



تشريح الشعاعي و الكورس الأول

NORMAL ANATOMY OF THE VERTEBRAL COLUMN

Sawa University

College of health and medical techniques

Department of Radiology Tech.

Third Stage

جامعة ساوة الاهلية

كلية التقنيات الصحية والطبية

قسم تقنيات الاشعة والسونار

المرحلة الثالثة

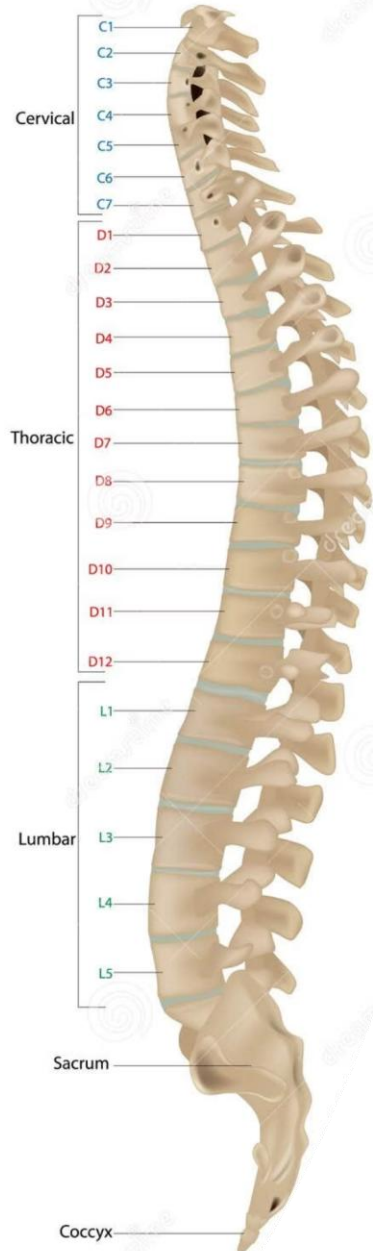
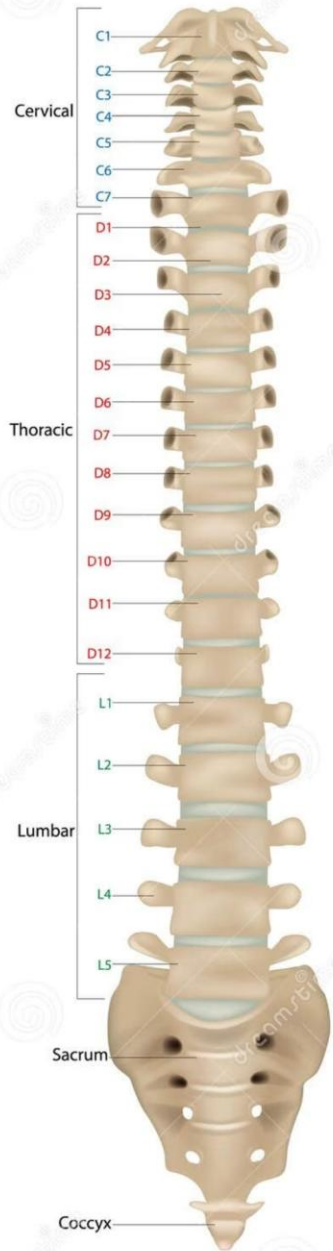
محاضرة رقم 3

Lecture No. .3...

الجانب النظري

Theoretical

تدريسي المادة : م.م. ابراهيم فاضل

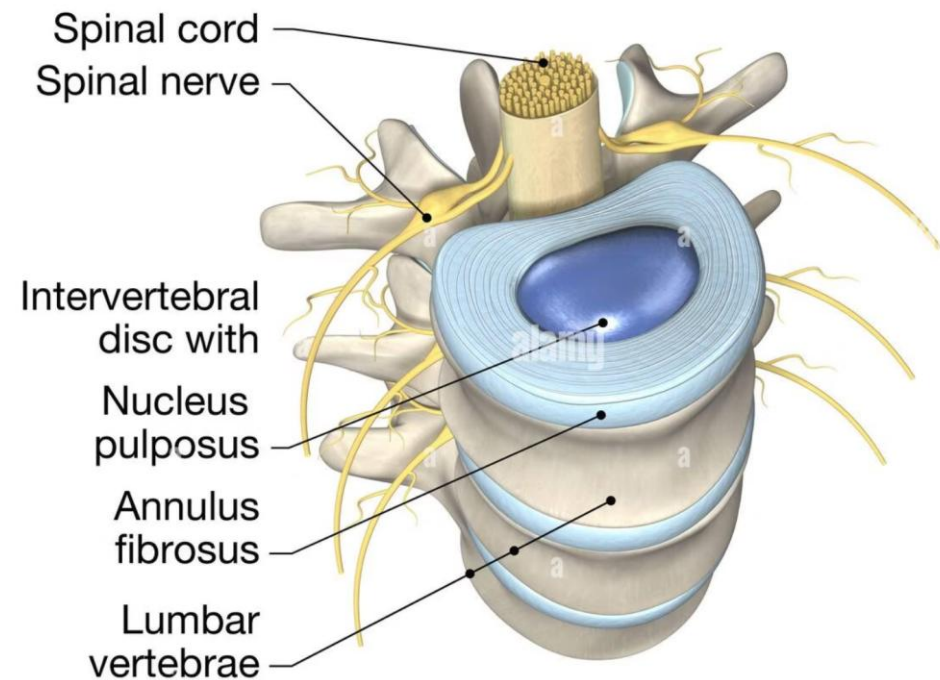


Normal Anatomy of the Vertebral Column

Overview: The Backbone of the Human Body

The vertebral column forms the central supporting structure of the human body, a remarkable feat of biological engineering that balances strength with flexibility.

- Approximately **33 vertebrae** cushioned by intervertebral discs
- Five distinct anatomical regions with specialized functions
- Multi-functional design enabling protection, support, and movement



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Essential functions: spinal cord protection, body weight distribution, postural stability, and dynamic movement coordination.

The Five Regions of the Vertebral Column



Cervical Region

Seven delicate vertebrae (C1-C7) supporting the head's weight while enabling complex neck movements and rotations.



Thoracic Region

Twelve robust vertebrae (T1-T12) articulating with ribs to form the protective thoracic cage around vital organs.



Lumbar Region

Five powerful vertebrae (L1-L5) with the largest bodies, designed to bear the majority of body weight and stress.



Sacral Region

Five fused vertebrae forming the triangular sacrum, creating the crucial connection between spine and pelvis.



Coccygeal Region

Four fused vertebrae forming the coccyx, a vestigial tailbone providing anchor points for muscles and ligaments.

The Curves of the Spine: Strength and Flexibility

Primary Curves

Thoracic & Sacral Kyphotic

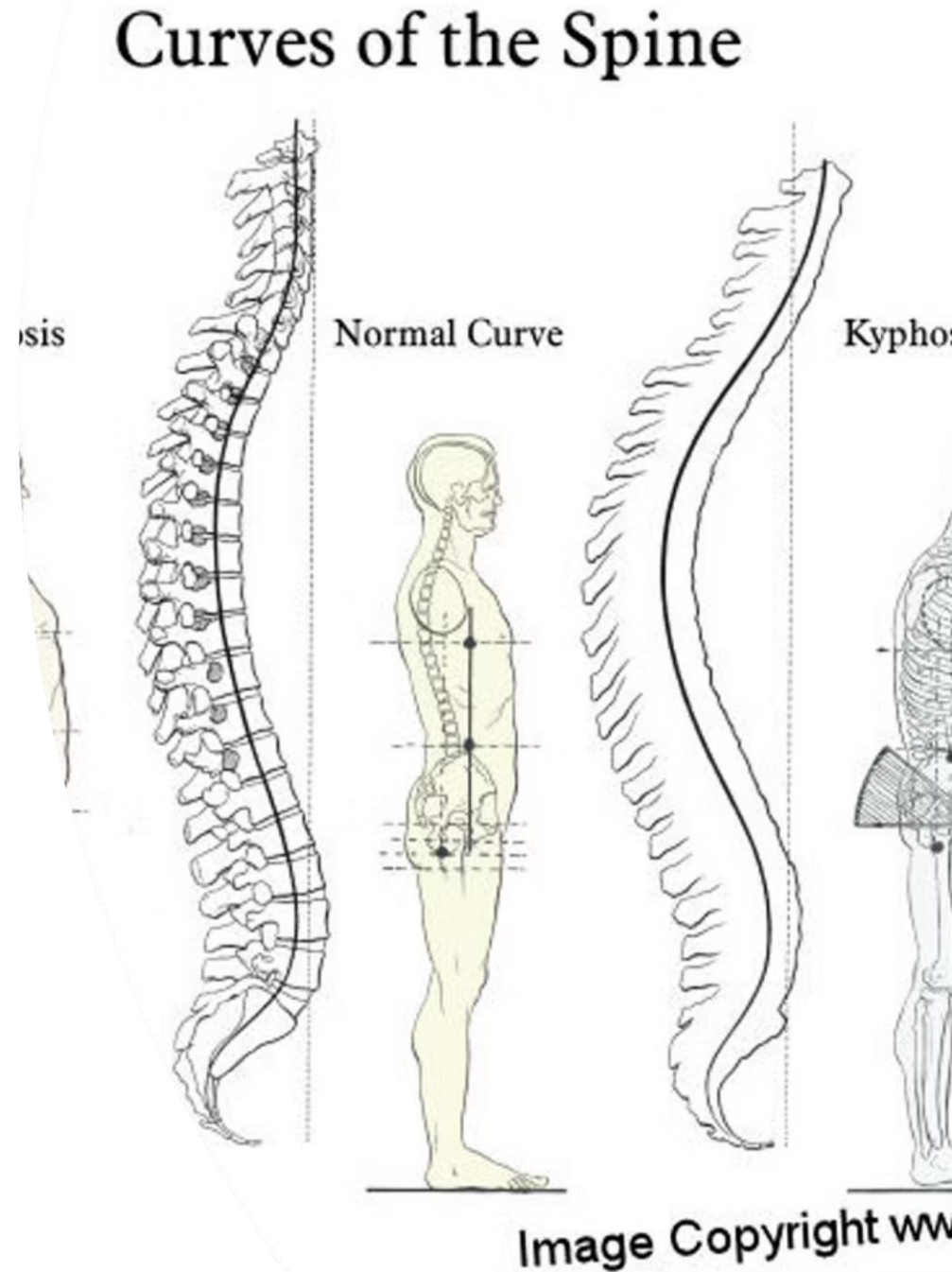
Present at birth, these posterior curves provide structural foundation and protect vital organs in the chest and pelvis.

Secondary Curves

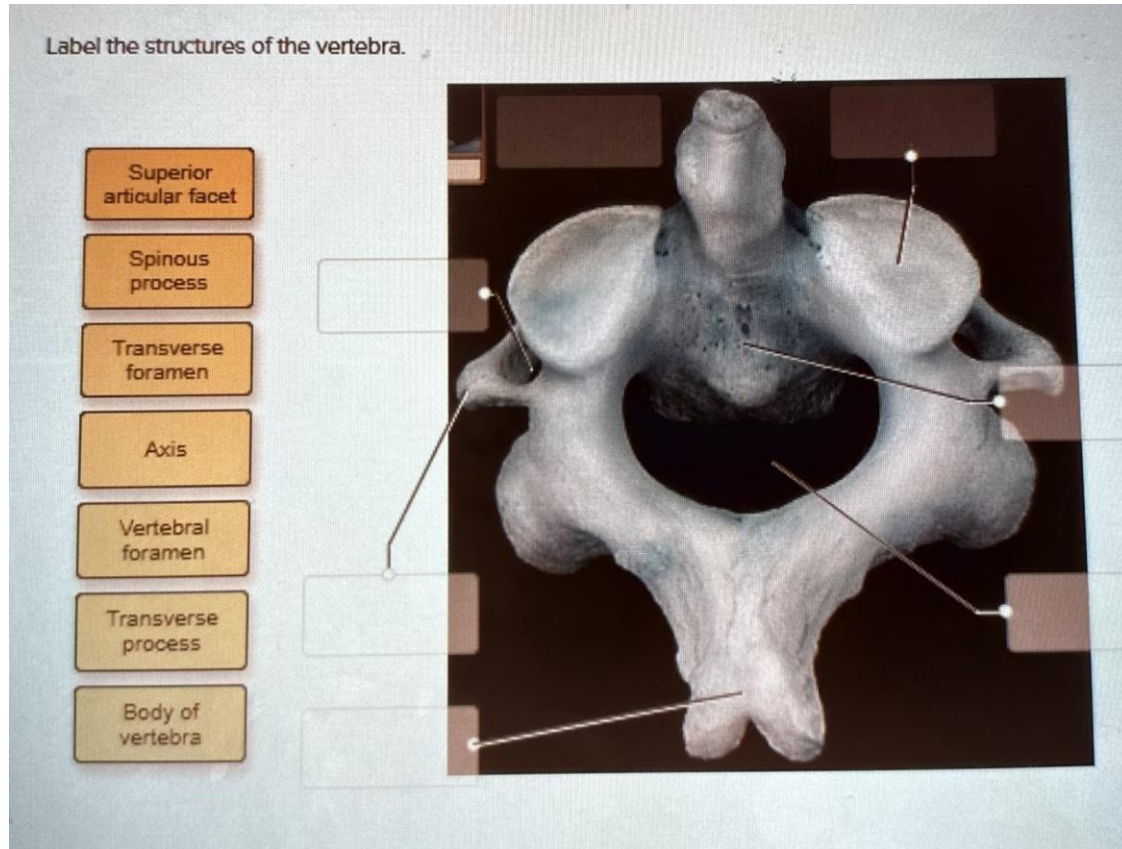
Cervical & Lumbar Lordotic

Develop with head lifting and walking, these anterior curves optimize balance and weight distribution during upright posture.

These four natural curvatures work together to increase the spine's [load-bearing capacity by 10 times](#) compared to a straight column, while providing shock absorption and maintaining flexibility during movement.



Anatomy of a Typical Vertebra



Essential Components

Vertebral Body

Anterior weight-bearing cylinder that increases in size from cervical to lumbar regions to handle greater loads.

Vertebral Arch

Posterior protective ring consisting of pedicles and laminae, forming the vertebral foramen for spinal cord passage.

Bony Processes

Seven projections: one spinous, two transverse, and four articular processes for muscle attachment and joint articulation.

Unique Features of Cervical Vertebrae



C1 - Atlas

Ring-like structure without a vertebral body, featuring large lateral masses that cradle the skull's occipital condyles.



C2 - Axis

Distinguished by the dens (odontoid process), a tooth-like projection that serves as a pivot for head rotation.



Transverse Foramina

Unique openings in C1-C6 that provide protective channels for vertebral arteries supplying the brain.



C7 - Vertebra Prominens

Features the most prominent spinous process, easily palpable at the base of the neck as a key anatomical landmark.

Thoracic Vertebrae: Rib Articulation and Stability

Heart-Shaped Bodies

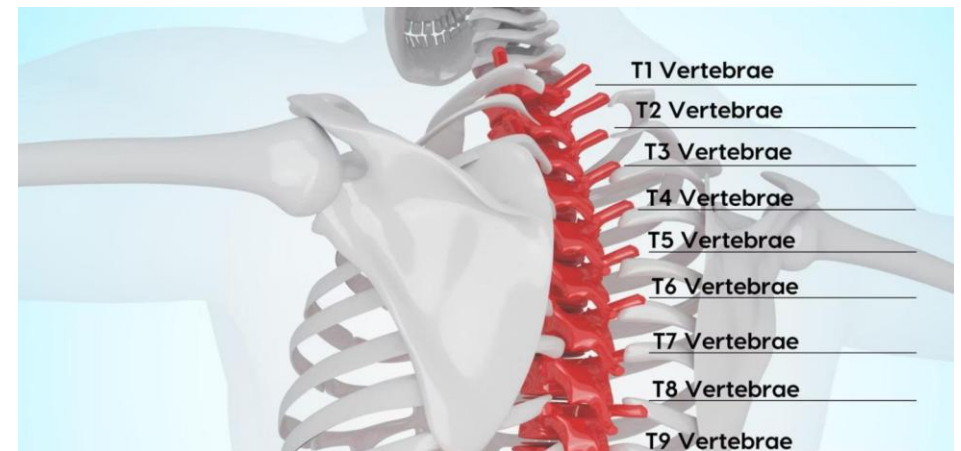
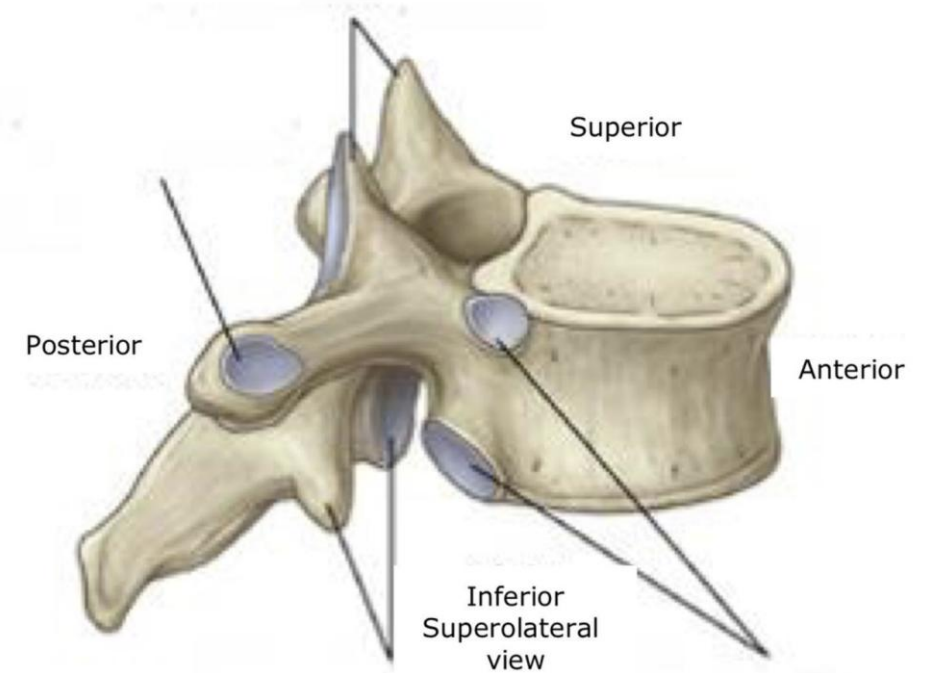
Distinctive vertebral bodies that are intermediate in size, perfectly designed to articulate with the rib cage structure.

Long Spinous Processes

Elongated, downward-pointing projections that overlap like roof shingles, providing structural stability and muscle attachment points.

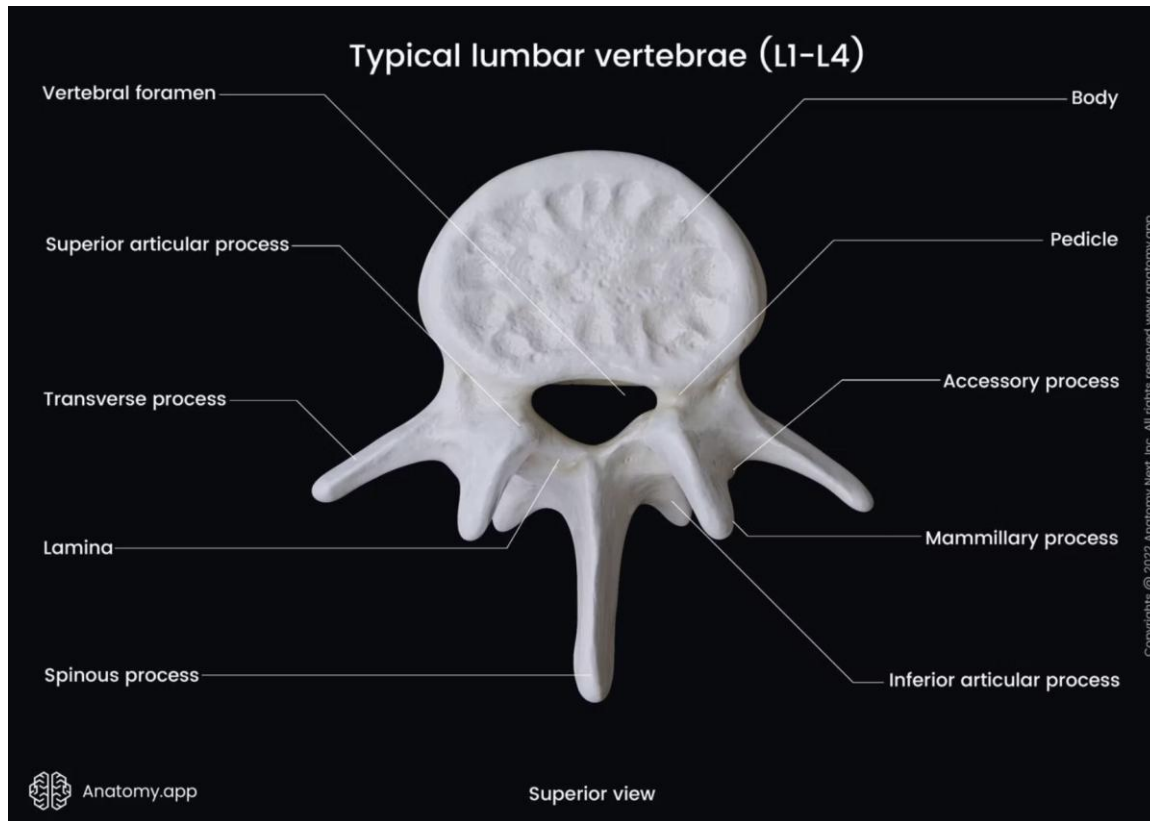
Costal Facets

Specialized articular surfaces on vertebral bodies and transverse processes that form synovial joints with rib heads and tubercles.



Lumbar Vertebrae: The Powerhouse of the Spine

L1 - L5



Massive Bodies

The largest and thickest vertebral bodies in the spine, perfectly engineered to support the majority of body weight and withstand compressive forces.



Triangular Canal

Spacious triangular vertebral foramen accommodates the cauda equina and allows for safe passage of lumbar nerve roots.

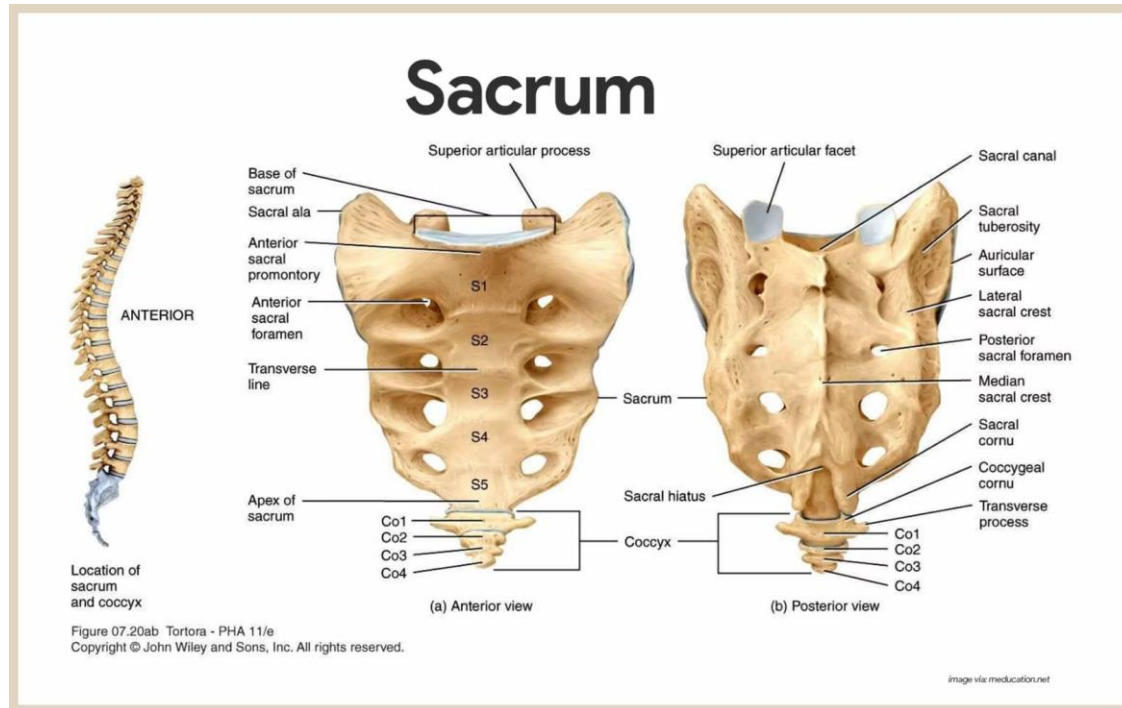


Mobility Hub

Enables flexion, extension, lateral bending, and limited rotation of the lower back while maintaining structural integrity.

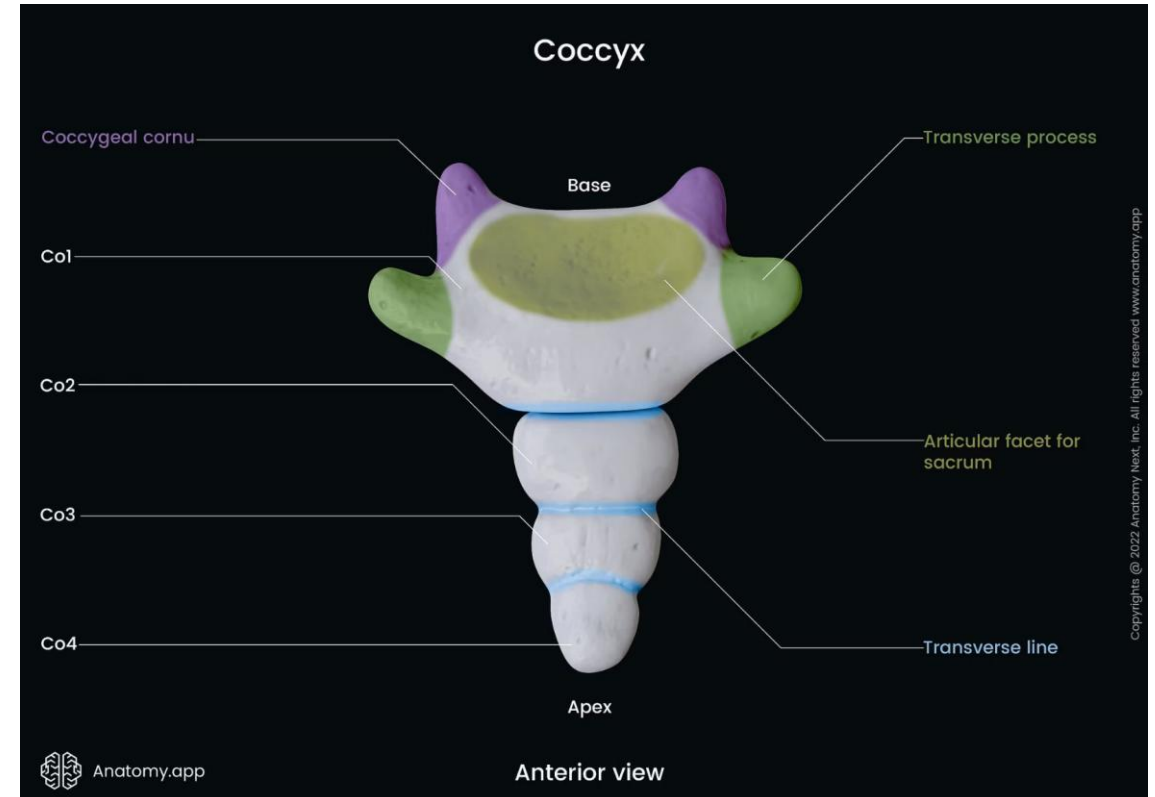
Sacrum and Coccyx: The Base of the Spine

Sacrum

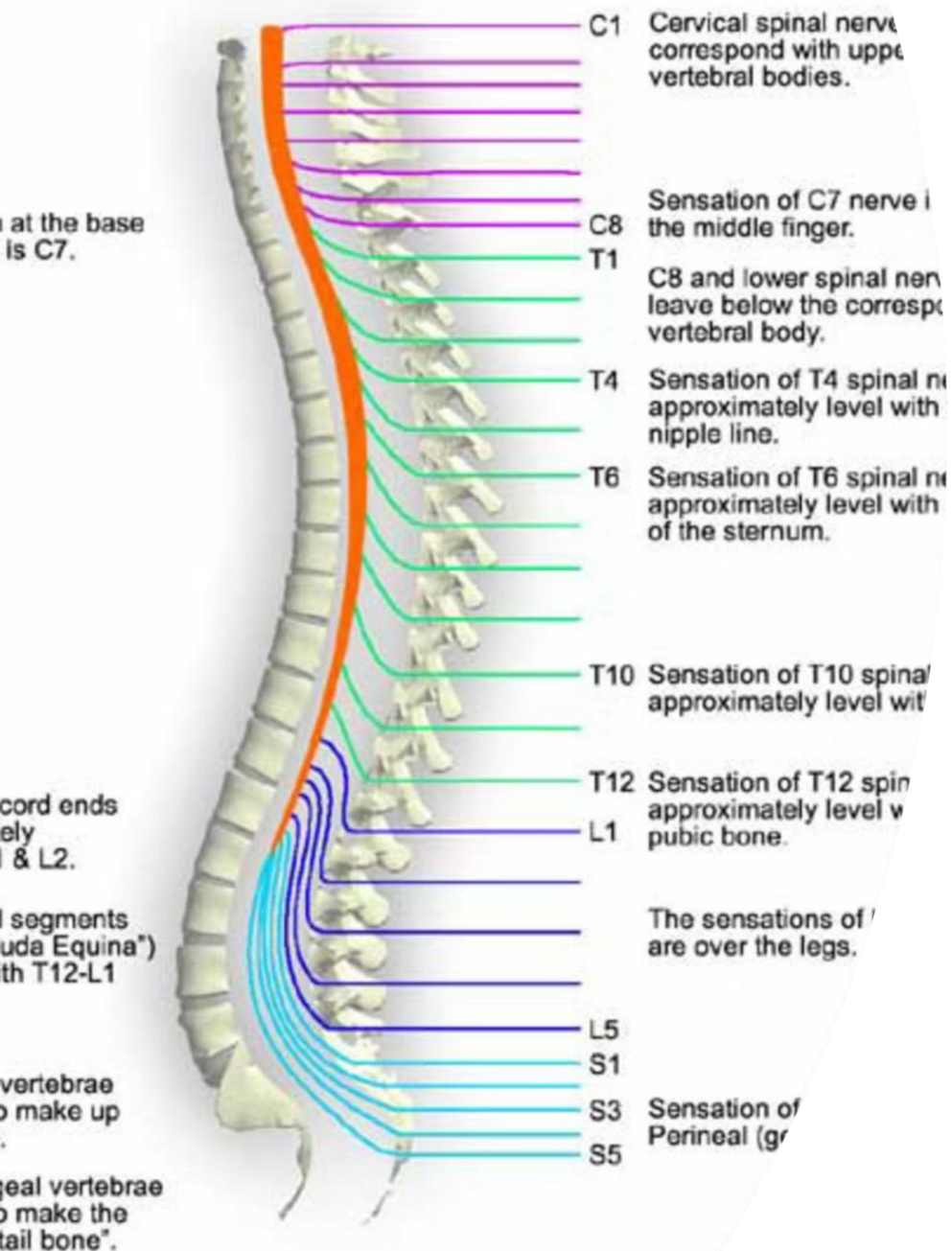


- **Five fused vertebrae (S1-S5)** forming a solid triangular foundation
- **Sacral foramina** provide passage for sacral nerves
- **Auricular surfaces** articulate with iliac bones of pelvis

Coccyx



- **Four fused vertebrae** forming the vestigial tailbone
- **Muscle attachments** for pelvic floor and gluteal muscles
- **Ligament anchor points** supporting pelvic stability



Summary: The Vertebral Column's Vital Role

Protective Function

Safeguards the delicate spinal cord and nerve roots within the vertebral canal while allowing neural communication throughout the body.

Structural Support

Serves as the body's central pillar, distributing weight efficiently from head to pelvis while maintaining upright posture.

Dynamic Flexibility

Enables complex movements in multiple planes while natural curvatures provide shock absorption and mechanical advantage.

Clinical Significance

Comprehensive understanding of vertebral anatomy is fundamental for diagnosing pathologies, planning treatments, and preventing spinal injuries.

❏ **Key Takeaway:** The vertebral column represents one of nature's most sophisticated biomechanical solutions, balancing protection, support, and mobility in a single integrated system.

QUIZ

- 1-LIST THE FOUR VITAL FUNCTIONS OF THE VERTEBRAL COLUMN.
- 2-EXPLAIN HOW THE NATURAL CURVATURES OF THE SPINE CONTRIBUTE TO BODY MOVEMENT
- 3-NAME THE FIVE REGIONS OF THE VERTEBRAL COLUMN.
- 4-DESCRIBE THE FUNCTION OF THE CERVICAL REGION.
- 5-HOW DOES THE THORACIC REGION CONTRIBUTE TO PROTECTING VITAL ORGANS?

Any questions?

*Thank
You*