The University Of Jordan
Faculty Of Medicine

The Vertebral Column

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Vertebral Column

It is composed of 33 vertebrae;

7 cervical,

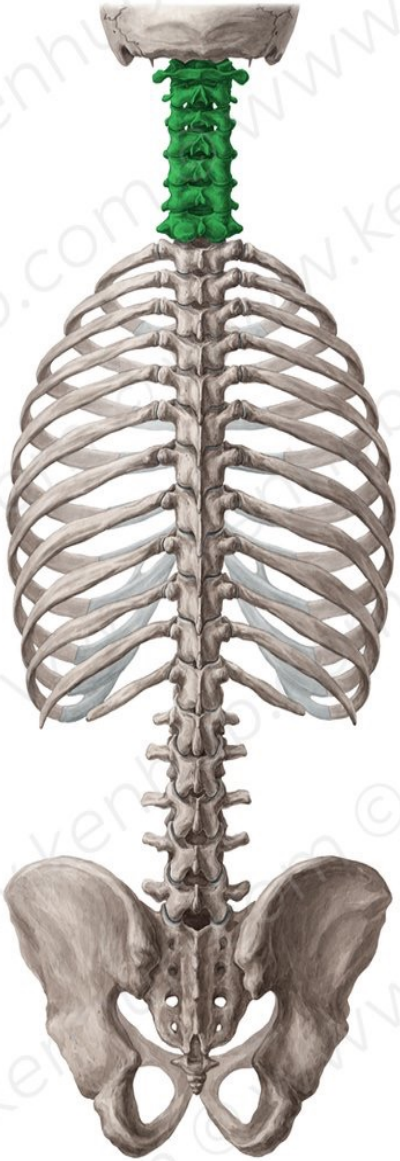
12 thoracic,

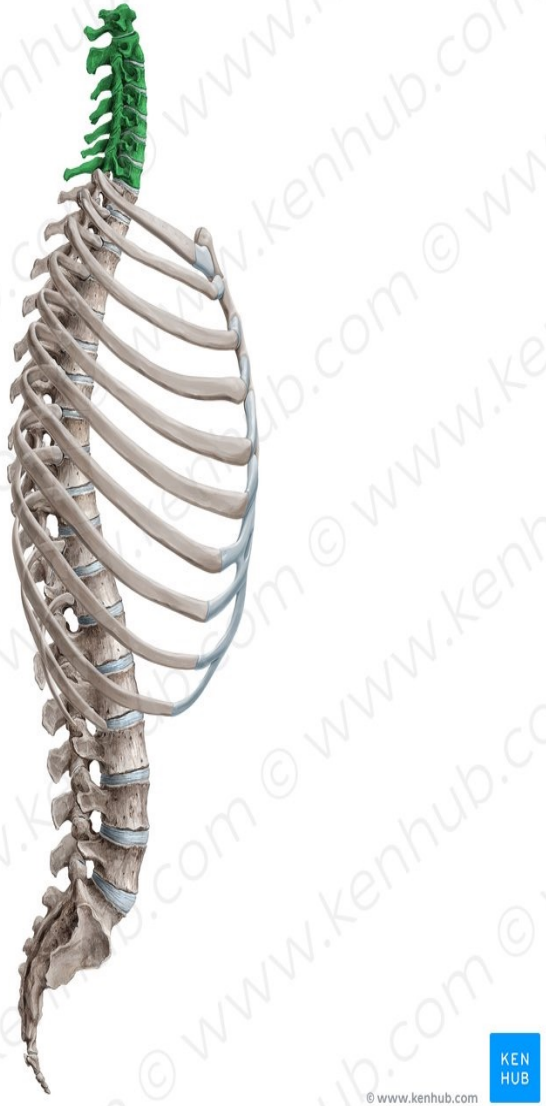
5 lumbar,

5 sacral,

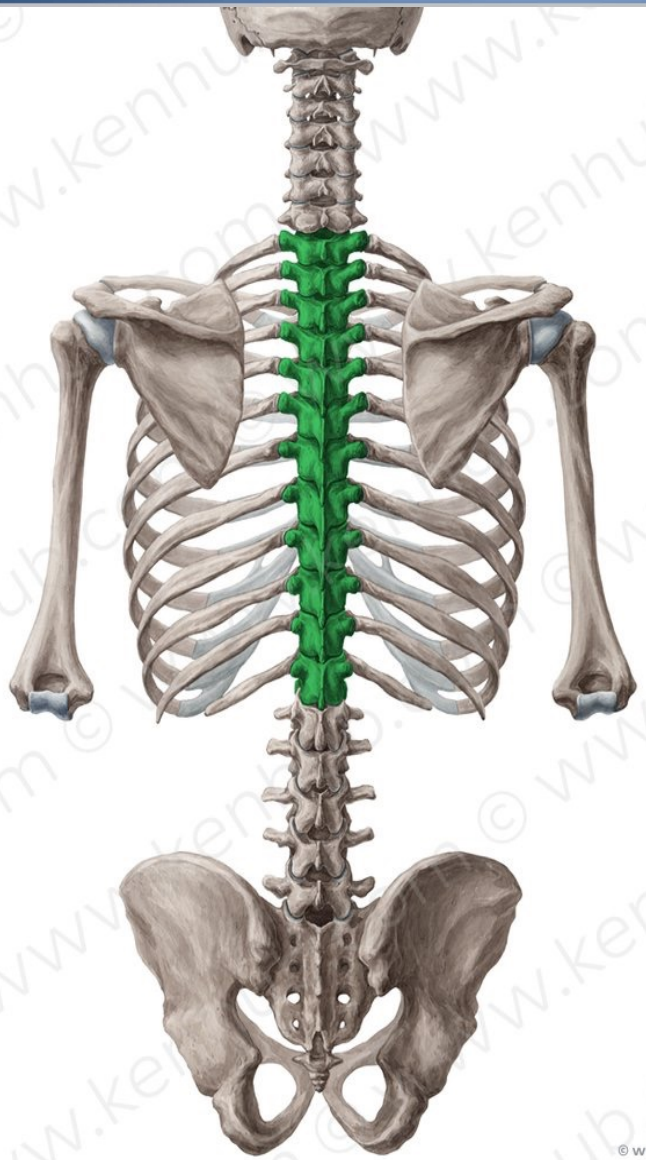
4 coccygeal separated from each other by intervertebral discs.

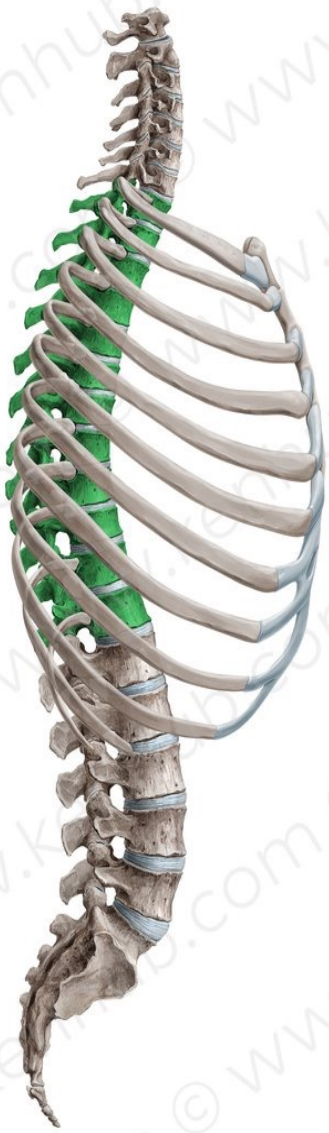
Cervical Region



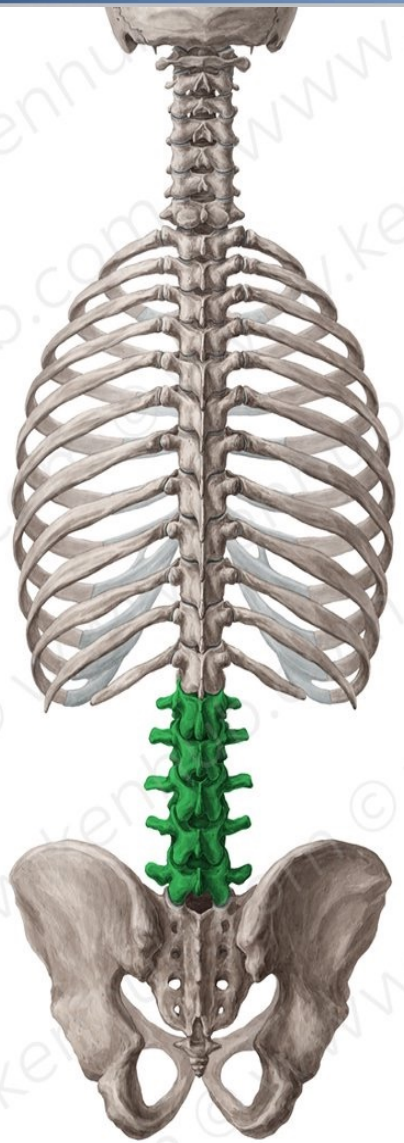


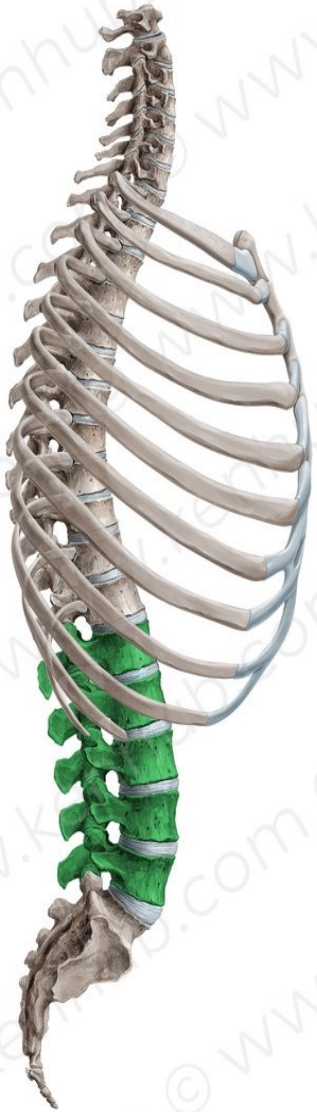
Thoracic Region





Lumbar Region





Sacral Region

Structure of a Typical Vertebrae

1- Vertebral Body

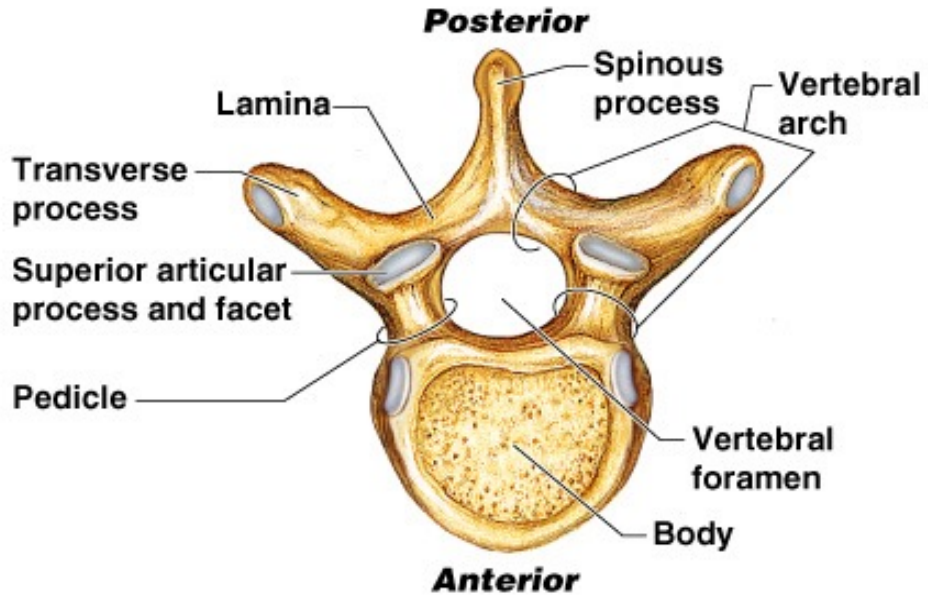
2-Vertebral arch ; composed of two pedicle and two lamina

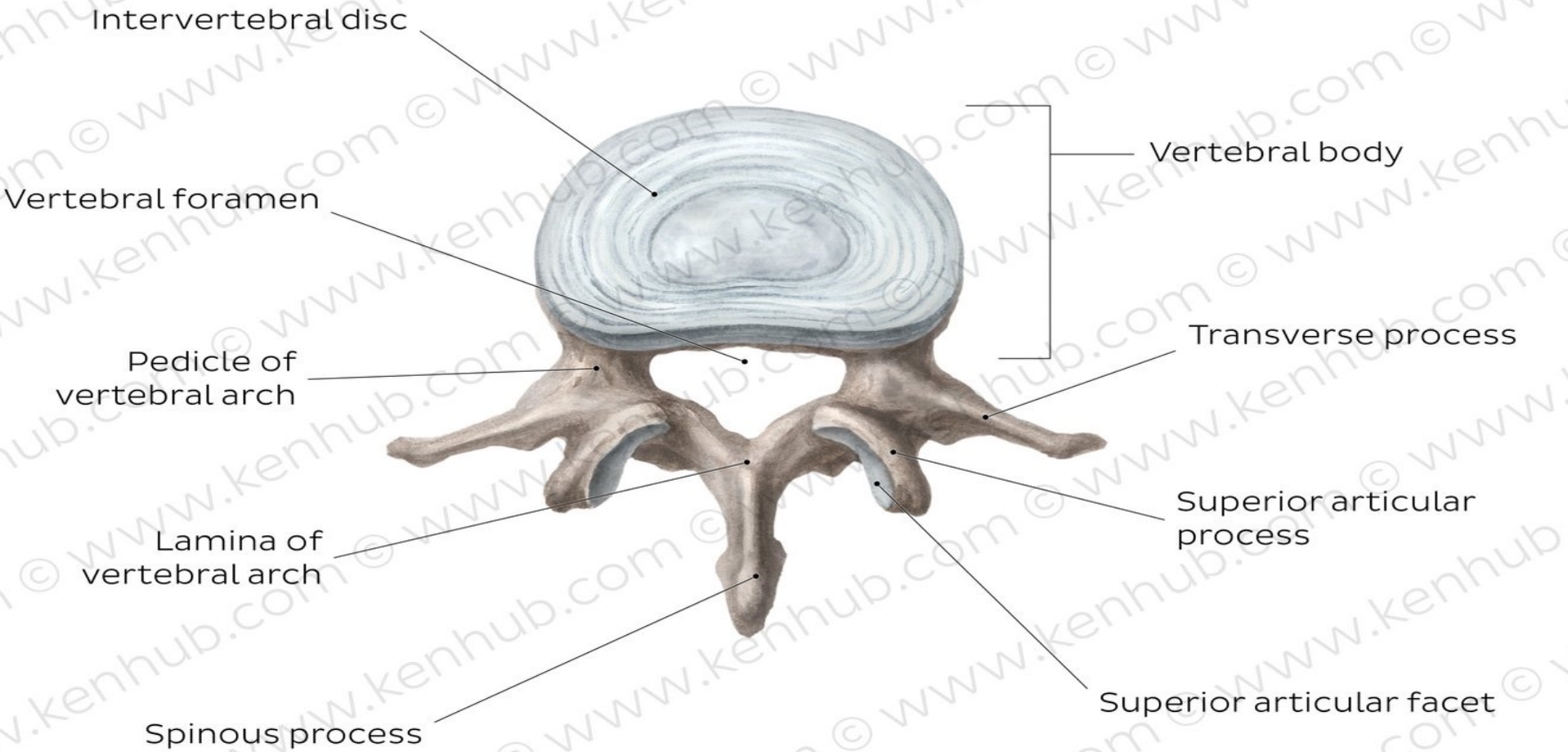
3-Vertebral Foramen between Body and arch transmits spinal cord

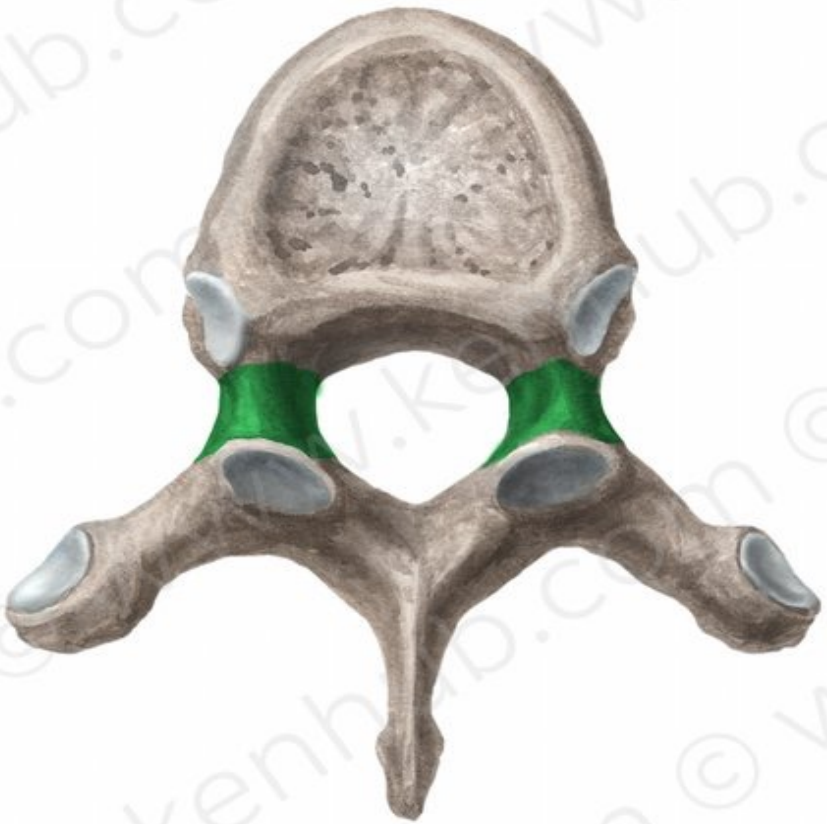
4- Intervertebral foramens transmit the spinal nerves

5- Seven processes

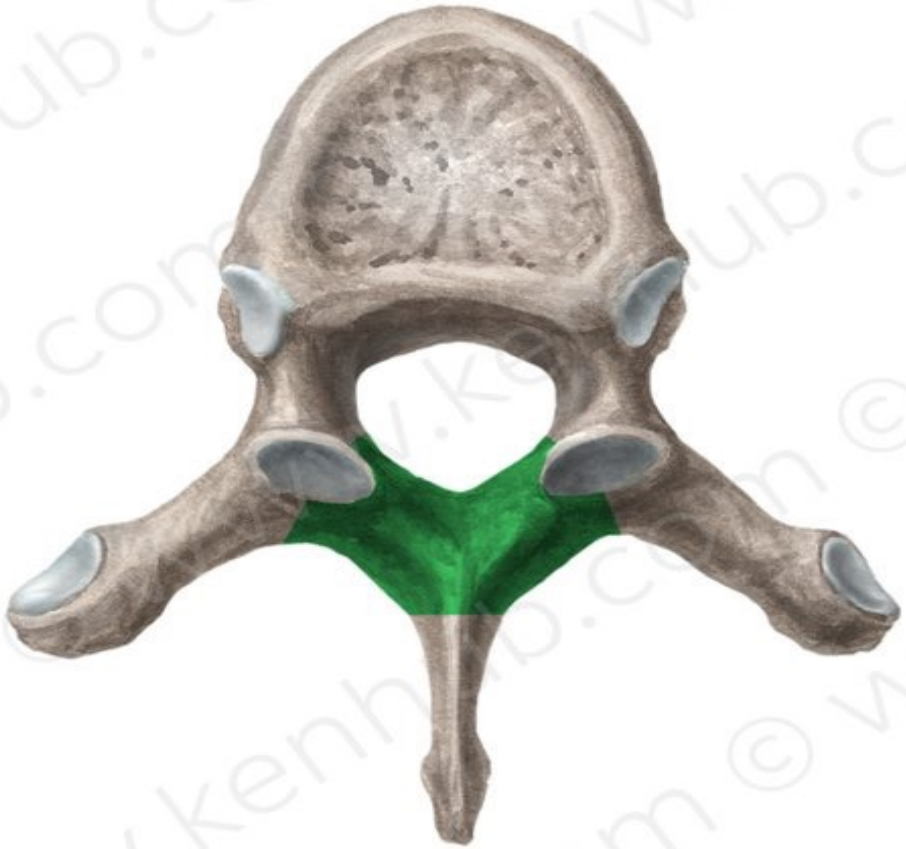
- 2 Transverse
- 2 Superior articular
- 2 Inferior articular
- 1 Spine



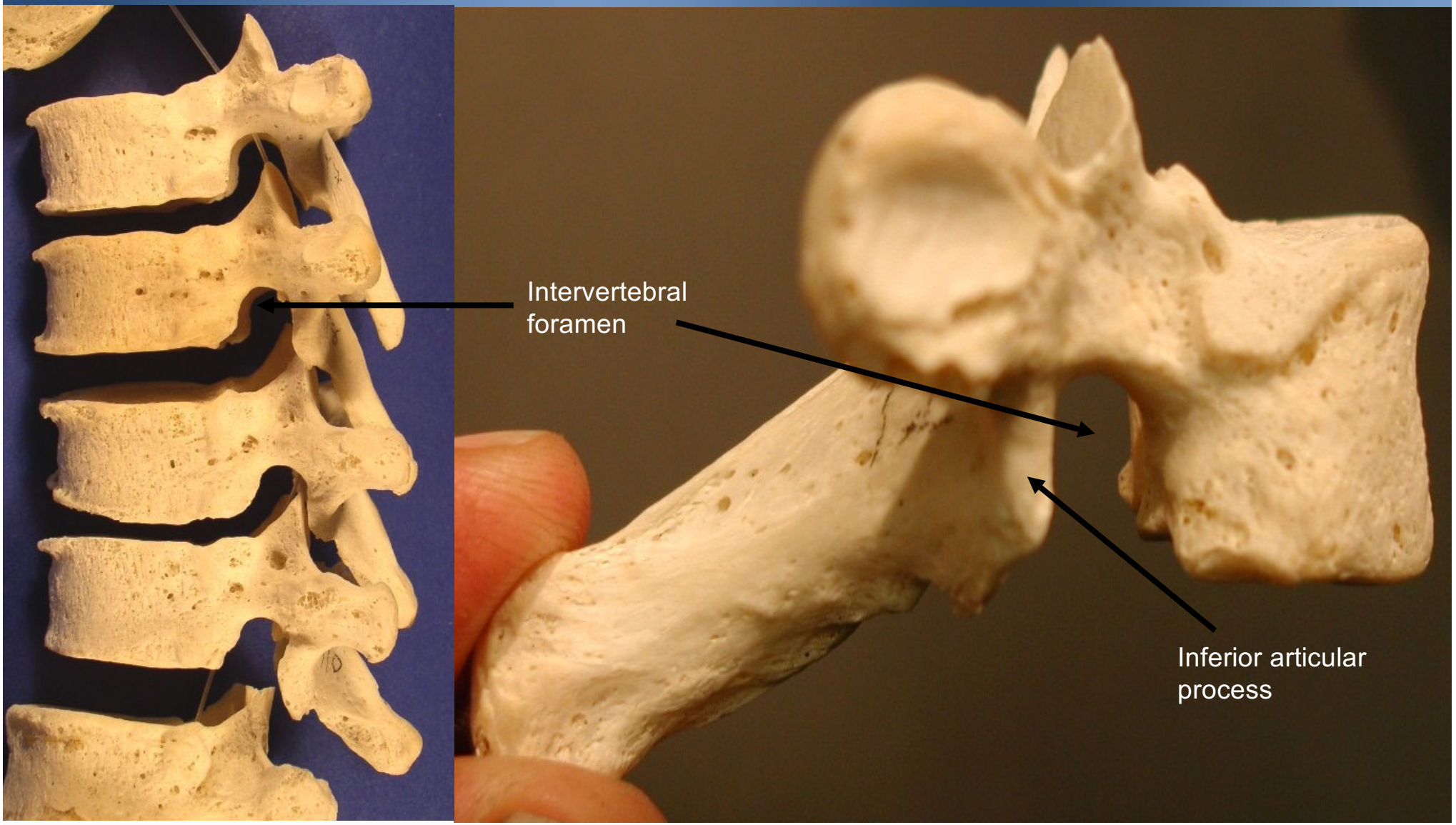


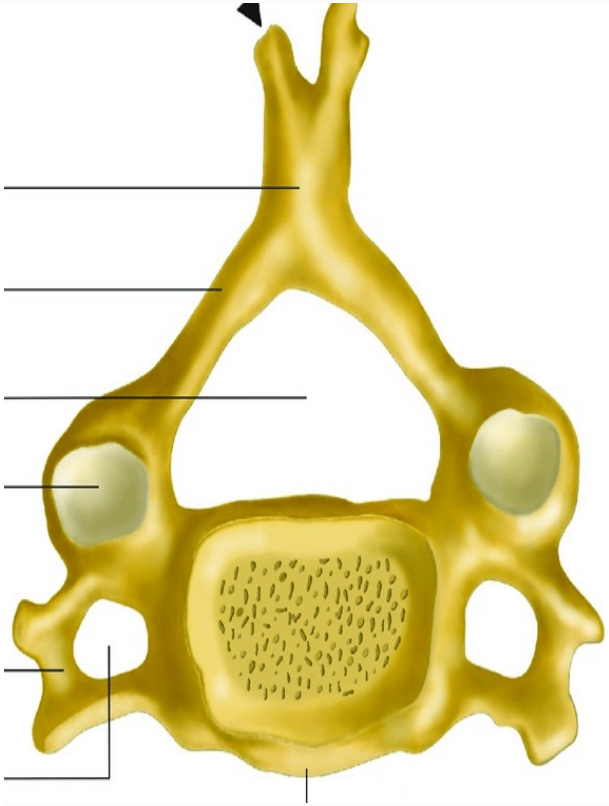


Pedicle



Lamina





Cervical

Thoracic

Lumbar

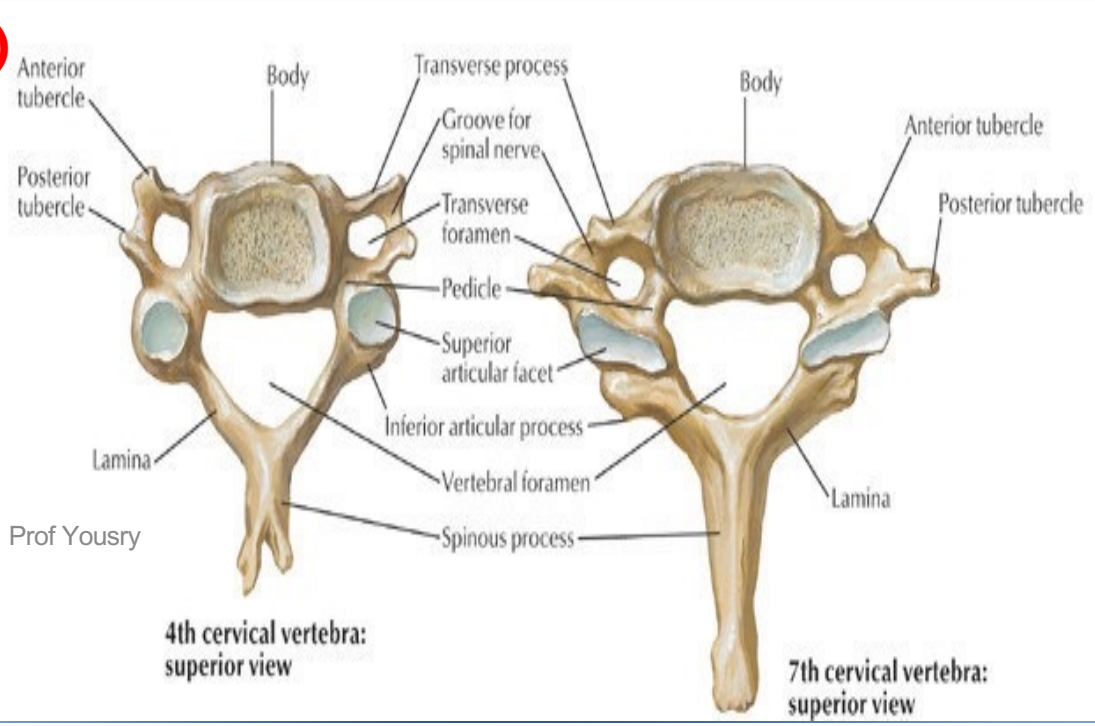
TYPICAL CERVICAL VERTEBRA

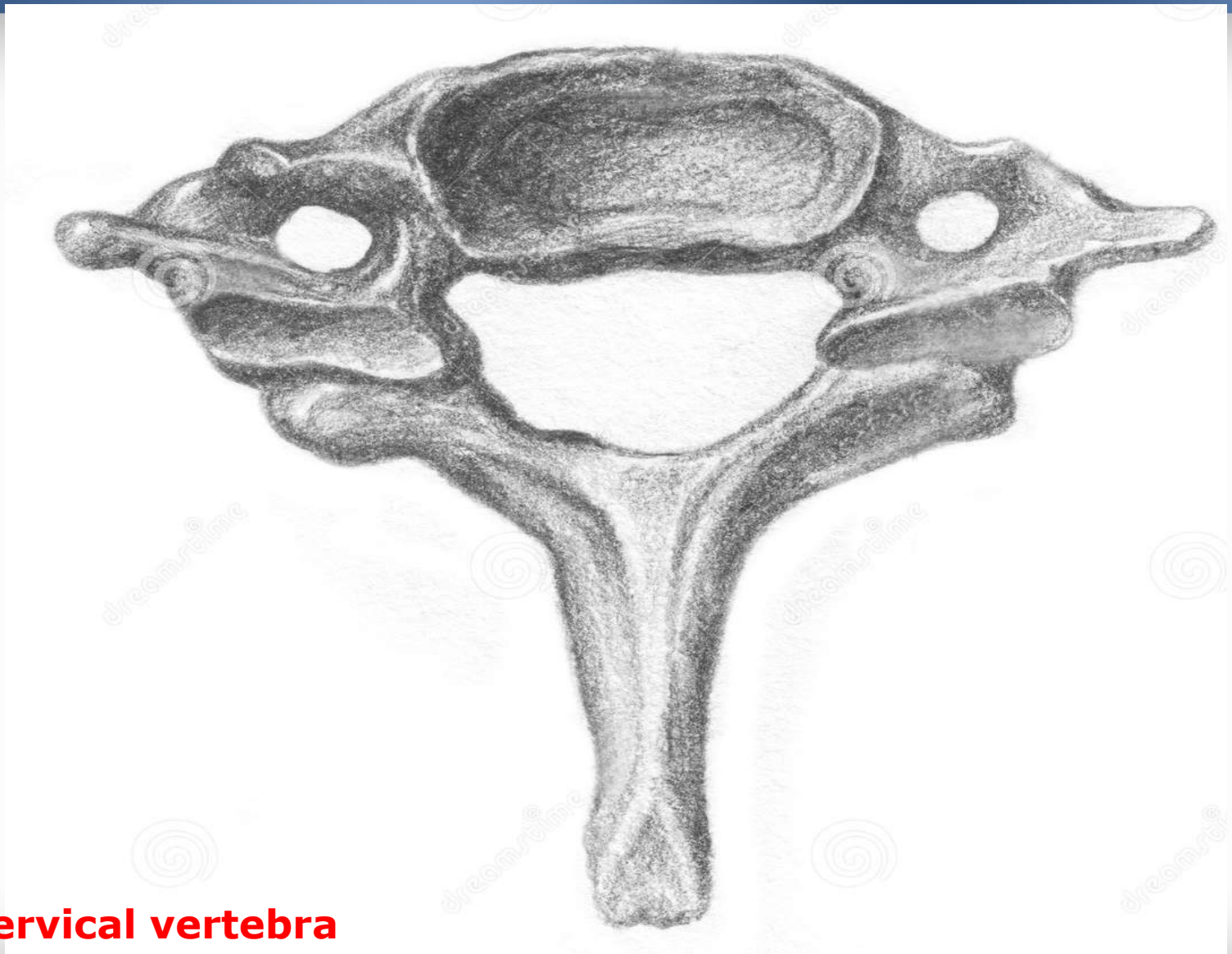
- The body is small & oval.
- The foramen is large triangular.
- The transverse processes are short, bifid with a foramen (foramen transversarium) which transmit vertebral artery and vein .
- The spine is short & bifid.

7th cervical vertebra (ATYPICAL)

(vertebra prominens)

It has the longest not bifid spinous process





7th cervical vertebra

Atlas and axis

Atlas :

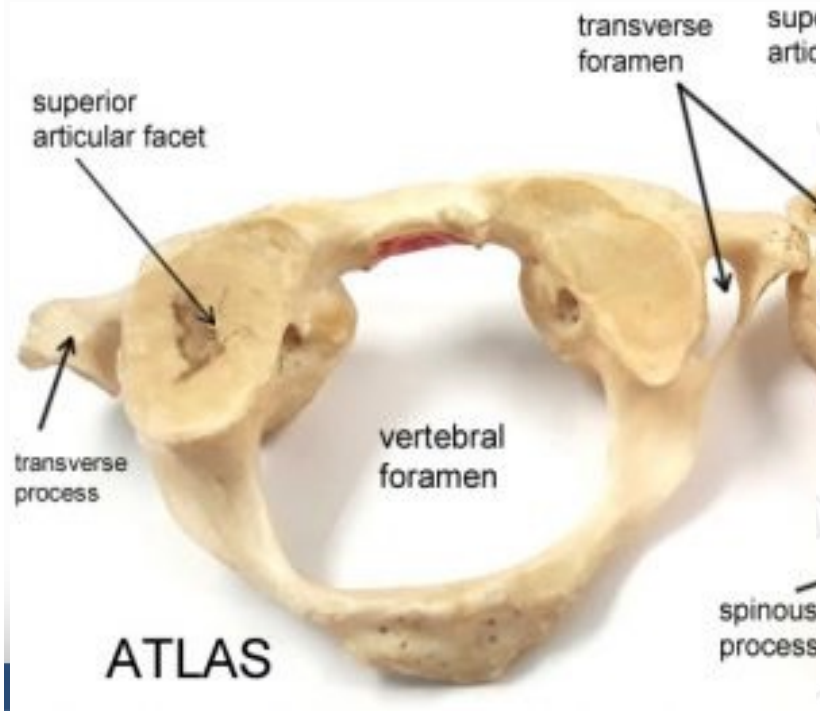
-Is the 1st cervical vertebra.

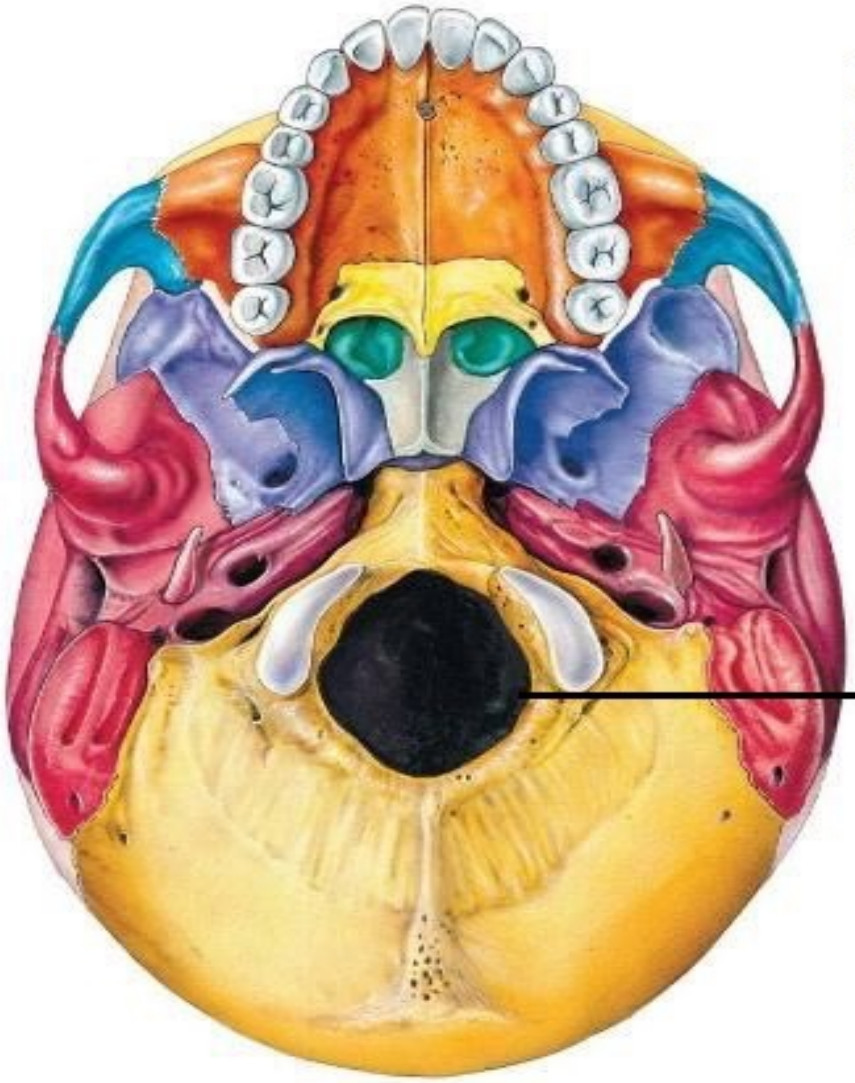
-It is ring-shaped and has two **lateral masses** connected by an **anterior arch** and a **posterior arch**.

- Each lateral mass articulates

Above with an **occipital condyle** of the skull

Below with the superior articular process of **axis** vertebra.

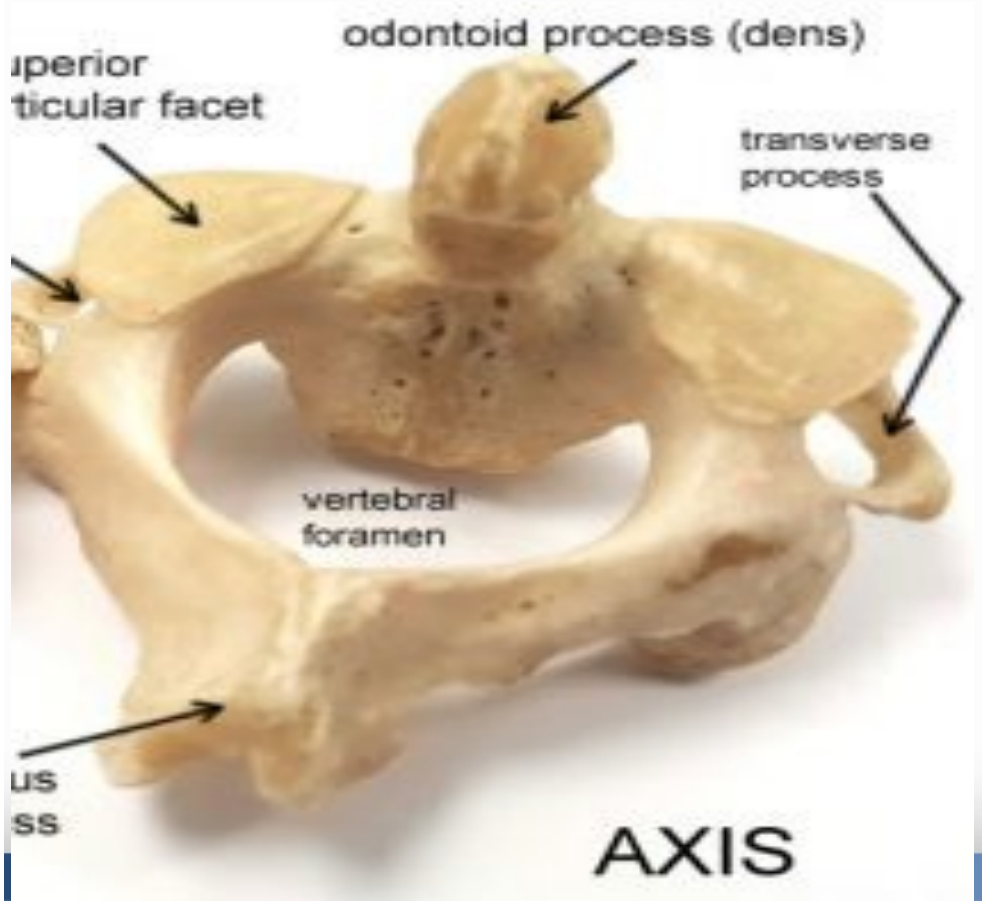




Location and
Structures
Passing through

Foramen
Magnum

Axis : is the 2nd cervical vertebra & is characterized by the large tooth-like dens (odontoid process), which extends superiorly from the vertebral body.



TYPICAL THORACIC VERTEBRA

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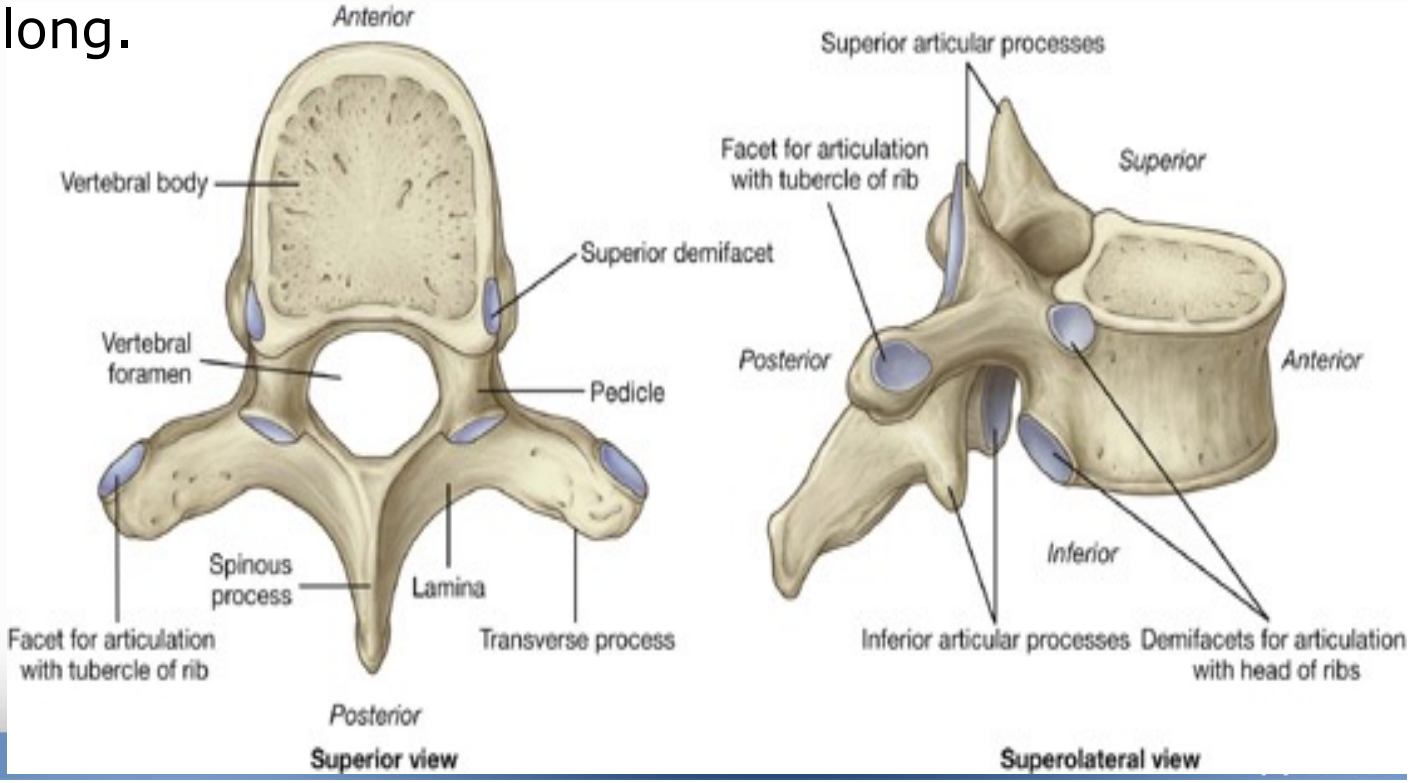
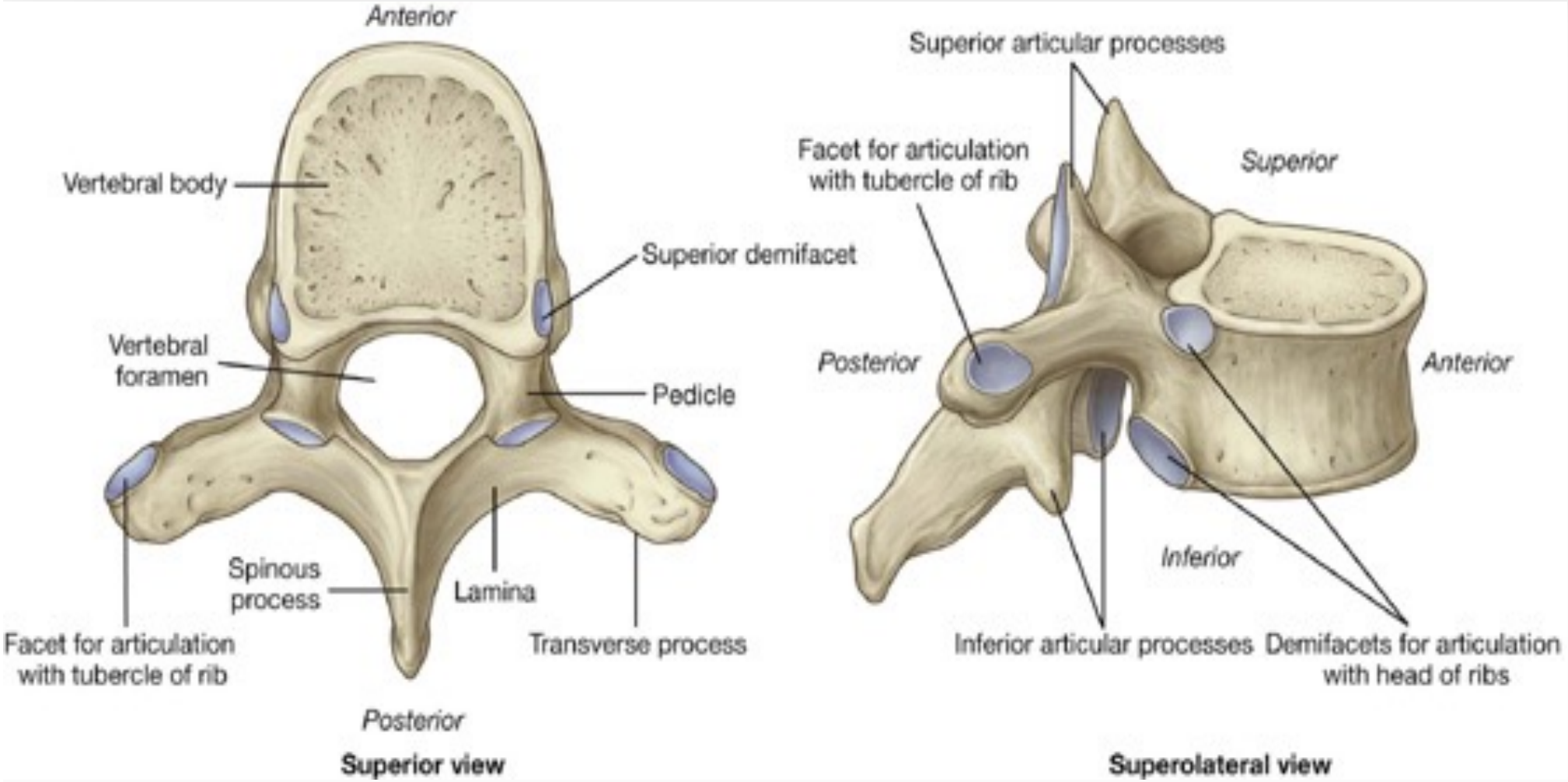
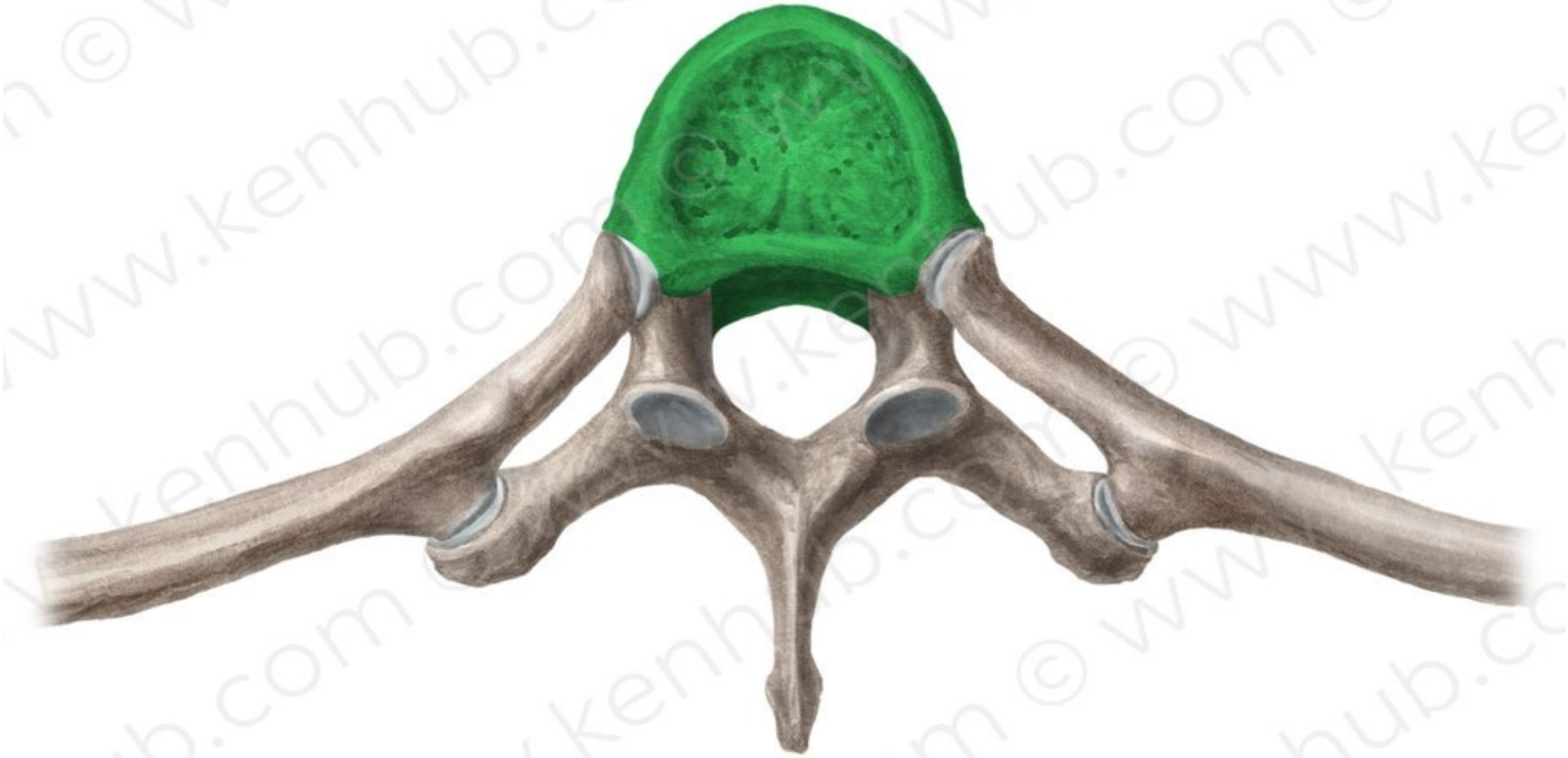
- The body is moderately sized & heart shaped.
- The foramen is small rounded.
- The transverse processes are large with impression for the rib & directed posterolaterally.
- The spine is large & long.



Typical thoracic vertebrae





LUMBAR VERTEBRA

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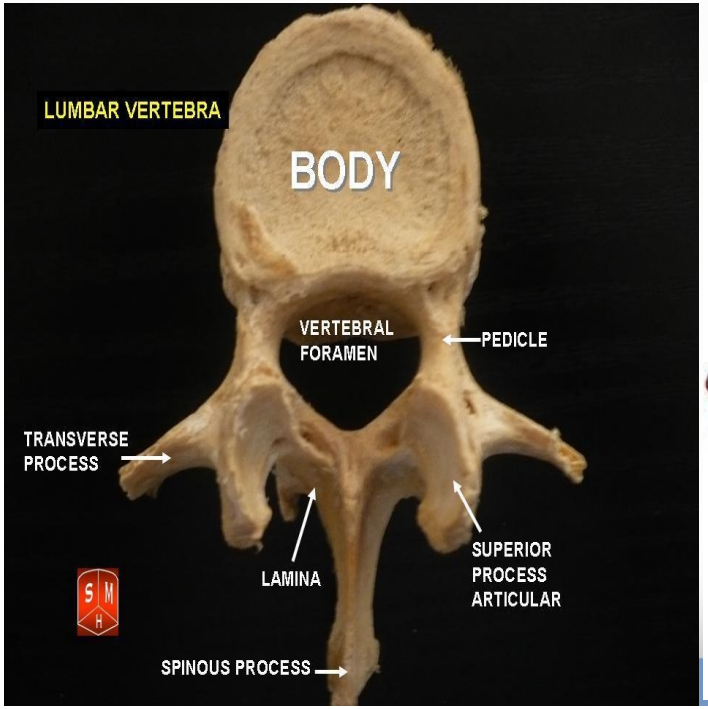
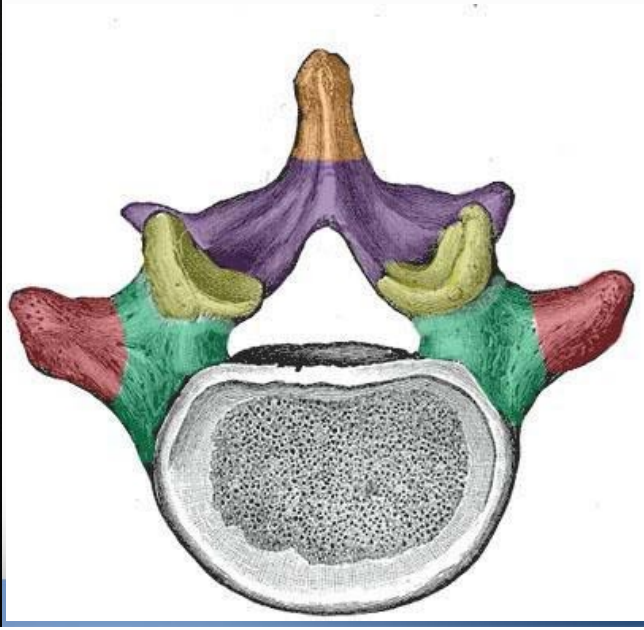
- The body is large kidney shaped.
- The foramen is large triangular.
- The transverse process is thin & directed laterally.
- The spine is short, thick & broad.

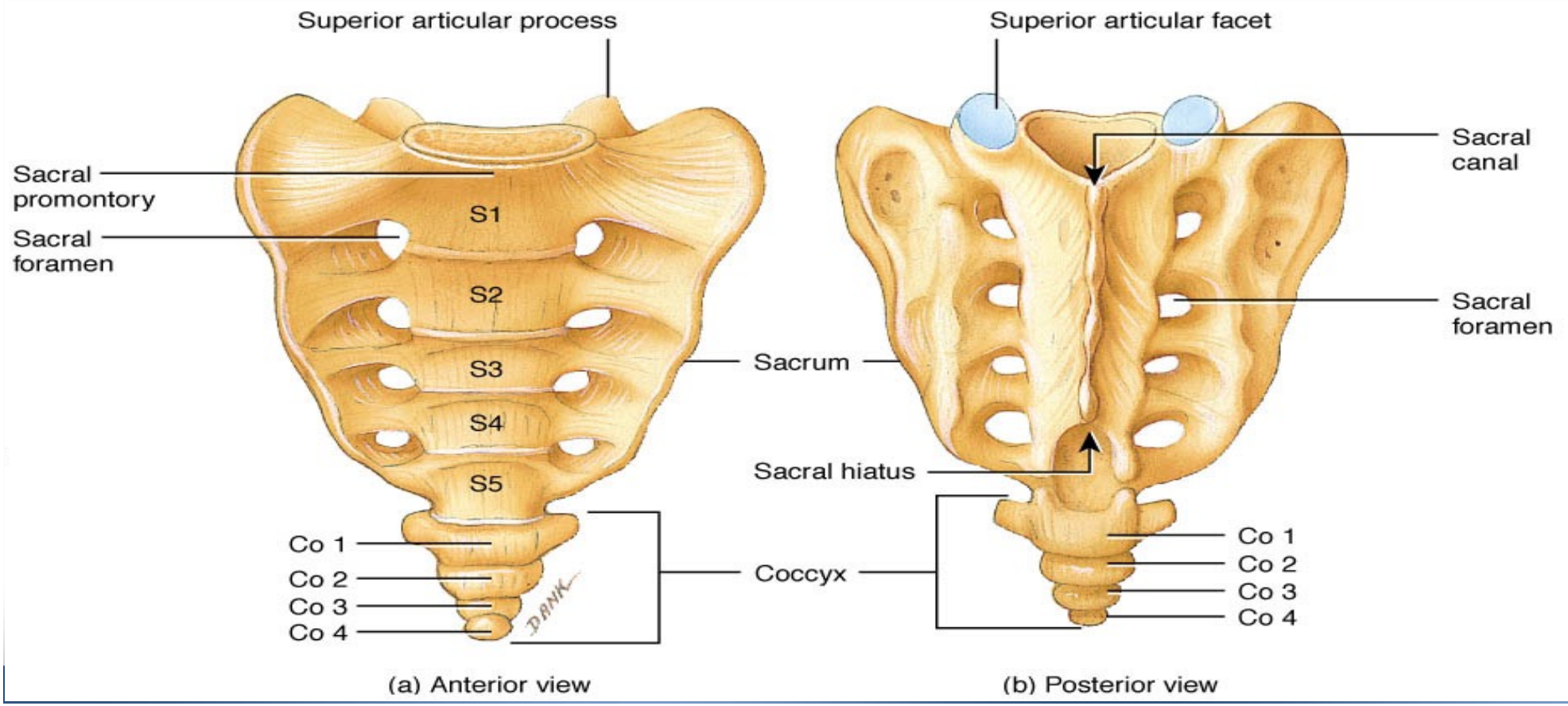




Spinous process
Lamina
Superior articular processes
Pedicles
Transverse processes

THE SACRUM & COCCYX

- The 5 sacral vertebrae join to form one mass known as the sacrum.
- It is roughly triangular with a base above & apex below & has 4 Anterior & 4 posterior sacral foramina
- The coccygeal segments join to form one mass known as the coccyx.



Comparison between vertebrae

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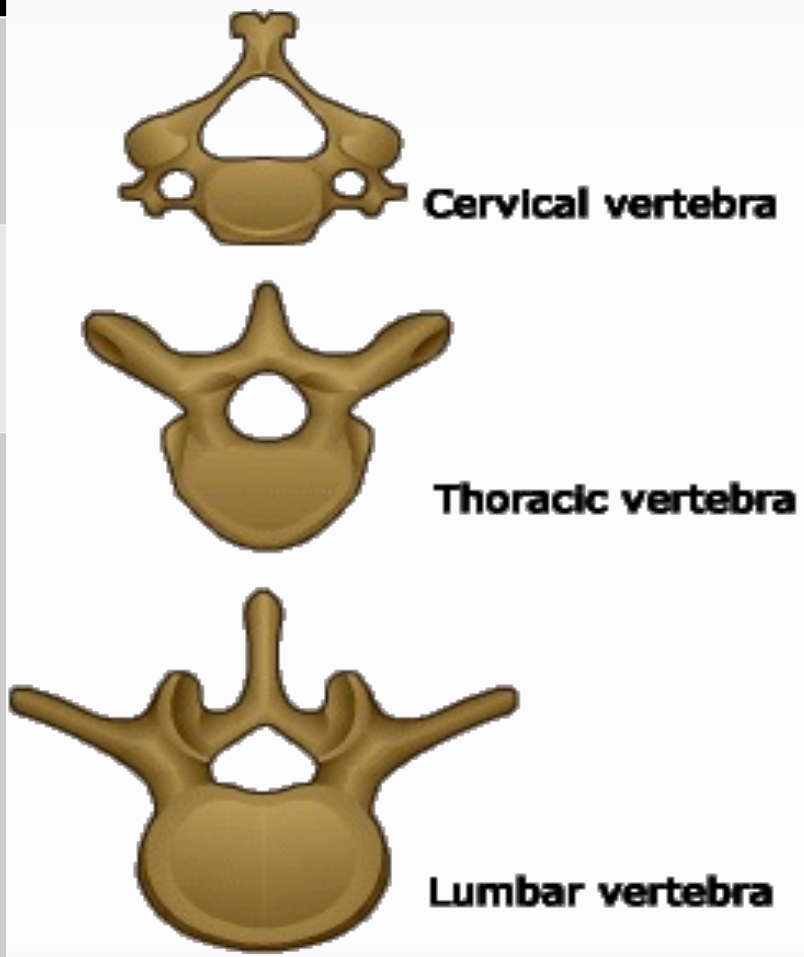
	Cervical	Thoracic	Lumbar
Body	Small - oval	Moderate - round	Large – kidney shape
Foramen	Large triangular	Small round	Large triangular
Arch	-Short bifid transverse process with a foramen. - Short bifid spine	-Thick large transverse process with rib facet. - Long strong spine	-Thin short transverse process. - Short, broad, horizontal spine.



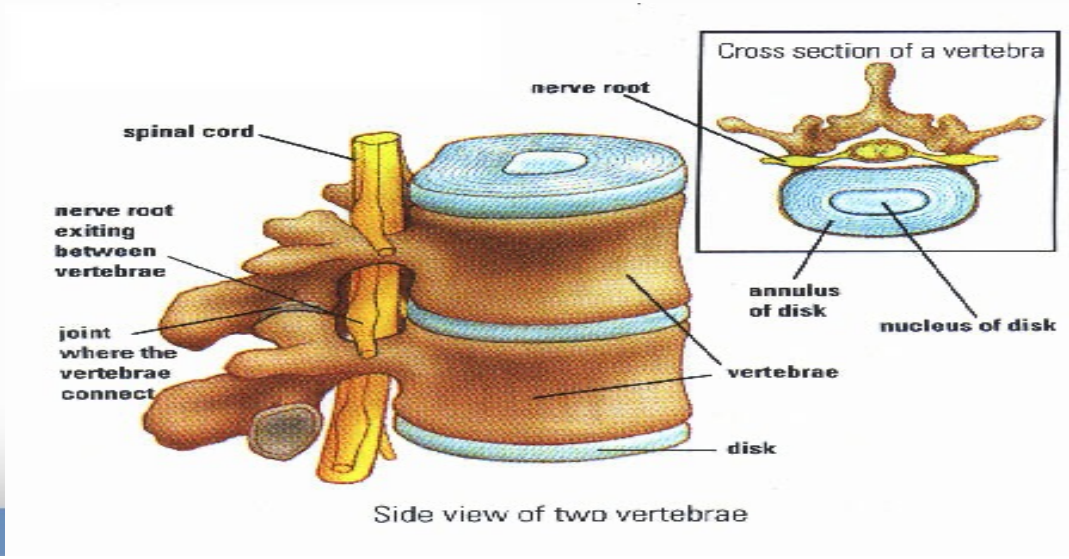
Joints of the Vertebral Column

The vertebrae articulate with each other by cartilaginous joints between their bodies and by synovial joints between their articular processes.

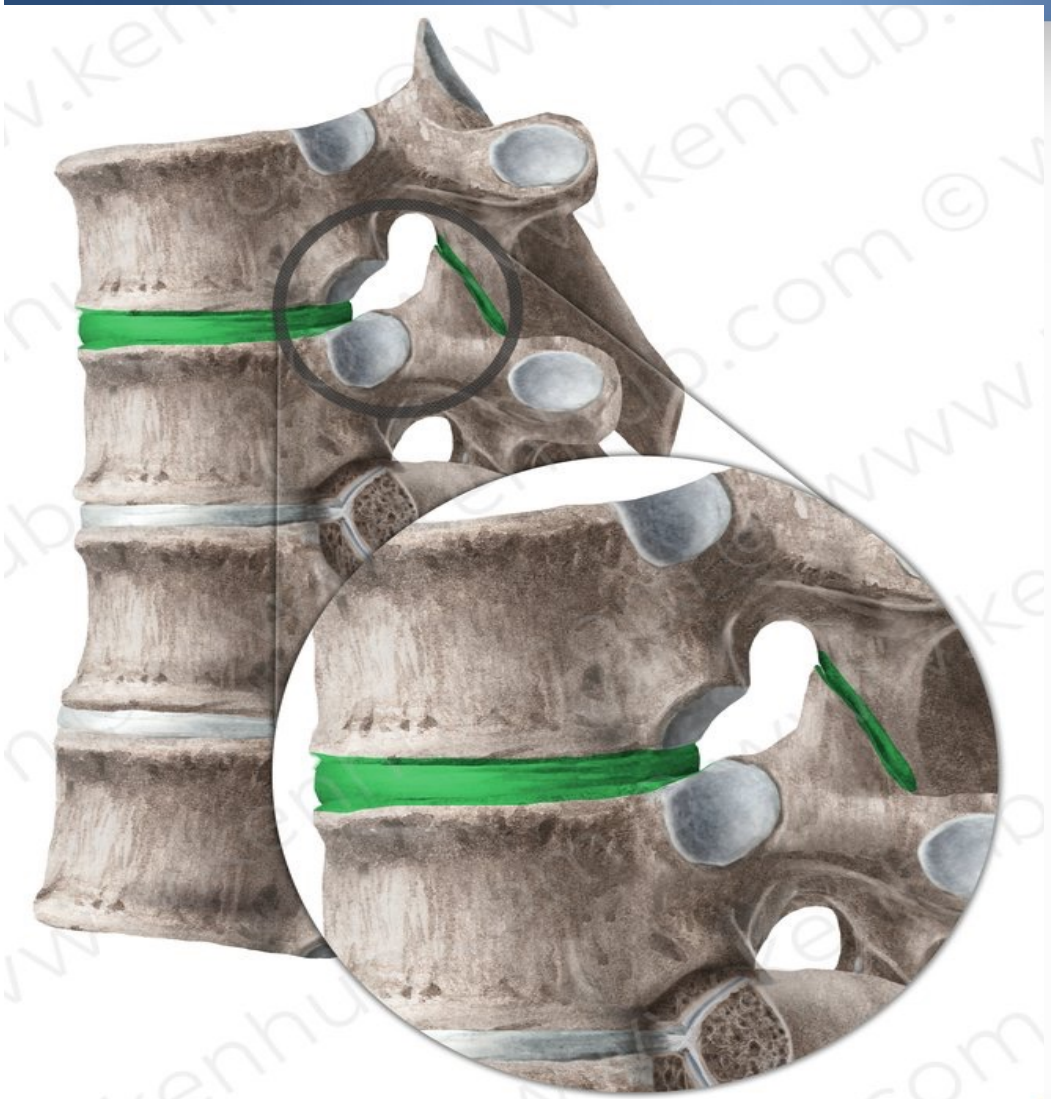
Intervertebral Disc

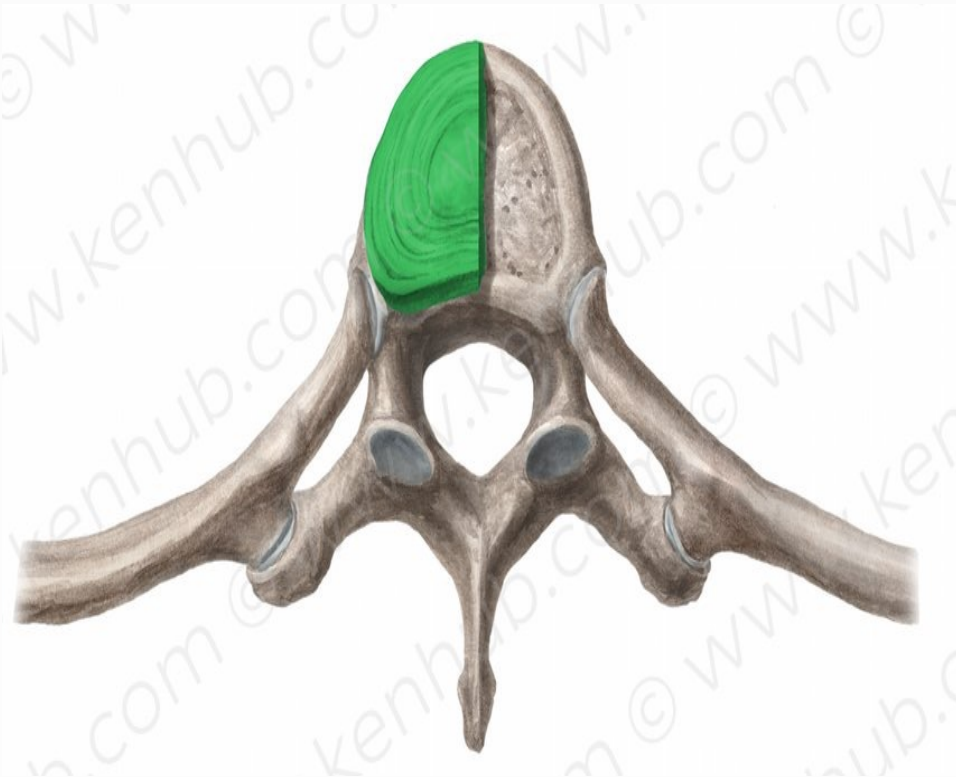
- Act as shock absorbers.
- Their elasticity allows the rigid vertebrae to move one on the other.
- Their elasticity is gradually lost with advancing age

Type : Secondary cartilaginous



Side view of two vertebrae





Intervertebral Disc

Structure :

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

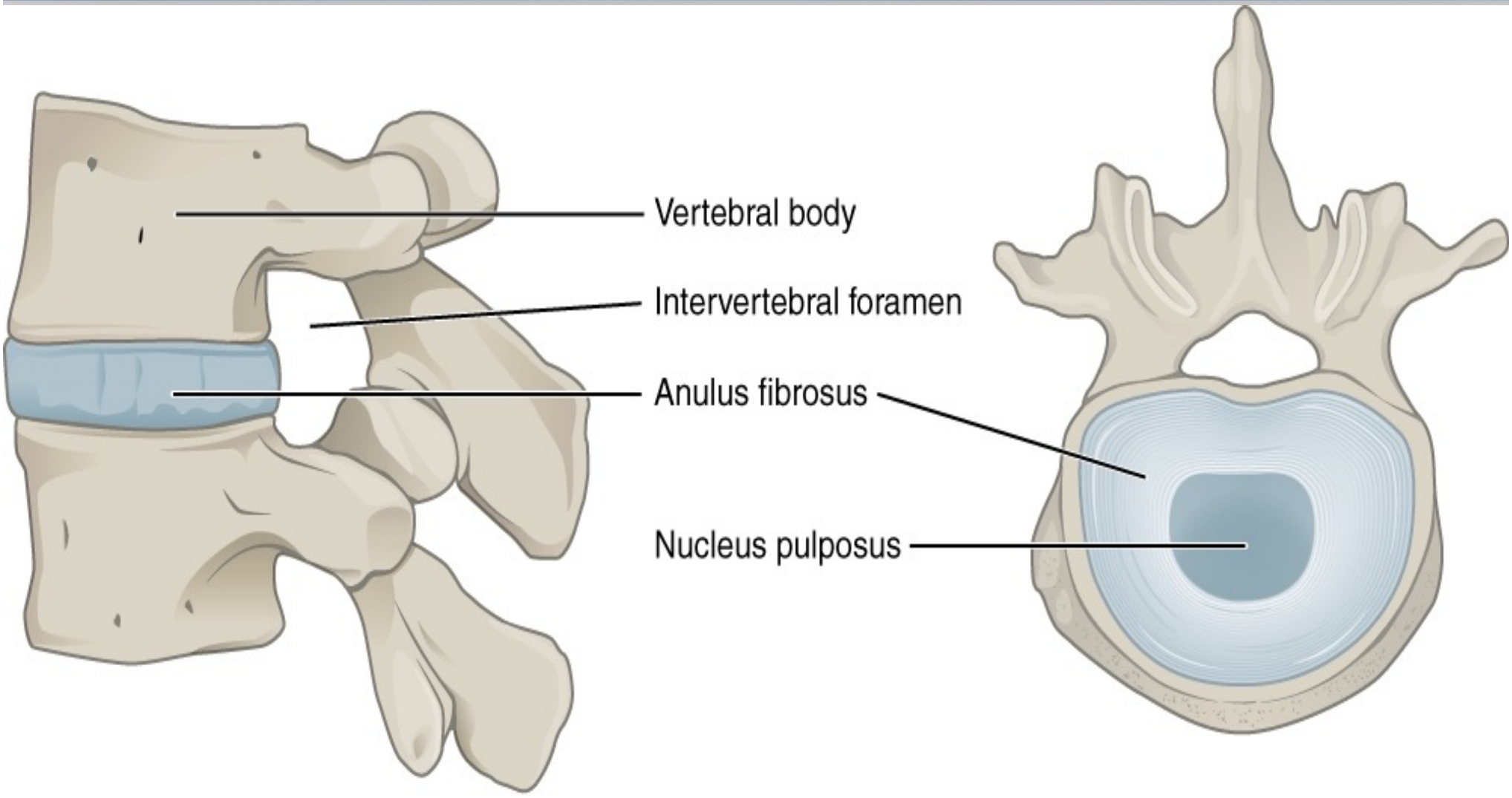
Between the plates of hyaline cartilage is an intervertebral disc of fibrocartilage.

Each intervertebral disc consists of:

1- Peripheral part, the anulus fibrosus: is composed of concentric layers of fibrocartilage.

2-Central part, the nucleus pulposus: is an ovoid mass of gelatinous material contains amount of water, a small number of collagen fibers, and a few cartilage cells.

It is normally under pressure and situated slightly nearer to the posterior than to the anterior margin of the disc.


Vertebral body
Intervertebral foramen
Anulus fibrosus
Nucleus pulposus
Lateral view
Superior view

Anulus fibrosus

Nucleus pulposus

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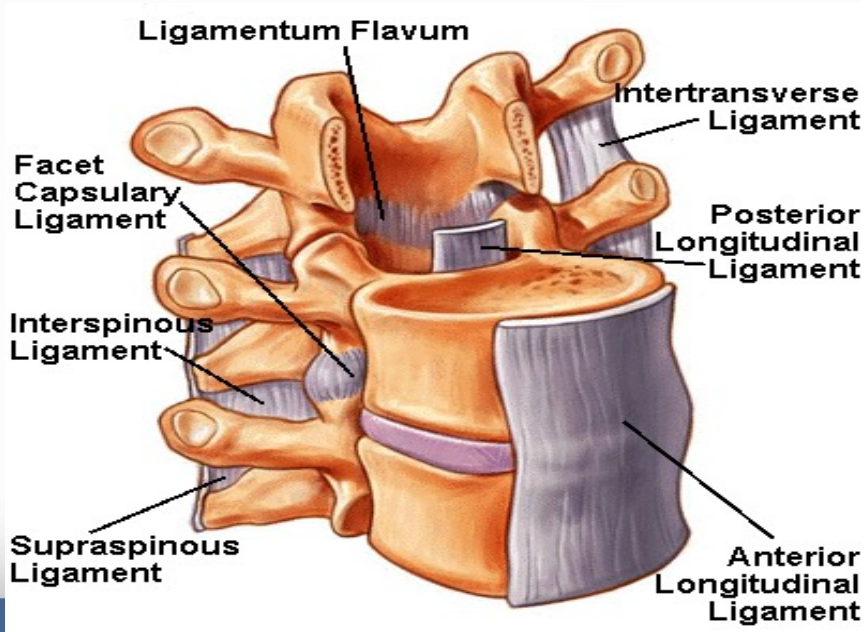
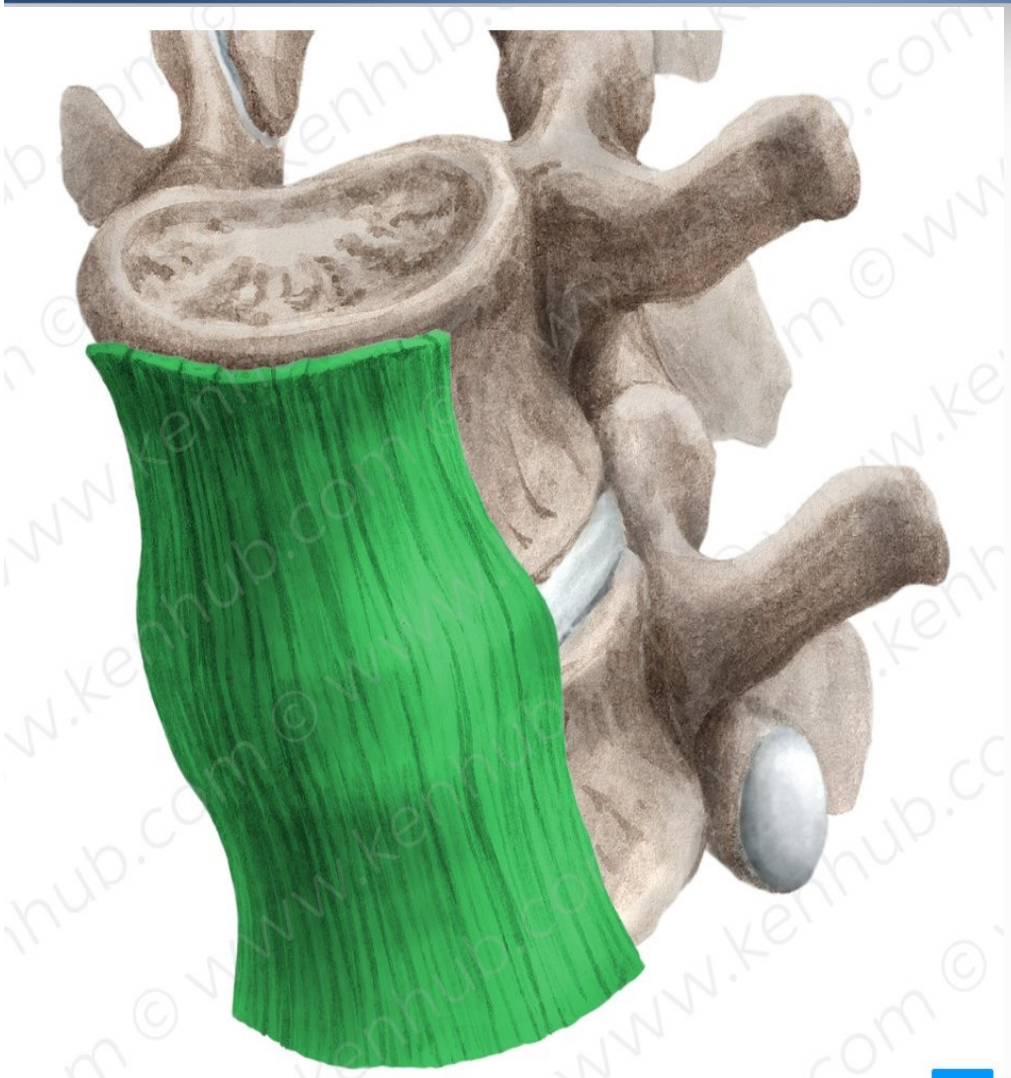
Ligaments of Intervertebral joints

The anterior and posterior longitudinal ligaments run down the anterior and posterior surfaces of the bodies of vertebrae 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.





Anterior longitudinal ligament

Posterior longitudinal ligament

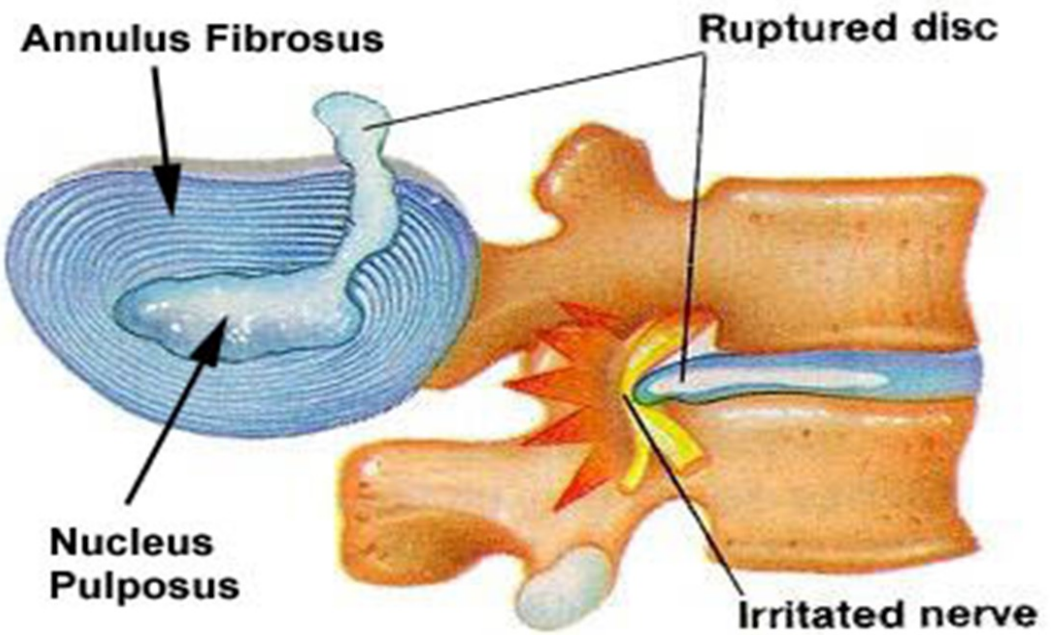
Intervertebral disc Herniation

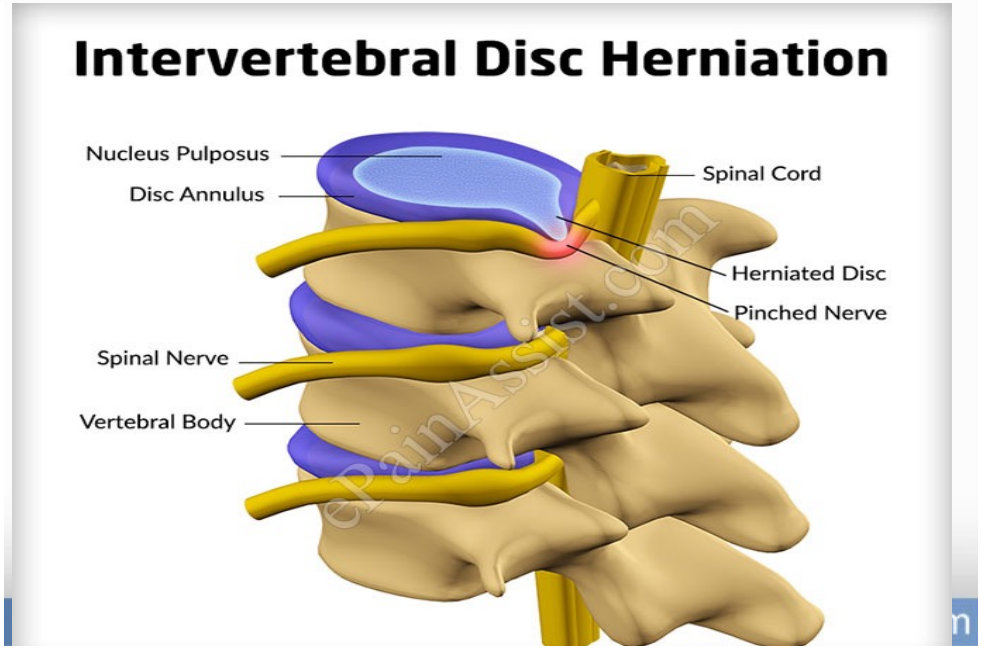
Leads to compression of spinal nerves and neurological manifestations .

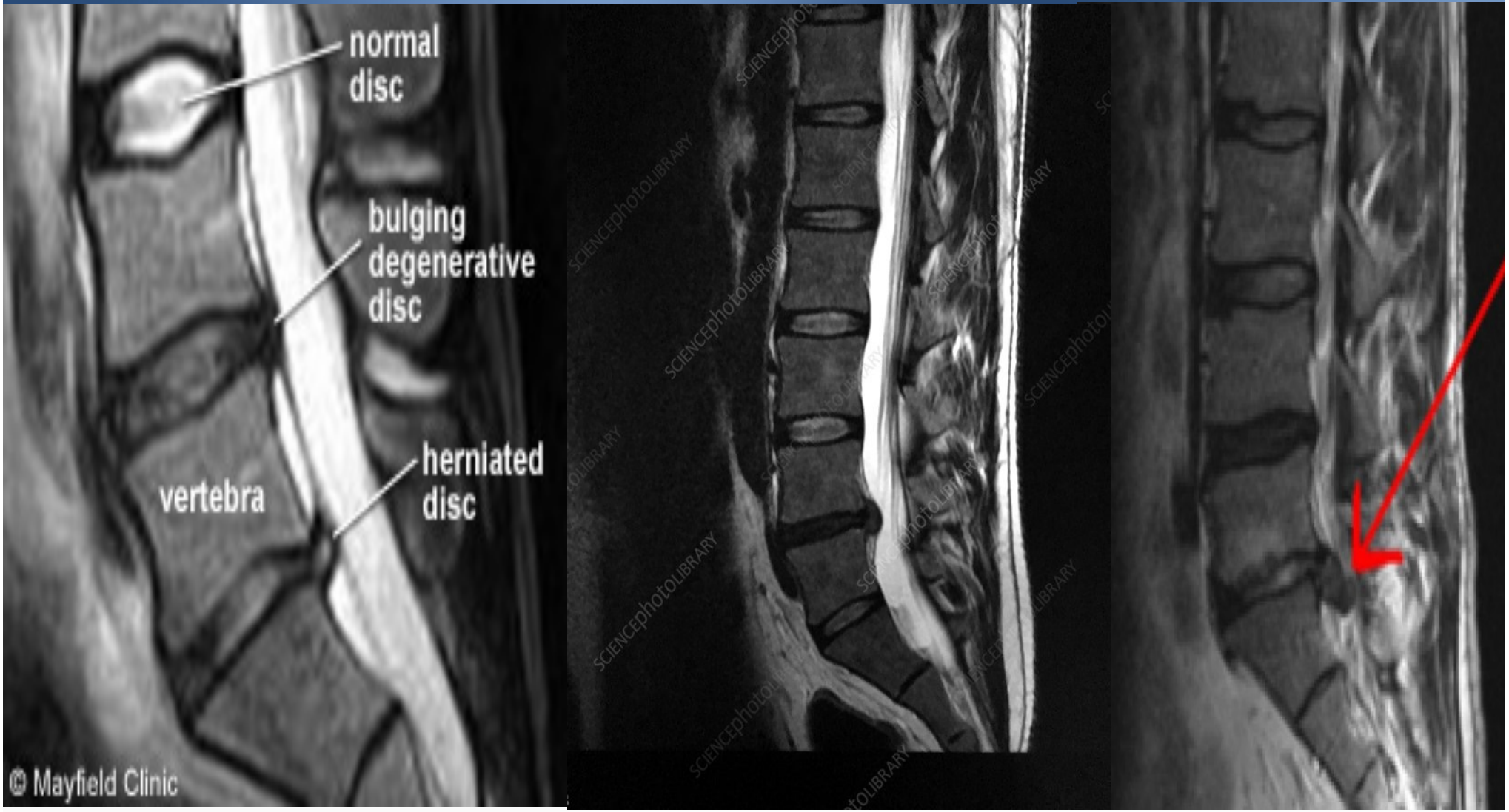
Sensory like numbness pain or sensory loss or Motors as muscle weakness .

Intervertebral disc Degeneration

As effect of ageing and disc degeneration thus limiting the ability of the disc to absorb shock.



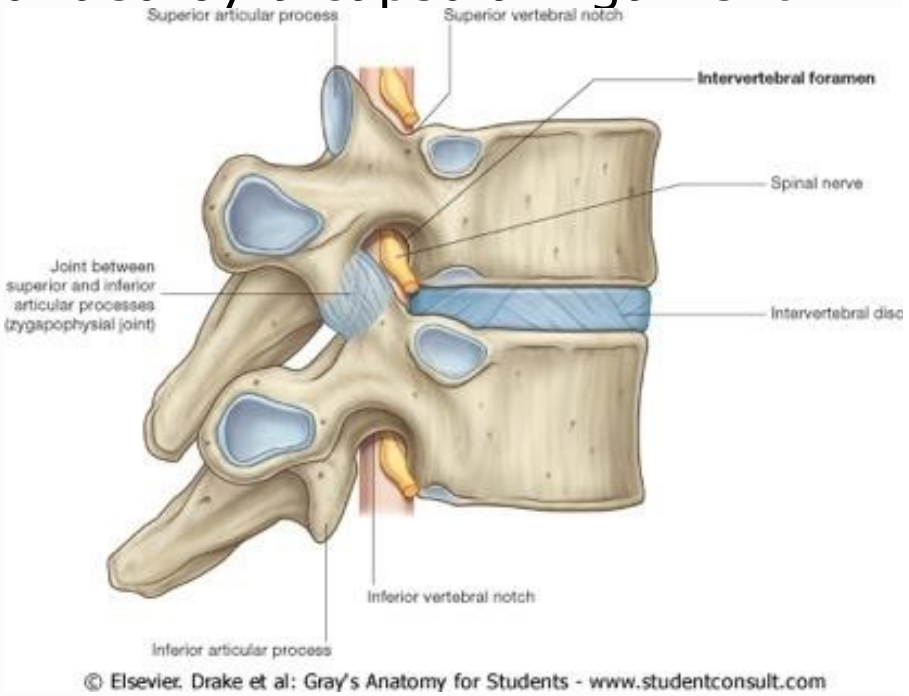



normal disc
bulging degenerative disc
herniated disc
vertebra
© Mayfield Clinic

Joints between Vertebral Arches
(Zygapophyseal joint)

Type : Plane synovial joints

Articular surfaces : between the superior and inferior articular processes of adjacent vertebrae The articular facets are covered with hyaline cartilage, and the joints are surrounded by a capsular ligament.



Ligaments

1-Supraspinous ligament:

Between the tips of adjacent spines.

2-Interspinous ligament:

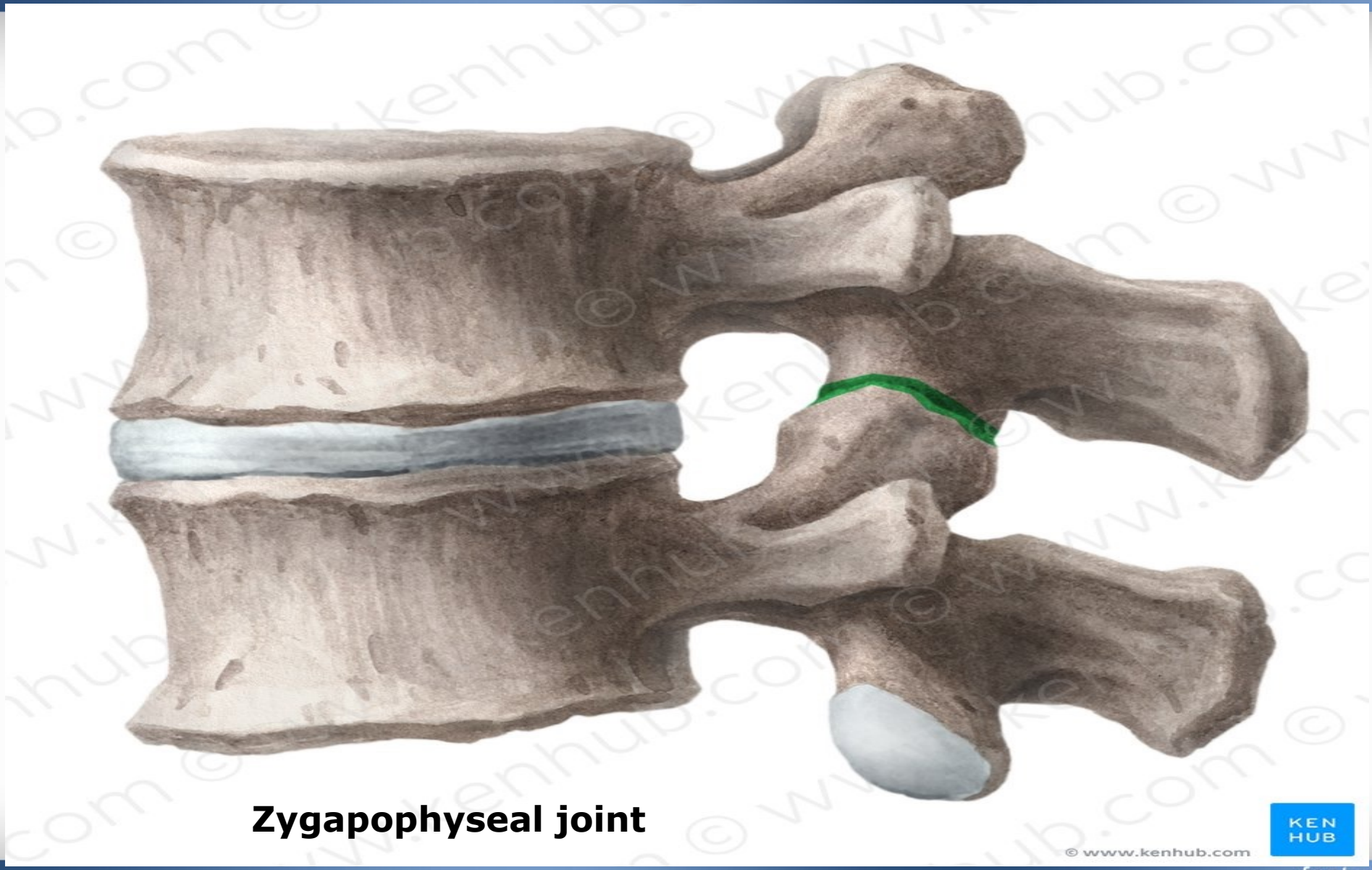
Connects adjacent spines.

3-Intertransverse ligament:

Between adjacent transverse processes.

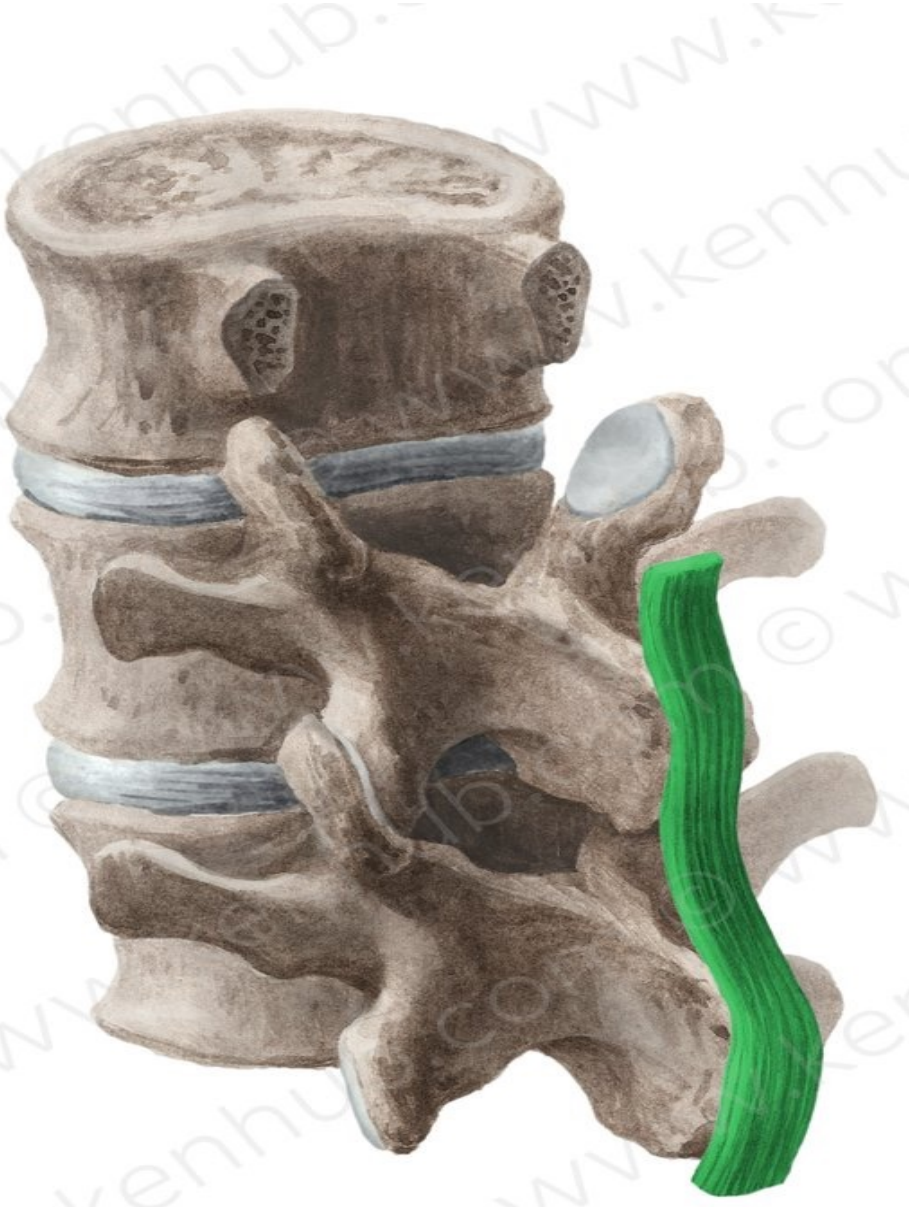
4-Ligamentum flavum:

Connects the laminae of adjacent vertebrae

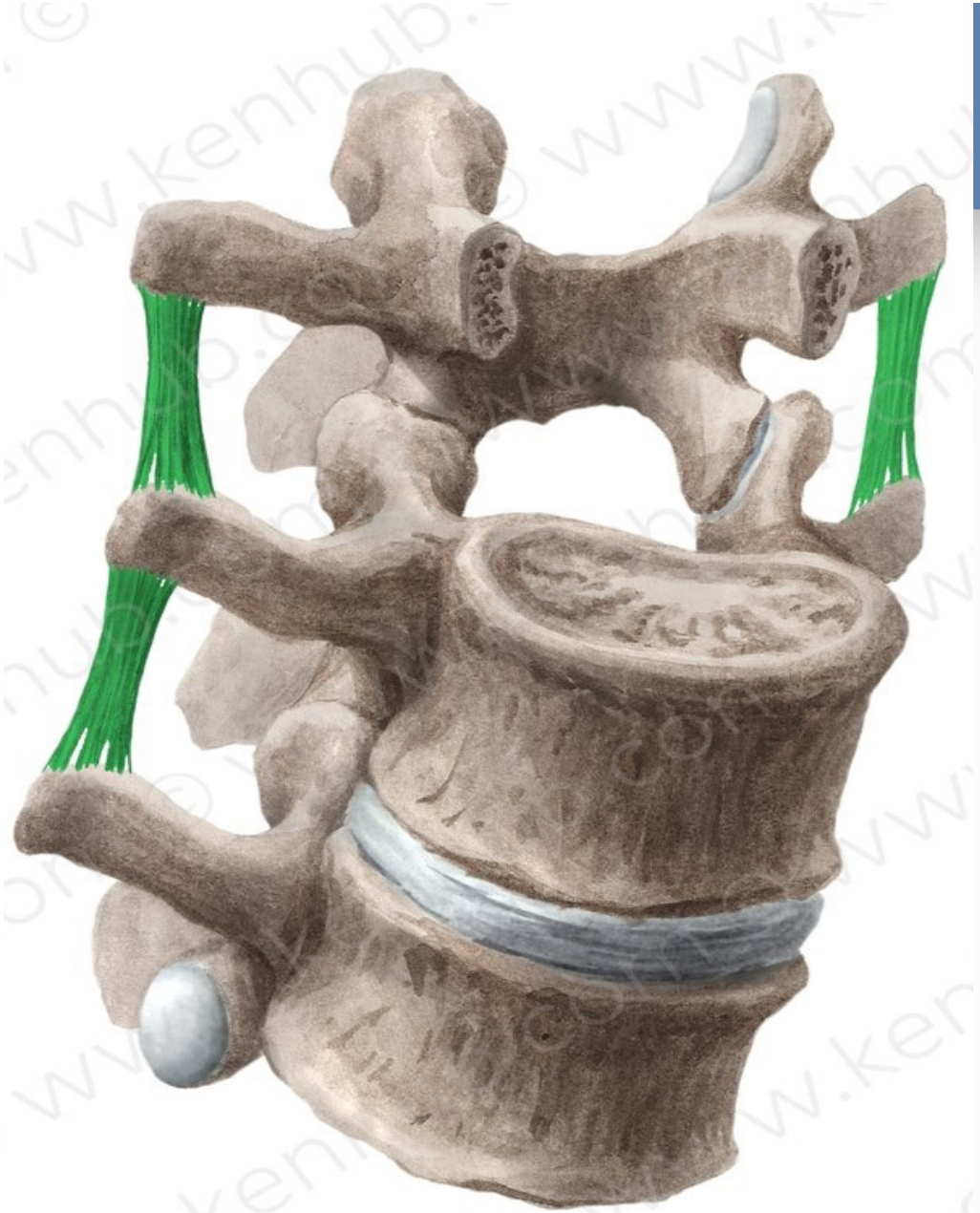


Zygapophyseal joint

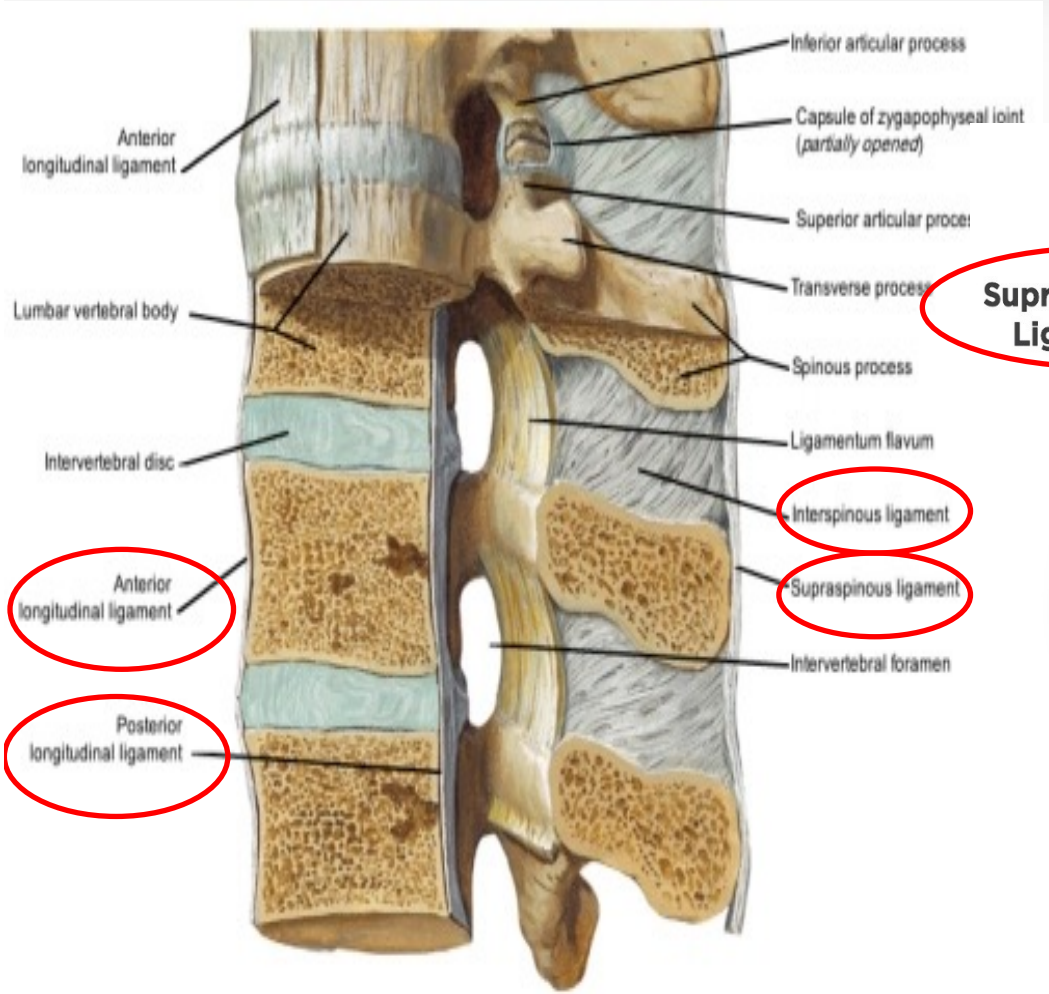
Interspinous ligament

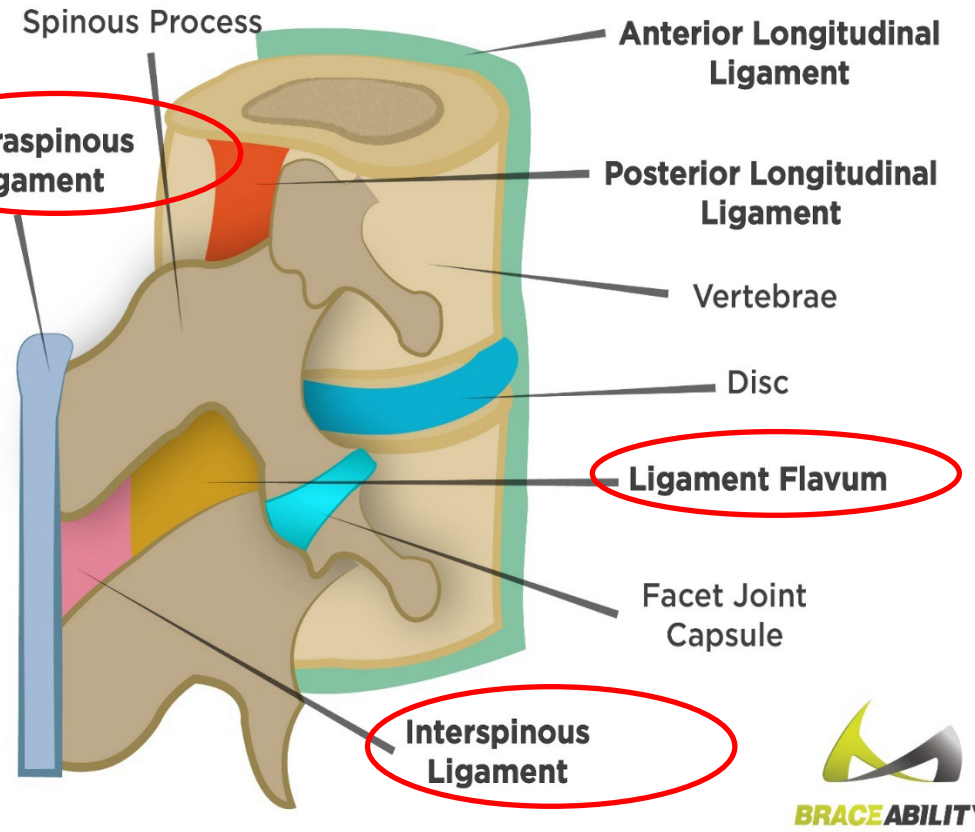


Supraspinous ligament



Intertransverse ligament

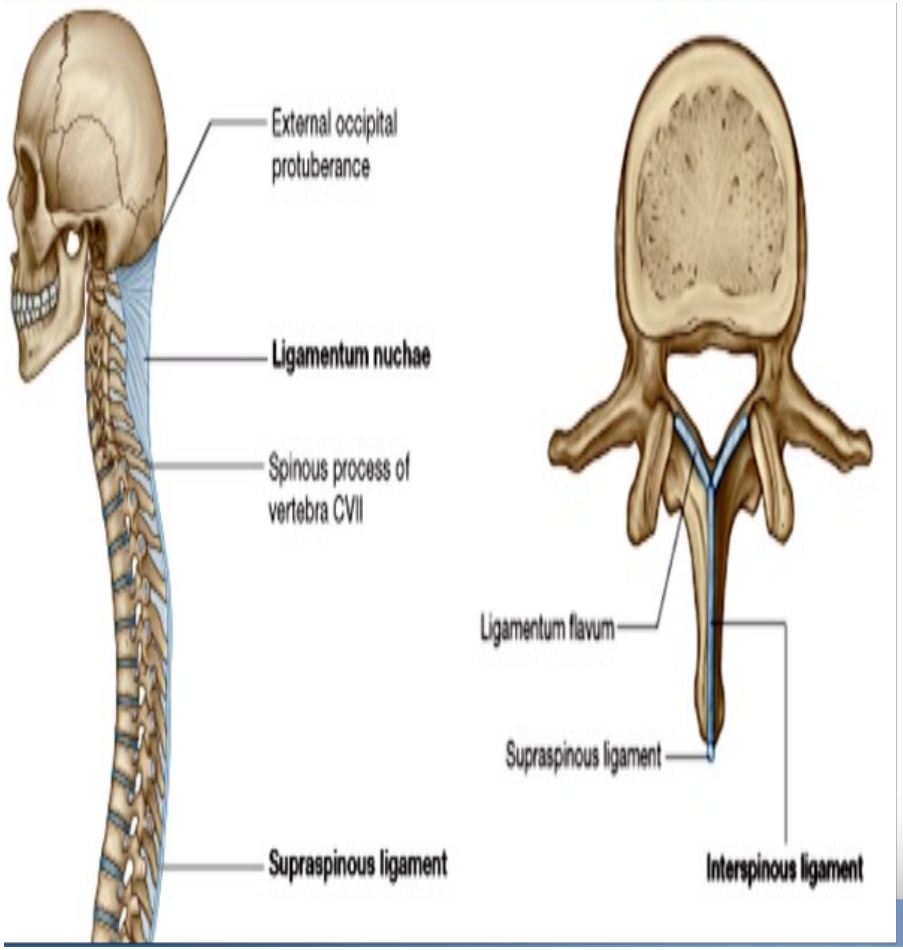


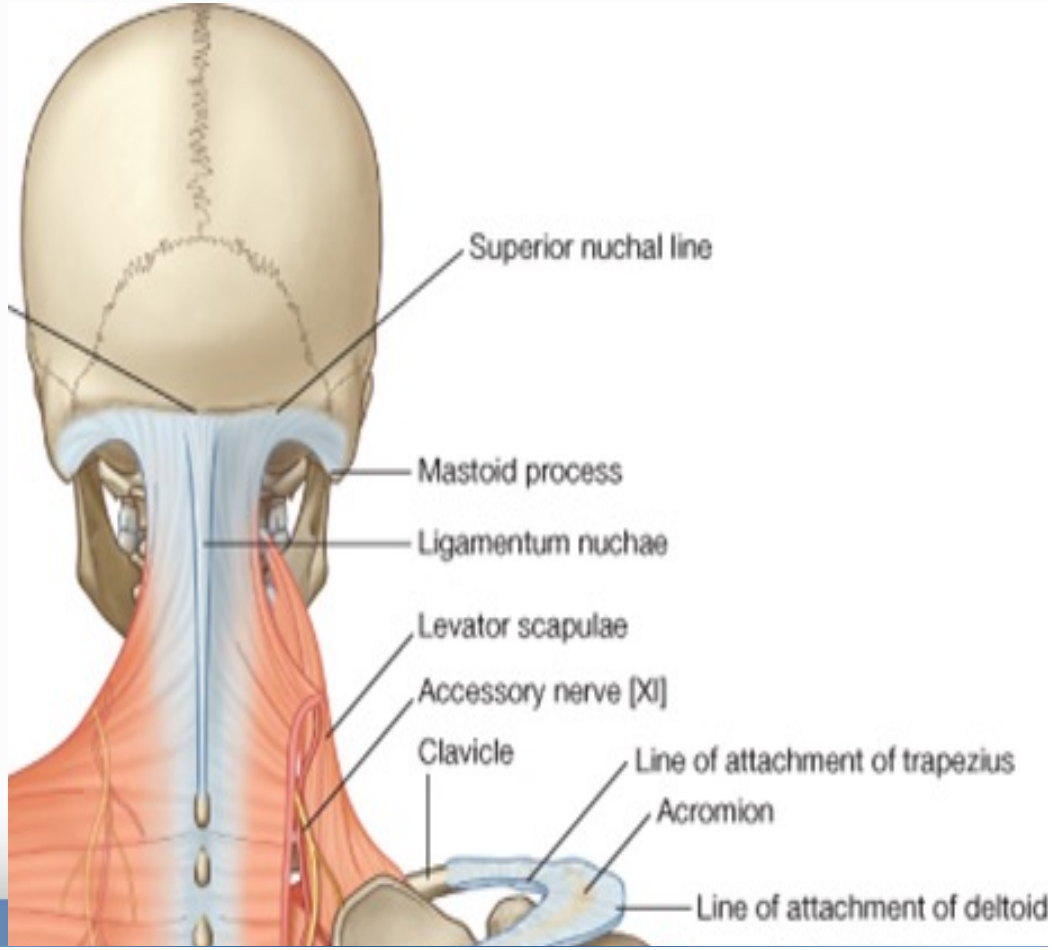


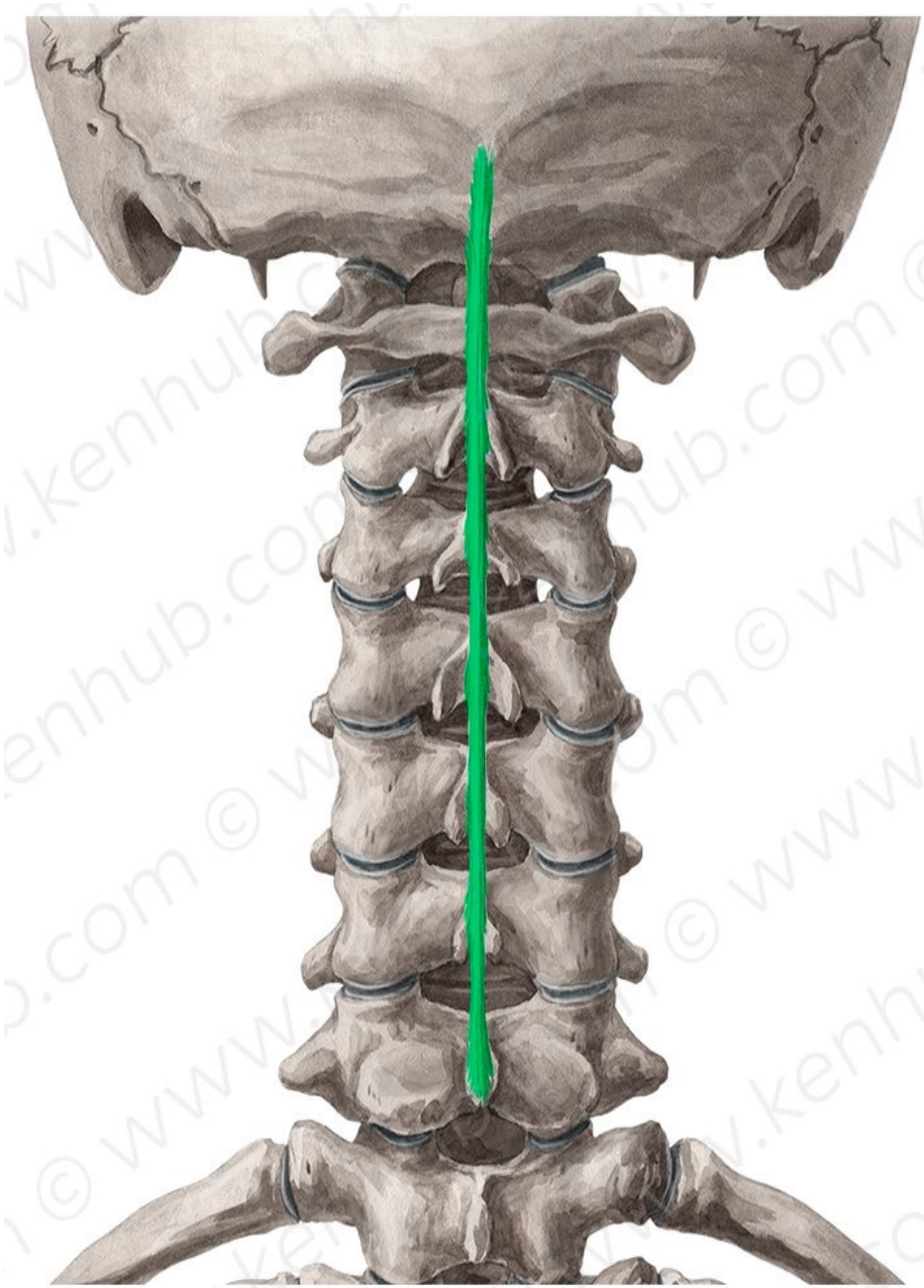
BRACEABILITY

5-Ligamentum nuchae :

In the cervical region, the **supraspinous and interspinous** ligaments are greatly thickened to form the strong ligamentum nuchae.







Ligamentum nuchae

Ligamentum flavum

Movement of Vertebral column

Flexion is a forward movement

Extension is a backward movement

Both are extensive ***in the cervical and lumbar regions***

but restricted in the thoracic region.

Lateral flexion is the bending of the body to one or the other side.

It is extensive in the cervical and lumbar regions but restricted in the thoracic region.

Rotation *is a twisting of the vertebral column.* This is least extensive in the **lumbar region**.

Circumduction is a combination of all these movements.

Movement of Vertebral column

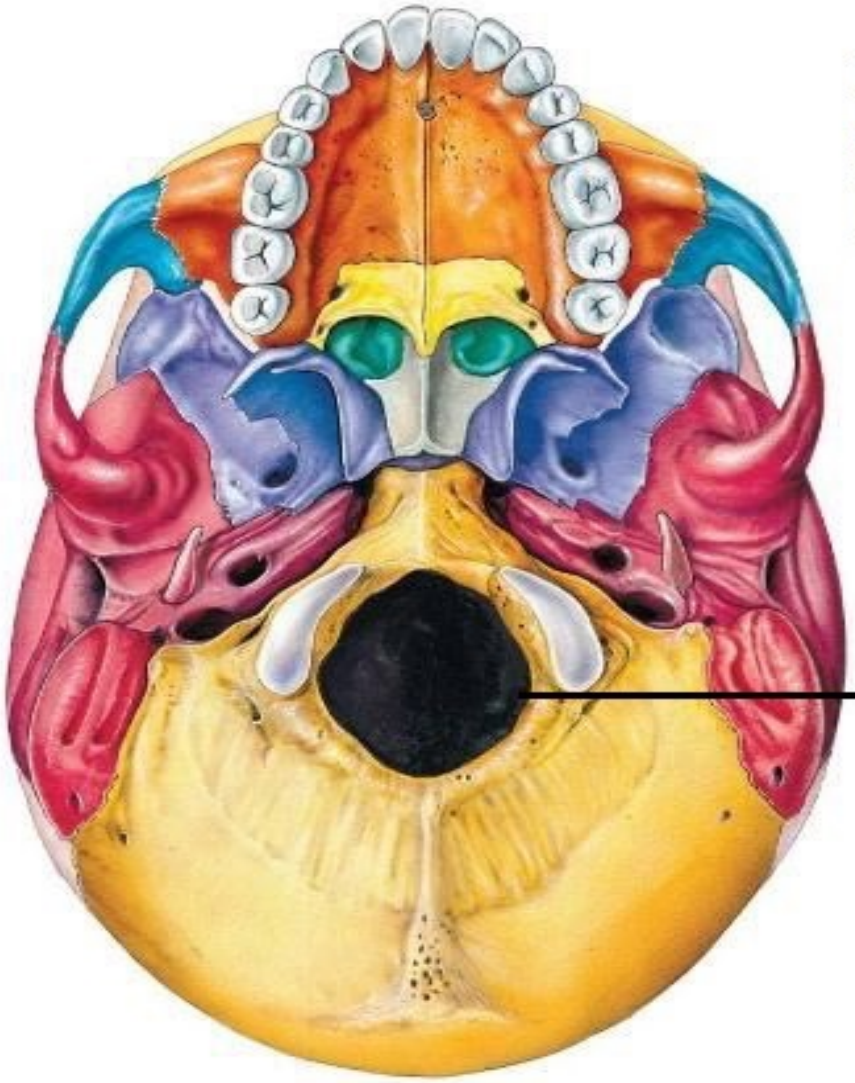
Flexion

Extension

Movement of Vertebral column

Lateral flexion

Rotation



Location and
Structures
Passing through

Foramen
Magnum

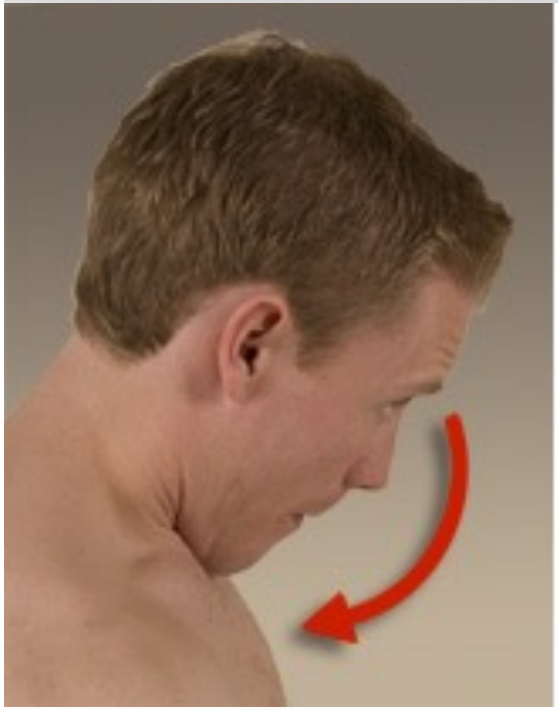
Atlanto-Occipital Joints

Articular Surface :

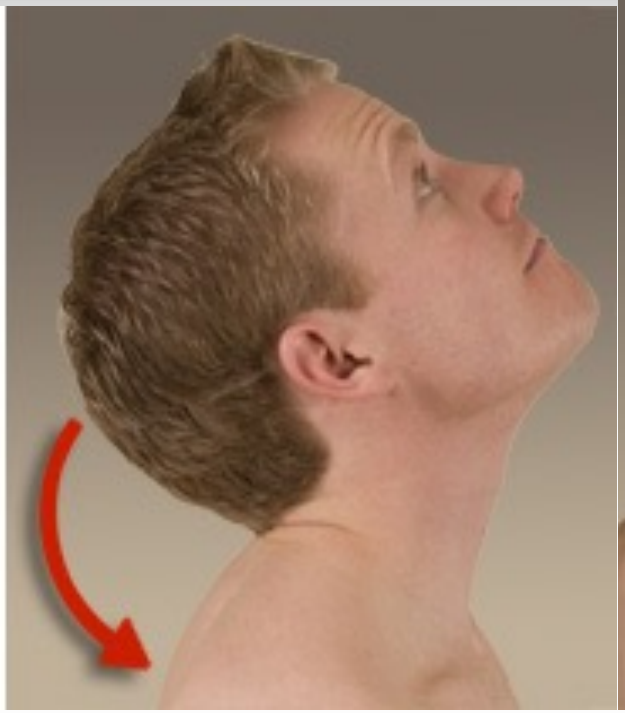
Occipital condyles, above and the superior articular surface of the atlas vertebra below.

Type : Synovial ellipsoid joint; biaxial

Movements They allow extension, forward and lateral flexion.



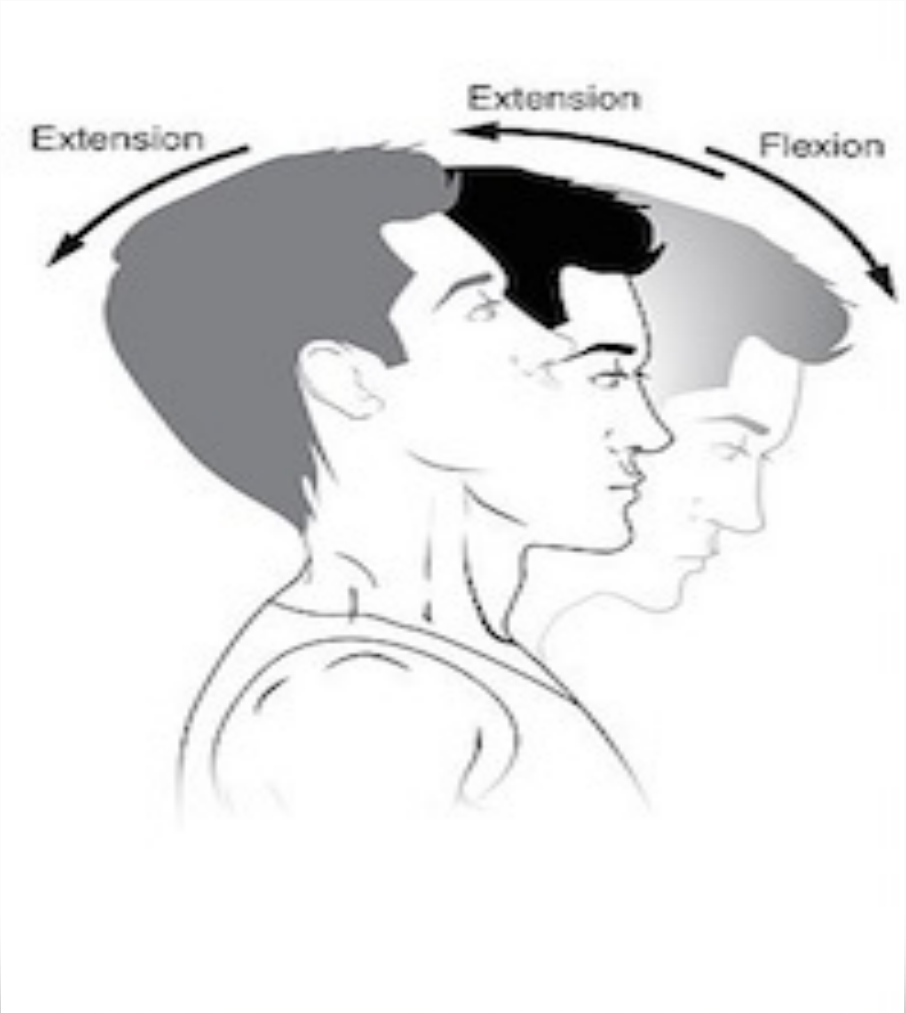
Forward flexion



Extension

lateral flexion

Cervical Lateral Flexion Stretch



Atlantoaxial Joints

A.The Median atlanto-axial Joint :

Articular Surface : between the odontoid process and the anterior arch of the atlas

Type: Pivot synovial joint

Movement : *Rotation*

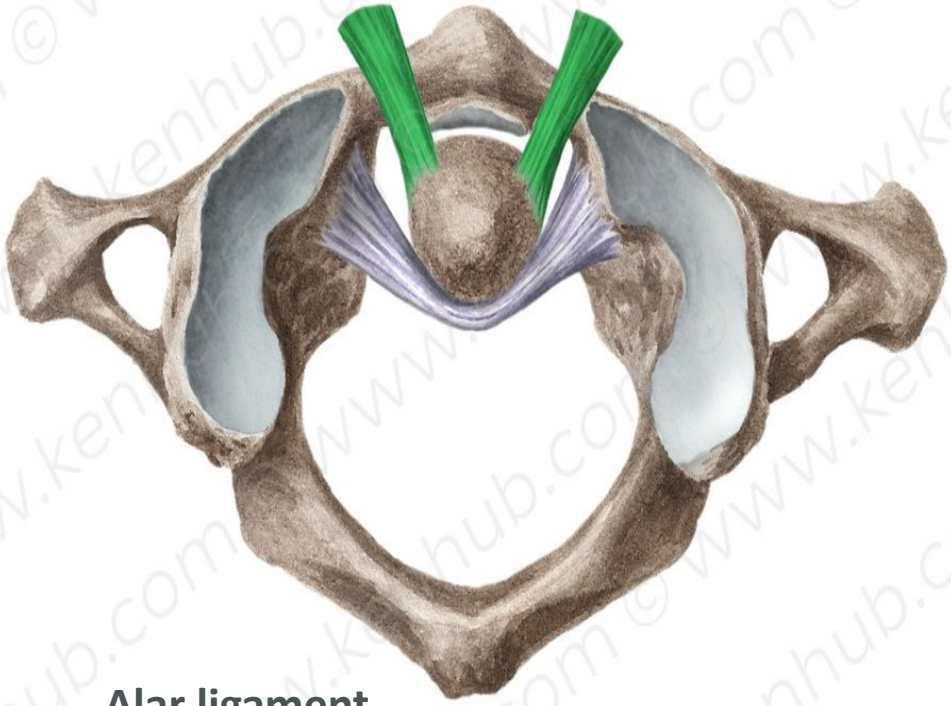
B. The Lateral atlanto-axial Joints :

Articular Surface :

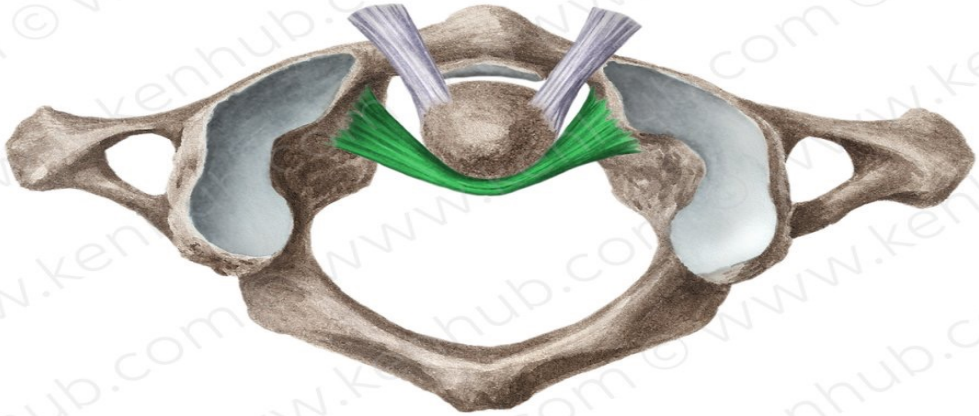
Inferior surface of articular surface of the atlas and the superior axial articular facets

Type:

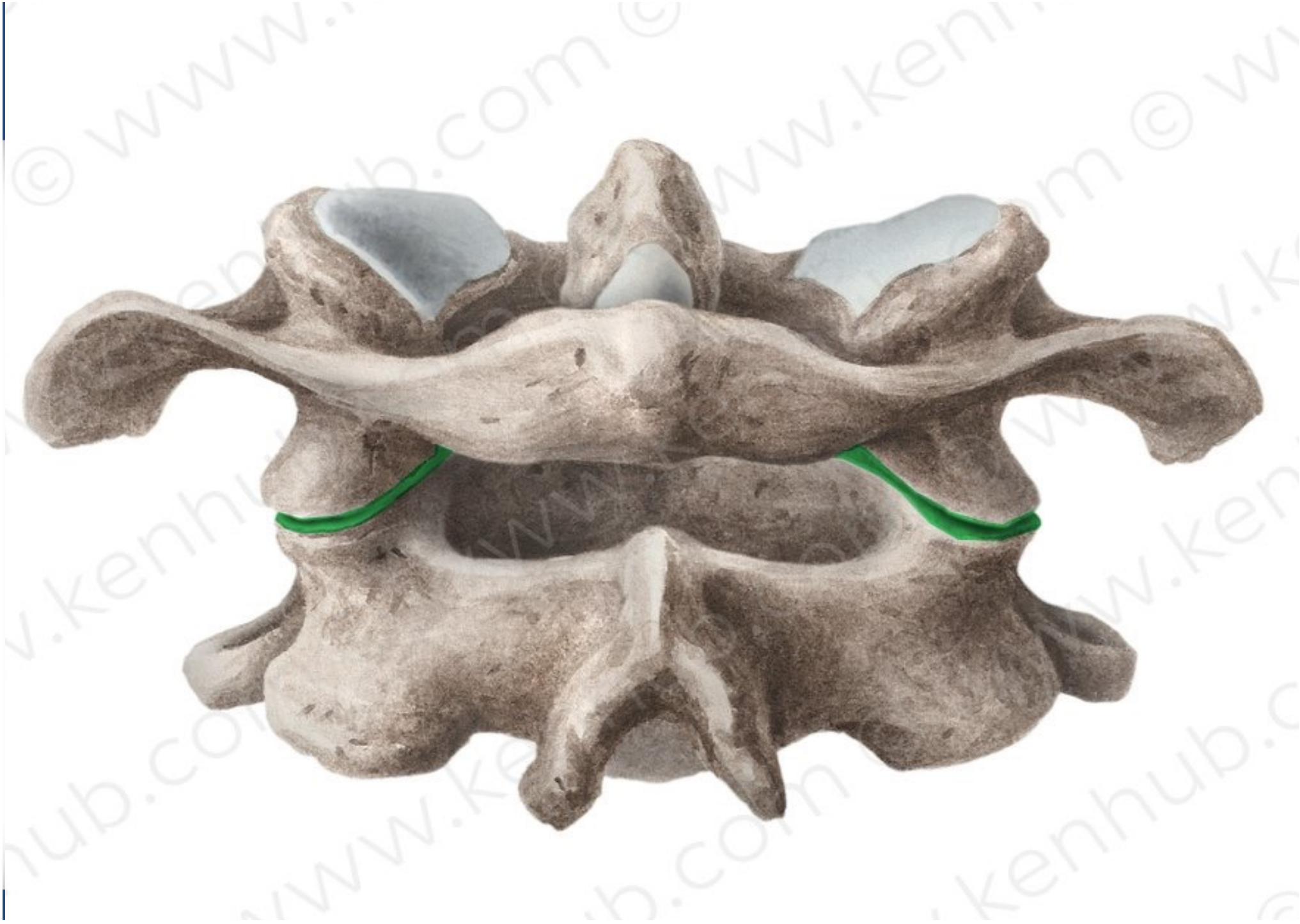
Plane synovial joint



Alar ligament

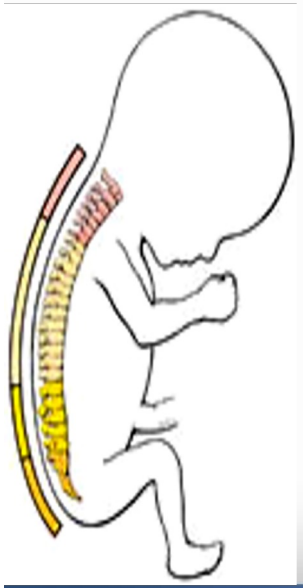


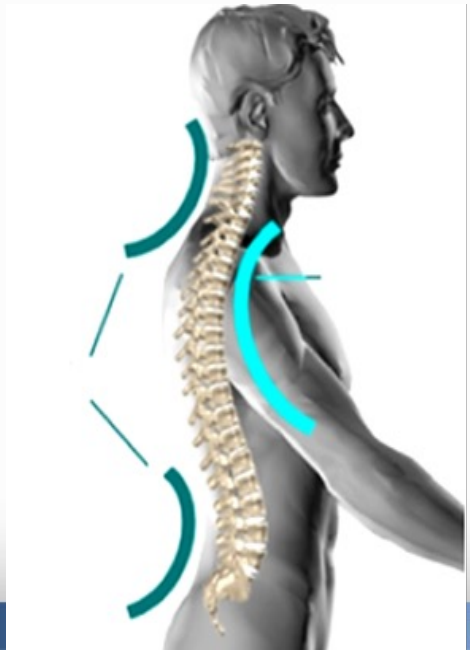
Transverse ligament of atlas



CURVES OF THE VERTEBRAL COLUMN

- In the fetus, the vertebral column has one continuous anterior concavity.
- After birth, when the child becomes able to raise his head the cervical part of the vertebral column becomes convex anteriorly (cervical Lordosis).
- Toward the end of the first year, when the child begins to stand upright, the lumbar part of the vertebral column becomes convex anteriorly (lumbar Lordosis).





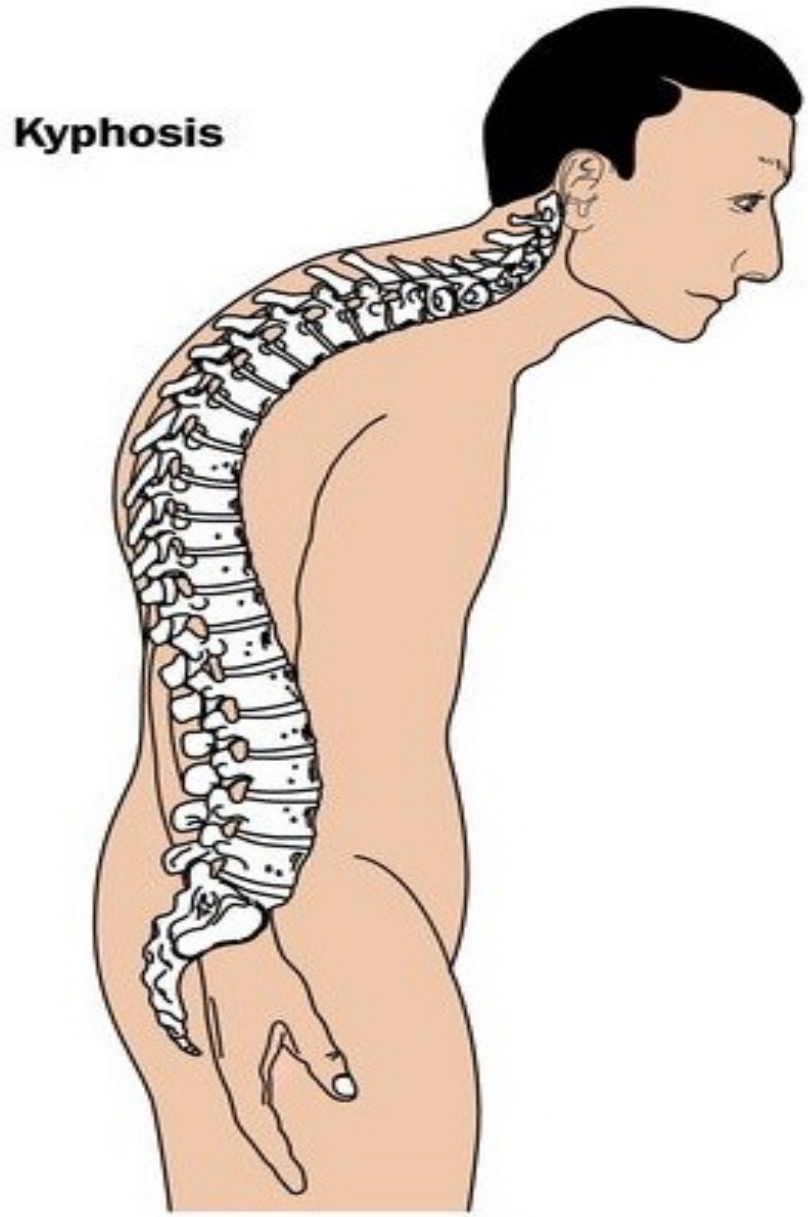
Abnormal Curves of the Vertebral Column

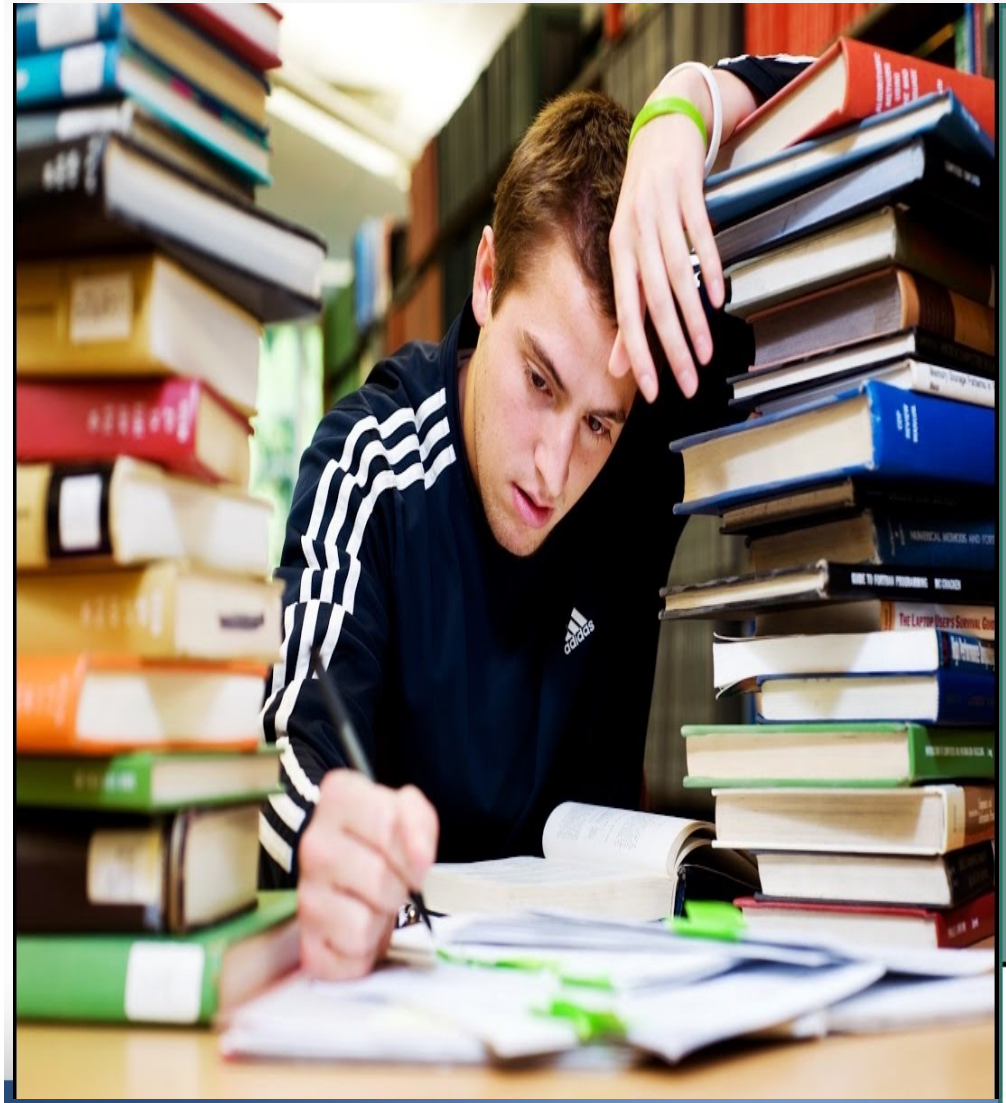
1-Kyphosis: is increase in the sagittal curvature present in the thoracic part of the vertebral column.

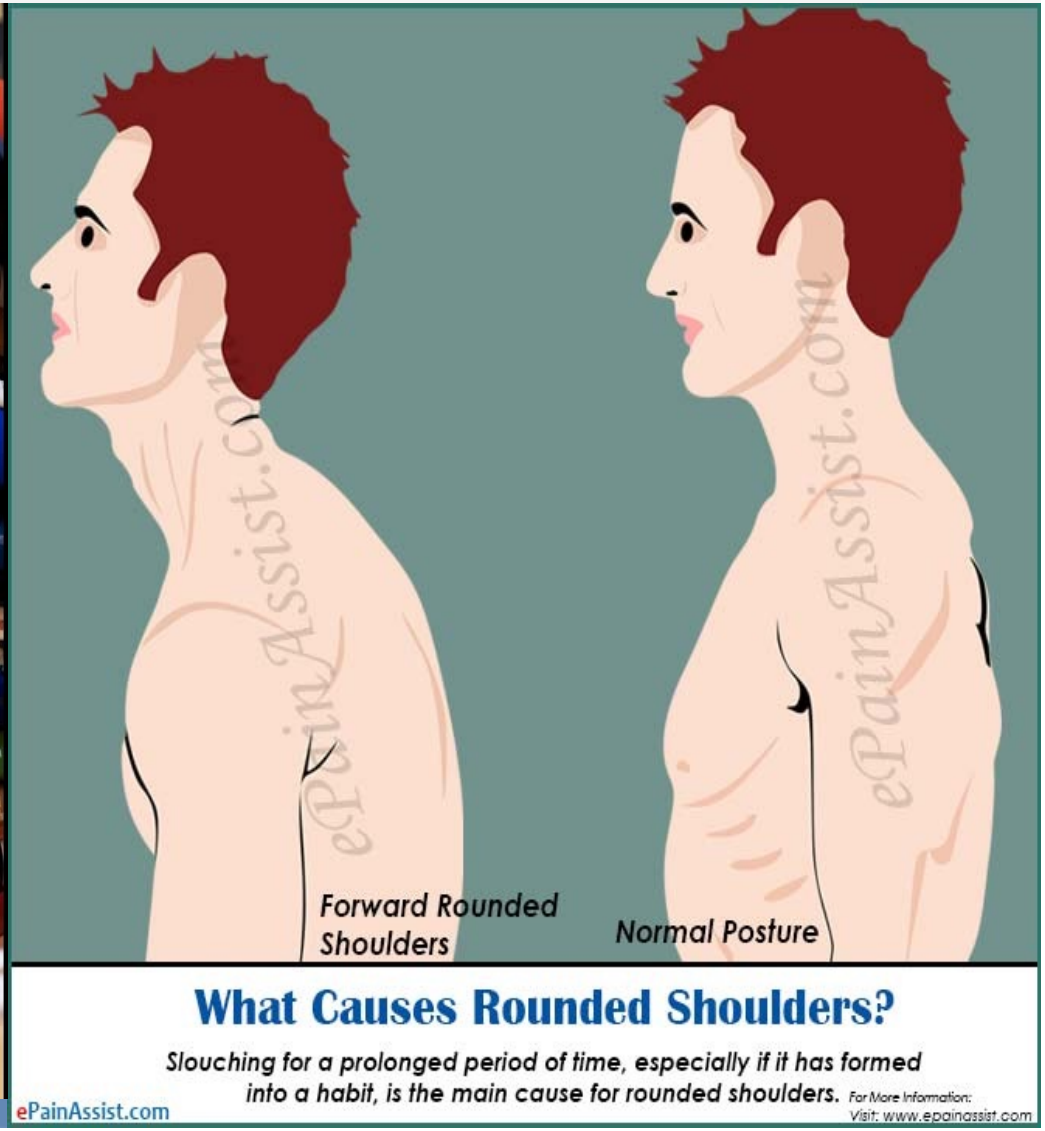
Causes : by muscular weakness or by structural changes in the vertebral bodies or by intervertebral discs

2-Lordosis

•is an exaggeration in the sagittal curvature present in the lumbar region.






ePainAssist.com
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Forward Rounded Shoulders
Normal Posture
What Causes Rounded Shoulders?
Slouching for a prolonged period of time, especially if it has formed into a habit, is the main cause for rounded shoulders.
For More Information: Visit: www.epainassist.com
ePainAssist.com

Lordosis

is an exaggeration in the sagittal curvature present in the lumbar region.

Scoliosis

is a lateral deviation of the vertebral column.

This is most commonly found in the thoracic region