Skeletal System:
Axial and Appendicular Skeleton
(Chapter 7 & 8)

Lecture Materials

for

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Primary Sources for figures and content:


Human skeleton = 206 bones
   Axial skeleton:
       longitudinal axis
       80 bones
   Appendicular skeleton:
       limbs, 126 bones
Axial Skeleton Functions:
1. Support and protect organs in dorsal and ventral body cavities.
2. Provide surface area for muscle attachment:
   A. Adjust position of head, neck, & trunk
   B. Perform respiratory movements
   C. Stabilize appendicular skeleton
1. Skull: 22 bones (on handout)
Skull bones interconnect at immovable joints called sutures (dense fibrous CT)
Four major sutures:
1. Lambdoid - separates occipital bone from parietal bones
2. Coronal - separates frontal bone from parietal bones
3. Sagittal - separates parietal bones
4. Squamous - (2) separates temporal bone from parietal bone
Sinuses = air filled chambers inside flat bones

Function:
1. Reduce weight of bone
2. House mucus membranes that moisten and clean incoming air

Found in:
- Sphenoid, Ethmoid, Frontal, Palatine and Maxillary bones
Skull Development:
- Intramembranous ossification from many centers of ossification
- During development, brain grows more rapidly than cranial bones
- Growing skull bones held together by bands of fibrous CT to provide flexibility (expansion of brain, compression for birth)

- Large intersections of CT between bones = fontanels ("soft spots"), persist until age 5
- Around age 5, brain stops growing in size, solid sutures form between cranial bones
Craniostenosis = premature closure of fontanels, w/o surgery brain is crushed
Microcephaly = brain fails to enlarge, cranium remains small
2. Vertebral column (26 bones)
7 cervical vertebrae (C₁-C₇)
12 thoracic vertebrae (T₁-T₁₂)
5 lumbar vertebrae (L₁-L₅)
1 sacrum (5 fused)
1 coccyx (3-5 fused)
- vertebral column not straight: 4 curves bring weight of body in line with central axis

A. Primary Curves:
- Thoracic & Sacral
  - present at birth
  - accommodate organs
B. Secondary Curves:
- Lumbar & Cervical
  - appear in first year
  - necessary for bipedalism
Cervical = hold head up
Lumbar = standing
**Kyphosis** = exaggerated thoracic curvature

**Lordosis** = exaggerated lumbar curvature

**Scoliosis** = abnormal lateral curvature

Construction of column:
- Vertebral body: stacking
- Intervertebral disc: spacing between bodies (not C1&C2)
- Annulus fibrosus: fibrocartilage, outside
- Nucleus pulposus: gel, inside (cushion)

(loss of water from discs = shrinking height)
- Vertebral arch: bone attached to vertebral body, with body forms vertebral foramen
- Vertebral foramen: hole for spinal cord
- Vertebral canal: bony canal for spinal cord formed by stacking of vertebral foramen

-Elastic ligaments: link bodies for alignment
- Intervertebral foramen: holes formed by spacing from discs, allow spinal nerves to exit column
**Spina bifida** - vertebral arch fails to develop correctly at 3 weeks (fetus) and spinal cord is unprotected or even exposed, 4/1000 births show some degree (due to lack of folic acid)
3. Thoracic cage (25 bones)

1 sternum

24 ribs:

7 pair true ribs: separate costal cartilage to attach to sternum
3 pair false ribs: common shared costal cartilage to attach to sternum
2 pair floating ribs: no cartilage, no attachment to sternum
Appendicular skeleton = 126 bones
- consists of limbs and limb girdles to provide movement
1. Pectoral girdle (on handout): 4 bones
2. Upper limbs (on handout): 60 bones

Carpal tunnel syndrome
- carpals arranged in two rows of four bones
- creates a U shape enclosed by the flexor retinaculum (ligament)
- all tendons, vessels and nerves of hand must pass through channel between bones and ligament (no extra space)
- any inflammation = pressure on nerves leading to pain
3. Pelvic girdle: (on handout) 2 bones
   2 os coxae
   note: “pelvis” (not anatomical) = pelvic girdle (2 os coxae) + sacrum + coccyx

4. Lower limbs: (on handout) 60 bones

*Individual bones and bone markings will be examined in detail in lab!