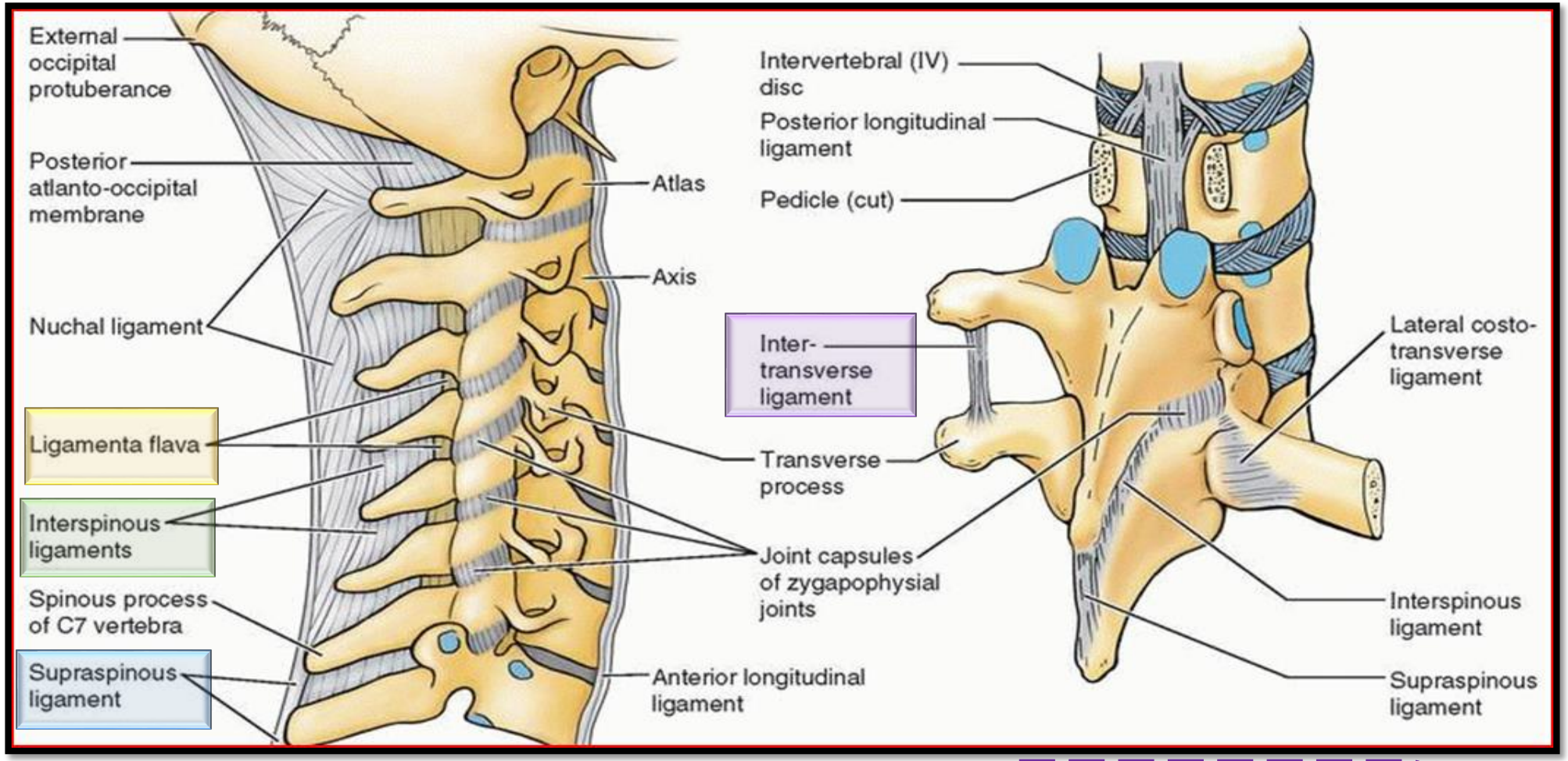
Produce a small amount of movement

LIGAMENTS

Ligamentum flavum: connects the laminae of adjacent vertebrae

Interspinous ligament: connects adjacent spines

Supraspinous ligament: runs between the tips of adjacent spines

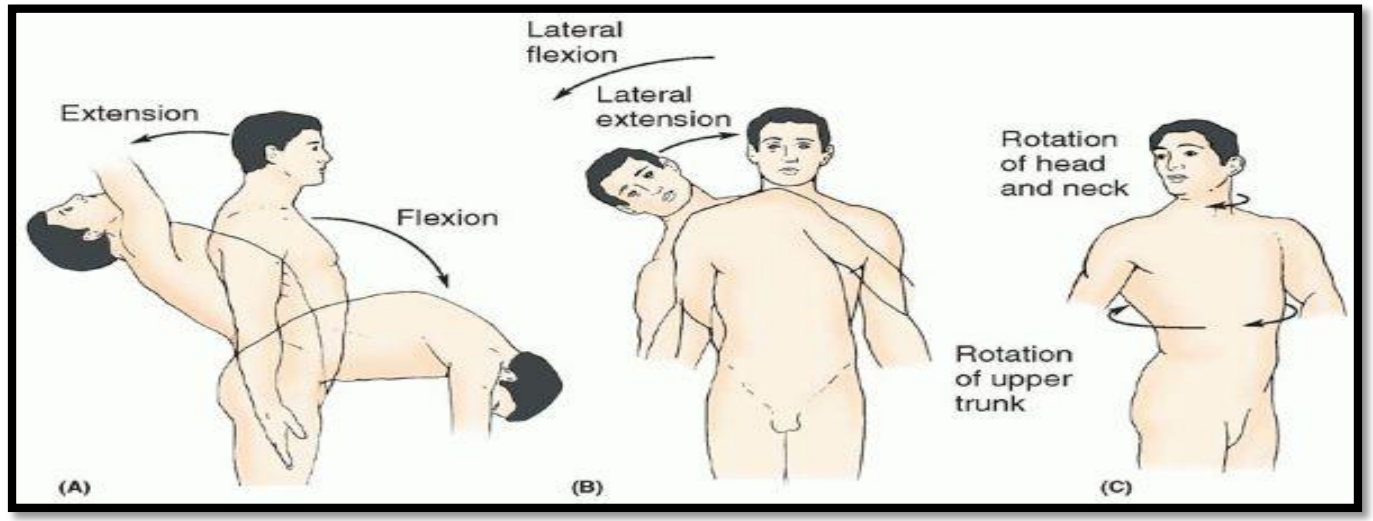


Intertransverse ligaments: run between adjacent transverse processes

MOVEMENTS OF THE THORACOLUMBAR SPINE

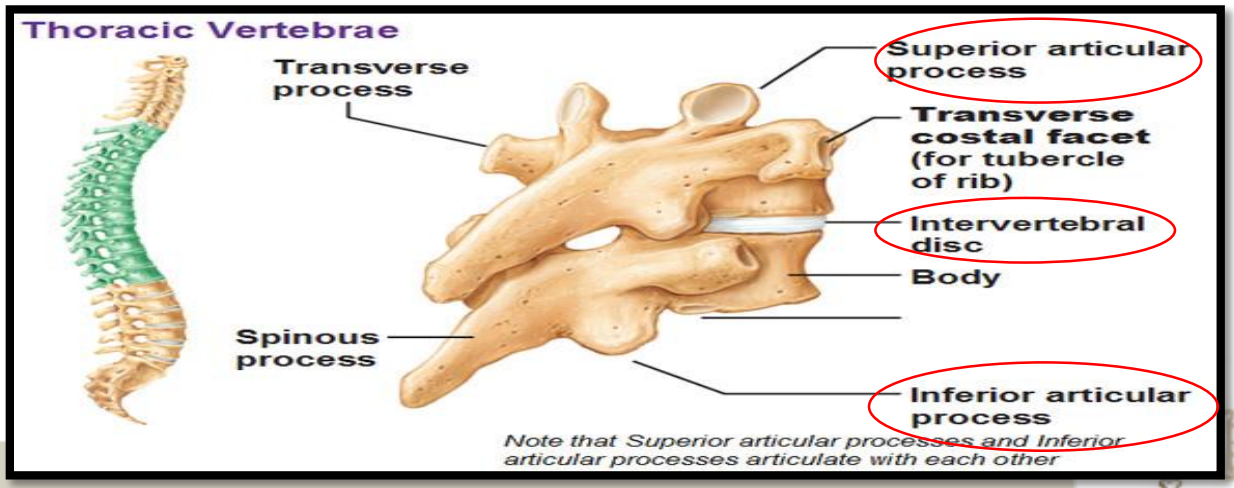
The following movements are possible on the spine:

1. **flexion,**
2. **extension**
3. **lateral flexion**
4. **Rotation**
5. **Circumduction = circular movement**



The type and range of movements depend on:

- Thickness of the intervertebral discs
- 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 Lateral flexion ⟹

Extensive in the lumbar regions Restricted in the thoracic regions

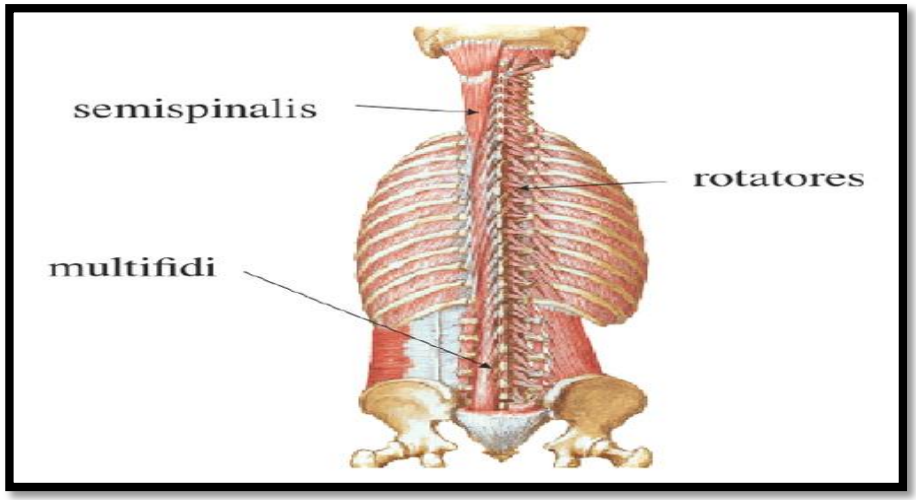
Rotation ⟹

Extensive in the thoracic regions Less extensive in the lumbar regions

MUSCLES PRODUCING MOVEMENTS

Thoracic Region

Rotation produced by semispinalis and rotator muscles, assisted by the oblique muscles of the anterolateral abdominal wall.

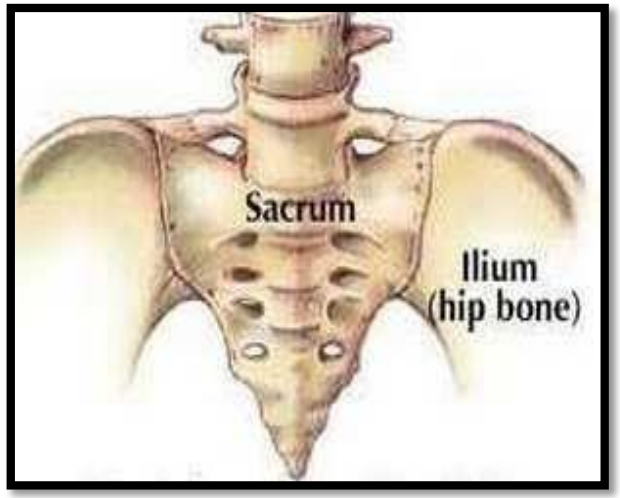


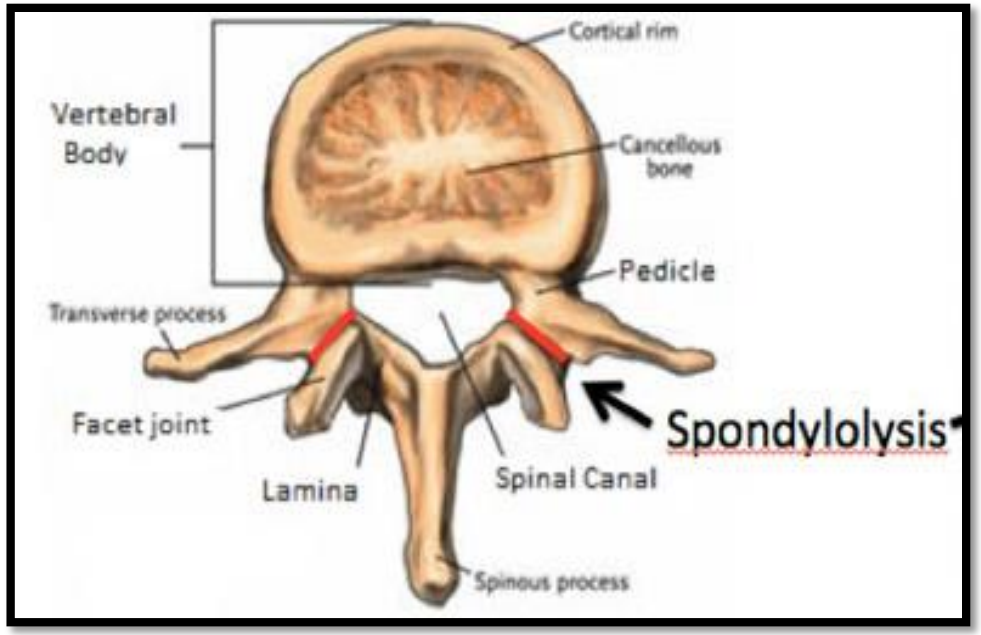
Lumbar Region

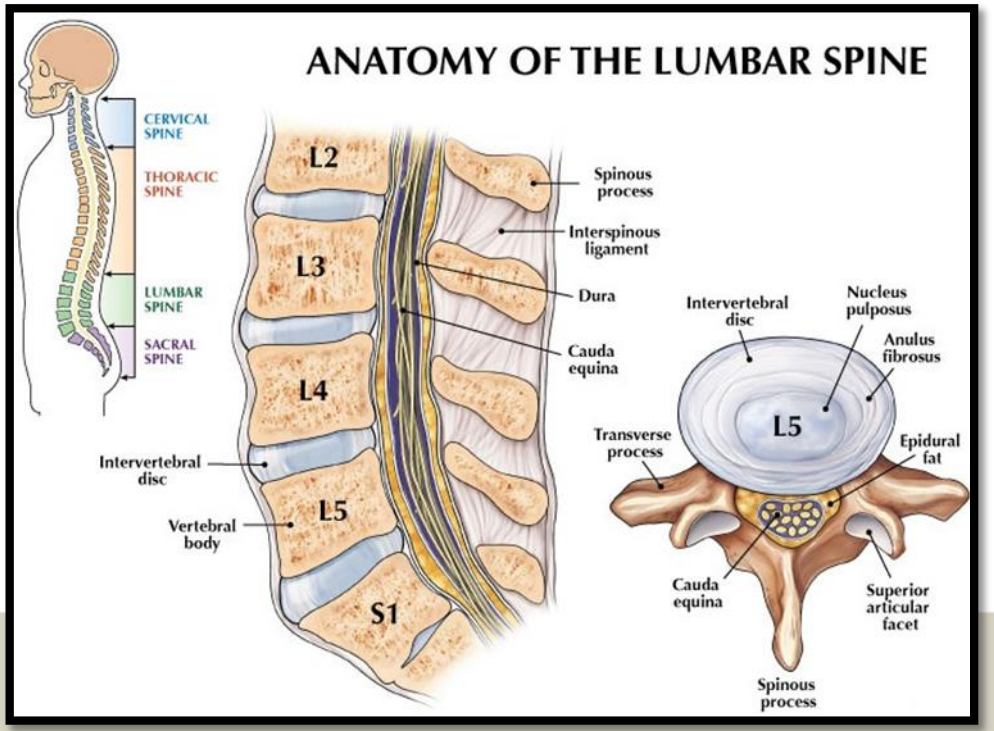
Flexion	produced by the rectus abdominis and the psoas muscles.
Extension	produced by the postvertebral muscles.
Lateral flexion	produced by the postvertebral muscles, the quadratus lumborum, and the oblique muscles of the anterolateral abdominal wall. The psoas may also play a part in this movement.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

Vertebra L5

- The largest movable vertebra.
- It has 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

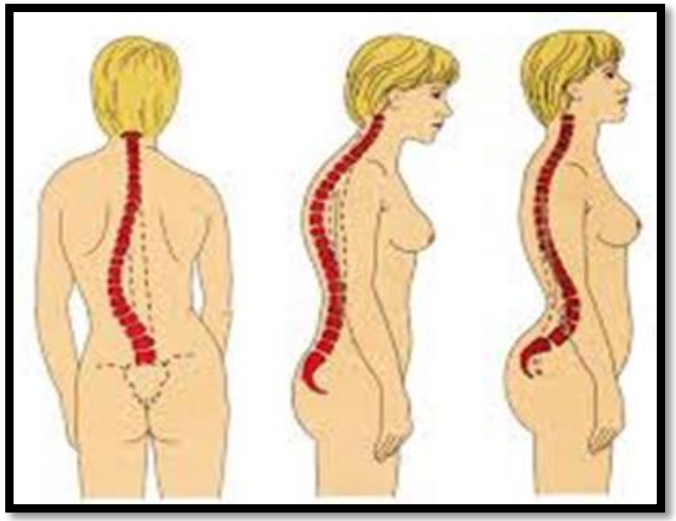




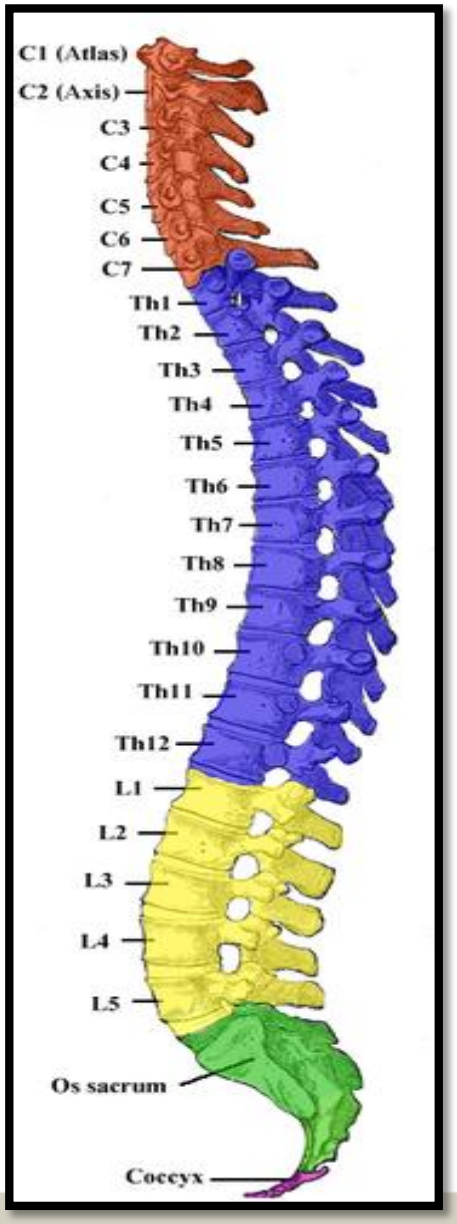


Vertebra L5

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).

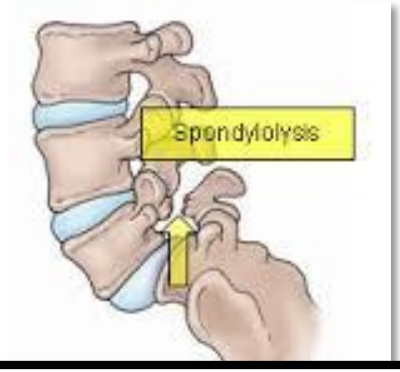


Scoliosis Kyphosis Lordosis



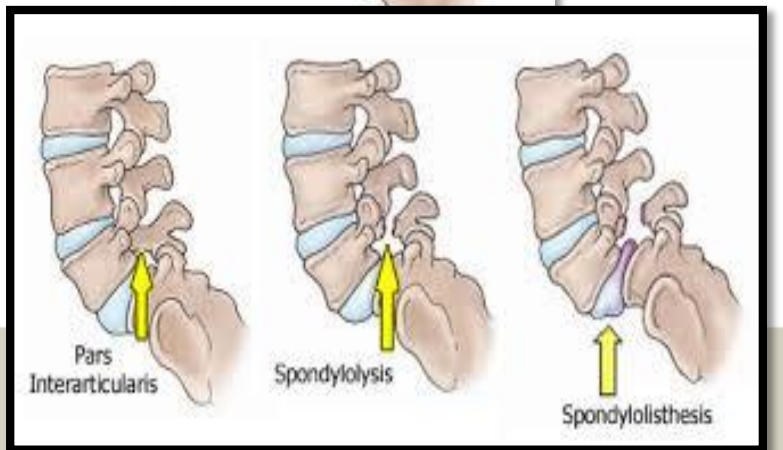
Normal Curvatures in Spine

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



Abnormal Curvatures of spine :

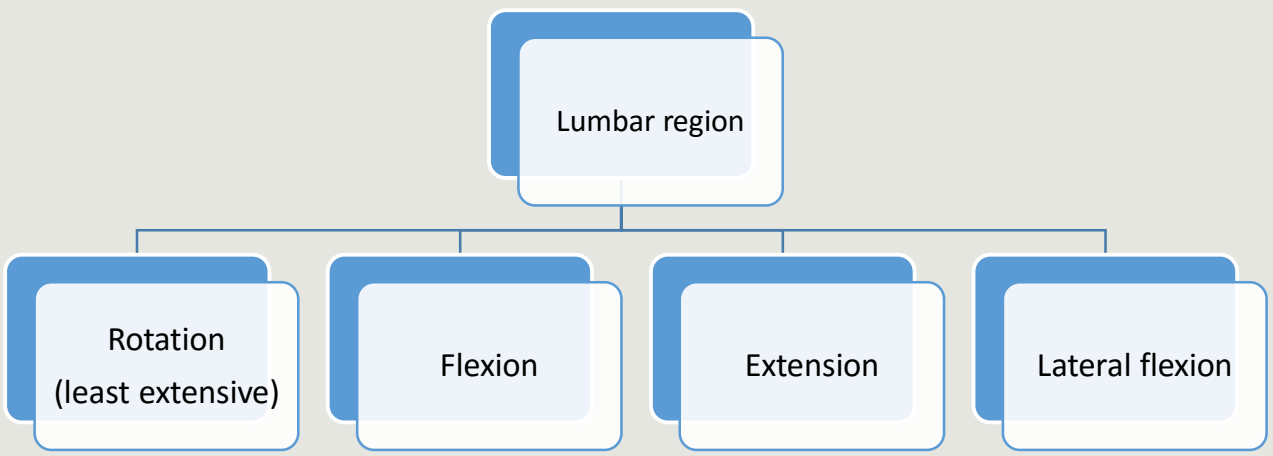
- Exaggerated **Thoracic** curvatures **(Kyphosis)**
- Exaggerated **lumbar** curvature **(Lordosis)**
- Lateral curvature of spine. **(Scoliosis)**

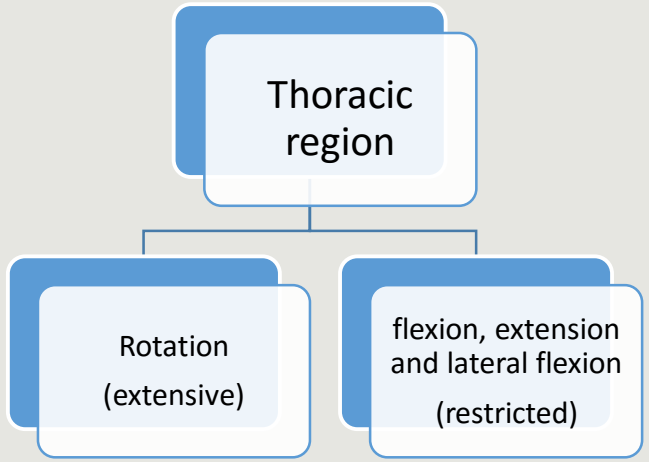


☺ SUMMARY

- There are 12 thoracic vertebrae that articulate with the rib cage .
- There are 5 lumbar vertebrae that are strong and highly flexible.
- Superior articular processes facets face backward and laterally, where as the Inferior articular processes face forward and medially.
- Cartilaginous joint between the bodies of the vertebrae and synovial joints between the vertebral arches .
- Only movement in the thoracic region is rotation, where as the lumber region has a variety of movements .

Type and range of movements





Don't forget

- No discs between the first & second cervical vertebrae and in the sacrum or coccyx.
- Rupture o f the Annulus fibrosus may cause the nucleus pulposus to herniate pressing on the surrounding nerves.
- Normal curvatures in thoracic and lumbar spine .

Video:The spinal ligaments
https://www.youtube.com/watch?v=GQ4193o5Q7Q

Video: Spine Anatomy 3D animation
https://www.youtube.com/watch?v=178XnTK5uHk

Application: Essential anatomy 5
you can have it for free, ask
https://twitter.com/Med_435

Quiz: https://www.onlineexambuilder.com/thoracolumbar-spine/exam-48810

هذا العمل إجتهاد من طلاب و طالبات

إن أصبنا فمن الله و إن أخطأنا فمن أنفسنا و من الشيطان

TEAM MEMBERS:

Group (2) Leader:

Fahad AlAbdullatif

Group(2) members:

Faisal AlJammaz
Faisal AlYahya
Saad AlMotairi
Hassan AlShammasi
Abdulwahab AlMansour
Talal AlEbewani
Abdullah AlMushawah
Ibrahim AlSuhaim
Fahad AlHomaid

TEAM LEADERS:

Ghaida Aljamili
Elham Alzahrani
Abdullah Alfuraih

Boudor Julaidan

- For questions and suggestions you can contact us on Anatomy435@gmial.com

Editing Team (boys):

Khaled Al Jedia **Rawhdan Al Nahdi** **Abdulwahab Sanari**