Human Anatomy

Axial Skeleton

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Skeletal System

- The bones of the skeleton form an internal framework to support soft tissues, protect vital organs, bear the body’s weight, and help us move.
- Typically, there are **206 bones in an adult skeleton**, although this number varies in some individuals.
- A larger number of bones are present at birth, but the total number decreases with growth and maturity as some separate bones fuse.
Skeletal System

- The **axial skeleton** is composed of the bones along the central axis of the body,
  - the skull
  - the vertebral column
  - the thoracic cage

- The **appendicular skeleton** consists of the bones of the appendages
  - upper and lower limbs
  - the bones that hold the limbs to the trunk of the body.
The Skull

- Cranial bones form the rounded cranium, which completely surrounds and encloses the brain.

- Facial bones form the bones of the face. They also
  - protect the entrances to the digestive and respiratory systems as well as
  - provide attachment sites for facial muscles
The Mandible

- The lower jaw is formed by the mandible.
- The prominent “chin” of the mandible is called the mental protuberance.
Cavities of The Skull

- The largest cavity is the cranial cavity, which encloses, cushions, and supports the brain.
- The skull also has several smaller cavities, including the orbits (eye sockets), the oral cavity (mouth), the nasal cavity, and the paranasal sinuses.
Markings of the Skull

- Numerous bone markings
  - canals
  - fissures
  - foramina
    - passageways for blood vessels and nerves
Sutures of the Skull

- Sutures are immovable fibrous joints that form the boundaries between the cranial bones.
- Dense regular connective tissue seals cranial bones firmly together at a suture.
- Allow the cranium to grow and expand during childhood.
- In adulthood, when cranial growth has stopped, the sutures fuse and are obliterated.
(a) Ethmoid bone, superior view
(b) Ethmoid bone, anterior view

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Sinuses

- Have a mucous lining that helps to humidify and warm inhaled air.
- Cause these skull bones to be lighter.
- Provide resonance to the voice.
Auditory Ossicles

- Three tiny ear bones called auditory ossicles are housed within the petrous region of each temporal bone.
  - the malleus
  - the incus
  - the stapes
Hyoid Bone

- Slender, curved bone located inferior to the skull between the mandible and the larynx (voice box).
- Does not articulate with any other bone in the skeleton.
- Serves as sites for attachment for tongue and larynx muscles and ligaments.
Fontanels

- The regions between the cranial bones are thickened, fibrous membrane remnants that are not yet ossified.
- Sometimes referred to as the “soft spots” on a baby’s head.
- They close by 15 months of age.
- When a baby travels through the birth canal, the cranial bones overlap at these fontanels, in order to ease the baby’s passage.
- Newborns frequently have a “cone-shaped” head due to this temporary deformation.
The Vertebral Column

- Composed of 26 bones, including
  - 24 individual vertebrae and the
  - fused vertebrae that form both the sacrum and the coccyx
- The vertebral column has several functions:
  - providing vertical support for the body
  - supporting the weight of the head
  - helping to maintain upright body position
  - helping to transfer axial skeletal weight to the appendicular skeleton of the lower limbs
  - housing and protecting the delicate spinal cord and providing a passageway for spinal nerves connecting to the spinal cord
(b) Posterior view
(c) Lateral view

- Superior articular process of L₁
- Intervertebral foramen
- Transverse process
- Spinous process
- Body
- Intervertebral disc
- Inferior articular process of L₁
- Inferior articular facet
Three Main Spinal Curvature Deformities

- Kyphosis is an exaggerated thoracic curvature that is directed posteriorly, producing a “hunchback” look.
- Lordosis is an exaggerated lumbar curvature, often called “swayback,” that is observed as a protrusion of the abdomen and buttocks.
- Scoliosis is an abnormal lateral curvature that sometimes results during development when both the vertebral arch and body fail to form, or form incompletely, on one side of a vertebra.
  - scoliosis is the most common spinal curvature deformity.
(a) Atlas (C₁), superior view
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Anterior

Dens (odontoid process)

Superior articular facet

Transverse foramen

Transverse process

Pedicle

Lamina

Spinous process (bifid)

Posterior

(b) Axis (C2), posterosuperior view
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(c) Axis and atlas, posterosuperior view
(a) Sacrum and coccyx, anterior view
(b) Sacrum and coccyx, posterior view

- Sacral canal
- Superior articular facet
- Median sacral crest
- Auricular surface
- Posterior sacral foramina
- Sacral cornu
- Sacral hiatus
- Coccygeal cornu
- Coccyx
Thoracic Cage

- Consists of the thoracic vertebrae posteriorly, the ribs laterally, and the sternum anteriorly.
- Acts as a protective cage around vital organs, such as the heart, lungs, trachea, and esophagus.
- Provides attachment points for many muscles supporting the pectoral girdles, the chest, the neck, the shoulders, the back, and the muscles involved in respiration.
Ribs

- Both males and females 12 pairs
  - Ribs 1–7 are called **true ribs**. At the anterior body wall, the true ribs connect individually to the sternum by separate cartilaginous extensions called costal cartilages.
  - Ribs 8–12 are called **false ribs** because their costal cartilages do not attach directly to the sternum. The costal cartilages of ribs 8–10 fuse to the costal cartilage of rib 7 and thus indirectly articulate with the sternum.
  - The last two pairs of false ribs (ribs 11 and 12) are called **floating ribs** because they have no connection with the sternum.