

PHYE 281 – Applied Kinesiology

Lecture 12

The Trunk and Spinal Column

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Objectives

Identify the bones of the trunk and spinal column

Identify specific anatomic landmarks on these bones

List the movements of the trunk and spinal column

Identify the muscles of the trunk and spinal column

Know the origin, insertion and action for each muscle of the trunk and spinal column

Understand the causes and affected anatomy in specific spinal column disorders and injuries

Master detailed kinesiological analysis of the trunk and spinal column

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The Trunk and Spinal Column

Vertebral column

24 vertebrae

7 cervical, 12 thoracic,
5 lumbar

5 fused sacral, 3-5
coccygeal

12 pair of ribs

Abdominal muscles

Deep postural muscles



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Bony Landmarks - Typical Vertebra

Body

Lamina

Pedicle

Vertebral foramen

Transverse foramen

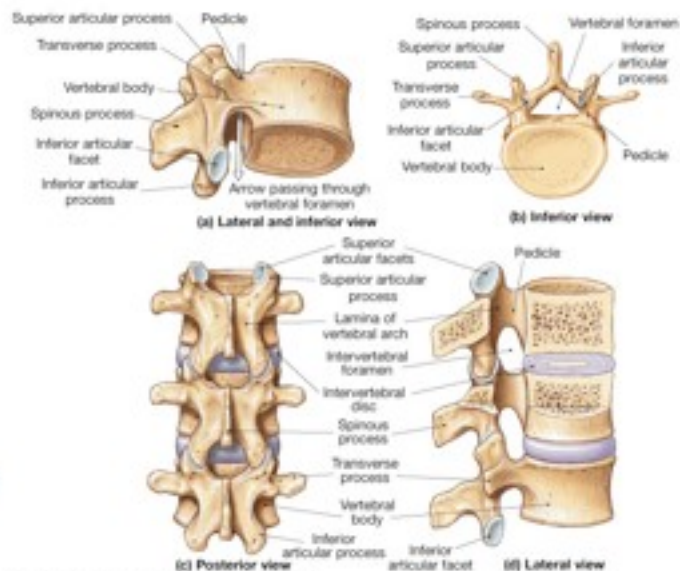
Transverse process

Spinous process

Superior art. process

Inferior art. process

Intervetebral foramen



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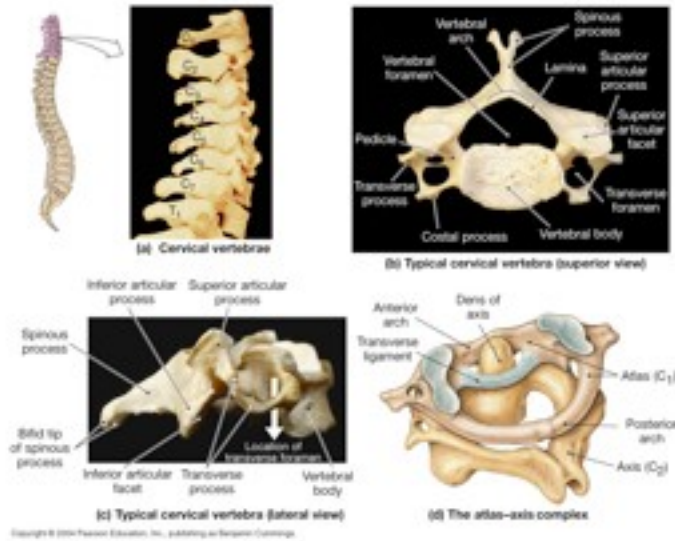
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Regional Characteristics

Cervical vertebrae

Bifid spinous process (C2-C6)

Unique C1-C2 articulation



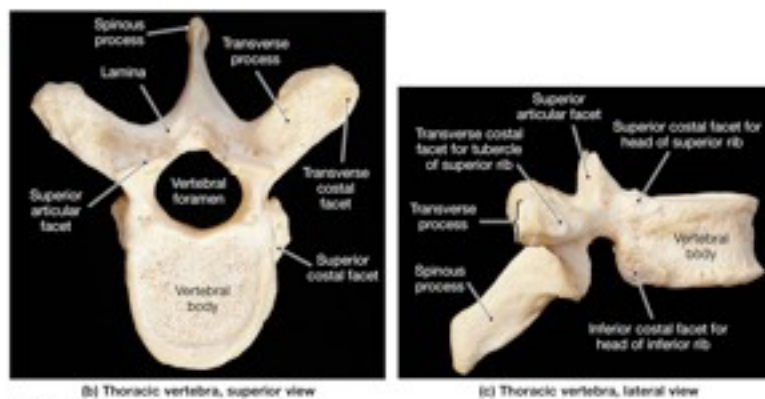
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Regional Characteristics

Thoracic vertebra

Inferior projecting spinous process

Facets for rib articulations

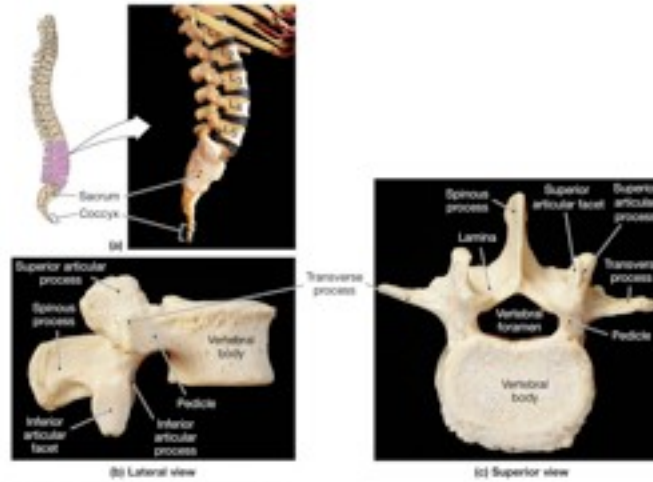


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Regional Characteristics

Lumbar vertebra

Thicker, shorter projections

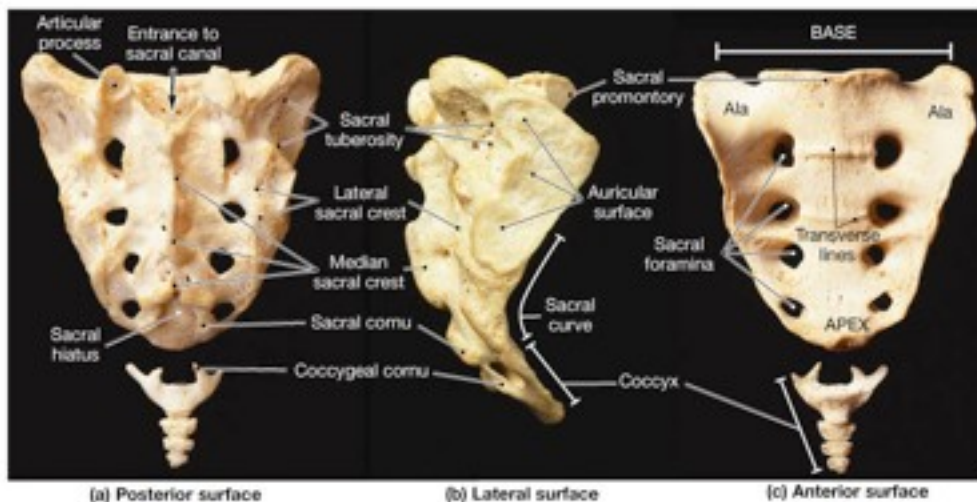


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Regional Characteristics

Sacrum and coccyx



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Ribs

12 pairs of ribs

7 true - attach directly to sternum

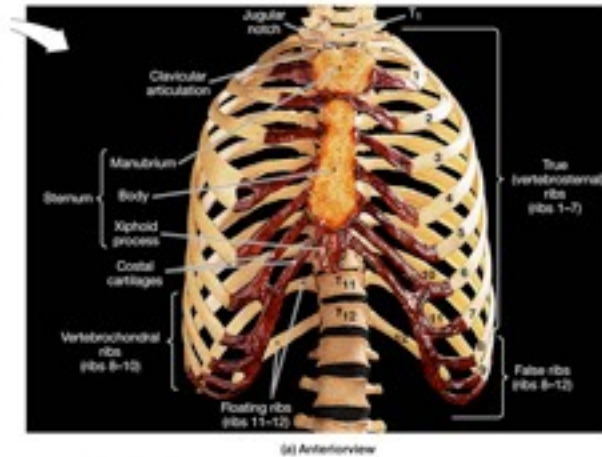
5 false (2 of which are floating)

Sternum

Manubrium

Body

Xiphoid



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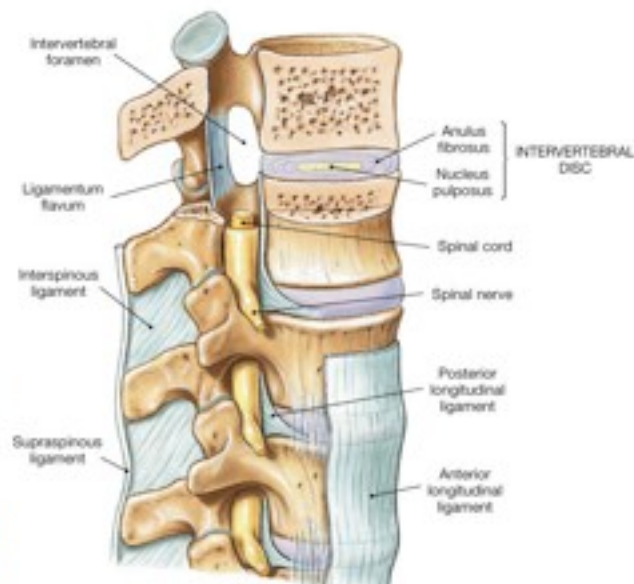
Joints of Vertebral Column

Minimal movement between any two vertebrae

Gliding-type synovial joints between superior and inferior articulating processes of adjacent vertebrae

Vertebral bodies articulate via intervertebral discs as a slightly moveable amphiarthrosis

IV discs are composed of an outer annulus fibrosus and a central nucleus pulposus



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Movements of Vertebral Column

Spinal flexion

Spinal extension,
hyperextension



Cervical flexion

A



Cervical extension
(hyperextension)

B



Lumbar flexion

E



Lumbar extension
(hyperextension)

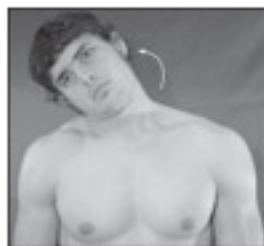
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Movements of Vertebral Column

Lateral flexion

Rotation



Cervical lateral flexion
to the right

C



Lumbar lateral flexion
to the right

G



Cervical rotation
to the right

D

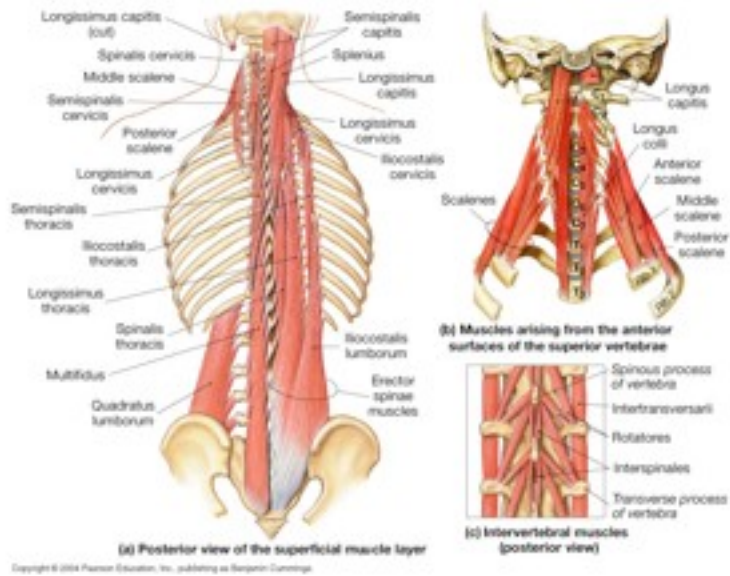
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Muscles of the Trunk and Spinal Column

Vertebral muscles

Several layers of deep muscles covered by trapezius and latissimus doris

Responsible largely for spinal extension, lateral flexion, rotation and posture



Muscles of the Trunk and Spinal Column

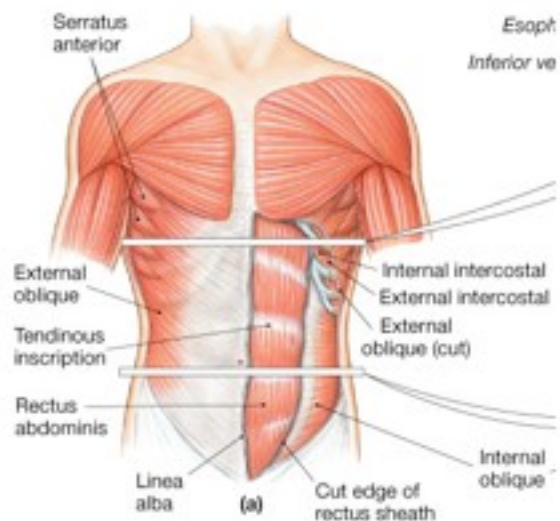
Abdominal muscles - vertebral flexors and rotators

Rectus abdominis

External oblique

Internal oblique

Transverses abdominis



Rectus Abdominis

Origin

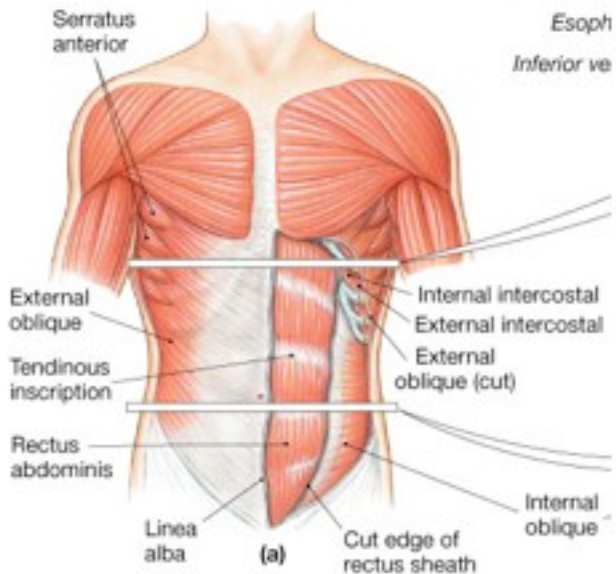
Pubic crest

Insertion

Ribs 5-7, xiphoid of sternum

Action

Vertebral flexion and lateral flexion



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External Oblique

Origin

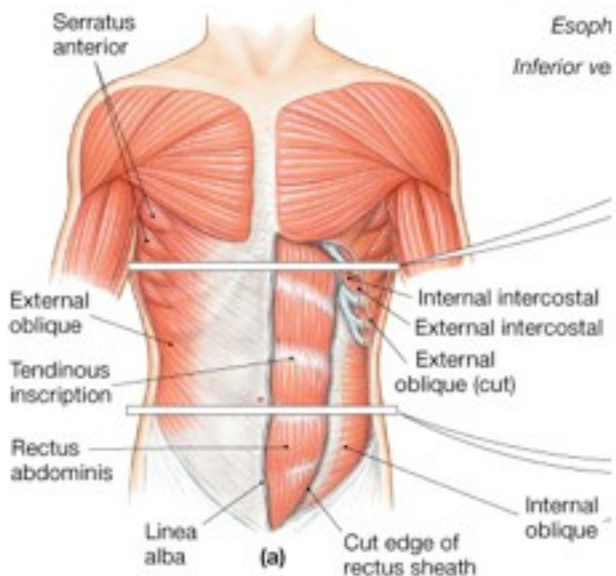
Ribs 5-12

Insertion

Iliac crest, pubic crest

Action

Vertebral flexion, lateral flexion and rotation



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Internal Oblique

Origin

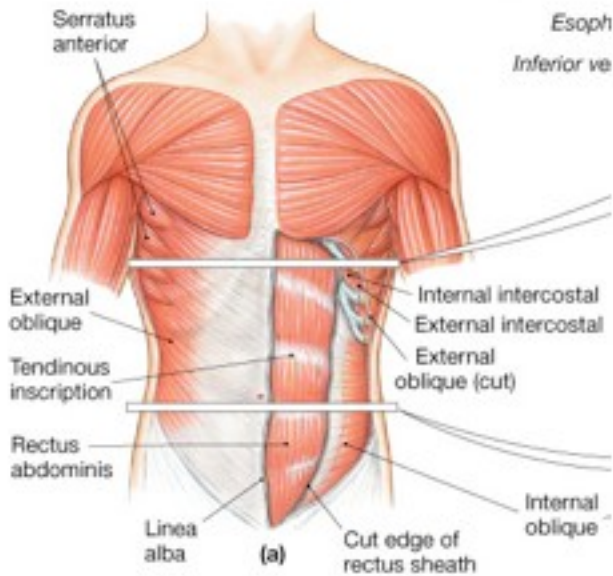
Inguinal ligament,
iliac crest

Insertion

Ribs 8-10

Action

Vertebral flexion,
lateral flexion
and rotation



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Transversus Abdominis

Origin

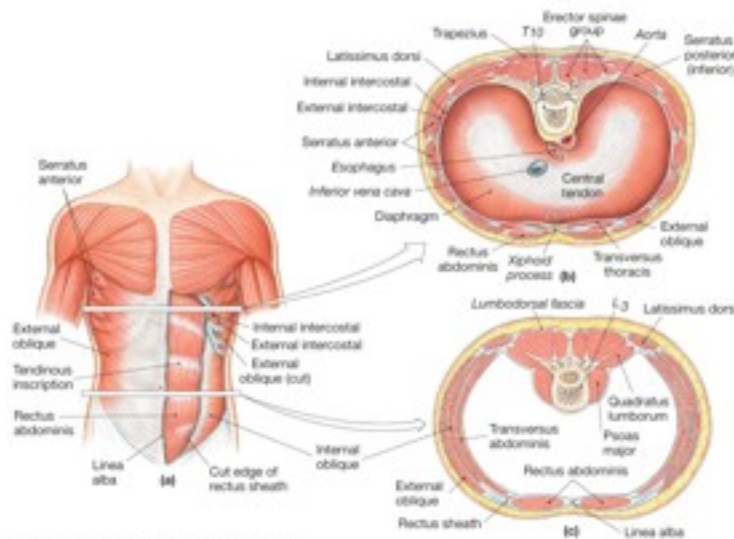
Inner portions
of the Iliac
crest and ribs
7-12

Insertion

Pubic crest and
linea alba

Action

Forced expiration



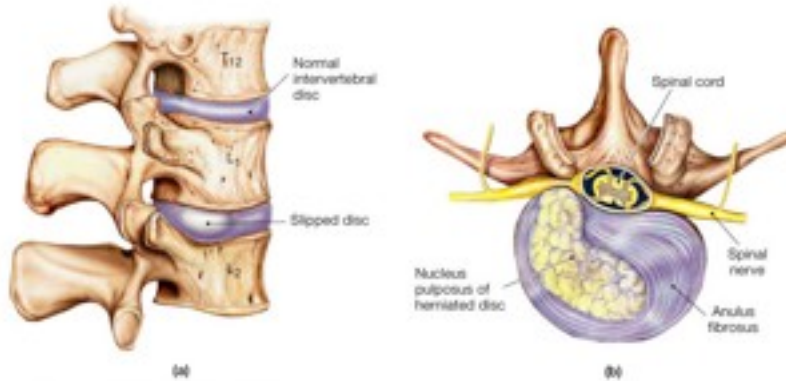
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Spinal Column Disorders

Herniated Disc

Anulus fibrosus degrades allowing nucleus pulposus to deform

Results often in compressed spinal nerve



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Spinal Column Disorders

Kyphosis or hunchback

Lordosis or swayback

Scoliosis



(a) Kyphosis



(b) Lordosis



(c) Scoliosis

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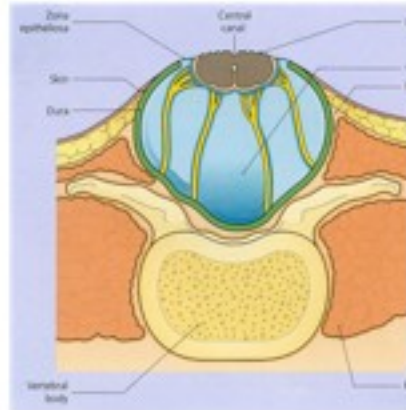
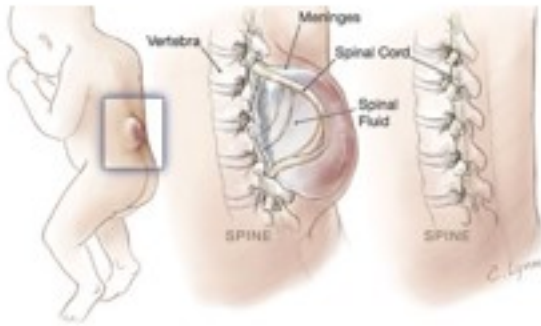
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Spinal Column Disorders

Spina Bifida

Incomplete closure of embryonic neural tube

Some vertebrae do not fully enclose spinal cord



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Spinal Column Disorders

Compression Fractures

Vertebral body height is compromised

Decompression can be achieved surgically



Compression fractures occur in vertebrae subjected to extreme stresses, such as those produced by the forces that arise when you land on your seat in a fall.

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