

## ANP1106 MIDTERM 1 REVIEW

### **Topic 1: Anatomical Terms**

- Anterior (toward the front)
- Posterior (toward the back)
- Lateral (away from the midline)
- Medial (toward the midline)

Regional Terms: 2 fundamental divisions

1. Axial part = head, neck and trunk
2. Appendicular part = appendages or limbs attached to axis

Body Planes and Sections: 3 common body planes – 2 vertical, 1 horizontal

1. Sagittal plane: vertical line that divides right and left parts – does not need to be through the midline □ parasagittal = not equal halves
2. Frontal plane: vertical plane that divides anterior and posteriorly (coronal plane)
3. Transverse/horizontal plane: from right to left dividing the body into superior and inferior parts (cross section) – oblique section = not parallel with ground\

Body Cavities:

1. Dorsal body cavity: cranial cavity (enclosed by skull – brain) and vertebral cavity (enclosed by vertebrae – spinal cord) – continuous and well protected
2. Ventral body cavity: separated by the diaphragm
  - o Thoracic cavity: 2 lateral pleural cavities and central pericardial cavity
  - o Abdominopelvic cavity: superior abdominal cavity and inferior pelvic cavity

Abdominopelvic quadrants: used surgically – intersect at belly button □ right upper quadrant, left upper quadrant, right lower quadrant and left lower quadrant

Nine abdominopelvic regions: used by anatomists □ Right hypochondriac, epigastric, left hypochondriac, right lumbar, umbilical, left lumbar, right iliac, hypogastric, left iliac (3X3 square)

## Topic 2: Integumentary System

Structure of Skin: 2 layers

1. Epidermis: epithelial layer – thick, keratinized stratified squamous epithelium
  - a. Keratinocytes: produce keratin (hard and water proof qualities) □ fibrous protein
  - b. Melanocytes: produce melanin (dark pigment; imparts color to skin and hair)- shield from UV rays; deepest layer of epidermis □ branching processes for cell to cell melanin transfer
  - c. Dendritic cells: Langerhans cells (star shaped) – migrate to epidermis from bone marrow; macrophages □ activate immune system and ingest foreign substances
  - d. Tactile cells: Merkel cells – at epidermis and dermis boundary □ associated with a disk-like sensory nerve ending (sensory receptor for touch)
2. Dermis: connective tissue

Four major epidermal layers- thin skin:

1. Stratum corneum: 20-30 layers of dead cells – flat membranous sacs filled with keratin
2. Stratum granulosum: 5 layers of flattened cells
3. Stratum spinosum: several layers of keratinocytes – thick bundles of intermediate filaments made of pre-keratin
4. Stratum basale: deepest epidermal layer – one row of actively mitotic stem cells

Thick skin: double layer of skin – found on feet, palms of hands and fingertips □ stratum lucidum: clear layer – 2-3 rows of clear, flat dead keratinocytes □ only found in thick skin (beneath corneum)

Layers of Dermis:

1. Papillary layer: 20%
  - a. Interwoven mat of areolar CT fibers interspersed with blood vessels
  - b. Dermal papillae: wavy boundary between dermis and epidermis: contains capillaries/nerve endings for touch □ allows blood vessels/sensor nerves to

be as close as possible to epidermis and helps the two layers stay together (creates friction)

- c. Dermal papillae overlie dermal ridges (palms of hands/soles of feet) □ friction ridges also known as finger prints
2. Reticular layer: 80%
    - a. Dense irregular CT (thick bundles of collagen fibers parallel to skin surface) \
    - b. Collagen fibers give strength and resiliency/maintain skins hydration: bundles in a particular fashion, in between matrix filled space, bundles around the body, up and down around the limbs □ during surgery cut with reticular layer
    - c. Elastic fibers provide stretch-recoil abilities

- Blister: once epidermis and dermis are separated, fluid builds up pulling the epidermis farther away. This causes a white color (pink color from dermis is further away)
- Striae: skin is stretched dramatically, extra pull in dermis □ pulls (ex. Putting on weight fast, pregnancy, extensive workout)
- Flexure lines: tend to fold skin, a lot of movement of the skin □ anchored more firmly

Hypodermis: superficial fascia, subcutaneous tissue □ subcutaneous tissue just deep to the skin

- Composed of adipose, blood vessels and areolar CT
- Anchors skin to underlying structures with ability to slide, shock absorber & insulation and stores fat

Pigments Contributing to Skin Color

1. Melanin: made in the skin □ several different forms that gives different color – skin color dependent on type, relative amount and keratinocyte retention of the pigment

- a. Too much sun exposure can cause melanin cells to become cancerous and skin can become “leathery” □ changes chemicals in skin causing it to be less resilient/ages the skin faster.
  - b. Skin darkens in the sun because it stimulates the production of melanin □ natural protection for UV radiation
2. Carotene: yellow- orange pigment found in plant products (ex. Carrots) – deposits in keratinocytes (esp stratum corneum) and hypodermis
    - a. Carotene can imbed itself in the superficial layers of the skin
  3. Hemoglobin: from capillary circulation and gives skin a pinkish hue – fair skinned people (hue from RBC)
    - a. Cyanosis: bluish discoloration in the skin due to low oxygen

### Accessory Structure of Skin

1. Hair and Hair follicles:
  - a. Functions: sense insects, guard head □ physical trauma, heat loss and sun protection, shield eyes, filter particles from inhaled air
  - b. Hard keratin: more durable doesn't flake
  - c. Hair shaft: shape determine if hair is straight or curly
    - c.i. Medulla: large cells partially separated by air spaces – absent in fine hairs
    - c.ii. Cortex: several layers of flattened keratinocytes (pigment here)
    - c.iii. Cuticle: single layer of overlapping cells – prevents tangling
    - c.iv. Split ends: oldest part of hair, damaged □ causes it to fragment.
    - c.v. Gray or white hair: air space accumulates between cells and pigment production slows down.
  - d. Hair structure:
    - d.i. shaft: part that projects from skin - has 3 layers indicated on previous slide
    - d.ii. root: part embedded in skin (contained within hair follicle)

- d.iii. bulb: expanded deep end of follicle - has papilla & root hair plexus  
- growth occurs here
  - d.iv. follicle: outer CT root sheath & inner epithelial root sheath; hair matrix
  - d.v. arrector pili muscle: 1/follicle; contract to pull hair up & dimple skin (goose bump)
  - d.vi. sebaceous gland: holocrine gland that secretes sebum (oily - lubrication & waterproofing; bactericidal) – protect and prevent tangling
- e. Hair thinning and baldness
- e.i. Vellus hair= finer/thinner hair
  - e.ii. Terminal hair= scalps and eye brows
  - e.iii. Testosterone: important influence in hair growth (male and females- not as much)
  - e.iv. Nutrition is very important- protein deficient → hair will thin out
  - e.v. Hirsutism= hair growth where you don't expect it (excessive androgens) ex. Cushing's syndrome
  - e.vi. Average rate of hair growth 2.5mm/week
  - e.vii. Active phase: then detached, reboots itself (resting phase)
  - e.viii. Head hair has longer active phase (6-10 years)
  - e.ix. Alopecia= natural hair loss/thinning that occurs with age (hair follicles slowing down)
  - e.x. Male pattern baldness= genetic condition- excessive, unnatural, early balding in males- speeds up active/resting phase in hair follicle (does not remain in active phase long enough for hair to show)

## 2. Nails

- a. Scale-like modification of epidermis – protective, useful tool → lots of hard keratin cells

- b. Nail fold protects your nail from chipping or breaking – 2 lateral and 1 proximal
  - c. Nail matrix= wear nail is growing
  - a. Lunula= thicker area of epidermal cells covering nail matrix for protection
3. Sweat glands
- a. Distributed over skin surface except nipples & parts of external genitalia- >2.5 million/person
  - b. Sweat: hypotonic filtrate of the blood that passes through secretory cells of the sweat glands and released by exocytosis
    - b.i. Merocrine: more common; esp. palms, soles, forehead - simple coiled tubular glands with pore at surface
    - b.ii. Apocrine: axillary & anogenital areas; larger; ducts empty into hair follicles - same as sweat but + fatty substances & some proteins - odourless until decomposed by skin bacteria ☐ BO
    - b.iii. Function unknown but activated by sympathetic nerve fibers during pain and stress and sexual foreplay
    - b.iv. Ceruminous - secrete wax (cerumen) in external ear canal
    - b.v. Mammary - secrete milk

### Major Functions of the Skin

1. PROTECTION: 3 types of barriers
  - a. chemical: secretions, melanin – slightly acidic – antibacterial properties
  - b. physical: barrier to trauma & bacterial invasion; also waterproofing
  - c. biological: Langerhans cells of epidermis & macrophages in dermis
  - d. Not impermeable to: gases, fat-soluble vitamins & steroids, plant oleoresins, organic solvents, salts of heavy metals, penetration enhancers for drug administration
2. BODY TEMPERATURE: sweating (0.5-12 L fluid/day) – vasoconstriction
3. CUTANEOUS SENSATION: temperature, texture, moisture, pain/pressure – important to give us information of our surroundings

4. METABOLIC: : activation of vitamin D, activation of steroid hormone (corticoid hormone)
5. BLOOD RESEVOIR: redirection of blood to needed areas ex. Exercise
6. EXCRETION: ammonia, urea, uric acid and sweat

Burns: caused from heat, electricity, radiation and chemicals

- Concerns: fluid loss (related to shock) loose protective layer and infections
- First degree: only epidermis
- Second degree: epidermis and upper dermis
- Third degree: entire thickness of skin (epidermis and all of dermis)
  - o little to no chance of repair (no basal layer to regenerate repair) □ skin grafts: rejection is major concern
- Rule of nine: how much fluid needs to be replace in accordance with the size of the burn

### Topic 3: Bony Tissue

1. Bone reacts to amount of force applied by increasing both the density & amount of roughening on bone or decreasing density when force is reduced or eliminated (eg: paralysis) (deposition vs resorption) -Deposition: calcium phosphates into bone/resorption: pulls calcium phosphate salts into blood stream
2. Bone stores calcium – resorbed & transferred to bloodstream when needed

Functions of bone:

- ✓ SUPPORT: holds up body, allows standing upright, physical support.
- ✓ PROTECTION: skull and ribcage □ protects lungs, brain and heart
- ✓ MOVEMENT: joints, allows body to move
- ✓ MINERAL STORAGE: calcium phosphate salts
- ✓ BLOOD CELL FORMATION: bone marrow (hematic poetic tissue)
- ✓ FAT STORAGE: adipose tissue in shafts of long bones

- ✓ HORMONE PRODUCTION: osteoblasts, osteocalcin (hormone: influence on insulin, blood glucose levels (metabolic functions))

### Cartilage:

- features between dense CT and bone □ tough but flexible and gives shape – ossification with aging
- avascular, devoid of nerve fibers – thin □ can survive without a blood supply (doesn't allow for proper repairs resulting in scar tissue)
- ground substance contains lots of the GAGs (glucose amino glycan – polypeptide chains and sugars: allows to hold water (spongy, shock absorbing)) chondroitin sulfate & hyaluronic acid - also Chondronectin, (adhesive protein)
- Collagen fibers (can have some elastic fibers)
- Up to 80% H<sub>2</sub>O
- Perichondrium: outer connective tissue surrounding cartilage
- Chondroblasts: immature cartilage cells - actively form cartilage
- Chondrocytes: mature cartilage cells □ maintain cartilage
- Lacunae: localized clusters of chondrocytes in cartilage

### Types of cartilage:

- a. Hyaline cartilage: most abundant – firm supports and pliable (lots of collagen); appears glassy blue-white; chondrocytes = 1-10% of volume
  - I. Location: embryonic skeleton, ends of long bones (epiphyseal plates in growing children), costal cartilages of ribs, cartilages of nose, trachea, larynx
  - II. Function: supports & reinforces; resilient cushioning & resists compressive stress
- b. Elastic cartilage: like hyaline but more elastic fibers
  - I. Location: external ear, epiglottis (needs to be bendy)
  - II. Function: maintains shape while giving lots of flexibility

- c. Fibrocartilage: rows of chondrocytes alternating with rows of thick collagen fibers; structural intermediate between hyaline cartilage & dense regular CT - Almost as strong as bone yet more resilient – lots of fibers
  - I. Location: intervertebral discs, pubic symphysis, discs of knee joints (where hyaline cartilage meets a ligament or a tendon)
  - II. Function: tensile strength with ability to absorb compressive shock

#### BONE:

- o Calcium salts give hardness & strength for support/protection of softer tissues; cavities for fat storage & synthesis of blood cells
- o osteoblasts: least differentiated cell
- o osteocytes: maintaining bone as a tissue
- o osteoclasts: reabsorb/digest bone cell into blood

#### Calcified tissue:

- Compact bone: dense, outer layer
- Spongy bone: trabeculae - interwoven projection of bones □ absorbs shock in many different directions (red/yellow marrow found in spongy bone)
- Outer layer is strongest/sturdiest
- Inner layer: osteoblasts and osteoclasts
- Linings:
  - o Periosteum: outer fibrous layer and inner osteogenic layer (outside layer of bone)
  - o Endosteum: covers trabeculae of spongy bone and lines canals of compact bone

#### Classification of bones:

- Lots of variations in shape and size of bones – fulfils a particular need □ classified by shape not size
- Structure the same for all bone shape: compact bone provides the external surface and spongy bone provides the inner bone

1. Long bone: much longer than wide – a shaft and 2 ends □ mostly compact with hollow center (spongy bone near joint ends) Ex. Femur – movement and strength
2. Short bone: roughly cube-shaped – primarily spongy bone and thin outer layer of compact bone Ex. Wrist, ankle and sesamoid bones
3. Flat bone: thin, flattened and sometimes curved Ex. Skull bones, ribs and breast bone
4. Irregular: leftovers – complicated shapes: primarily spongy bone and thin covering layer of compact bone Ex. Vertebrae and hip bones

#### Long Bones:

- A. Diaphysis: tubular shaft of the long bone = long axis of bone
  - a. collar of compact bone surrounding marrow cavity ( medullary cavity)
  - b. in adults, medullary cavity contains fat (yellow marrow or yellow bone marrow cavity)
- B. EPIPHYSES: (sing. = epiphysis)
  - a. extremities of a long bone; expanded for articulation with other bones
  - b. compact bone forms thin outer layer; interior filled with spongy bone
  - c. thin layer of hyaline cartilage at end of epiphyses for protection, shock absorption and to avoid friction between bones
- C. EPIPHYSEAL LINE
  - a. between diaphysis & each epiphysis; remnant of epiphyseal plate
  - b. used to be cartilage as a child (epiphyseal plate) □ as growth occurs it turns to bone
- D. MEMBRANES
  - a. Covers outer & inner surfaces of long bones – periosteum and endosteum

#### Microscopic Compact Bone Structure:

- Osteon: structural unit of compact bone - elongated cylinder oriented parallel to the long axis of bone □ group of hollow tubes of bone matrix

- o Veins, artery, nerve fibers and lymphatic vessels in central canal.
- o Collagen fibers perpendicular allow for extensive, twisting force to occur without breaking.
- o Lamellae bone: layers of bones
- Central (Haversian) canal: runs through the center of each osteon containing small blood vessels and nerve fibers □ serve osteon cells
- Perforating (Volkmann's) canal: perpendicular to long axis of bone – connect the nerve and blood supply from the medullary cavity to the central cavities
- Lacunae: small space, cavity, or depression □ in bone/cartilage occupied by cells
- CANALICULI: small canals that connect the lacunae with each other; also connected to central canal of Haversian system
- INTERSTITIAL LAMELLAE: fill the gaps between forming osteons or are leftovers of osteons that were partially destroyed by bone remodeling
- CIRCUMFERENTIAL LAMELLAE: sheets of bone located just deep to periosteum; extend around entire circumference of shaft

#### Microscopic Spongy Bone Structure:

- Contains trabeculae, lamellarly arranged osteocytes and canaliculi (no osteons)
- Trabeculae arranged along lines of stress; helps bone to resist stress
- Trabeculae only a few cell layers thick
- nutrients diffuse through canaliculi from the marrow spaces between the trabeculae to reach the osteocytes

#### Bone Formation:

- ❖ osteogenesis/ossification: includes formation of bony skeleton in embryos, growth of bones during childhood & adolescence & remodeling/repair of bones in adults

##### 1. Intramembranous Ossification:

- a. bone develops from fibrous CT membrane containing mesenchymal cells
- b. cranial bones of the skull and the clavicles – these are flat bones

- c. begins at about 8 weeks of embryonic development
2. Endochondral Ossification:
- a. More complex because the hyaline cartilage must be broken down as ossification proceeds
  - b. bone development via the replacement of a hyaline cartilage model
  - c. Primary ossification: region where formation of long bone begins in the center of the hyaline cartilage shaft – blood vessels infiltrate the perichondrium covering the hyaline cartilage → vascularized periosteum → change in nutrition, underlying mesenchymal cells specialize into osteoblasts (now set for ossification)
  - d. Begins in second month of development
  - e. Secondary Ossification:
    - f. Bone collar forms around the diaphysis of the hyaline cartilage model: osteoblasts (new periosteum) secrete osteoid against diaphysis encasing it in a collar of bone
    - g. Cartilage in the center of the diaphysis calcifies and then develops cavities: chondrocytes within the shaft enlarge and signal surrounding cartilage to calcify → chondrocytes die, matrix deteriorates, outer cartilage continues to grow elongating the bone
    - h. Periosteal bud (nutrient artery/vein, nerve fibers, RBM, osteoclasts) invades the internal cavities and spongy bone forms
    - i. Diaphysis elongates and medullary cavity forms: osteoclasts break down spongy bone and open up medullary cavity – cartilage calcifies, erodes and then is replaced by bony spicules
    - j. Epiphysis ossify: secondary ossification: cartilage in center of epiphysis calcifies and deteriorates opening up cavities that allow periosteal buds to enter (spongy bone in the interior is retained and no medullary cavity forms)
  - k. When secondary ossification is complete, hyaline cartilage remains:
    - k.i. on the epiphyseal surfaces as the articular cartilages

- k.ii. at the junctions of diaphysis and epiphyses where it forms the epiphyseal plates - this is the area where long bones continue to grow

Mechanisms of Bone Growth:

During infancy & youth, long bones lengthen entirely by interstitial growth of the epiphyseal plates and all bones grow in thickness by appositional growth

Most bones stop growing during adolescence or in early adulthood - shaft facial bones (eg: nose & lower jaw) continue to grow (almost imperceptibly) throughout life

Long Bone Growth:

Mimics most events of endochondral ossification:

1. Cells divide quickly pushing the epiphysis away from the diaphysis
2. Cells enlarge and their lacunae erode and enlarge leaving large interconnected spaces □ surrounding cartilage matrix calcifies, chondrocytes die and deteriorate = calcification zone
3. Long slender spicules of calcified cartilage at junction (look like stalactites)
4. Spicules become part of ossification zone □ invaded by marrow elements, osteoclasts erode, then osteoblasts cover them with new bone □ spongy bone
  - o As osteoclasts digest, medullary lengthens
  - o Epiphyseal plate remains a constant thickness

As long bone lengthens, the shape of the ends must be altered (remodeling) □ ends are wider than shaft □ bone is destroyed by osteoclasts and laid down by osteoblasts on both the inner and outer surfaces of a growing long bone.

Longitudinal bone growth ends when epiphysis and diaphysis fuses (18-21 – only articular cartilage remains).

Growth in Width:

- ❖ Growth in width = appositional growth
- ❖ Layers of bone are laid down on top of one another
  - o Osteoblasts on periosteal side secrete bone matrix
  - o Osteoclasts on the endosteal side remove bone matrix

- ✓ *Interstitial and appositional growth is an unequal process produces a thicker, stronger bone but prevents it from becoming too heavy*

#### Topic 4: Bones

- ✓ **206** bones in human skeleton - make up about 20% of body weight
- ✓ grouped into **axial** and **appendicular** skeletons
- ✓ **axial skeleton** = bones of skull, vertebral column, rib cage □ supports, protects the brain/spinal cord and organs
- ✓ **appendicular skeleton** = bones of upper & lower limbs + pectoral/pelvic girdles (attach limbs to axial skeleton)

#### SKULL

- ❖ most complex
- ❖ 2 sets of bones: **cranial** + **facial** = 22 bones
- ❖ most skull bones are flat bones; (except mandible); united by **sutures**
- ❖ facial bones form anterior part of skull & cranial bones form the rest
- ❖ skull has eye orbits & paranasal sinuses, houses organs of hearing, has 85 openings for nerves, blood vessels & spinal cord

#### A. Cranium □ vault and base

- vault: forms superior, lateral & posterior aspects of the skull + forehead
  - base: inferior aspect of skull
  - internally, 3 bony ridges divide the cranial base into 3 distinct areas: anterior (highest) fossa, middle fossa & posterior (lowest) fossa
  - 8 cranial bones are the paired parietal & temporal bones & the unpaired frontal, occipital, sphenoid & ethmoid bones
- Frontal bone: dome-shaped bone also forms the roof of the orbits & anterior cranial fossa articulates with paired parietal bones posteriorly – glabella: between orbits
  - Parietal Bones: paired – form superior and lateral aspects of the skull □ form bulk of cranial vault - four largest sutures occur where the parietal bones articulate with other cranial bones

- III. Occipital Bone: single bone at base of skull; helps form posterior aspect of skull - also forms walls of the post cranial fossa
  - a. large hole at base = foramen magnum (passage for spinal cord)
  - b. occipital condyles on each side of foramen magnum = site of articulation with first cervical vertebra – nodding action (hypoglossal canal □ cranial nerve passes)
  - c. external occipital protuberance = projection at back of skull - more prominent in males
  
- IV. Temporal Bone: paired; form inferior & lateral aspects of skull and parts of the cranial floor located just below the 2 parietal bones; have 3 very different areas or regions
  - a. Squamous region: flattened – zygomatic process to cheekbone - mandibular fossa receives condyle of mandible
  - b. Tympanic region: surrounds external acoustic meatus (ear canal)
  - c. Petrous region: is on internal aspect of temporal bone - contributes to cranial base; houses middle and inner ear cavities
    - c.i. mastoid process is attachment site for some neck muscles
    - c.ii. styloid process is attachment area for muscles of the tongue
  
- V. Sphenoid Bone: complex bone; difficult to visualize; articulates with all other cranial bones - forms base of middle cranial fossa; contributes to base of anterior cranial fossa
  - a. Central body and 3 pairs of processes: greater wings, lesser wings and pterygoid processes.
  - b. Hypophyseal fossa – pituitary gland.
  - c. Optical canals – allows optic nerves to pass to the eyes
  
- VI. Ethmoid Bone: approximates a cube that lies deep between orbits & nasal cavities
  - a. cribriform plate forms roof of nasal cavity & floor of anterior cranial fossa; tiny holes (olfactory foramina) transmit olfactory nerves
  - b. perpendicular plate projects inferiorly to contribute to nasal septum
  - c. crista galli projects superiorly to attach to dura mater of brain
  - d. lateral masses contain Ethmoid sinuses

## B. Facial Bones:

- a. Form framework of the face – cavities for sensory organs of sight, smell and taste – provides opening for food and air passage – secure the teeth
  - b. 14 bones of which mandible and vomer are unpaired
  - c. paired bones are: maxillae, zygomatic, nasal, lacrimal, palatine & inferior conchae
1. Mandible: lower jaw bone - strongest & largest bone of the face - body is horizontal part & contains chin; left & right rami join body at mandibular angle
  2. Maxillary bones: fused medially - alveolar margins hold teeth of upper jaw - palatine processes project posteriorly forming anterior 2/3 of hard palate
    - a. Form upper jaw and central portion of the facial skeleton.
    - b. All facial bones except the mandible articulate with the maxillae.
    - c. Maxillae meet just above the nose to make the nasal spine.
    - d. Incisive fossa: serves as passageway for blood vessels and nerves.
    - e. Frontal processes: bridge of nose
  3. Zygomatic bones: = cheekbones - articulate with zygomatic processes of maxilla and of temporal bones □ contribute to inferolateral margins of orbit
  4. Nasal bones: 2 tiny, rectangular bones that fuse medially to form bridge of nose □ articulate with frontal bone superiorly & maxillary bones laterally
  5. Lacrimal bones: 2 fingernail-shaped bones in anterior, medial portion of orbit – each has a depression (lacrimal fossa)
  6. Palatine bones: 2 L-shaped bones/horizontal plates form part of hard palate - vertical plates - nasal cavity & orbit
  7. Vomer: single thin bone forms nasal septum
  8. Inferior nasal conchae: [superior and middle nasal conchae from ethmoid bone] - thin, curved bones - project medially □ largest of 3 pairs of conchae

Paranasal Sinuses: frontal, maxillary, sphenoid, and Ethmoid

- o mucosa-lined, air-filled sinuses
- o lighten skull and enhance resonance of voice; connect to nasal cavity so also help to warm & humidify incoming air

**Hyoid:**

- o Only bone of the body that does not articulate with any other bone
- o Supports tongue & gives attachment to muscles for swallowing & speech
- o Horseshoe-shaped with a body + 2 pairs of horns

**Orbits:**

- o Zygomatic
- o Frontal
- o Maxilla
- o Ethmoid
- o Lacrimal
- o Sphenoid
- o Palatine (orbital process)

**Major Cranial Sutures:**

- ❖ Bones of the adult skull are firmly united by sutures\_
- ❖ Sutural bones: tiny irregular bones; can occur within cranial suture additional ossification centres that appeared rapidly during fetal development (lambdoid suture)
- ❖ 4 main sutures that connect the cranial bones\_
  - (1) Coronal suture: frontal bone & 2 parietal bones
  - (2) Squamous suture: parietal bone & temporal bone
  - (3) Lambdoid suture: occipital bone & 2 parietal bones
  - (4) Sagittal suture: 2 parietal bones

**Topic 5: The Skeleton****Vertebral Column:**

- o 33 bones of which 24 remain separate (flexibility) and the remaining 9 fuse to form 2 composite bones (sacrum & coccyx) - 70 cm long □7 cervical 12 thoracic, 5 lumbar, 5 sacral, 3-4 coccyx

- o 3 main functions: weight-bearing, anchor for muscles & ligaments, protection of spinal cord
- o Curvatures: resilience and flexibility □ cervical and lumbar= concave, thoracic and sacral= convex

#### 1. Ligaments:

- a. strap-like; support column of bones so stay upright
- b. major supporting ligaments are anterior & posterior longitudinal
- c. continuous bands down front & back of vertebral bodies from neck to sacrum
- d. broad anterior is strongly attached to bony vertebrae & the discs; prevents hyperextension of spine
- e. posterior is narrow, weaker & attached only to discs; prevents hyperflexion of spine

#### 2. Intervertebral Discs:

- a. cushioning between bony vertebral bodies - shock absorbers - 25% length of vertebral column
- b. each is circular with nucleus pulposus in centre & annulus fibrosus around periphery
- c. nucleus pulposus is like a rubber ball »» elasticity & compressibility
- d. annulus fibrosus holds together successive vertebrae & resists tension in spine – woven strap (bind vertebrae) and withstand twisting
- e. Herniated disc: “slipped disc” – involves rupture of the annulus fibrosus followed by protrusion of the spongy nucleus pulposus through the annulus