

ANATOMY OF SPINE

Dr Pankaj N Surange
MBBS, MD, FIPP

Interventional Pain and Spine specialist



Anatomical Planes

A-P X-ray of a scoliotic spine in the coronal plane.



The **CORONAL PLANE**, also called the **FRONTAL PLANE**, is a vertical cut that divides the body into front and back sections. Physicians look at the coronal plane when they view an A-P (anterior-posterior) x-ray of the spine to evaluate scoliosis.

Anatomical Planes

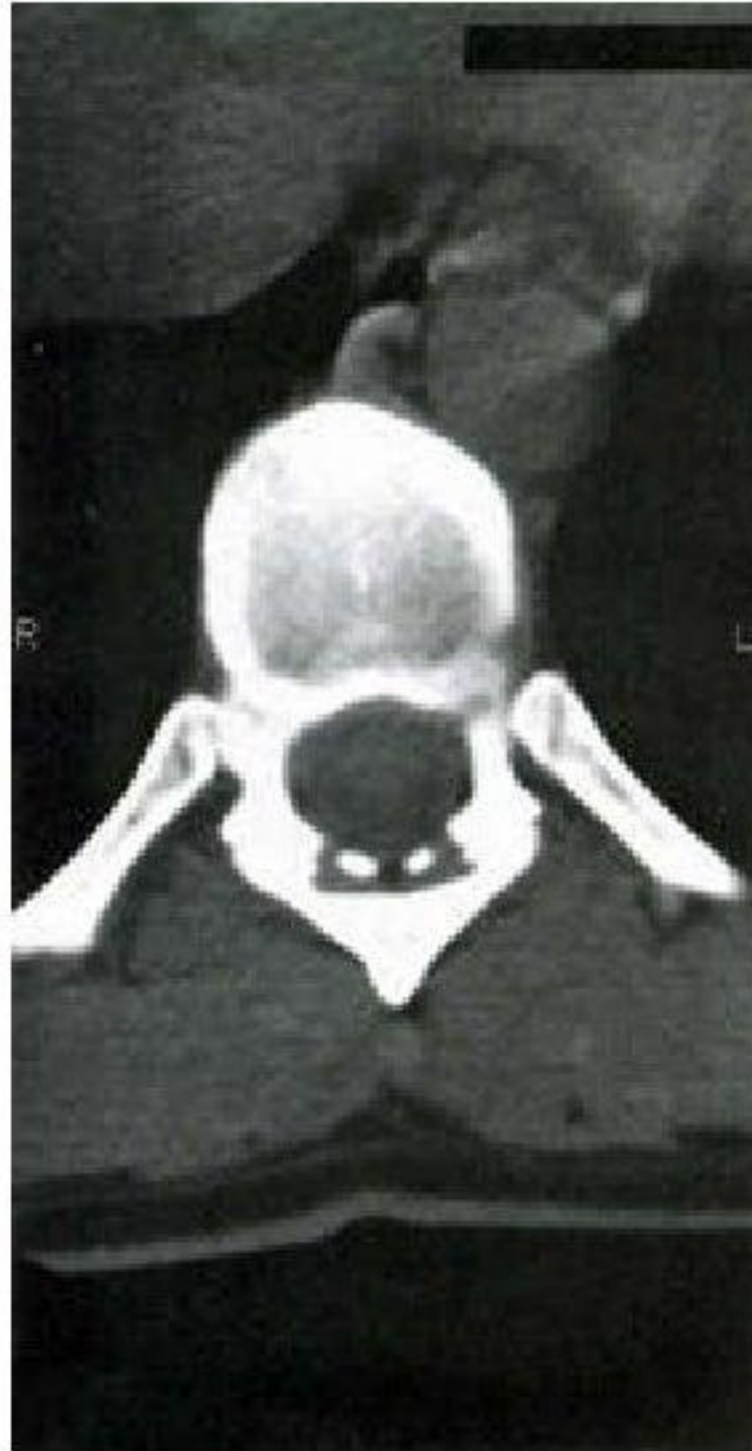
Lateral X-ray of a kyphotic spine in the sagittal plane.



The **SAGITTAL** or **MEDIAN PLANE** is a vertical cut that divides the body into left and right sections. The sagittal view is seen by surgeons on a lateral x-ray of the spine.

Anatomical Planes

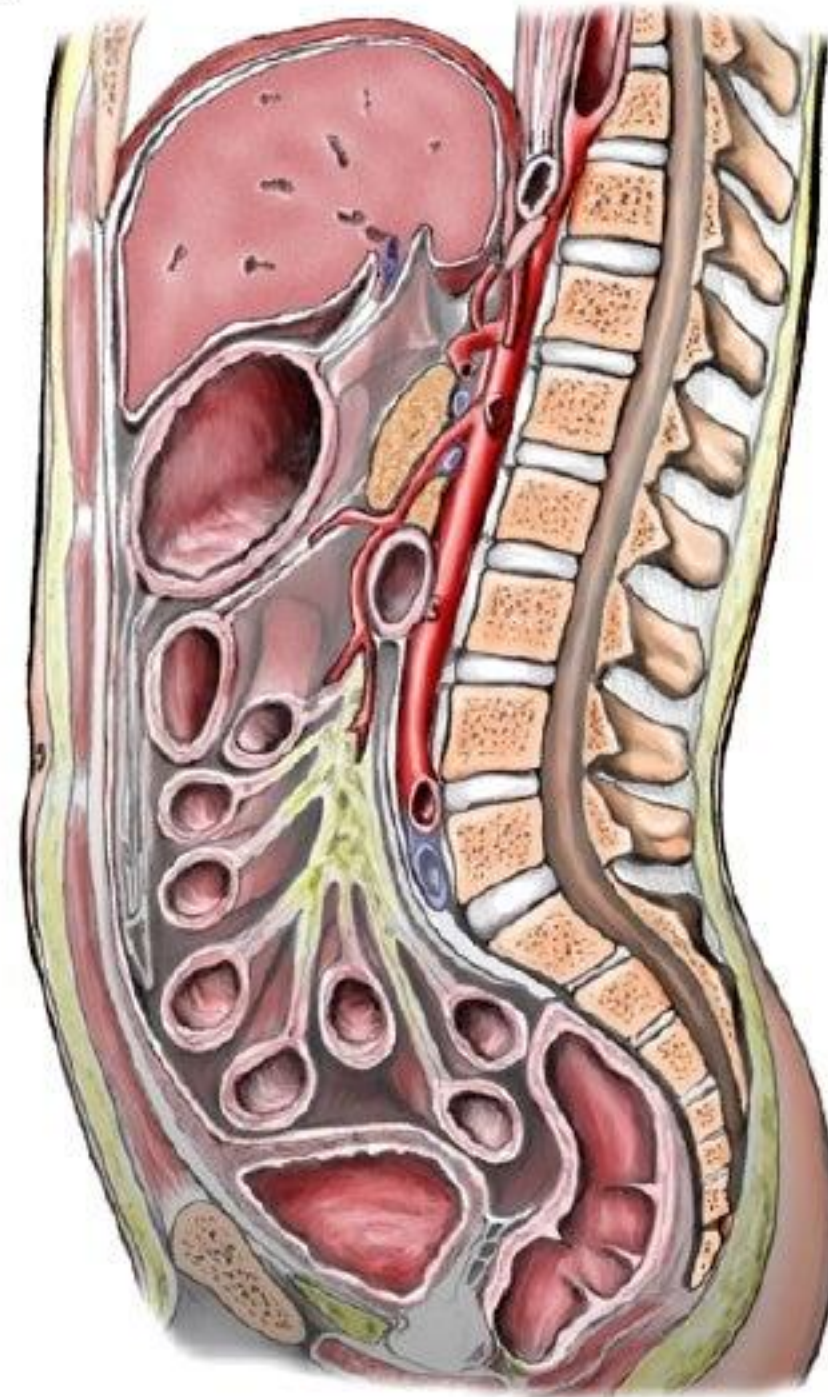
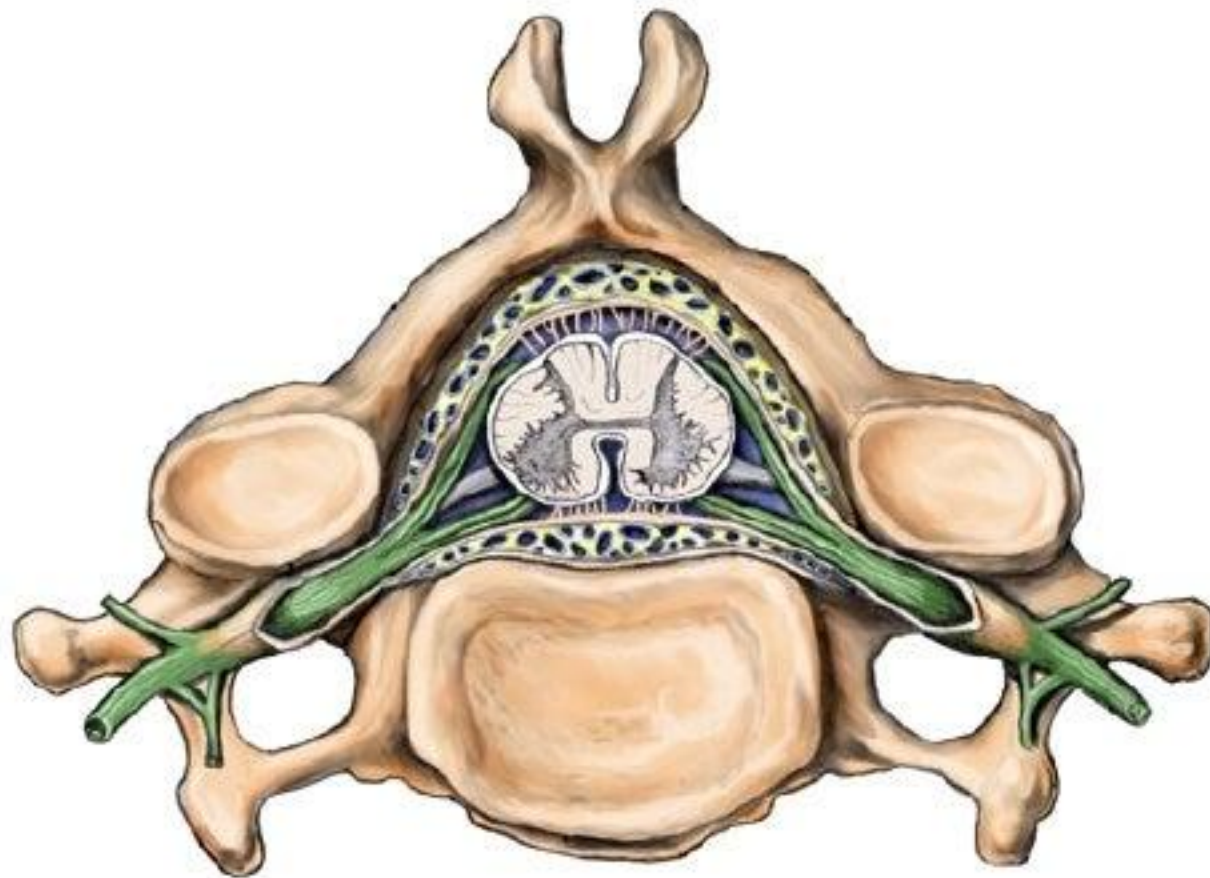
CT Scan of a thoracic vertebra in the axial plane.



The **AXIAL** or **TRANSVERSE PLANE** is a horizontal cut that divides the body into upper and lower sections. To best view the axial plane of the spine, surgeons will often obtain a CT scan with axial cuts.

Functions of the Spine

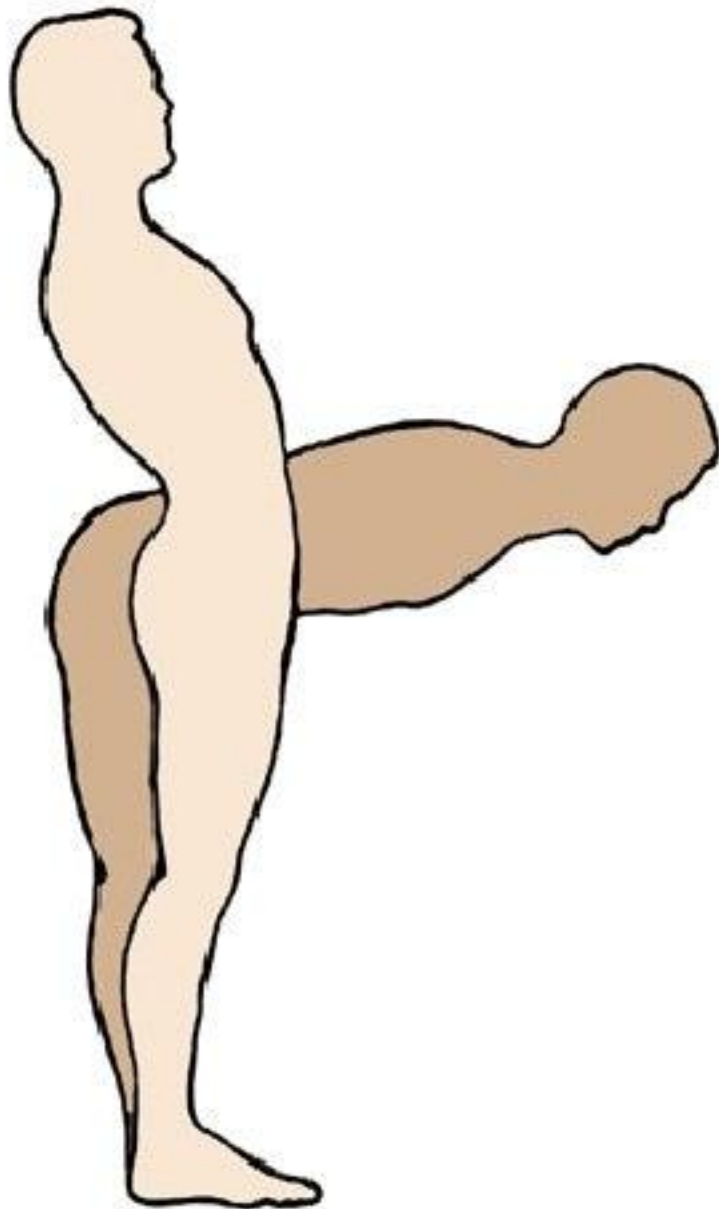
- Protection of
 - spinal cord and nerve roots
 - internal organs



Functions of the Spine

- Flexibility of motion in six degrees of freedom

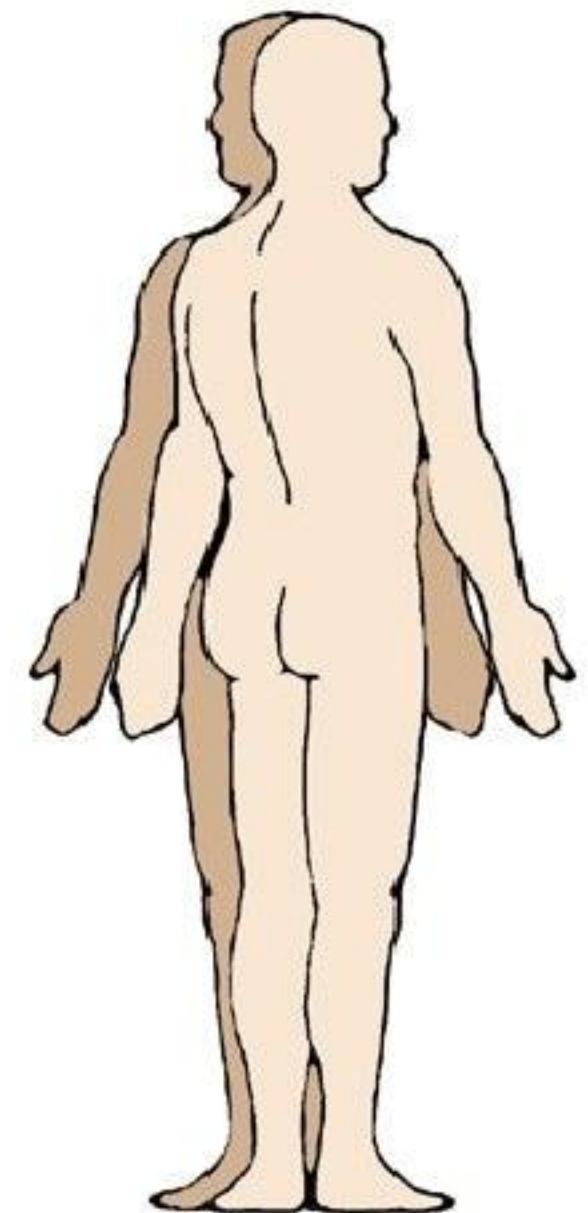
Flexion and Extension



Left and Right Side Bending



Left and Right Rotation

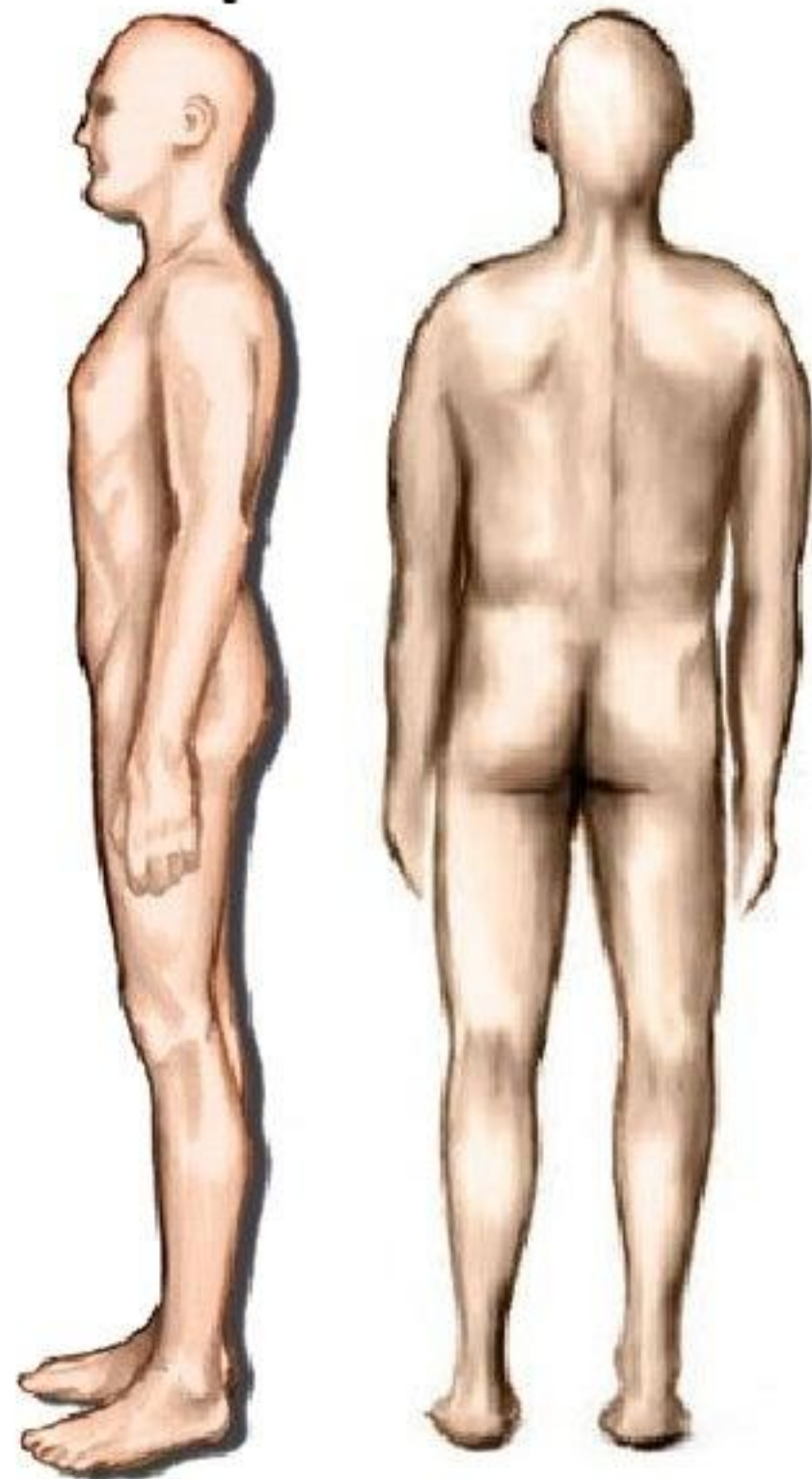


Functions of the Spine

- **Structural support and balance for upright posture**

The spine is the axle bearing the load of the head, shoulders and thorax. The upper body weight is then distributed to the lower extremities through the sacrum and pelvis.

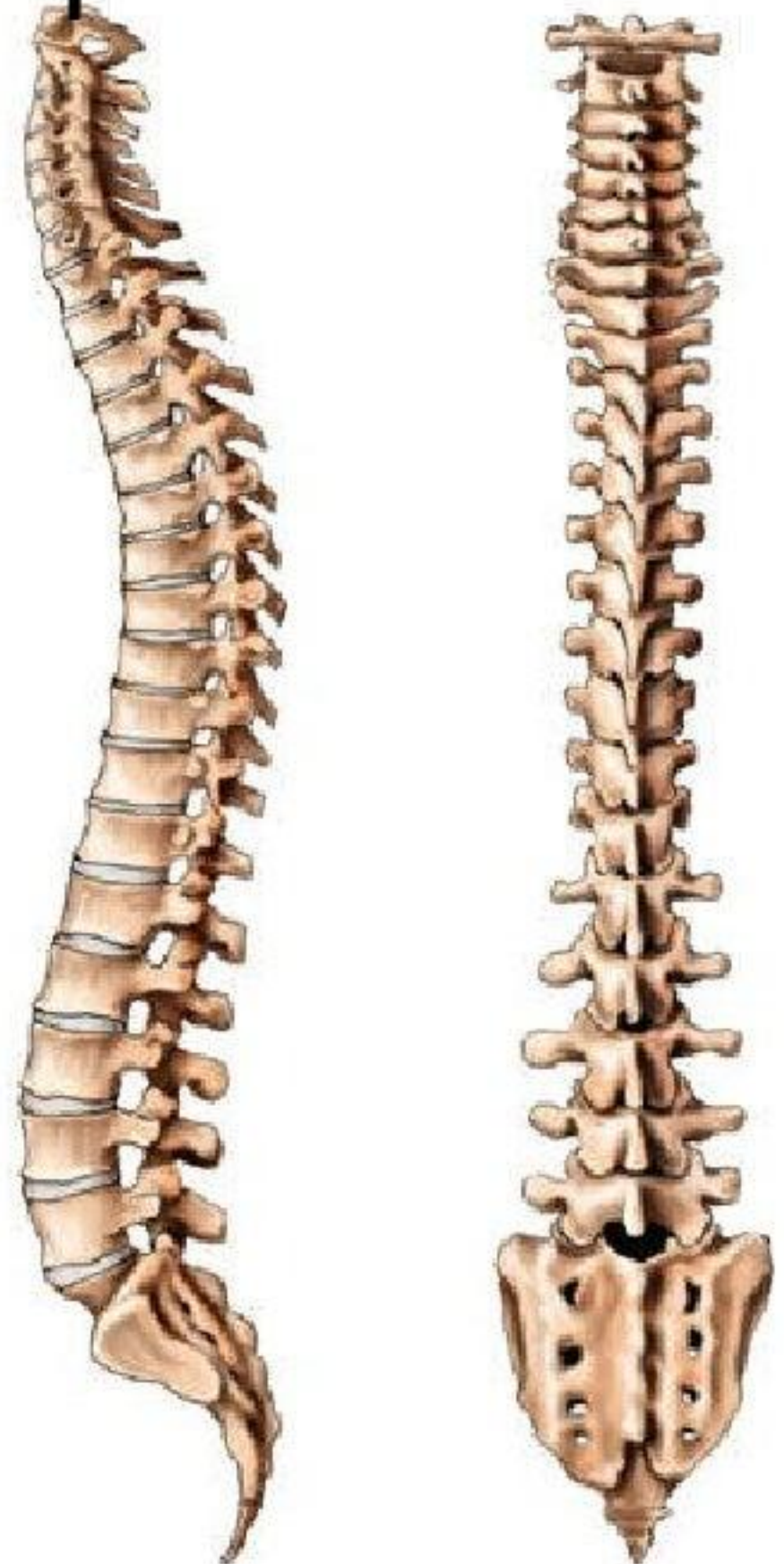
This reduces the amount of work required by the spinal muscles and can eliminate muscle fatigue and back pain.



Functions of the Spine

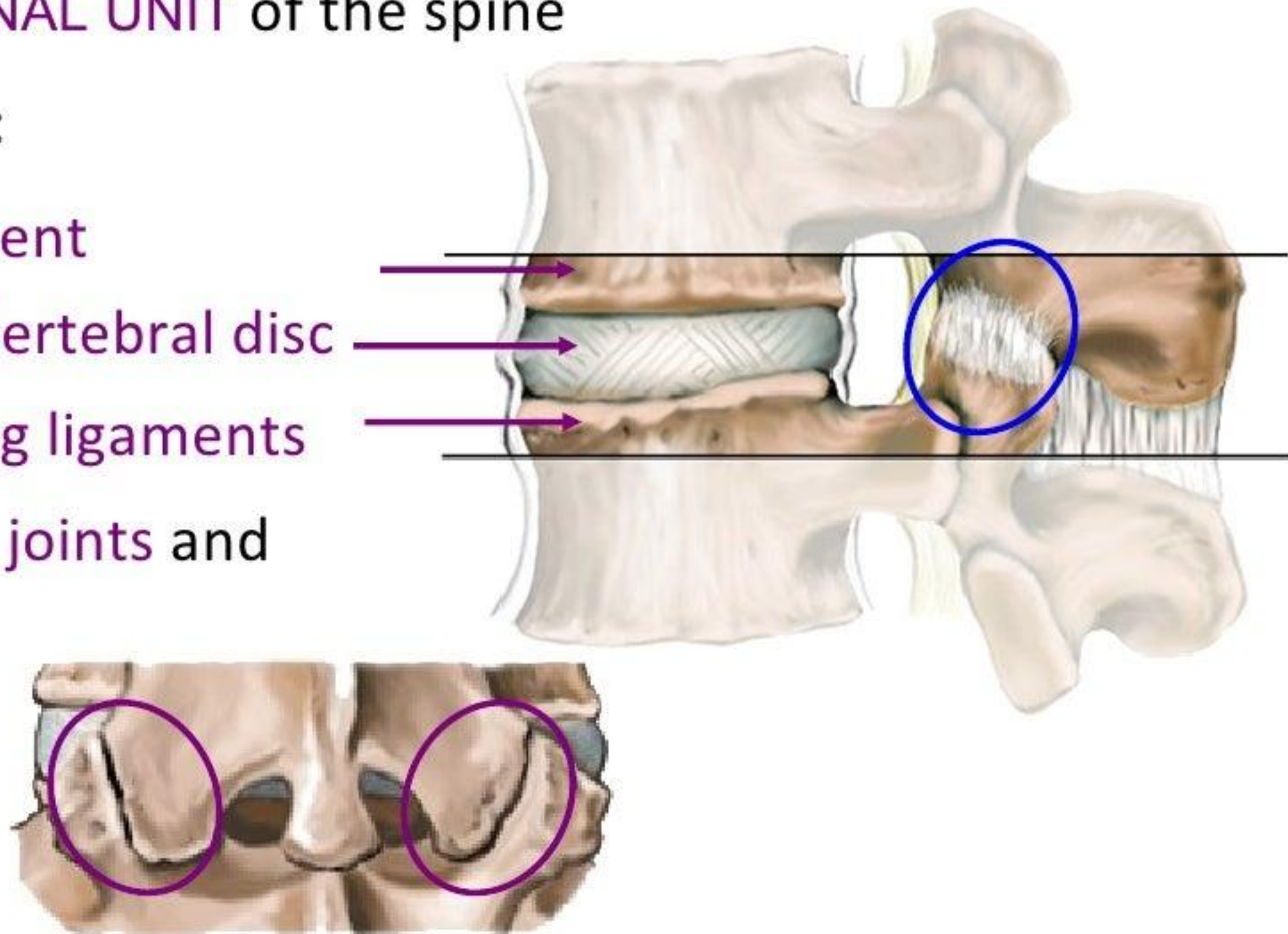
To achieve these functions, the spine must have:

- **Resistance** to axial loading forces, accomplished by:
 - Kyphotic and lordotic sagittal plane curves
 - **Increased mass** of each vertebra from C1 to the sacrum
- **Elasticity** accomplished by:
 - Alternating lordotic and kyphotic curves
 - Multiple **MOTION SEGMENTS**



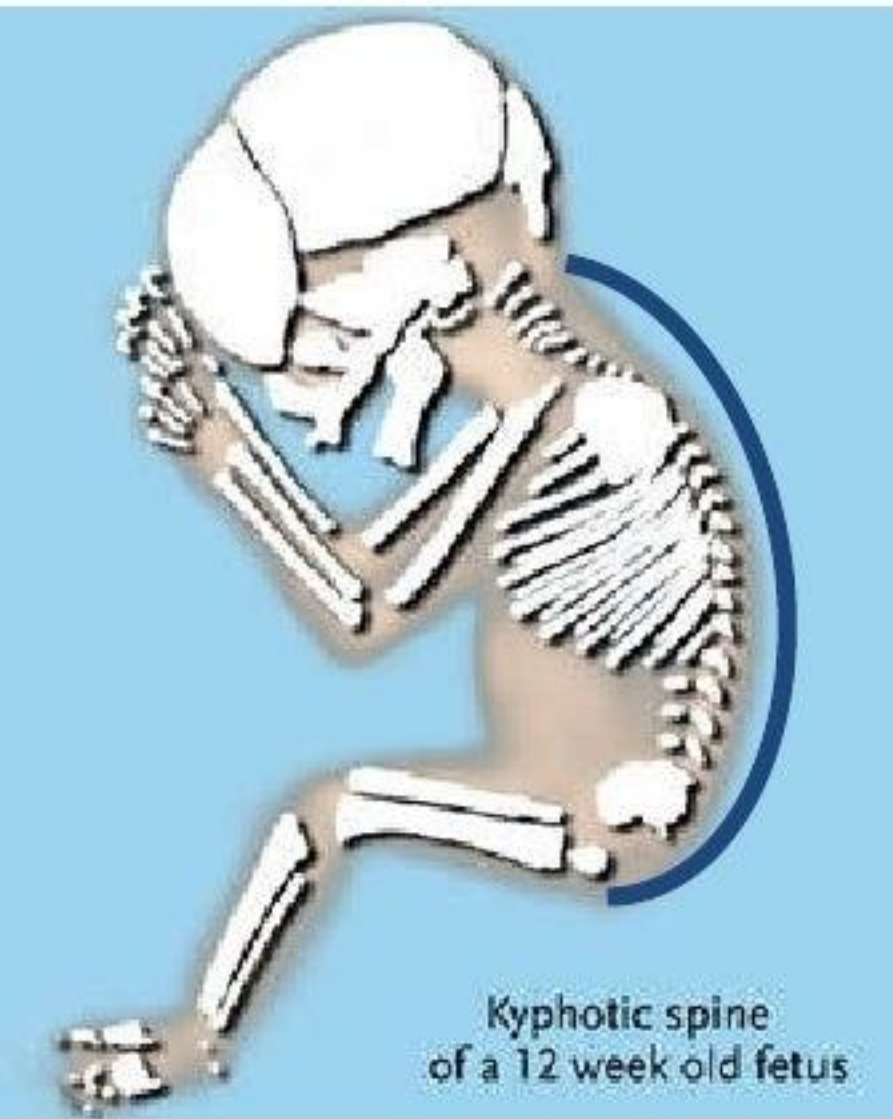
The Motion Segment

- The **FUNCTIONAL UNIT** of the spine
- Composed of:
 - Two adjacent vertebrae
 - The intervertebral disc
 - Connecting ligaments
 - Two facet joints and capsules



Sagittal Plane Curves

- Primary Curves
- Secondary Curves



Sagittal Plane Curves

Cervical Lordosis 20° - 40°

Thoracic Kyphosis 20° - 40°

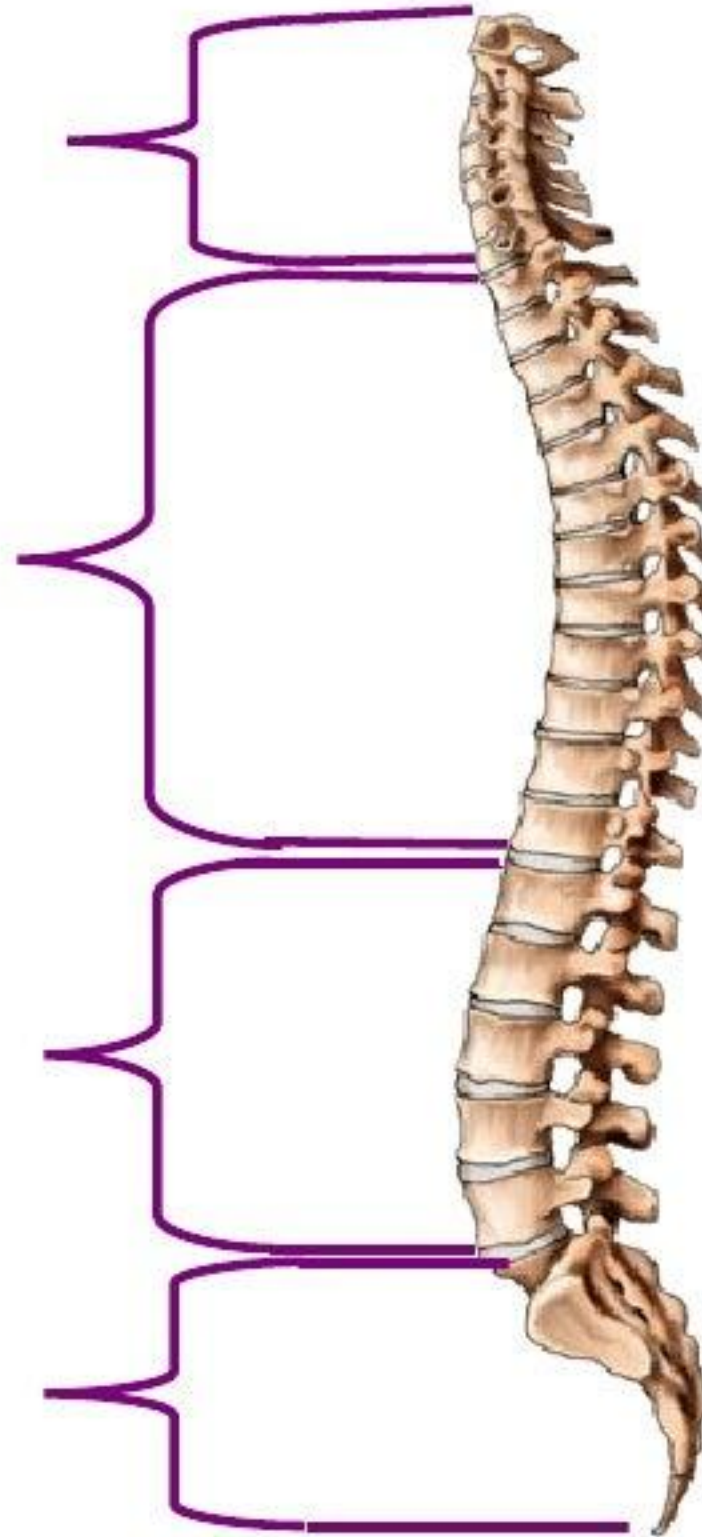
Lumbar Lordosis 30° - 50°

Sacral Kyphosis



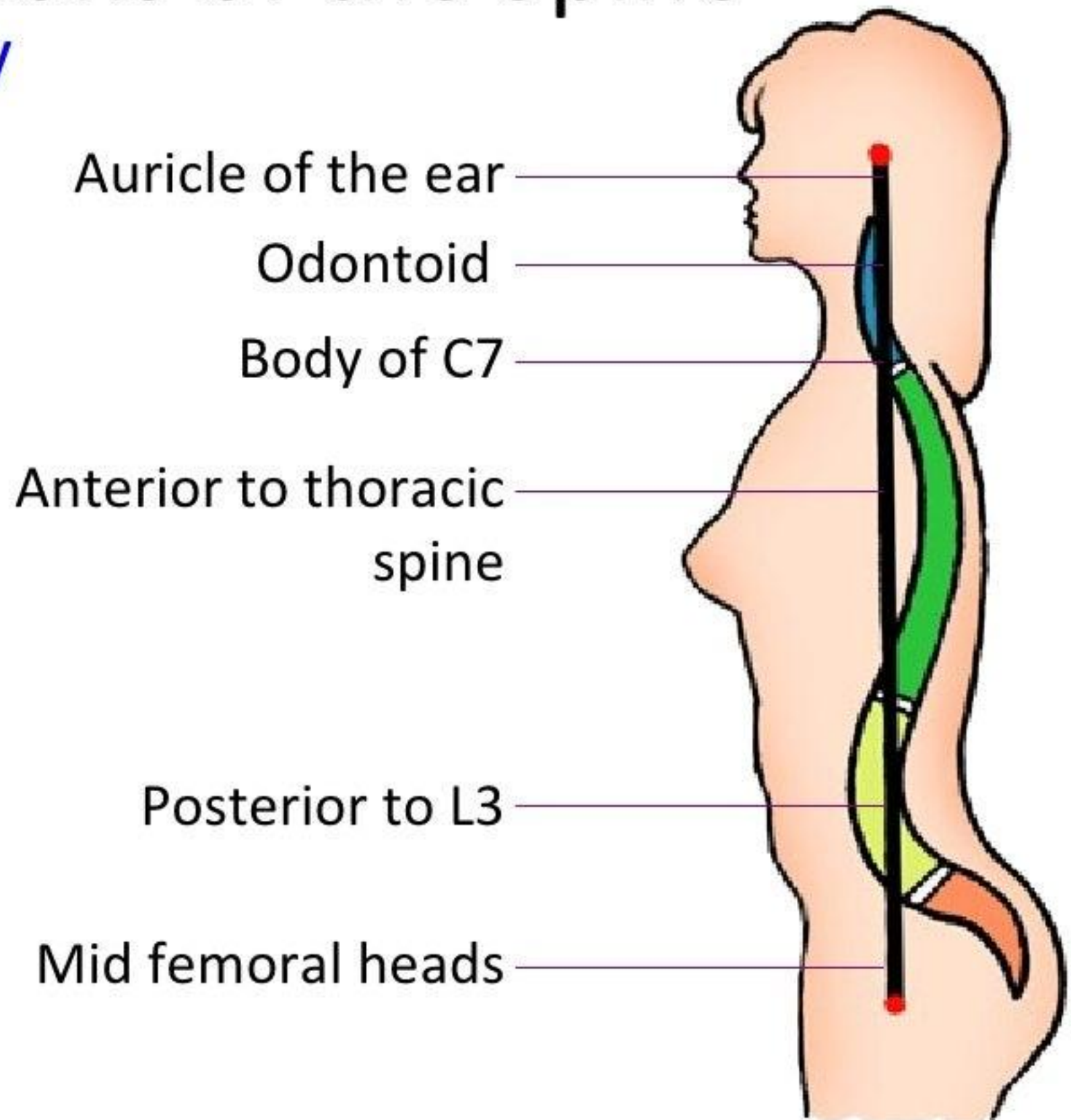
Regions of the Spine

- **Cervical**
 - Upper cervical: C1-C2
 - Lower cervical: C3-C7
- **Thoracic:** T1-T12
- **Lumbar:** L1- L5
- **Sacrococcygeal:** 9 fused vertebrae in the sacrum and coccyx.



Regions of the Spine

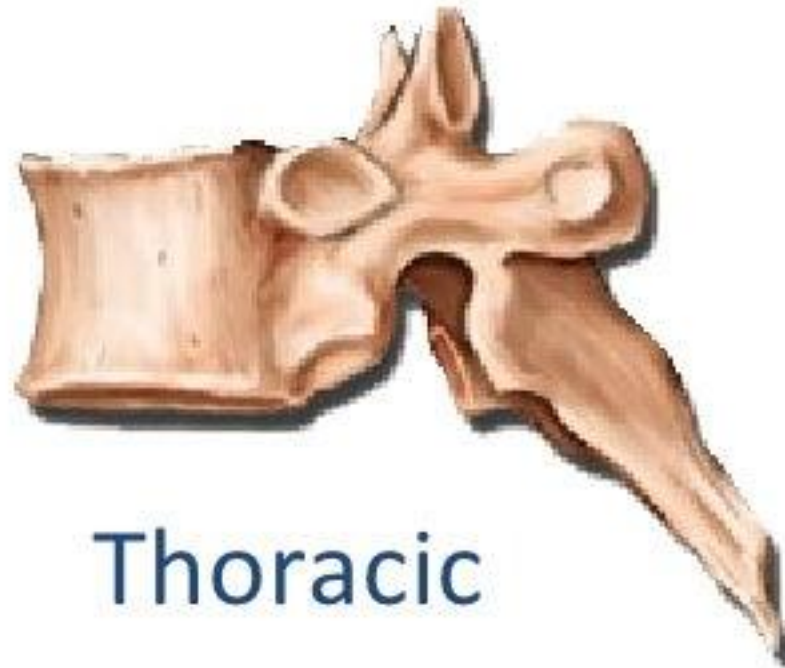
- Line of gravity



Basic Vertebral Structures



Cervical



Thoracic

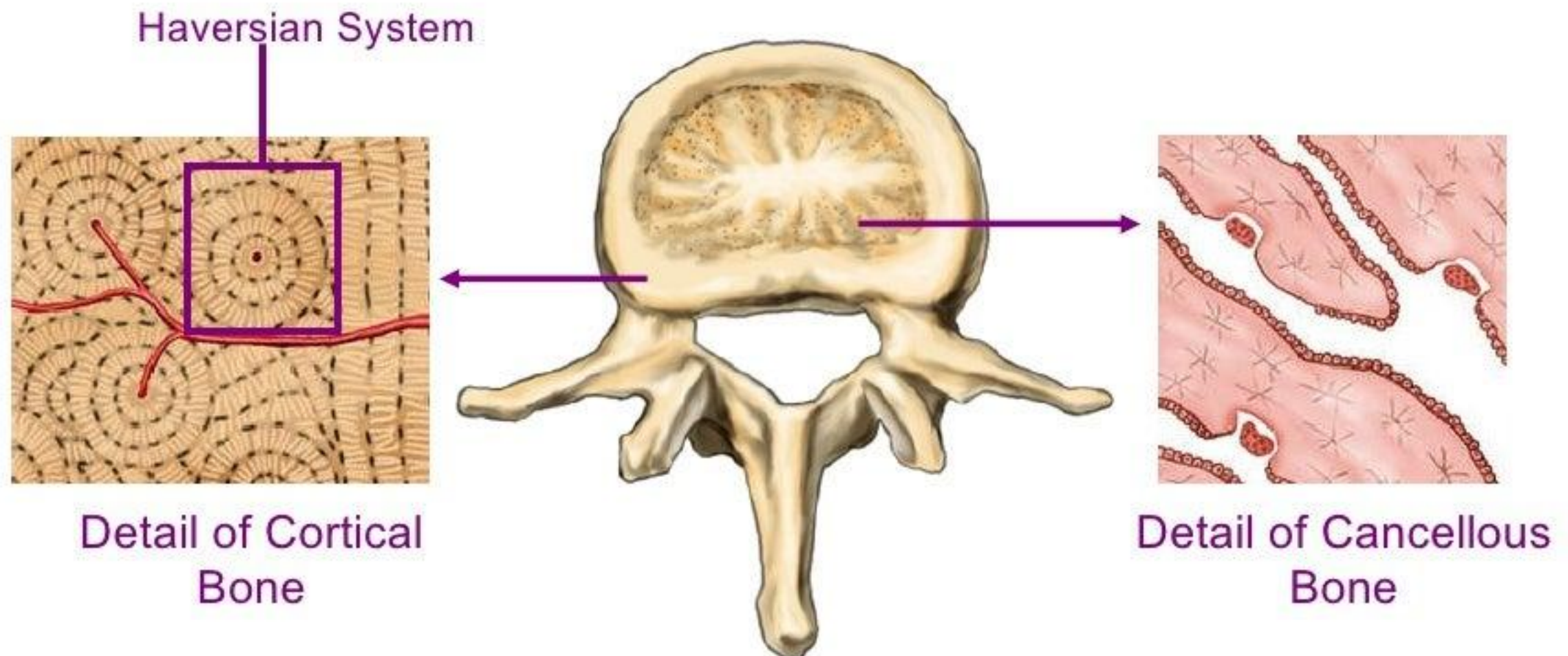


Lumbar

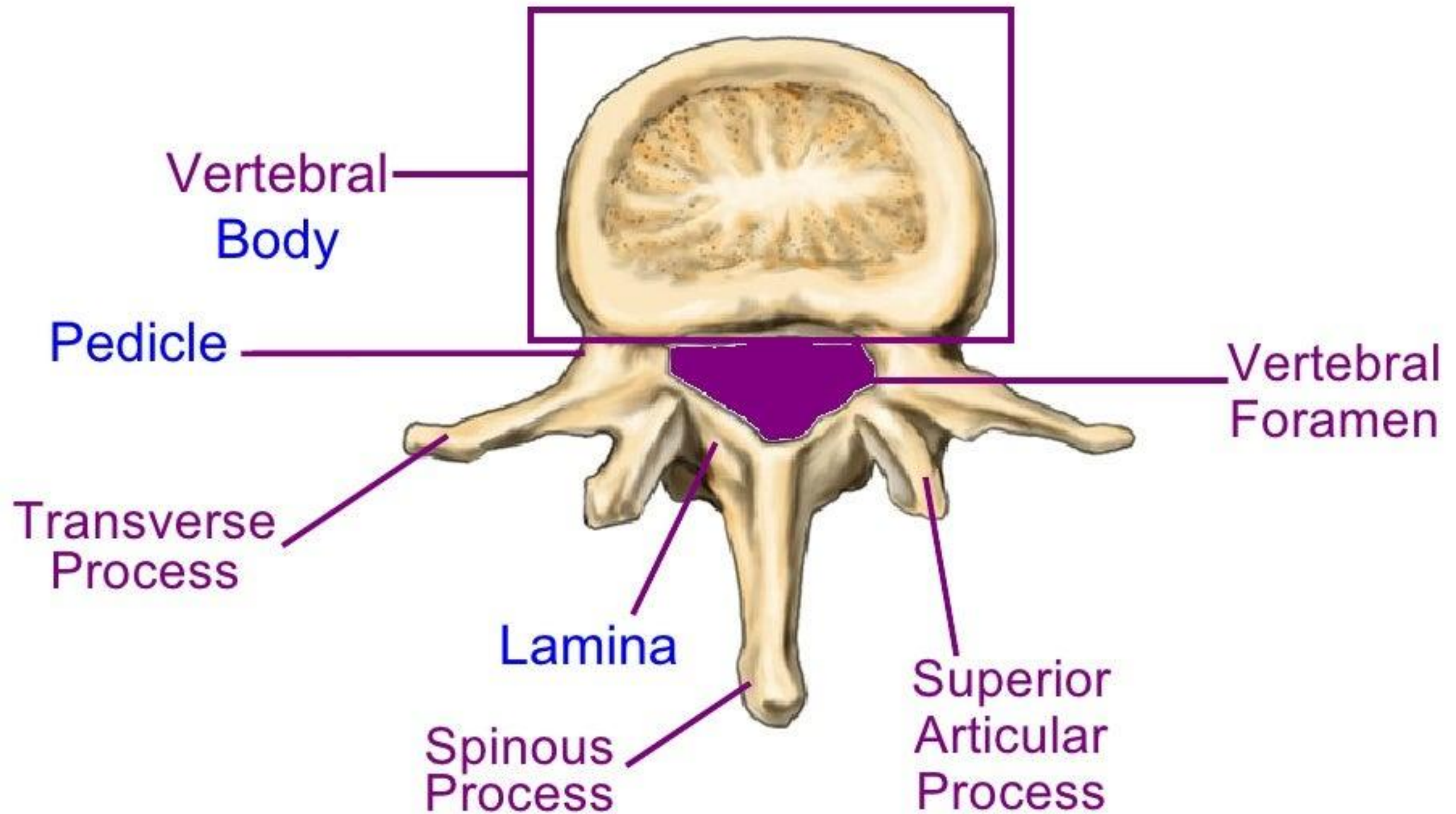
Types of Bone Tissue

There are two types of bone tissue:

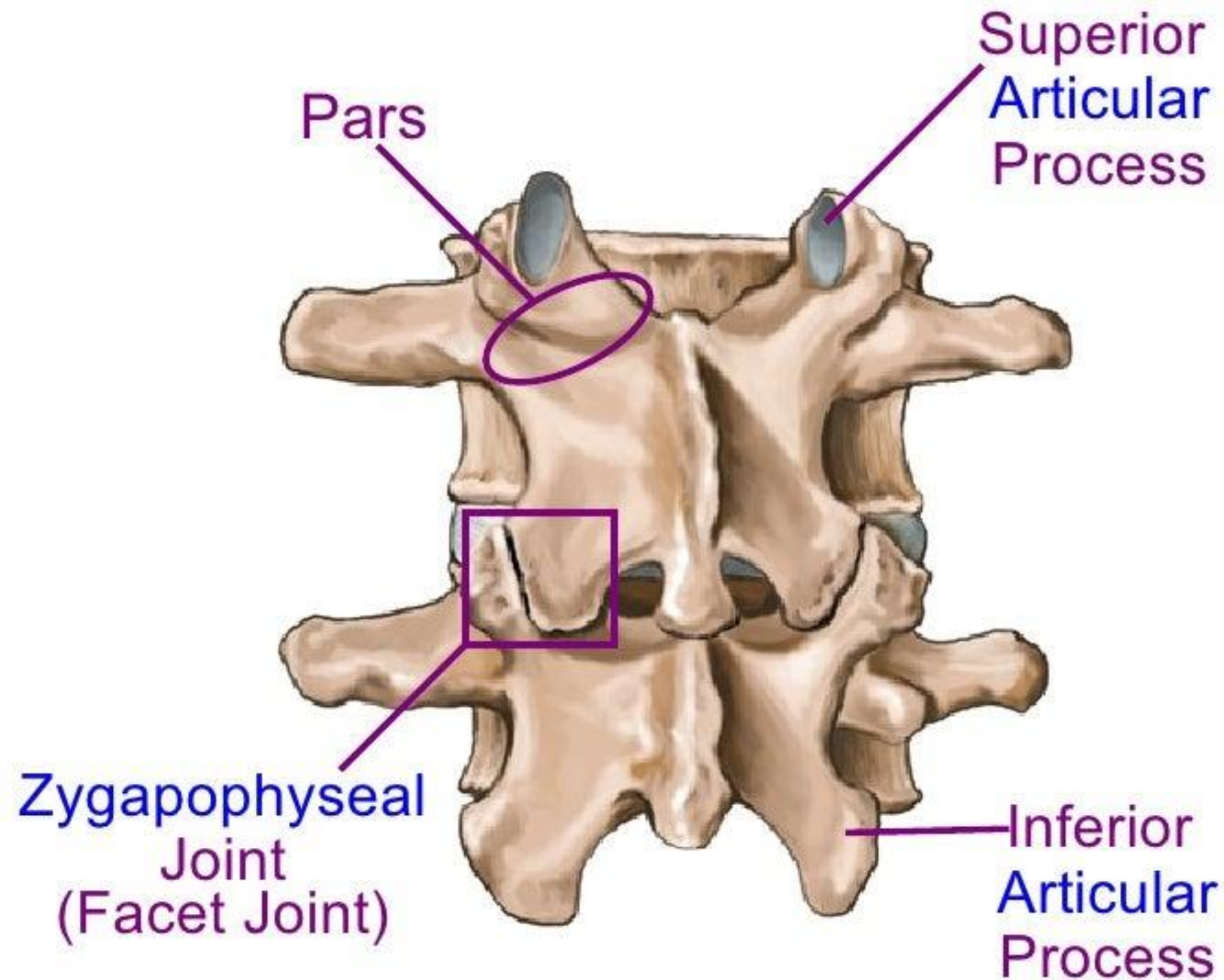
- **Cortical bone:** dense, outer shell of the vertebra
- **Cancellous bone:** inner, spongy bone



Vertebral Structures

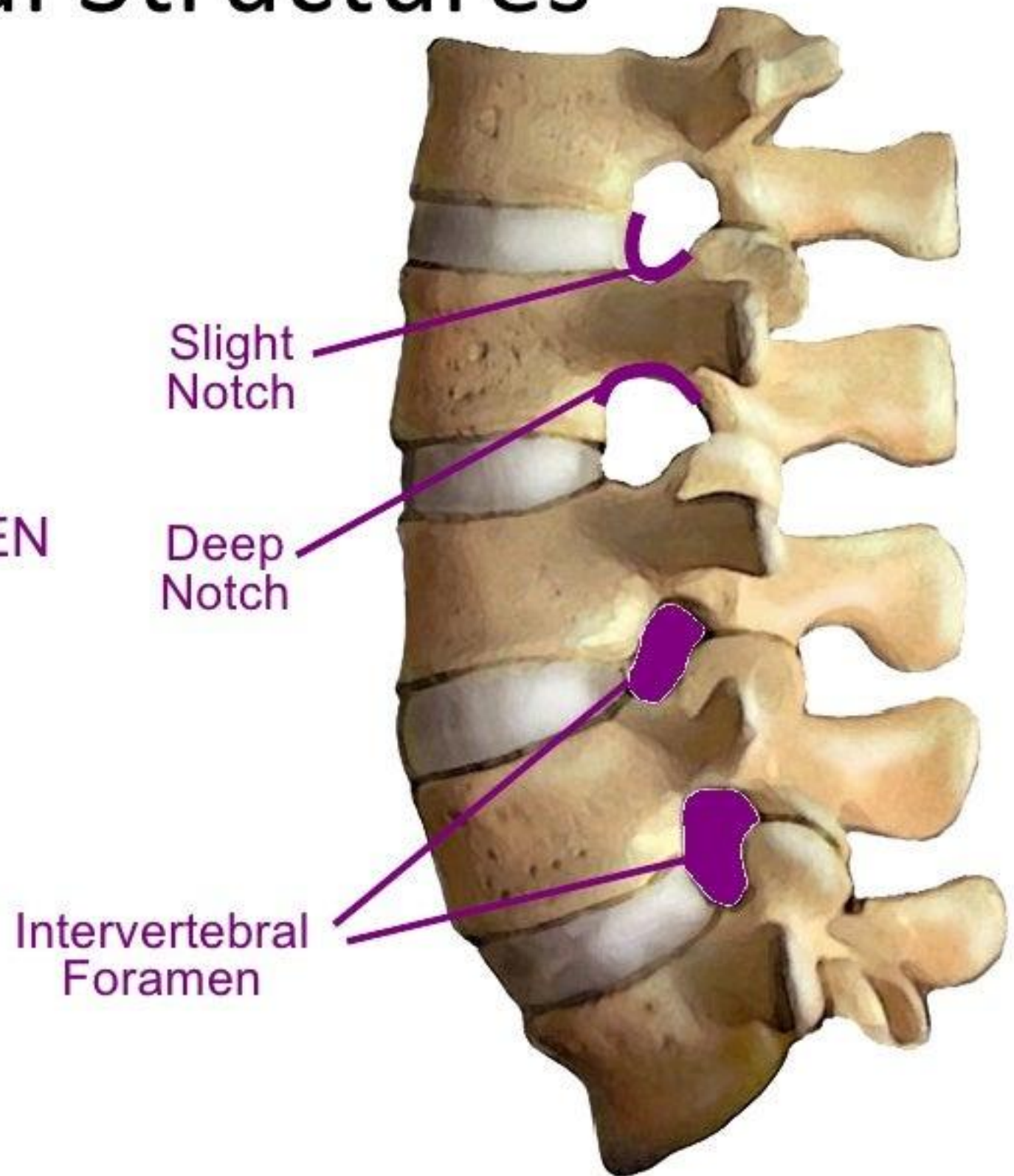


Vertebral Structures



Vertebral Structures

- Pedicle notches
- **INTERVERTEBRAL FORAMEN**
through which the spinal nerve roots leave the spinal cord



Vertebral Arches

- Anterior Arch

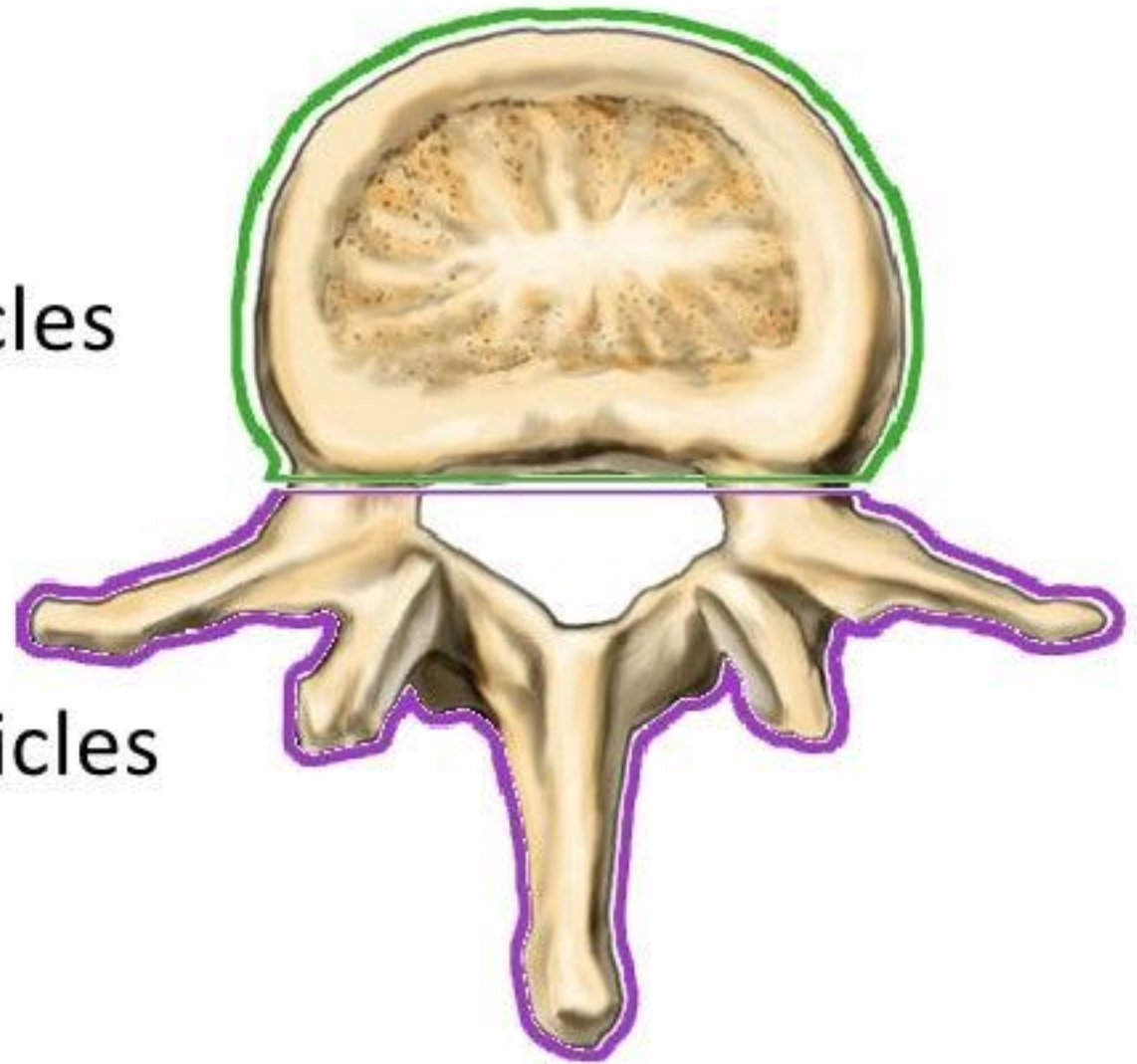
Comprised of:

- Vertebral body
- Anterior 1/3 of the pedicles

- Posterior Arch

Comprised of:

- Posterior 2/3 of the pedicles
- Lamina
- Processes



The Atlas (C1)

