CHAPTER 7 AXIAL SKELETON

Skeletal System

• Bones
  — axial skeleton
     • skull, vertebral column, ribs
  — appendicular skeleton
     • upper extremities, shoulder girdle
     • lower extremities, pelvic girdle
• Cartilage
  • joints, discs
  • growth plates
• Joints
• Fibrous connective tissue ligaments
  periosteum

  bone markings – bumps

• bumps for muscle attachments process
  — tubercle
  — tuberosity
  — trochanter
  — epicondyle
  — spine
• bumps forming joints
  — head
  — facet
  — condyle

  holes and dips in bones

• indentations:
  — fissure
  — groove
  — sulcus
  — fossa
• holes
  — foramen
  — foramina
  — canal
  — meatus

  Skull

• = cranium + facial bones
• cranium
  — protect the brain, ear
  — cranial vault = calvarium
  — cranial floor
• facial bones
  — protect sensory organs: eye, nose, mouth
  — attach facial muscles

• bones
  — cranium
  — cranial cavity
  — facial bones

• ligaments
  — periosteum

• indentations:
  — fossa
  — sulcus
  — decorum

• holes
  — foramen
  — foramina
  — canal

• bone markings
  — tubercle
  — trochanter
  — epicondyle
  — condyle

Skull

• cranial cavity
  — protecting the brain
  — cranial nerves

• facial bones
  — protecting sensory organs
  — attaching facial muscles
cranial bones

- frontal
- parietal
- temporal
- occipital
- sphenoid
- ethmoid

facial bones

- mandible
- maxilla
- zygomatic
- nasal
- lacrimal
- vomer
- palatine
- inferior nasal conchae

temporal bone

- squamous portion
- zygomatic portion
  - zygomatic process
  - mandibular fossa
- mastoid portion
  - mastoid process
  - styloid process
  - external acoustic meatus
  - stylomastoid foramen
- petrous portion
  - inner ear: internal acoustic meatus
  - carotid canal

occipital bone

- floor, posterior wall of cranial cavity
- occipital condyles: joint with vertebral column
- foramen magnum: passage for spinal cord
- basilar portion (clivus)
- hypoglossal canal
- external occipital protuberance
- superior, inferior nuchal lines

sphenoid bone

- greater wing
- lesser wing
- pterygoid processes: medial, lateral
- sella turcica
  - dorsum sellae; tuberculum sellae
  - hypophyseal fossa
- optic canal
- superior orbital fissure
• foramen ovale
• foramen spinosum
• foramen rotundum

ethmoid bone
• lateral mass ; orbital plate
• perpendicular plate
• superior nasal concha
• middle nasal concha
• cribiform plate
  — olfactory foramina
• crista galli

mandible
• body ramus angle
• mandibular condyle
• coronoid process
• mental foramen
• mandibular foramen

features of skull bones
• occipital bone floor, posterior wall of cranial cavity
  articulates with C1
• parietal protect brain
• frontal forehead ; roof of orbits; anterior floor
  frontal sinuses
• temporal protect ear
  articulate with mandible
  muscles for jaw, neck
  mastoid sinus
• sphenoid articulates with every other cranial bone
  unites cranial and facial bones
  houses pituitary gland (sella turcica)
  optic canal

features of skull bones
• ethmoid medial wall of orbit
  foramina for olfactory nerves (cribiform)
  nasal septum (perpendicular plate)
  attach dura, stabilize brain (crista galli)
• maxilla floor of orbit; part of hard palate
  teeth
  maxillary sinuses
• zygomatic lateral wall of orbit; “cheek” bone
• mandible teeth; jaw
  articulate with temporal bone
• conchae increase area of nasal cavity

sutures
• sagittal betw parietal bones
• coronal parietal – frontal bones
• lambdoid parietal – occipital bones
• squamous parietal – temporal bones
• occipitomastoid occiput - temporal
• frontal bone
• zygomatic
• maxilla
• ethmoid
• sphenoid
• lacrimal
• optic canal
• superior orbital fissure
• inferior orbital fissure

compound structures
• zygomatic arch  zygomatic bone
    zygomatic process of temporal
• nasal septum  perpendicular plate of ethmoid
    vomer
• palate  palatine bone
    palatine process of maxilla
• temporal fossa

holes in front
• orbit
  — optic canal  sphenoid  optic nerve  CN II
  — superior orbital fissure  sphenoid
  — inferior orbital fissure  several bones  CN V
• facial
  — supraorbital foramen  frontal  CN V
  — infraorbital foramen  maxilla  CN V
  — mental foramen  mandible  CN V
• above:
  — olfactory foramina  cribriform plate  CN I

holes down under
• foramen magnum  occiput  spinal cord
• carotid canal  temporal  int carotid artery
• jugular foramen  temporal  int. jugular vein ; CN’s
• stylomastoid foramen  temporal
• foramen ovale  sphenoid  CN V
• foramen spinosum  sphenoid
• hypoglossal canal  occiput
• foramen rotundum  occiput  CN V
• foramen lacerum
• incisive fossa  maxilla

sinuses
• paranasal sinuses  air filled
  extensions of nasal cavity
  make skull lighter
  — frontal
  — ethmoid
  — maxillary
  — sphenoid
• mastoid sinus  no connection to nasal
functions of vertebral column

- weight bearing
- support head
- muscles for trunk and head
- protect spinal cord
- passage for spinal nerve

vertebral terms

- vertebra 1 bone
- vertebral column all bones
- spinal column = vertebral column
- spine = vertebral column
- spinal cord nervous system
  extension from brain
- naming C1-7; T1-12; L1-5

vertebra

- vertebral body
- vertebral foramen = vertebral canal
  - protects spinal cord
- vertebral arch
  - lamina
  - pedicle
- processes
  - spinous process SP
  - transverse process TP
  - articular processes = facets
- intervertebral foramina between vertebra, laterally
  spinal nerves

Cervical spine

- C1 – C7
- small vertebral body
- bifid SP
- transverse foramen hole in transverse process
  vertebral artery and vein
- atlas = C1
- axis = C2
- vertebral prominens = spinous of C7

atlas

- C1
- no vertebral body
- lateral mass
- anterior and posterior arch
- joint with occipital condyles
  - flex and extend head “yes”
- vertebral foramen - foramen magnum
axis

- C2
- dens = odontoid process
- atlas rotates around dens
  - rotations of head and neck “no”

thoracic vertebra

- T1 – T12
- attach ribs
- attach muscles support and move spine
- long SP - angled down

lumbar spine

- L1 – L5
- thick vertebral body + straight SP
- support most body weight
- attach muscles of support and movement

sacrum and coccyx

- sacrum
  - fused S1 – S5
  - sacral promontory top surface (meets L5)
  - ala
  - sacral foramina
  - sacral crest
  - sacral canal
  - sacral hiatus
- coccyx

Intervertebral disc

- IVD same # as vertebra above
- “cushion” between vertebrae
- nucleus pulposus gel / water
  hydraulic pressure
- annulus fibrosus fibrocartilage contains NP
- “herniated disc”

vertebral curves

- lordosis anterior curve C/S L/S
- kyphosis posterior curve T/S Sacrum
- abnormal
  - hyperlordosis increased lordosis
  - hypolordosis decreased lordosis
  - hyperkyphosis increased kyphosis (T/S)
  - scoliosis lateral curvature
thoracic cage

- sternum
  - body
  - manubrium
    - jugular notch  (= sternal notch)
    - sternal angle
  - xiphoid process
- ribs
- functions:
  - protect heart and lungs
  - aid in respiration
  - attach upper extremity muscles for trunk, UE, and neck
- ribs
  - 7 true ribs  attach to sternum
  - 3 false ribs  attach to rib 7
  - 2 floating ribs  don’t attach anteriorly
  - costal cartilage  ribs are cartilage anteriorly