

## Unit 1:

# Bones and joints of axial skeleton

### GENERAL OBJECTIVES:

- recognize, name and correctly position vertebral bony elements
- explain how the structure of vertebral column serves its function
- understand vertebral movements
- name and describe all vertebral joints
- name and describe elements of the thoracic cage

### SPECIFIC OBJECTIVES:

Identify major bony features of a typical CERVICAL, THORACIC & LUMBAR vertebrae

#### BODY

VERTEBRAL ARCH (pedicles, laminae)

PROCESSES (transverse, spinous, articular)

JOINT SURFACES - intervertebral disc

- for (zyg)apophyseal or "facet" joints

- for ribs (thoracic vertebra)

### Cervical vertebrae

Identify the bony features on:

typical cervical vertebrae (C3 - C6), vertebrae prominens (C7), atlas (C1) & axis (C2)

Deduce (from the articular facets) the movements of the:

(i) cervical spine (ii) atlanto-axial joint and (iii) atlanto-occipital joint

Indicate the bony attachments of major ligaments maintaining joint stability (while allowing movements).

Identify the boundaries of the intervertebral foraminae.

Indicate (i) the particular spinal nerve which emerges from each intervertebral foramen

(noting that there are 8 cervical spinal nerves yet only 7 cervical vertebrae)

(ii) where the vertebral vessels travel (including the relationship to the atlas).

### Typical Cervical Joints

#### of Bodies:

*Intervertebral Discs*

*Uncovertebral Joints*

#### of Vertebral Arches:

*Zygapophyseal Joints*

*Ligaments of Cervical Joints*

Movements of the Cervical Spine (Neck):

Flexion/Extension

Lateral Flexion

### Atlanto-Occipital & Atlanto-Axial Joints

*Ligaments of Joints of Atlas*

Movements at the Joints of the Atlas (i.e. below & above)

*Rotation* (at Atlanto-Axial) of the Neck

*Flexion/Extension* (at Atlanto-Occipital) of the Head

### Thoracic and lumbar vertebrae

Compare and contrast the following groups of thoracic and lumbar vertebrae:

Upper Thoracic, Middle Thoracic, Lower Thoracic, Upper Lumbar & Lower Lumbar  
Define the boundaries of an intervertebral foramen (noting the intervertebral disc anteriorly and the zygapophyseal joints posteriorly).

Indicate where each spinal nerve emerges from an intervertebral foramen.

Deduce the movements of (i) the thoracic spine & (ii) the lumbar spine (from direction of articular facets).

Indicate the bony attachments of major ligaments maintaining joint stability (while allowing movements).

Joints of Thoracic & Lumbar Spine

Joints of Vertebral Bodies

*Intervertebral Discs*

*Anterior and Posterior Longitudinal Ligaments*

Joints of Vertebral Arches

*Zygapophyseal (Facet) Joints*

*Ligamenta Flava*

*Interspinous & Supraspinous Ligaments*

Movements

*Flexion/Extension*

Lateral Flexion

Rotation (at thoracic joints only)

### **Sacrum and coccyx**

Describe the shape and position of sacrum and coccyx (surfaces, base, apex)

Describe features of dorsal surface of the sacrum, sacral hiatus and cornua

Describe main features on the lateral sacral surface

### **Thoracic Vertebrae, Ribs (& Costal Cartilages), Sternum**

Arrangement of Thoracic Cage; *Superior & Inferior Apertures*

*Parts, Bony Features & Articular Surfaces*

Describe features on true, false and floating ribs (head, neck, tubercle, body)

What are atypical ribs?

How are ribs curved and why?

Where are weak regions on ribs?

What do costal cartilages connect and how?

Describe main features of the sternum

### **Joints**

Costovertebral (Joints of Heads of Ribs, Costotransverse Joints)

Sternocostal, Interchondral, Costochondral

Sternal (Manubriosternal, Xiphisternal)

Describe biomechanical properties (movements) of thoracic cage in relation to respiration.

What are 'bucket' and 'pump' handle movements of ribs?