

The Vertebral Column

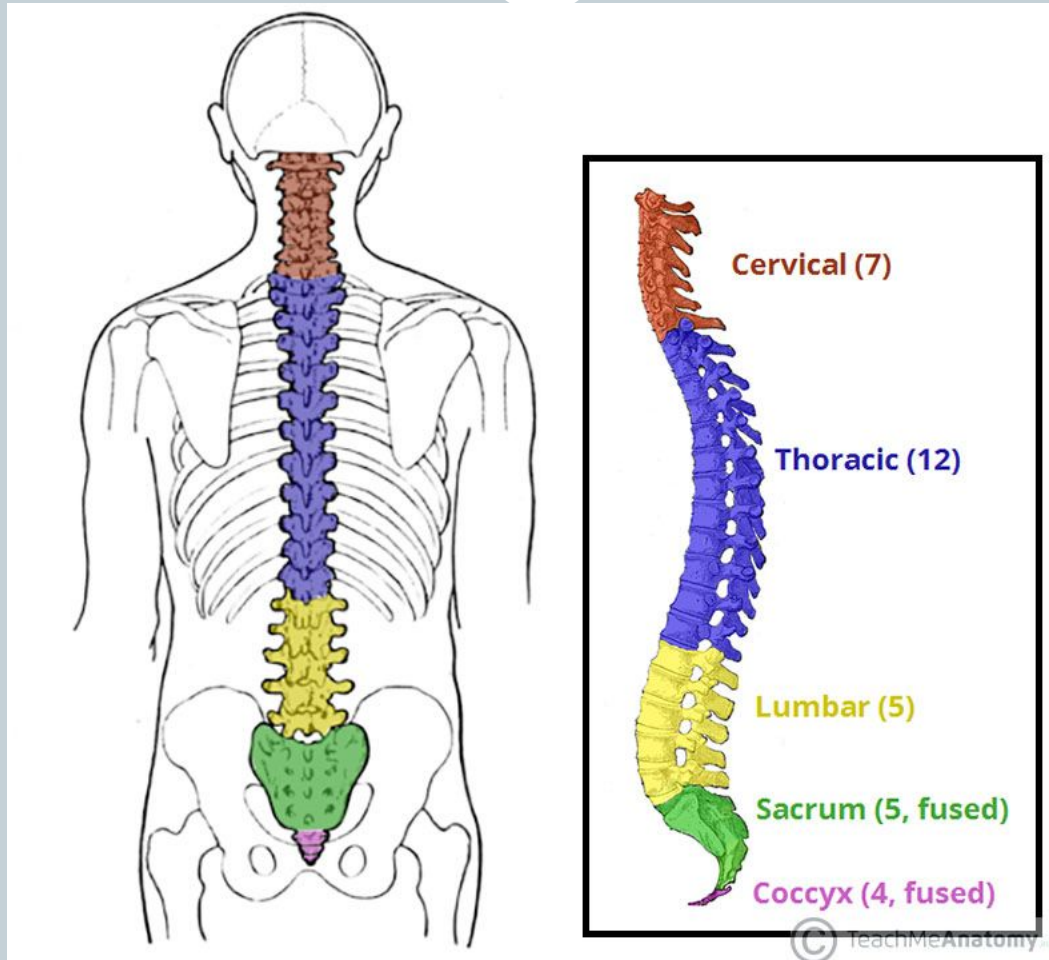


The Vertebral Column



- The vertebral column is made up of approximately **33** bones called vertebrae which are separated by intervertebral discs.
- The column can be divided into **five** different regions, each region is characterised by a different a vertebral structure
 - Cervical (7), Thoracic (12), Lumbar (5), Sacrum (5, fused), Coccyx (4, fused)

Regional Anatomy



Functions of the Vertebral Column



- **Protection**

- encloses and protects the spinal cord within the spinal canal.

- **Support**

- carries the weight of the body above the pelvis.

- **Axis**

- forms the central axis of the body.

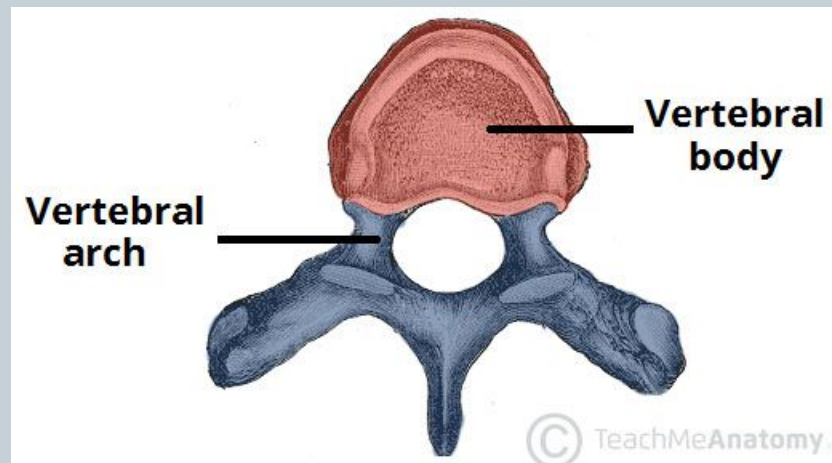
- **Movement**

- has roles in both posture and movement.

Structure of a Vertebrae



- All vertebrae share a basic common structure
- They each consist of an anterior vertebral body, and a posterior vertebral arch
 - C1 of the cervical vertebrae lacks a vertebral body



Vertebral Arch

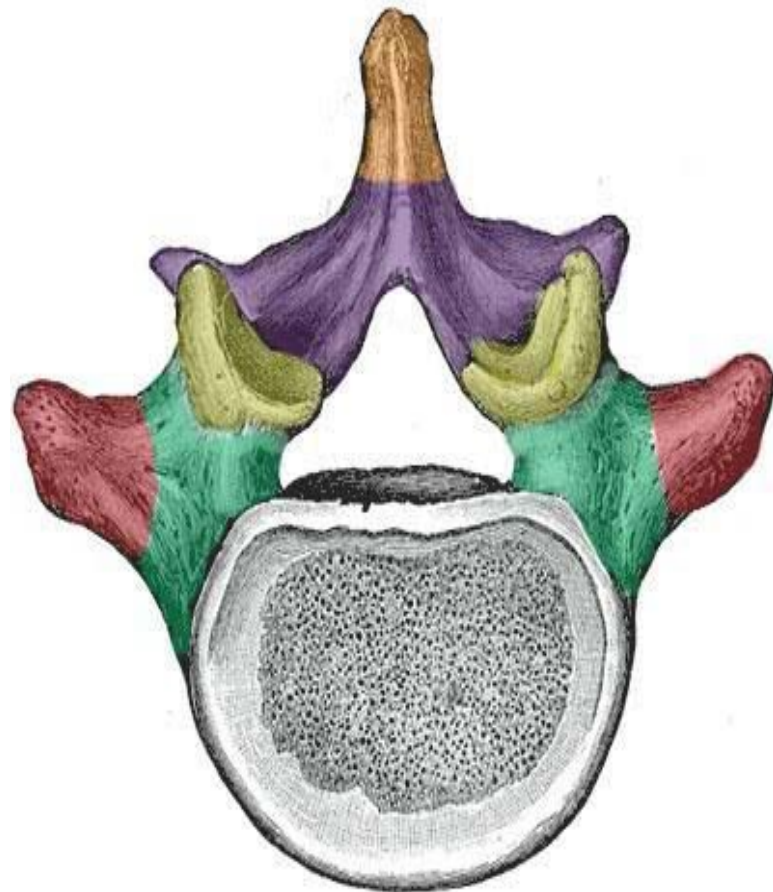


- The vertebral arch forms the lateral and posterior aspect of each vertebrae
- Together, the vertebral body & the vertebral arch creates an enclosed hole called the vertebral foramen
- The vertebral foramen of all vertebrae line up to form the vertebral canal which encloses the spinal cord

Vertebral Arch ct'd



- The vertebral arches have several bony prominences which function as attachment sites for muscles and ligaments:
 - Spinous processes
 - ▢ single spinous process, centered posteriorly at the point of the arch.
 - Transverse processes
 - ▢ each vertebra has two transverse processes, which extend laterally and posteriorly from the vertebral body
 - Pedicles
 - ▢ connect the vertebral body to the transverse processes.
 - Lamina
 - ▢ connect the transverse and spinous processes.
 - Articular processes (facets)
 - ▢ form joints between one vertebrae and its superior and inferior counterparts
 - ▢ the articular processes are located at the intersection of the laminae and pedicles.



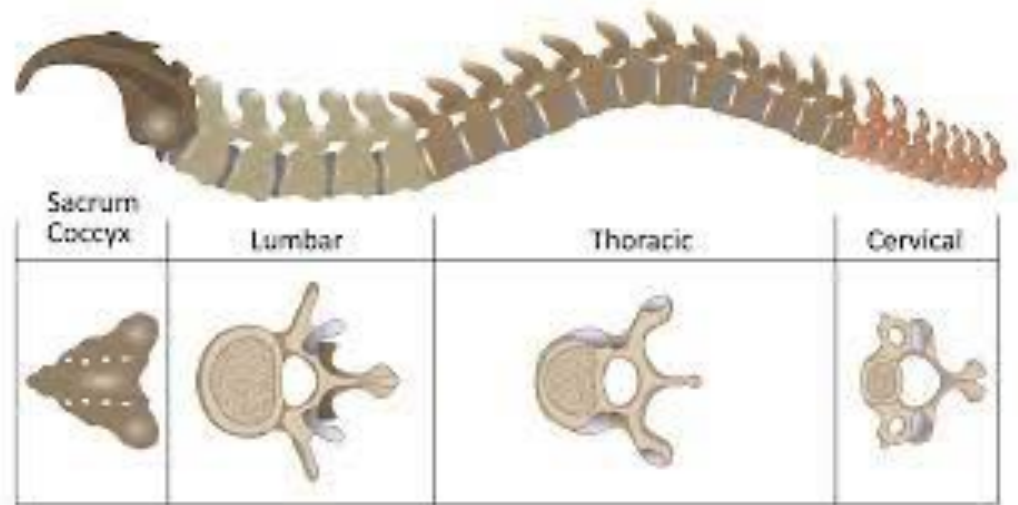
-  Spinous process
-  Lamina
-  Superior articular processes
-  Pedicles
-  Transverse processes



teachmeanatomy

The #1 Applied Human Anatomy Site on the Web.

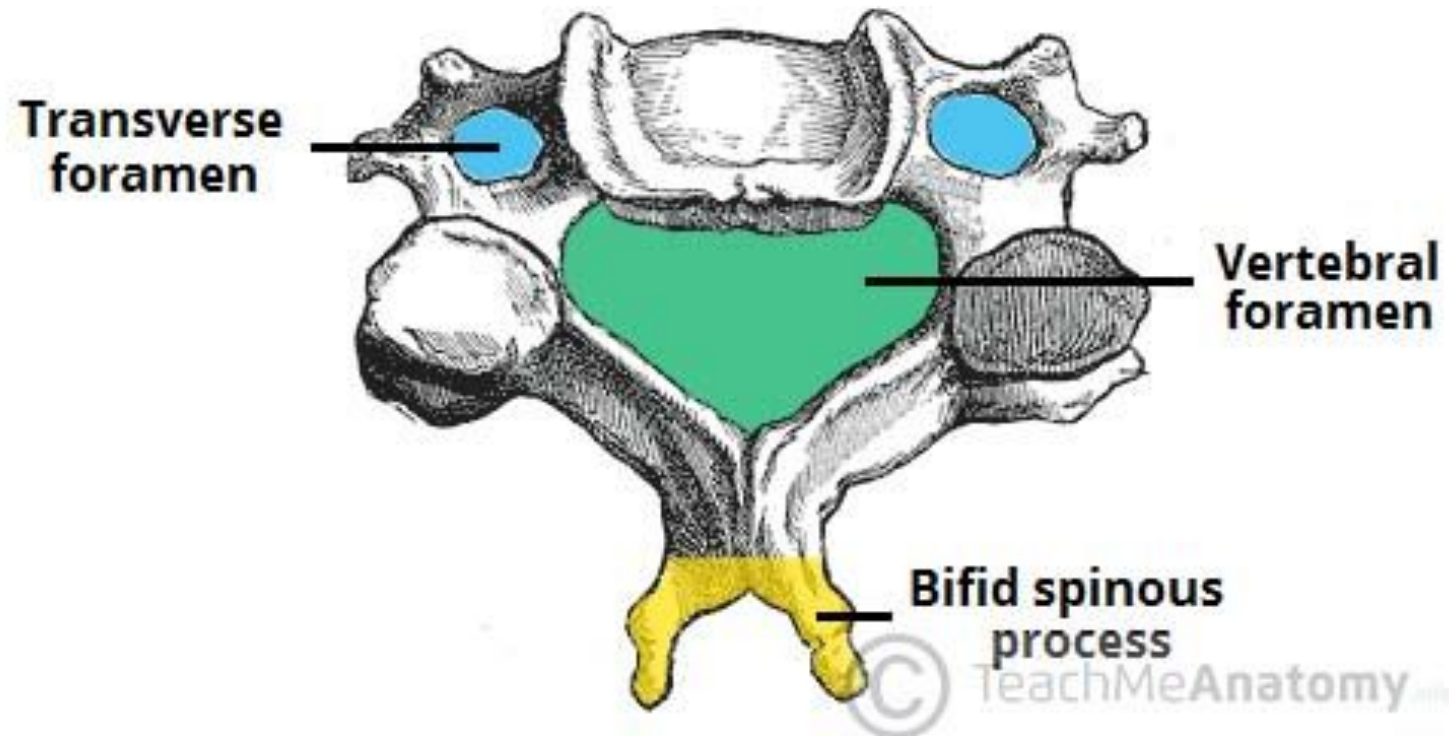
Classification of Vertebrae



Cervical Vertebrae



- There are **7 cervical** vertebrae in the human body
- Distinguishing features:
 - bifid spinous process – the spinous process bifurcates at its distal end
 - exceptions to this are C1 (no spinous process) and C7
 - triangular vertebral foramen
 - transverse foramina – an opening in each transverse process
 - the vertebral arteries travel to the brain (C1 – C6)
- C1 & C2 (called the atlas and axis respectively) are specialised to allow for the movement of the head.



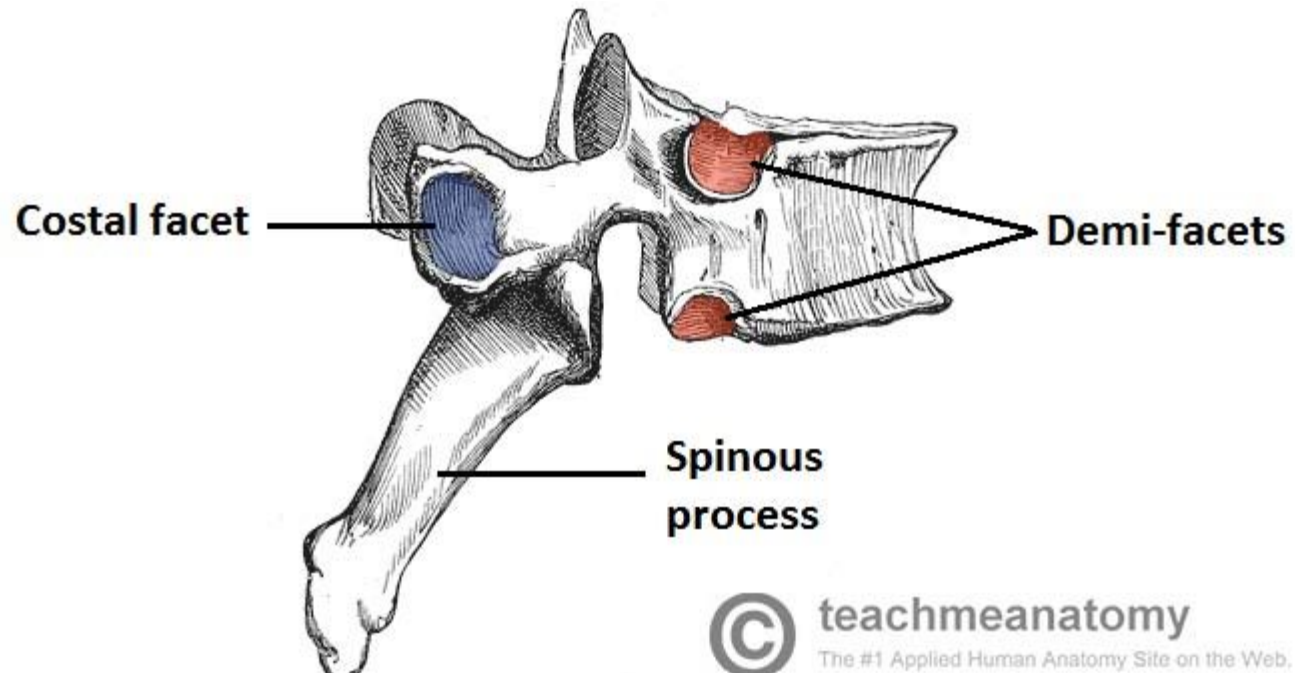
Thoracic Vertebrae



- There are **12 thoracic** vertebrae in the human body
- Their specialized function of the thoracic vertebrae is to articulate with the ribs
- Distinguishing features:
 - demi facets - 2 sets located superiorly and inferiorly on either side of the vertebral body
 - articulate with **the heads of two different ribs**
 - costal facet - located on the transverse processes of the vertebrae
 - articulate with **the shaft of a single rib**

Example:

- the head of rib 2 articulates with the inferior demi facet of thoracic vertebra 1 (T1) and the superior demi facet of T2
- the shaft of rib 2 articulates with the costal facets of T2
- the spinous processes of thoracic vertebrae are oriented obliquely, inferiorly and posteriorly
- the vertebral foramen of thoracic vertebrae is circular



teachmeanatomy

The #1 Applied Human Anatomy Site on the Web.

Lumbar Vertebrae



- There are **5 lumbar** vertebrae in the human body
 - the largest in the vertebral column
- Their specialized function is to support the weight of the torso
- Distinguishing features:
 - lumbar vertebrae have very large vertebral bodies which are kidney-shaped
 - no transverse foramina, costal facets, or bifid spinous processes
 - triangular-shaped vertebral foramen
 - spinous processes are shorter than those of thoracic vertebrae and do not extend inferiorly below the level of the vertebral body
 - their size and orientation allows for clinical access to the spinal canal

Sacrum & Coccyx



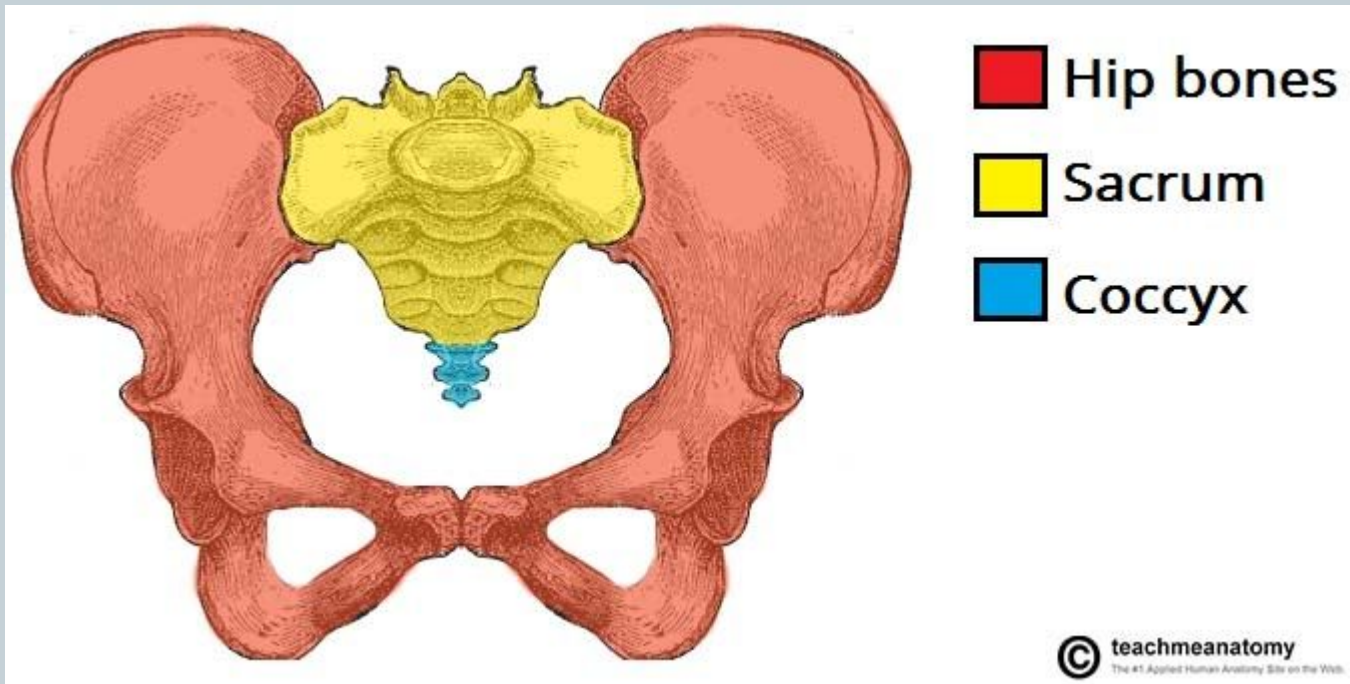
● The sacrum

- a collection of five fused vertebrae
- described as an inverted triangle, with the apex pointing inferiorly
- On the lateral walls of the sacrum are facets for articulation with the pelvis at the sacro-iliac joints.

● The coccyx

- is a small bone which articulates with the apex of the sacrum
- it is recognised by its lack of vertebral arches and vertebral canal

Sacrum & Coccyx



Joints & Ligaments



Joints



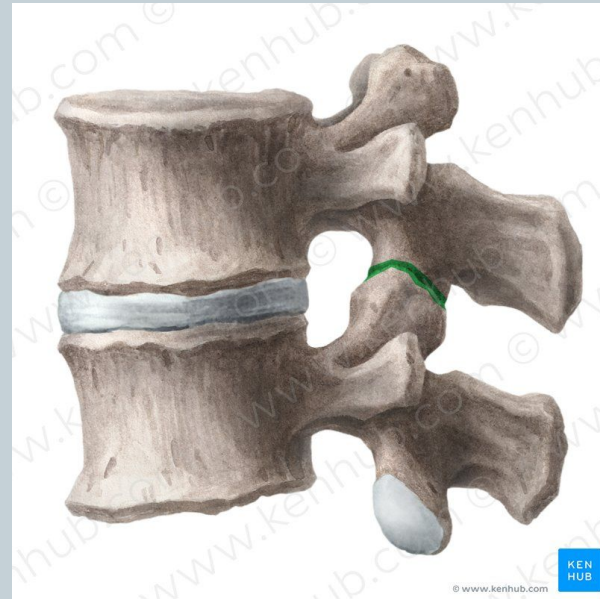
- vertebrae are mobile and articulate with each other via joints between their bodies and articular facets:
 - left and right superior articular facets articulate with the vertebra above
 - left and right inferior articular facets articulate with the vertebra below
 - vertebral bodies indirectly articulate with each other via the intervertebral discs
- The joints between the vertebral bodies are called cartilaginous joints
 - function: designed for weight-bearing
 - structure: the articular surfaces of the vertebral bodies are covered by hyaline cartilage and connect indirectly by the intervertebral disc

Joints ct'd



- **Facet joints**

- functionally: diarthrotic
- structurally synovial plane joints

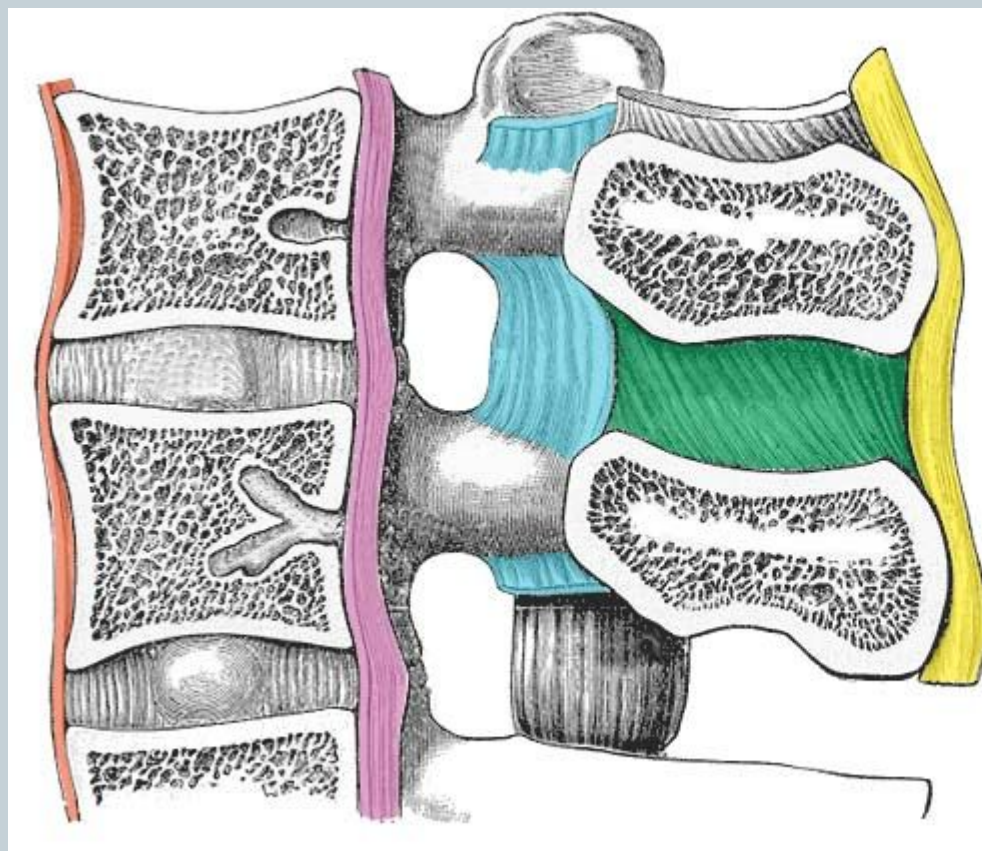


Ligaments



- There are **2** ligaments that strengthen the vertebral body joints:
 - the anterior and posterior longitudinal ligaments
 - run the full length of the vertebral column.
 - the **anterior longitudinal ligament** is thick and **prevents hyperextension** of the vertebral column
 - the **posterior longitudinal ligament** is weaker, and **prevents hyperflexion**
- facet joints
 - allow for some gliding motion between the vertebrae
 - strengthened by several ligaments:
 - ligamentum flavum
 - extends between lamina of adjacent vertebrae
 - interspinous and supraspinous
 - join the spinous processes of adjacent vertebrae
 - the interspinous ligaments attach between the spinous processes
 - the supraspinous ligaments attach to the tips of the spinous processes
 - intertransverse ligaments
 - extends between transverse processes

Ligaments



-  Anterior longit. ligament
-  Posterior longit. ligament
-  Ligamentum flavum
-  Interspinal ligament
-  Supraspinous ligament