

VISIBLE BODY®

Cranial Nerves (Part 2)

A nervous system lab activity using Visible Body Suite

Molli Crenshaw, Instructor of Biology, TCU

A. Identification of the Facial Nerves (VII): Use Module 21.16 to answer the following questions:



- 1. These nerves are sensory/motor/mixed (circle one).
- 2. Select the **facial nerves**, and select Fade Others. Observe their location, and read their description.
- 3. The motor fibers of this nerve emerge from which brain region?
 - a. How many branches are produced by the motor portion?
 - b. What are the functions of the motor fibers of the facial nerve?

- c. Identify these motor branches and describe the regions they innervate:
 - i. Temporal branch of the facial nerve:
 - ii. Zygomatic branch of the facial nerve:
 - iii. Buccal branch of the facial nerve:
 - iv. Mandibular branch of the facial nerve:
 - v. Cervical branch of the facial nerve:
- 4. What are the functions of the sensory fibers of the facial nerve?
 - a. To which regions of the brain and brain stem do these sensory fibers relay input?
 - b. Identify the geniculate ganglion and describe its significance.

5. Rotate the skull so that you are viewing the occipital bone, then select and hide the occipital bone. As you view the sphenoid bone, identify the two foramina that the facial nerve passes through:

6. Based on your learning, how do you think damage to this nerve would present clinically?

7. What types of tests would you devise to test the function of this nerve in patients?

<u>B. Identification of the Vestibulocochlear Nerves (VIII): Use Module 21.17, 23.22, 23.25, 23.26, 23.27, and 23.28 to answer the following questions:</u>

Module 21.17 Vestibulocochlear Nerves (VIII)



Module 23.22 Inner Ear



Module 23.26 Auditory Pathway



1. These nerves are sensory/motor/mixed (circle one).

2. Select the **vestibulocochlear nerves**, and select Fade Others. Observe their location and read their description.

3. The cochlear branches of the vestibulocochlear nerves transmit signals for ______.

4. The vestibular branches of the vestibulocochlear nerves transmit signals for ______.

5. In Module 23.22, identify the following structures, and describe what type of sensory input they are responsible for:

a. Semicircular canals and vestibule

b. Cochlea

6. Watch the video in Module 23.25, Hearing, and fill in the blanks to complete the statement below:

b. Signals are carried through the ______ to the

_____ lobe of the brain, where they are interpreted as sound.

7. Use Module 23.26, Auditory Pathway, to identify the following structures:

a. Vestibulocochlear nerves

- b. Medulla oblongata
- c. Midbrain
- d. Thalamus
- e. Cerebral cortex

8. Observe the image in Module 23.27, Equilibrium, and fill in the blanks to complete the statement below:

a. Changes in ______ are sensed through the special sense of equilibrium.

b. Movement of fluid inside the______ of the inner ear causes hair cells in the canal to bend.

c. A signal moves from the hair cell ______ through the ______ (part of the brainstem).

9. Use Module 23.28, Equilibrium Pathway, to identify the following structures:

- a. Vestibulocochlear nerves
- b. Medulla oblongata
- c. Pons
- d. Cerebral cortex

10. Based on your learning, how do you think damage to this nerve would present clinically?

11. What types of tests would you devise to test the function of this nerve in patients?

<u>C. Identification of the Glossopharyngeal Nerves (IX): Use Module 21.18 to answer the following questions:</u>

1. These nerves are sensory/motor/mixed (circle one).

2. Select the **glossopharyngeal nerves**, and select Fade Others. Observe their location and read their description.

3. Where do fibers of this nerve originate?

4. The fibers exit the skull through which opening? (Tip: Select the occipital bone and fade it to make these foramina more visible.)

5. The motor fibers arise from nuclei in the ______.

a. These motor fibers innervate the ______ muscle. What is the action of this muscle?

b. The motor fibers of this nerve also innervate the parotid gland to stimulate secretion of

6. Read the description of the sensory axons of the glossopharyngeal nerve, and answer the following questions:

a. What is the location of those on the tongue?

b. What is the function of proprioceptors of swallowing muscles?

c. *To discuss in class or research in your textbook:* What is the function of baroreceptors in the carotid sinus? Be sure to identify the location of these sinuses.

d. *To discuss in class or research in your textbook:* What is the function of chemoreceptors in the carotid body? Be sure to identify the location of these carotid bodies.

e. Cell bodies of the sensory fibers are found in which two ganglia?

f. Which region of the cerebral cortex will receive sensory input from this cranial nerve?

7. Based on your learning, how do you think damage to this nerve would present clinically?

8. What types of tests would you devise to test the function of this nerve in patients?

D. Identification of the Vagus Nerves (X): Use Module 21.19 to answer the following questions:

1. These nerves are sensory/motor/mixed (circle one).

2. Select the **vagus nerves** and select Fade Others. Observe the location of the nerves in the mediastinum.

3. Where do fibers of these nerves originate?

4. The fibers exit the skull through which opening? (Tip: Select the occipital bone and fade it to make these foramina more visible.)

- 5. Identify the following structures and note their significance:
 - a. Superior and inferior ganglia:
 - b. Pharyngeal branch of the vagus nerve:
 - c. Superior laryngeal branch of the vagus nerve:
 - d. Superior cervical (vagal) cardiac branch of the vagus nerve:
- 6. Select "vagus innervation" and make a list of all the organs the vagus nerve is associated with:

7. The vagus nerves contain many parasympathetic fibers that influence activities of organs in the thoracic and abdominal cavities. Make a list of the actions of the nerves in these cavities:

- 8. Based on your learning, how do you think damage to this nerve would present clinically?
- 9. Why do you think that damage to both vagus nerves is often fatal?
- 10. What types of tests would you devise to test the function of this nerve in patients?

E. Identification of the Accessory Nerves (XI): Use Module 21.20 to answer the following questions:

- 1. These nerves are sensory/motor/mixed (circle one).
- 2. Select the **accessory nerves** and select Fade Others. Observe their location.
- 3. Trace the nerves from their origin to their site of termination.
 - a. Read the description of the accessory nerves. What is the origin of these nerves?
 - b. Why do you think these nerves are often referred to as "spinal" accessory nerves?
 - c. Through which foramen do they enter the cranium?

- d. Through which cranial foramina do they exit?
- e. Why do you think they are classified as cranial nerves?
- 4. Identify the two groups of muscles innervated by the accessory nerves, and describe their actions:

a. Sternocleidomastoid muscles:

b. Trapezius muscles:

- 5. Based on your learning, how do you think damage to this nerve would present clinically?
- 6. What types of tests would you devise to test the function of this nerve in patients?

F. Identification of the Hypoglossal Nerves (XII): Use Module 21.21 to answer the following questions:

- 1. These nerves are sensory/motor/mixed (circle one).
- 2. Select the hypoglossal nerves and select Fade Others. Observe their location.
- 3. Where do fibers of these nerves originate?

4. The fibers exit the skull through which opening? (Tip: Select the occipital bone and fade it to make these foramina more visible.)

- 5. Which muscles do these nerves innervate?
- 6. What actions do they initiate for these muscles?

7. Based on your learning, how do you think damage to this nerve would present clinically?

8. What types of tests would you devise to test the function of this nerve in patients?

MAKING CONNECTIONS:

A. Using Module 20.9, Midbrain, identify the cranial nerves that emerge from the midbrain:

B. Using Module 20.8, Medulla and Pons, identify the cranial nerves that emerge from the medulla and pons:

<u>C. Assume you have just entered your favorite restaurant and are sitting down to eat a delicious</u> <u>meal.</u>

1. Which nerve is solely responsible for the sense of sight as you see your waiter carrying your food to the table?

2. Which nerves are responsible for motor control of the extraocular muscles as you glance back and forth at the food on your plate?

3. Which nerve is responsible for turning your head side to side to see what your friends have ordered?

4. Which nerve is responsible for accommodation of the lens and constriction of the pupil to enable close vision of this delicious meal?

5. Which nerve is responsible for your sense of smell as the delicious aromas rise from the plate?

6. Which cranial nerves stimulate the production of saliva from salivary glands as you anticipate your meal?

7. Which cranial nerve is associated with motor control of the muscles of chewing as you take the first bite?

8. Which nerve is responsible for your sense of hearing as you hear the crunching of food in your mouth?

9. Which three cranial nerves transmit impulses from taste receptors to the brainstem as you chew your food?

10. Which cranial nerve is associated with motor control of the tongue as you propel food backwards?

11. Which cranial nerves are associated with motor control of muscles of swallowing?

12. Which cranial nerve has parasympathetic fibers to control digestive activities of the stomach, liver, pancreas, and intestines?

13. After you finish this meal and decide to lie down for a short nap, which cranial nerve monitors your change in equilibrium?

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Student Practice

Label the structures in the following figures.

Module 21.16 Facial Nerves (VII)

Module 21.17 Vestibulocochlear Nerves (VIII)

Module 21.18 Glossopharyngeal Nerves (IX)

Module 21.19 (Vagus Nerves)

Module 21.10 Accessory Nerves (XI)

Module 21.21 Hypoglossal Nerves (XII)

Module 23.22 Inner Ear

Module 23.26 Auditory Pathway

