BIO 4432 – Human Anatomy
Week 16 – Week of 05/02/2022

Well, it’s week 16 which means this is our LAST resource for the semester!! You guys have worked so hard this semester and I’m so proud of each and every one of you. This resource is meant to cover the major topics of the entire semester, so it will not include everything you need to know, including UG. For more comprehensive guides, please refer to all the resources that have been posted for previous weeks. Good luck on the final exam!!!

Remember: The tutoring center offers free individual and group tutoring for this course. Our group tutoring session will be Thursdays from 6:45-7:45 PM in the basement of Sid Rich, room 74. You can reserve your spot at https://baylor.edu/tutoring. Hope to see you there!

Keywords: Final review

Topic of the Week: Final Review!

Cranial Nerves: (S = sensory, M = motor, B = both)
CN I: Olfactory (S) – cribriform foramina
CN II: Optic (S) – optic canal
CN III: Oculomotor (M) – superior orbital fissure
CN IV: Trochlear (M) – superior orbital fissure
CN V1: Ophthalmic (S) – superior orbital fissure
  - Nasociliary, frontal, lacrimal
CN V2: Maxillary (S) – foramen rotundum
  - Zygomatic, nasopalatine, superior alveolar, infraorbital, lesser palatine, greater palatine
CN V3: Mandibular (B) – foramen ovale
  - Auriculotemporal, inferior alveolar, lingual
CN VI: Abducent (M) – superior orbital fissure
CN VII: Facial (B) – internal acoustic meatus
CN VIII: Vestibulocochlear (S) – internal acoustic meatus
CN IX: Glossopharyngeal (B) – jugular foramen
CN X: Vagus (B) – jugular foramen
CN XI: Accessory (M) – jugular foramen
CN XII: Hypoglossal (M) – hypoglossal canal

Vertebrae
Lamina: connects the transverse and spinous processes
Pedicle: connects the vertebral arch and body
Superior and inferior articular facets: form facet joints that allow for flexion and extension between vertebrae
  - Cervical: superior facets point up and inferior point down
  - Thoracic: superior facets point posteriorly and inferior point anteriorly
  - Lumbar: superior facets point medially and inferior point laterally
Intervertebral foramen: where spinal nerves exit the vertebral column
Features of Upper Limb

<table>
<thead>
<tr>
<th>Humerus</th>
<th>Features of Lower Limb</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Greater tubercle and lesser tubercle</td>
<td>- Greater and lesser trochanters</td>
</tr>
<tr>
<td>- Head: articulates with glenoid fossa of scapula</td>
<td>- Head and neck: head articulates with acetabulum of bony pelvis</td>
</tr>
<tr>
<td>- Anatomical neck and surgical neck: fractures occur here; affect the axillary nerve</td>
<td>- Pectineal line</td>
</tr>
<tr>
<td>- Deltoid tuberosity</td>
<td>- Medial and lateral condyle</td>
</tr>
<tr>
<td>- Radial groove: mid-humeral fractures; affect the radial nerve</td>
<td>- Tibial tuberosity: where tendon of quadriceps inserts</td>
</tr>
<tr>
<td>- Trochlea</td>
<td>- Medial malleolus</td>
</tr>
<tr>
<td>- Capitulum</td>
<td></td>
</tr>
<tr>
<td>- Lateral and medial epicondyles: ulnar nerve runs behind the medial epicondyle</td>
<td></td>
</tr>
<tr>
<td>- Olecranon fossa</td>
<td></td>
</tr>
<tr>
<td>- Coronoid fossa</td>
<td></td>
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</tbody>
</table>

Radius

- Radial tuberosity: where the biceps brachii insert
- Styloid process

Ulna

- Olecranon: your elbow bone; articulates with olecranon fossa of humerus
- Coronoid process: articulates with coronoid fossa of humerus

Articulations

Movement:
- Synarthrosis = immovable
- Amphiarthrosis = slightly movable
- Diarthrosis = freely movable

Structure:
- Fibrous: joint is made up of fibrous ligaments
- Cartilaginous: joint is made up of either hyaline cartilage or fibrocartilage
  - Hyaline = synchondrosis
  - Fibrocartilage = symphysis
- Synovial: joint has a joint cavity and surrounded by a synovial membrane; freely movable

Mechanical classifications: hinge, pivot, ball and socket, condyloid/ellipsoid, gliding/ plane, saddle

Extraocular Muscles
1. Superior rectus – looks up (elevates eye)
2. Inferior rectus – looks down (depresses eye) (CN III)
3. Medial rectus – looks medially (towards nose) (CN III)
4. Lateral rectus – looks laterally (CN VI)
5. Superior oblique – depresses the adducted eye (CN IV)
6. Inferior oblique – elevates the adducted eye (CN III)

**Spinal Cord**

**Dorsal Rami**

Sensory to: the skin over the back
Motor to: the deep/intrinsic back muscles

**Ventral Rami**

Sensory to: the skin over ventral trunk and limbs
Motor to: skeletal muscles of neck, trunk, and extremities

<table>
<thead>
<tr>
<th>Myotomes (movement)</th>
<th>Dermatomes (touch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C5: should abduction</td>
<td>C2: back of the head</td>
</tr>
<tr>
<td>C6: elbow flexion</td>
<td>C5: lateral epicondyle</td>
</tr>
<tr>
<td>C7: elbow extension</td>
<td>C6: dorsal surface of thumb (digit 1)</td>
</tr>
<tr>
<td>C8: finger flexion (make a fist)</td>
<td>C7: dorsal surface of middle finger (digit 3)</td>
</tr>
<tr>
<td>T1: finger abduction</td>
<td>C8: dorsal surface of little finger (digit 5)</td>
</tr>
<tr>
<td>L2: hip flexion</td>
<td>T1: medial epicondyle</td>
</tr>
<tr>
<td>L3: hip adduction</td>
<td>T4: level of the nipple</td>
</tr>
<tr>
<td>L4: knee extension</td>
<td>T10: level of bellybutton/umbilicus</td>
</tr>
<tr>
<td>L5: dorsiflexion</td>
<td>L1: inguinal ligament</td>
</tr>
<tr>
<td>S1: plantar flexion</td>
<td>L3: medial knee</td>
</tr>
</tbody>
</table>

**Lower Limb Musculature** (muscle and innervation only; make sure to review functions!!)

<table>
<thead>
<tr>
<th>Muscles of anterior thigh/leg</th>
<th>Muscles of posterior thigh/leg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thigh: femoral nerve</td>
<td>Thigh: tibial nerve</td>
</tr>
<tr>
<td>- Rectus femoris</td>
<td>- Biceps femoris long head</td>
</tr>
<tr>
<td>- Vastus lateralis</td>
<td>- Biceps femoris short head: common fibular nerve</td>
</tr>
<tr>
<td>- Vastus medialis</td>
<td>- Semitendinosus</td>
</tr>
<tr>
<td>- Vastus intermedius</td>
<td>- Semimembranosus</td>
</tr>
<tr>
<td>- Sartorius</td>
<td>Leg: tibial nerve</td>
</tr>
<tr>
<td>Leg: deep fibular nerve</td>
<td>- Gastrocnemius</td>
</tr>
<tr>
<td>- Anterior tibialis</td>
<td>- Soleus</td>
</tr>
<tr>
<td>- Extensor digitorum longus</td>
<td>- Posterior tibialis</td>
</tr>
<tr>
<td>- Extensor hallucis longus</td>
<td>- Flexor digitorum longus</td>
</tr>
</tbody>
</table>
Brachial Plexus and Upper Limb Musculature

Parasympathetics

III

- preganglionic
- postganglionic

V1

1. pupillary constriction
2. lacrimal makes bigger for near vision

V2

1. palate
2. nasal cavity
3. lacrimal gland

V3

1. preganglionic
- postganglionic

greater petrosal n.

VII

- preganglionic
- postganglionic

vidian or
pterygoid canal
(壶 also transports
deep petrosal n.)

pterygo-
palatine
ganglion
in pterygo-
palatine fossa
Lungs
The right lung has 3 lobes and 2 fissures. The left lung has 2 lobes, 1 fissure, and the cardiac notch.
RALS: For the right lung: pulmonary artery is anterior to the bronchus. For the left lung: pulmonary artery is superior to the bronchus.
Larynx

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Vessels</th>
<th>Nerves</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respiratory muscles</strong> –</td>
<td><strong>Superior laryngeal artery:</strong></td>
<td><strong>Recurrent laryngeal n.</strong></td>
</tr>
<tr>
<td>posterior cricoarytenoid</td>
<td>- Supplies above the vocal folds</td>
<td>- Motor: all intrinsic muscles of the larynx</td>
</tr>
<tr>
<td><strong>Phonatory muscles</strong> –</td>
<td>- Runs with internal laryngeal nerve</td>
<td>except for the cricothyroid muscle</td>
</tr>
<tr>
<td>lateral cricoarytenoid, arytenoids, cricothyroid, and thyroarytenoid</td>
<td><strong>Inferior laryngeal artery:</strong></td>
<td>- Sensory: below the vocal folds</td>
</tr>
<tr>
<td></td>
<td>- Supplies below the vocal folds</td>
<td><strong>Internal laryngeal n.</strong></td>
</tr>
<tr>
<td></td>
<td>- Runs with recurrent laryngeal nerve</td>
<td>to above the vocal folds</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>External laryngeal n.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>innervates the cricothyroid</td>
</tr>
</tbody>
</table>

GI

**Foregut:** from the last 1/3 of the esophagus to the first half of the duodenum
- Blood supply: celiac trunk
- Sympathetic innervation: greater splanchnics (T5-T9)
- Parasympathetic innervation: vagus nerve

**Midgut:** from the second half of the duodenum to the first half of the transverse colon
- Blood supply: superior mesenteric artery
- Sympathetic innervation: lesser splanchnics (T10-T11), least splanchnics (T12), and lumbar splanchnics
- Parasympathetic innervation: vagus nerve

**Hindgut:** from the second half of the transverse colon to the anus
- Blood supply: inferior mesenteric artery
- Sympathetic innervation: lumbar splanchnics (L1-L2) and sacral splanchnics
- Parasympathetic innervation: vagus nerve

**Important ligaments:**
- **Hepatoduodenal ligament:** the portal triad lies within this ligament (common bile duct, hepatic artery proper, and portal vein)
- **Gastrosplenic ligament** contains the short gastric and right gastroepiploic vessels
**Final Knowledge Checkpoint:**

1. In this superior view of the skull, can you label all the foramina along with the nerve(s) each transmits? *This image is a screenshot from Complete Anatomy.*

![Skull Diagram](image1.png)

2. You are testing the extraocular muscles and their innervation in a patient who periodically experiences double vision. When you ask him to turn his right eye inward toward his nose and look downward, he is able to look inward, but not down. Which nerve is most likely involved?
   a. Abducens
   b. Nasociliary
   c. Oculomotor
   d. Trochlear

3. If a patient suffers nerve damage to the C7 spinal nerve level, which movement will be affected? Which area, if palpitated, will they be unlikely to feel?

4. Which of the following muscles is LEAST likely to be affected in the presence of an ulnar nerve lesion?
   a. Palmar interossei
   b. Lateral two lumbricals
   c. Dorsal interossei
   d. Medial two lumbricals
   e. Abductor digiti minimi

5. Identify the indicated nerve.

![Nerve Diagram](image2.png)
6. If a sympathetic neuron is traveling to the head, where will its pre-ganglionic neuron most likely synapse?
   a. At the sympathetic ganglion at same level
   b. At the sympathetic ganglion higher
   c. At the sympathetic ganglion lower
   d. Within the target organ

7. A patient expresses to you that he is concerned that he cannot taste anything on the anterior 2/3 of his tongue. What nerve innervates this portion of the tongue?
   a. Chorda Tympani
   b. Glossopharyngeal
   c. Vagus
   d. Mandibular

8. Which fetal structure allows blood to bypass the liver?
   a. Ductus arteriosum
   b. Ductus venosus
   c. Ligamentum arteriosum

9. The brachiocephalic artery divides to form the right common carotid and the ____ ____ artery.
   a. Left subclavian
   b. Left common carotid
   c. Right subclavian
   d. Right thoracic artery

10. Which nerve runs with the inferior laryngeal artery?

11. A patient was admitted with symptoms of an upper bowel obstruction. Upon CT examination, it was found that the third (transverse) portion of the duodenum was compressed by a large vessel causing the obstruction. The vessel involved is most likely to be the:
   a. Inferior mesenteric artery
   b. Inferior mesenteric vein
   c. Portal vein
   d. Superior mesenteric artery

12. What nerve(s) supply parasympathetic innervation to the midgut?
   a. Pelvic splanchnics
   b. Vagus
   c. Lumbar splanchnics
   d. Least splanchnics
Answers

1. A = cribiform foramina; CN I – olfactory
   B = optic canal; CN II – optic
   C = superior orbital fissure; CN III – oculomotor, CN IV – trochlear, CN V1 –
   ophthalmic, CN VI – abducens
   D = foramen rotundum; CN V2 – maxillary
   E = foramen ovale; CN V3 – mandibular
   F = foramen spinosum; middle meningeal artery
   G = internal acoustic meatus; CN VII – facial, CN VIII – vestibulocochlear
   H = jugular foramen; CN IX – glosopharyngeal, CN X – vagus, CN XI – accessory
   I = hypoglossal canal; CN XII – hypoglossal
   J = foramen magnum; spinal cord

2. d
3. Elbow extension; dorsal surface of digit 3
4. b
5. Radial
6. b
7. a
8. b
9. c
10. Recurrent laryngeal nerve
11. d
12. b