

VISIBLE  BODY®

## **Cranial Nerves (Part 2)**

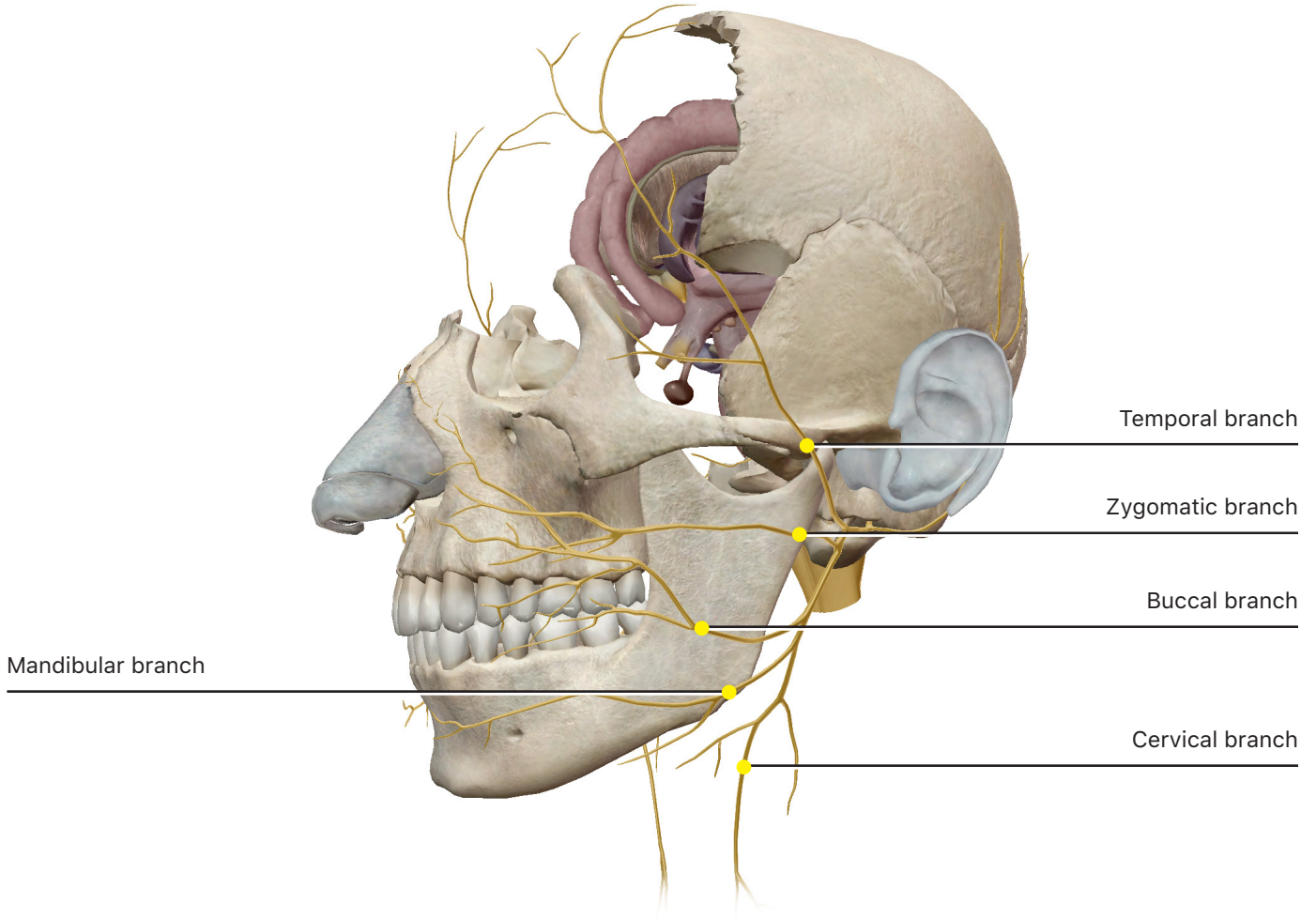
A nervous system lab activity using Visible Body Suite

**Molli Crenshaw, Instructor of Biology, TCU**

**We've split our Cranial Nerves lab activity into two parts.**

Part 1 is pre-lab exercises as well as exercises that incorporate cranial nerves I-VI. Part 2 includes exercises covering cranial nerves VII-XII as well as post-lab exercises.

**F. Identification of the Facial Nerves (VII)**



1. Select the **facial nerves**, and use the Select Others and Fade buttons for a better view. Observe their location, and read their description.
2. These nerves are sensory/motor/mixed (circle one).
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. **Marginal 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?

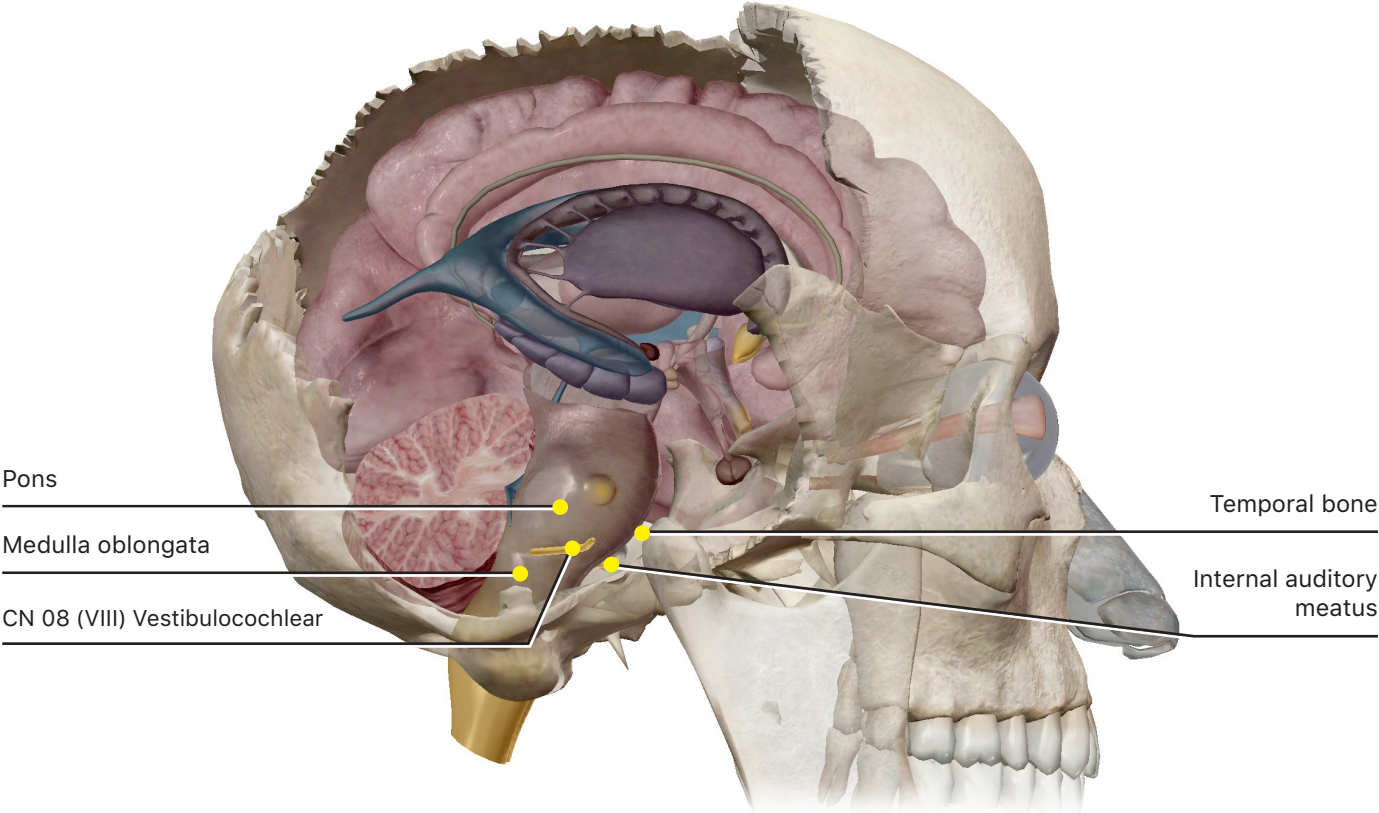
b. Identify the **geniculate ganglion** and describe its significance.

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

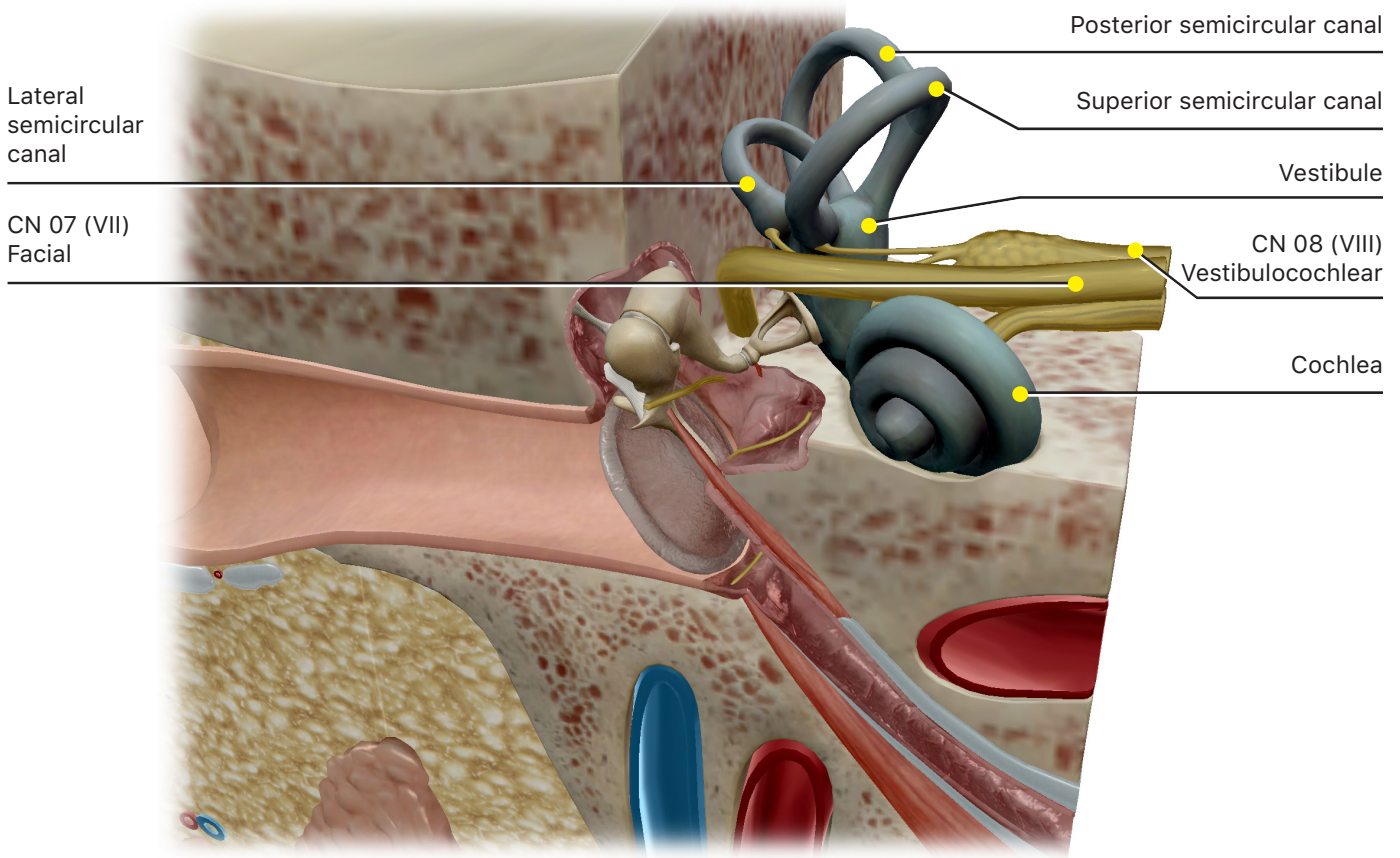
6. Click on the pathology icon and write out the symptoms of **Bell's Palsy**:

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

**G. Identification of the Vestibulocochlear Nerves (VIII)**



## Vestibulocochlear Nerves (VIII)



1. Select the **vestibulocochlear nerves**, and use the Select Others and Fade buttons for a better view. Observe their location and read their description.

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

3. The **cochlear branches of the vestibulocochlear nerves** transmit signals for the sense of \_\_\_\_\_. The cochlear sensory cell bodies are found in the \_\_\_\_\_ and their fibers emerge from the organ of \_\_\_\_\_ in the \_\_\_\_\_.

4. The **vestibular branches of the vestibulocochlear nerves** transmit signals for \_\_\_\_\_. The vestibular sensory cell bodies are found in the \_\_\_\_\_.

5. The cochlear and vestibular nerves pass through the \_\_\_\_\_ in the \_\_\_\_\_ bone.

6. In the search bar, search for "inner ear". Identify the following in the app, and on a model or specimen if provided:

- a. **Cochlea**
- b. **Vestibule**
- c. **Superior semicircular canal**
- d. **Posterior semicircular canal**
- e. **Lateral semicircular canal**
- f. **CN 07 (VII) Facial nerve**
- g. **CN 08 (VIII) Vestibulocochlear nerve**

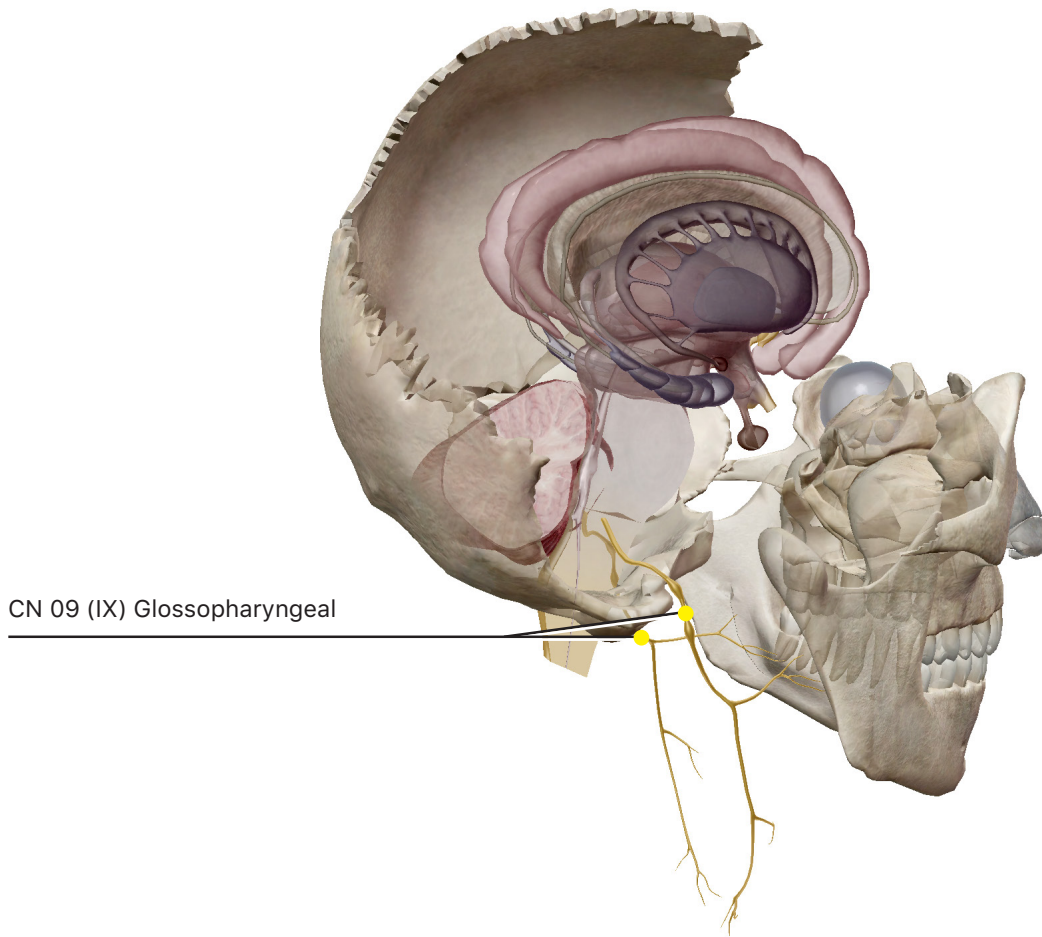
7. From the view generated above, click on the vestibule and answer the following questions from its description:

- a. Each of the semicircular canals has an expansion at one end called an \_\_\_\_\_, which contains extracellular fluid known as \_\_\_\_\_, and a small elevation, the \_\_\_\_\_, with a cluster of hair cells.
  
- b. As the head rotates or moves, the movement of \_\_\_\_\_ in the \_\_\_\_\_ causes the \_\_\_\_\_ to bend, which generates \_\_\_\_\_.

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

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

## H. Identification of the Glossopharyngeal Nerves (IX)



1. Open the Nervous System View "Cranial Nerves." Hide the temporal, sphenoid, and frontal bones along with the cerebellum as before. Then, select the **glossopharyngeal nerves**, and use the Select Others and Fade buttons for a better view. Observe their location and read their description.
2. These nerves are sensory/motor/mixed (circle one).
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 and function of those on the tongue?

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

c. What is the function of **baroreceptors in the carotid sinus**? Be sure to identify the location of these sinuses.

d. What is the function of **chemoreceptors in the carotid body**? Be sure to identify the location of these carotid bodies.

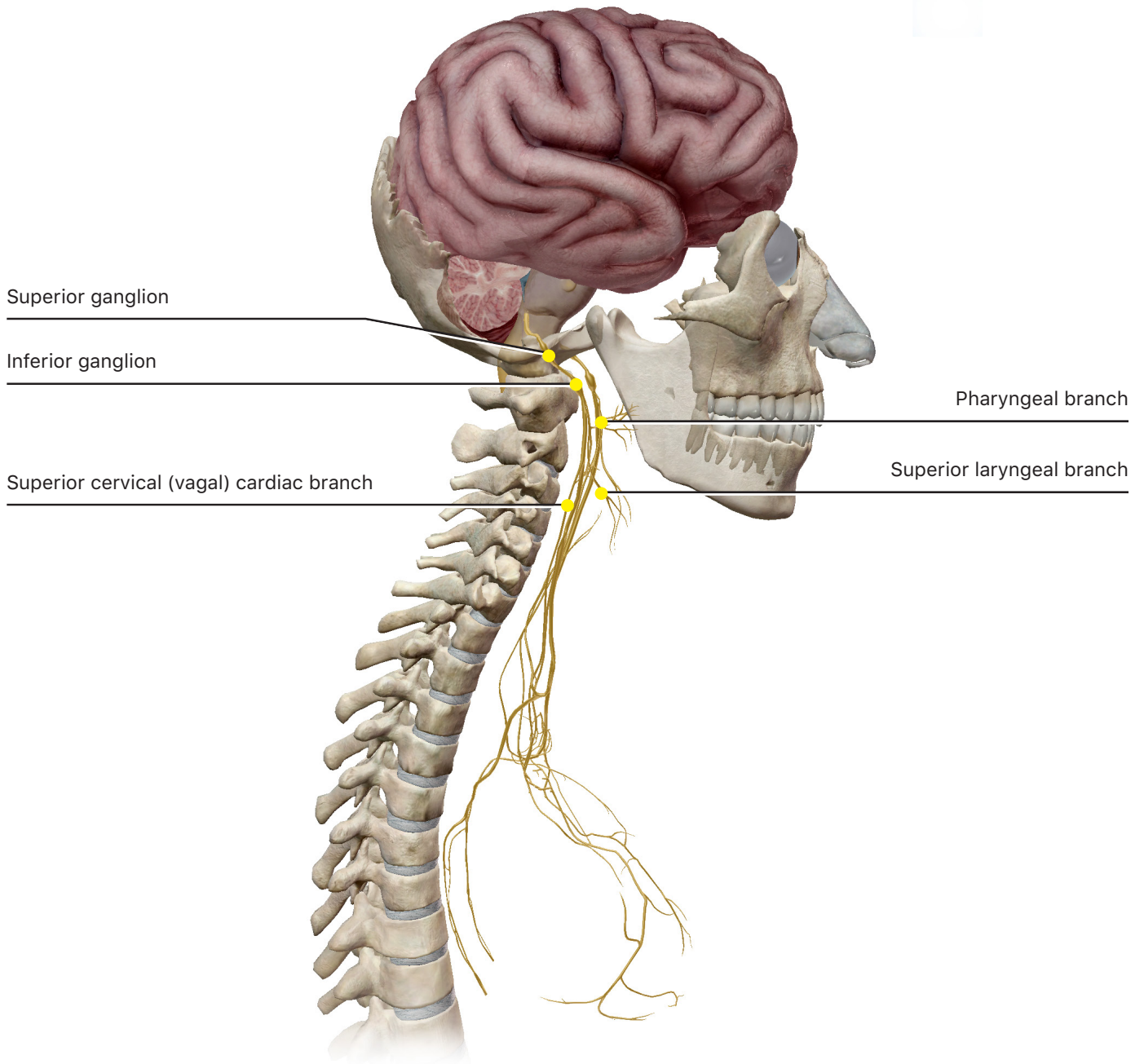
e. Cell bodies of the sensory fibers are found in which two ganglia?

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?

## I. Identification of the Vagus Nerves (X)



1. Select the **vagus nerves**, and use the Select Others and Fade buttons for a better view. Observe the location of the nerves in the mediastinum.
2. These nerves are sensory/motor/mixed (circle one).
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. Open the Nervous System View "Vagus Nerve (X)." Identify the following structures and note their significance. (Tip: It will be easier to see these regions if you hide the circulatory system initially.)

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**

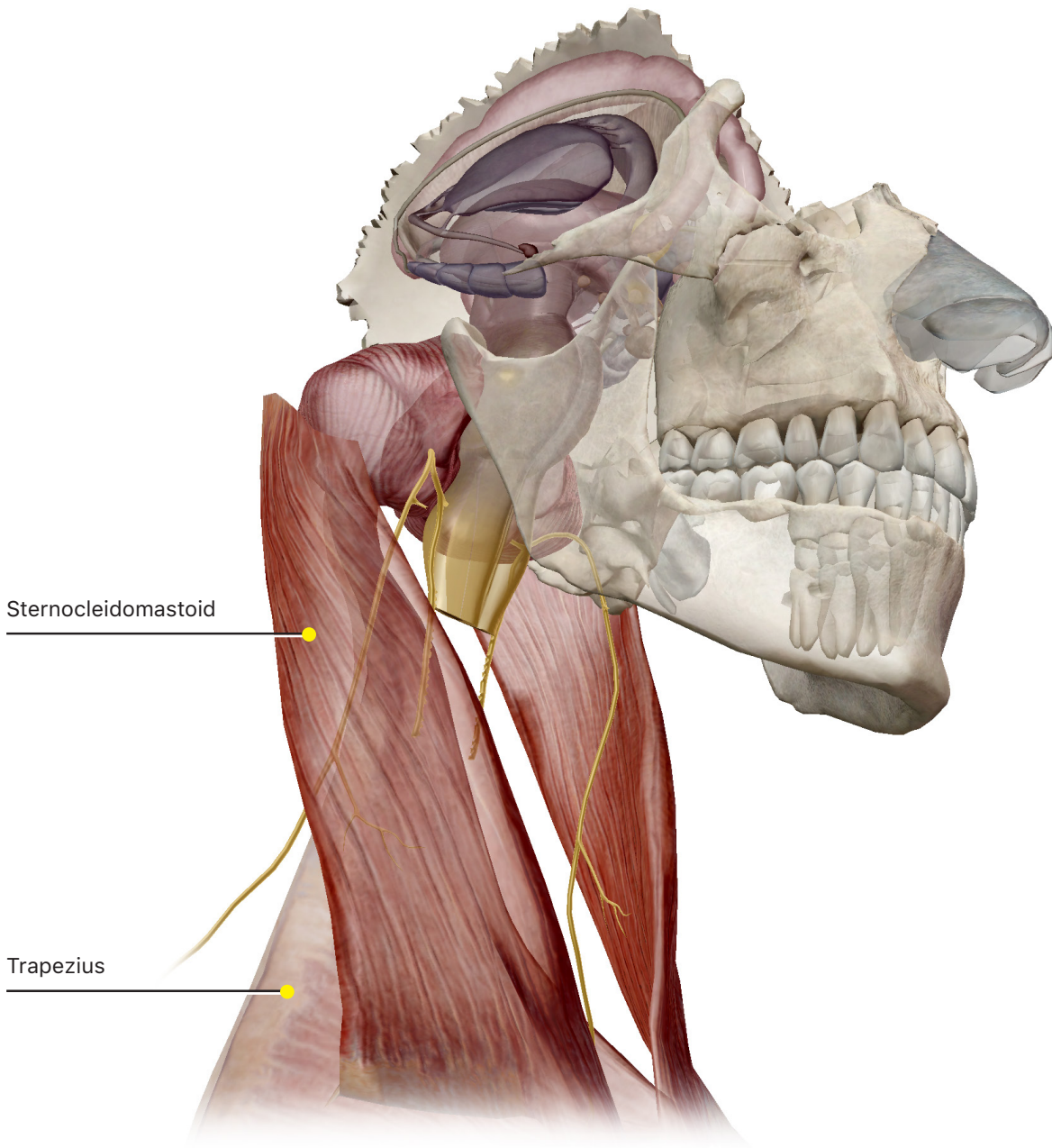
6. Read back through each description of the vagus nerve and make a list of all the organs and tissues innervated by the nerve.

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

8. Why do you think that damage to both vagus nerves is often fatal?

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

## J. Identification of the Accessory Nerves (XI)

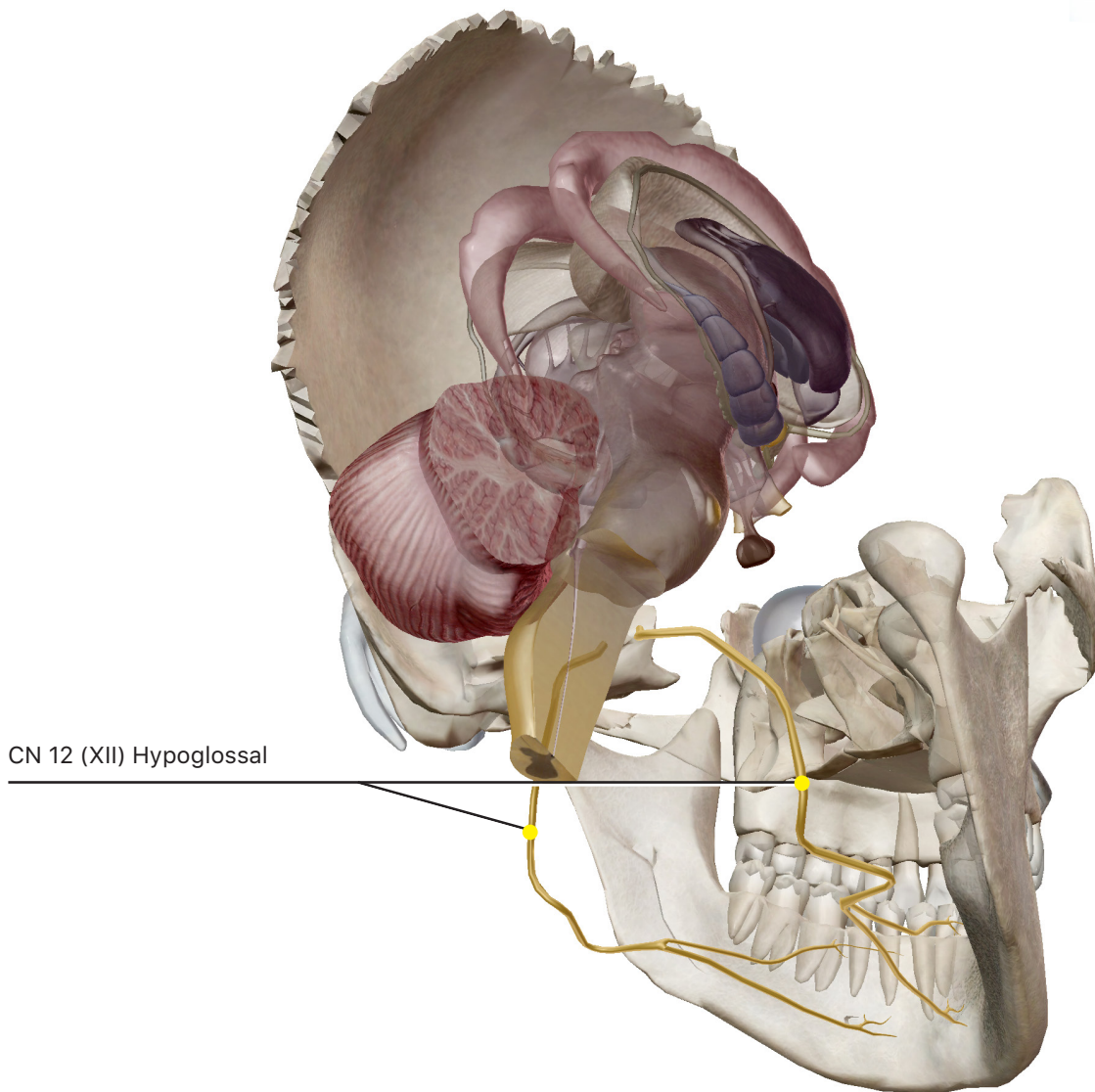


1. Return to the view of the cranial nerves. Hide the temporal, sphenoid, and frontal bones along with the cerebellum as before. Then, select the **accessory nerves**, and use the Select Others and Fade buttons for a better view. Observe their location and read their description.

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

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. Use the search bar to identify these target muscles and 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?

## K. Identification of the Hypoglossal Nerves (XII)



1. Select the **hypoglossal nerves**, and use the Select Others and Fade buttons for a better view. Observe their location.

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

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. Look back through the activity to help you name each of the following cranial nerves in numerical order:**

1. Cranial nerve 01 (I)
2. Cranial nerve 02 (II)
3. Cranial nerve 03 (III)
4. Cranial nerve 04 (IV)
5. Cranial nerve 05 (V)
6. Cranial nerve 06 (VI)
7. Cranial nerve 07 (VII)
8. Cranial nerve 08 (VIII)
9. Cranial nerve 09 (IX)
10. Cranial nerve 10 (X)
11. Cranial nerve 11 (XI)
12. Cranial nerve 12 (XII)

**TIME TO PRACTICE!**

**SEARCH FOR AND TAKE THE FOLLOWING NERVOUS SYSTEM QUIZ:**  
**CRANIAL NERVES**

**B. Look back through the activity to review the functional classification of the cranial nerves. Be sure to identify them both by name and by Roman numeral for practice.**

1. Which three cranial nerves are designated as purely sensory?
2. Which five cranial nerves are designated as purely motor?
3. Which four cranial nerves are designated as mixed?



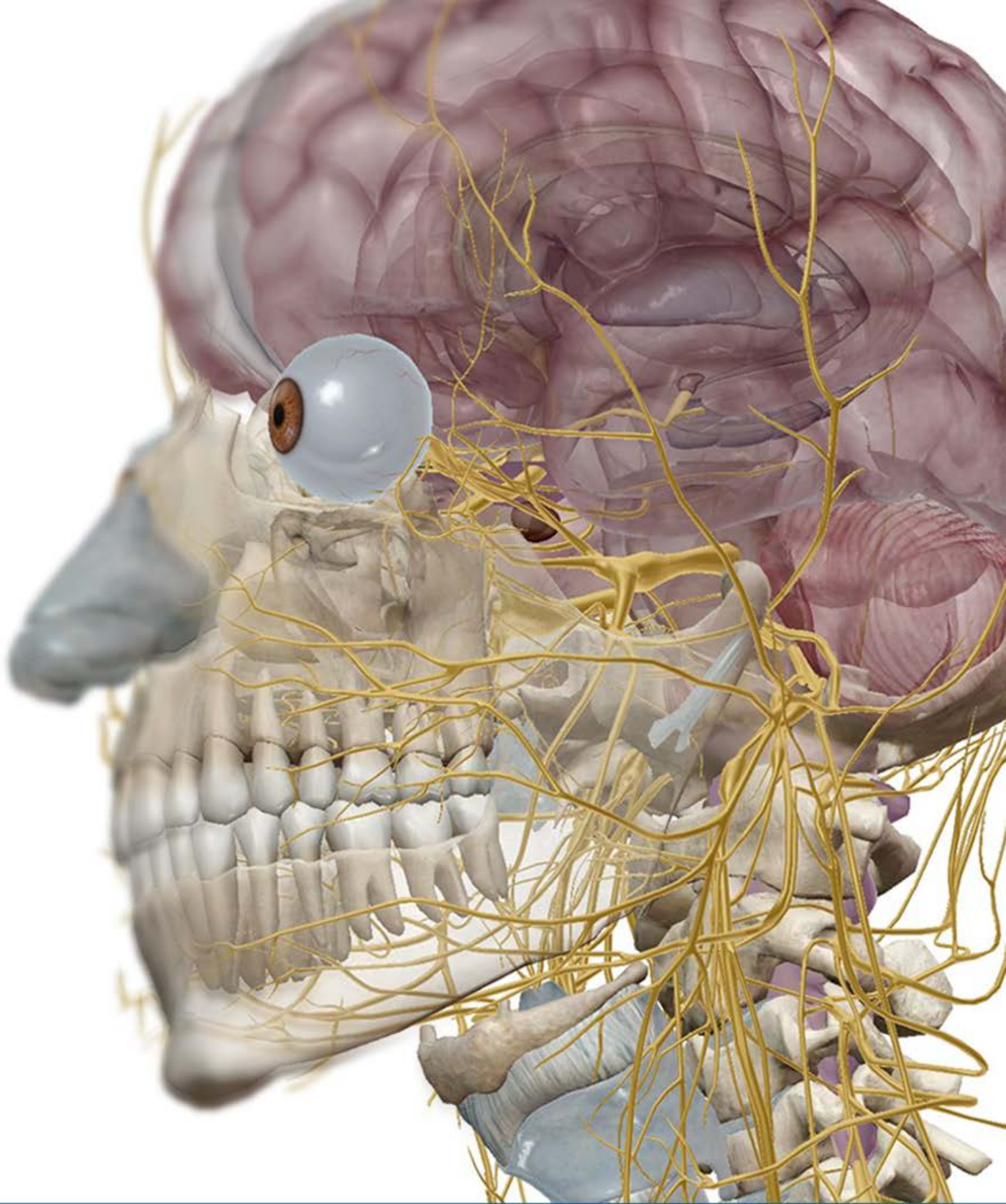
**C. Look back through the exercise and make a list of all the cranial nerves that emerge from the midbrain:**

**D. Look back through the exercise and make a list of all the cranial nerves that emerge from the medulla and pons:**

**E. Assume you have just entered your favorite restaurant and are sitting down to eat a delicious meal:**

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 nerves would help you interpret the temperature of food in your mouth as hot or cold?
  
9. Which nerve is responsible for your sense of hearing as you hear the crunching of food in your mouth?
  
10. Which three cranial nerves transmit impulses from taste receptors to the brain stem as you chew your food?
  
11. Which cranial nerves regulate muscles of the tongue, mouth, and throat to facilitate 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?

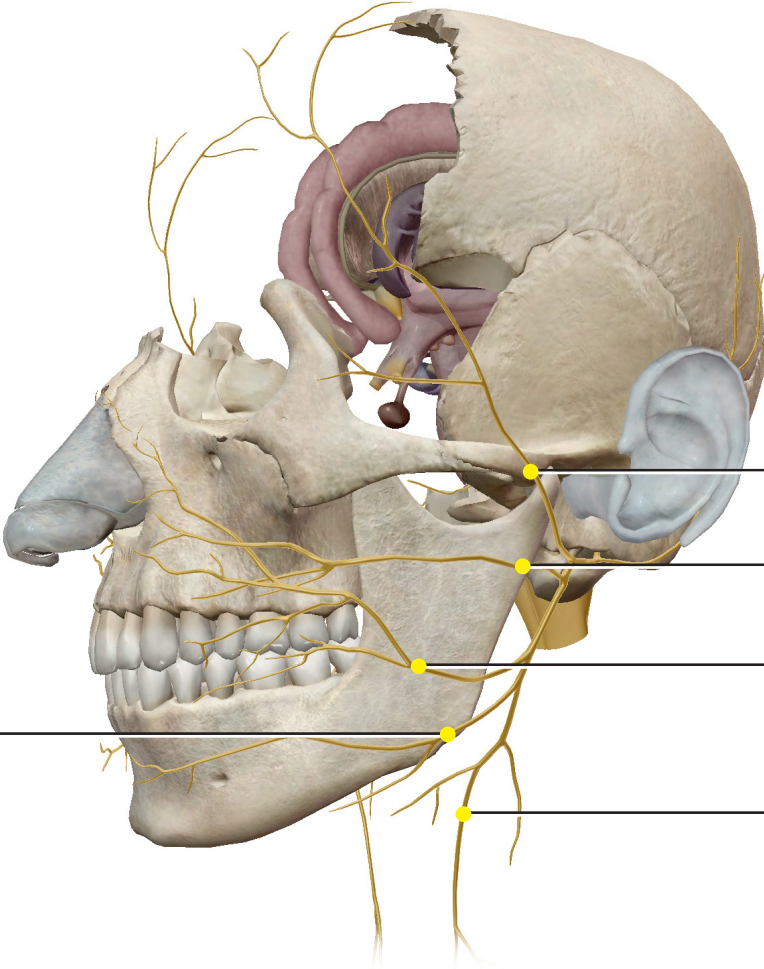


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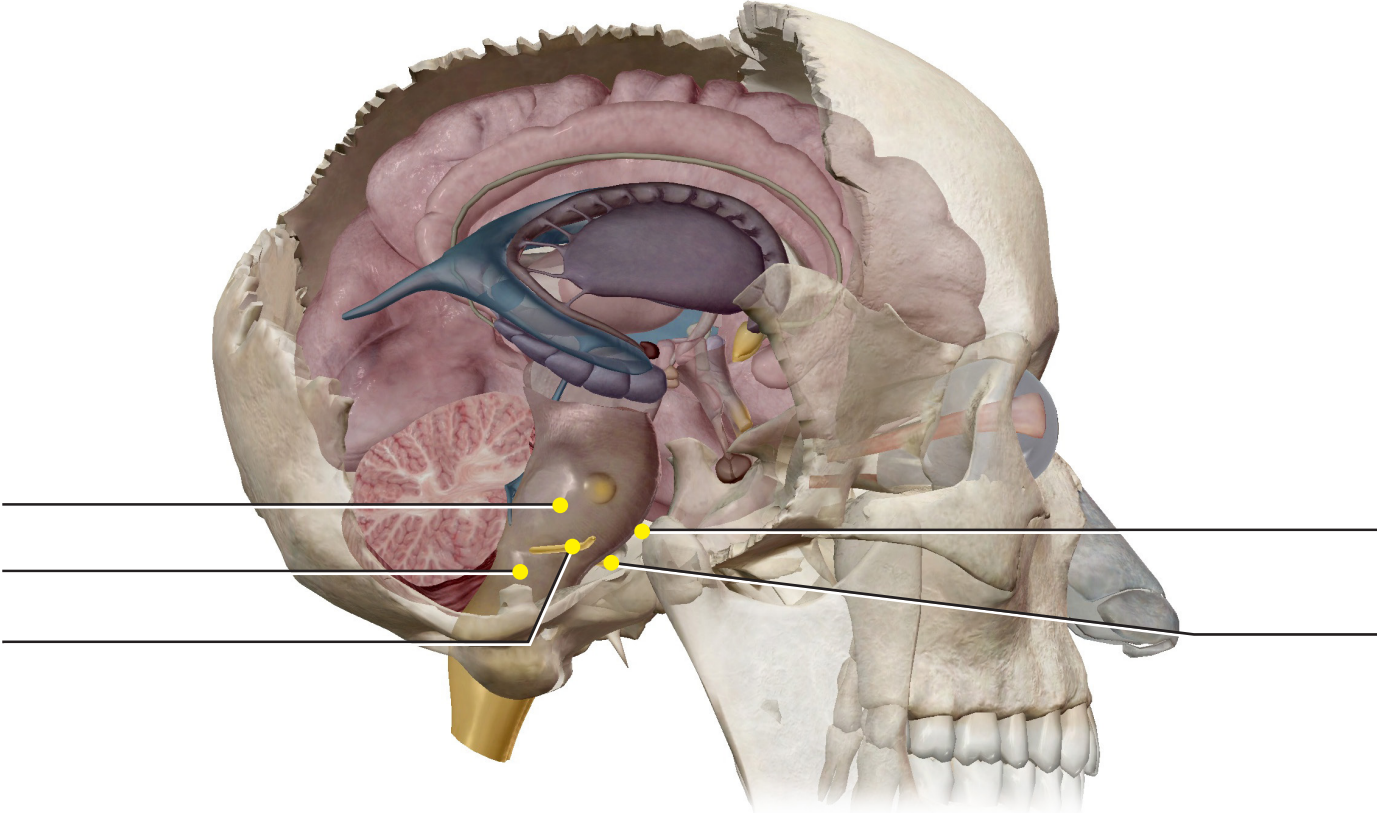
## Student Practice

Label the structures in the following figures.

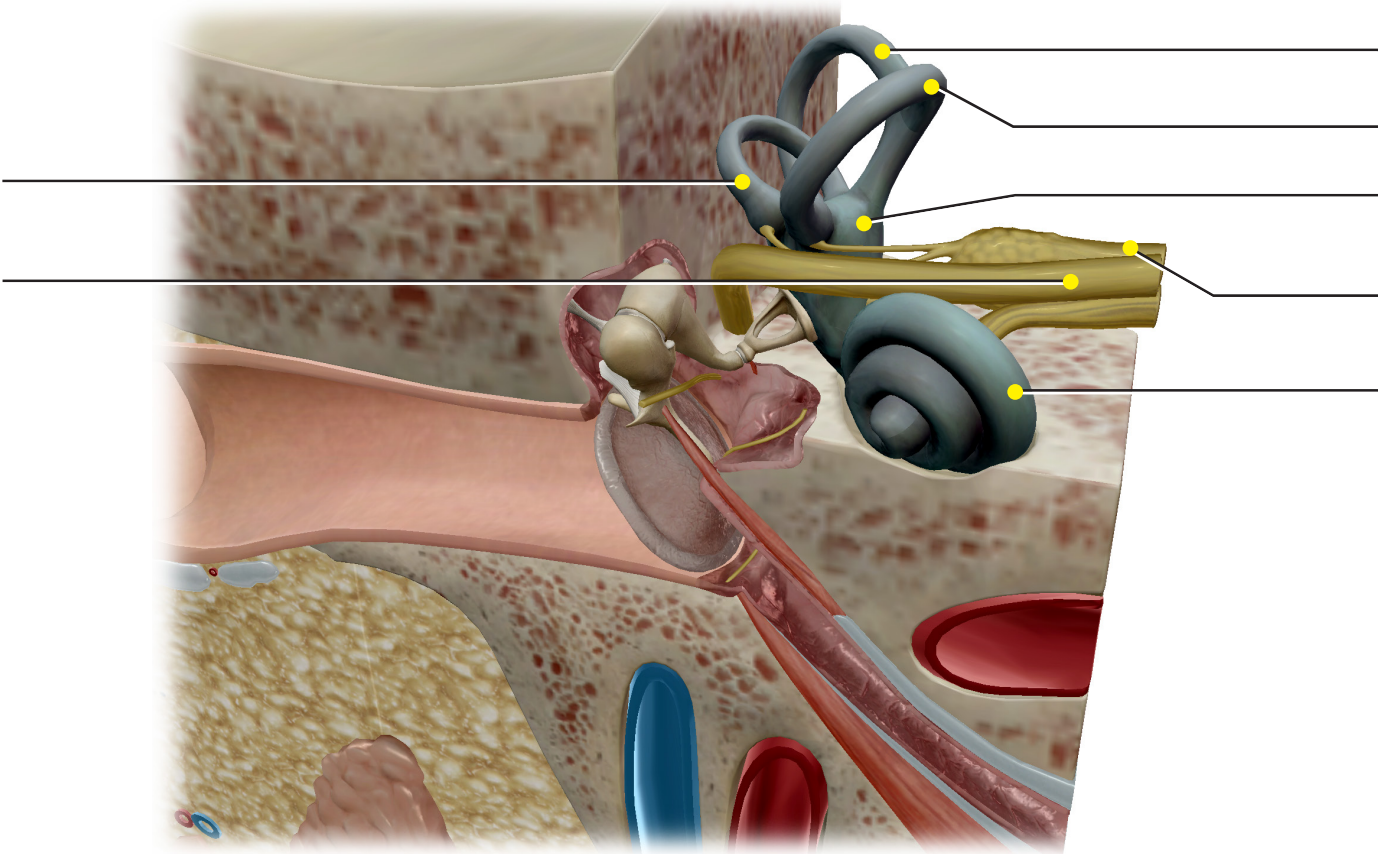
**Facial Nerves (VII)**



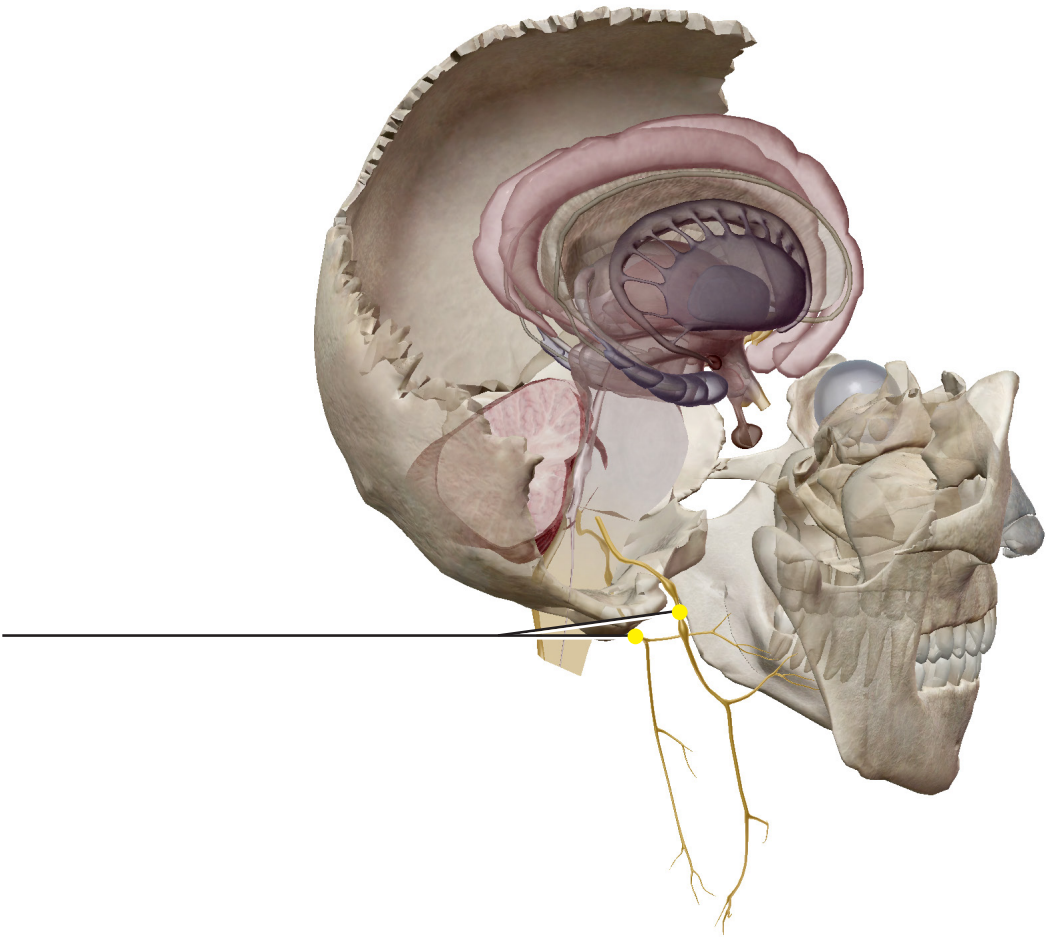
**Vestibulocochlear Nerves (VIII)**



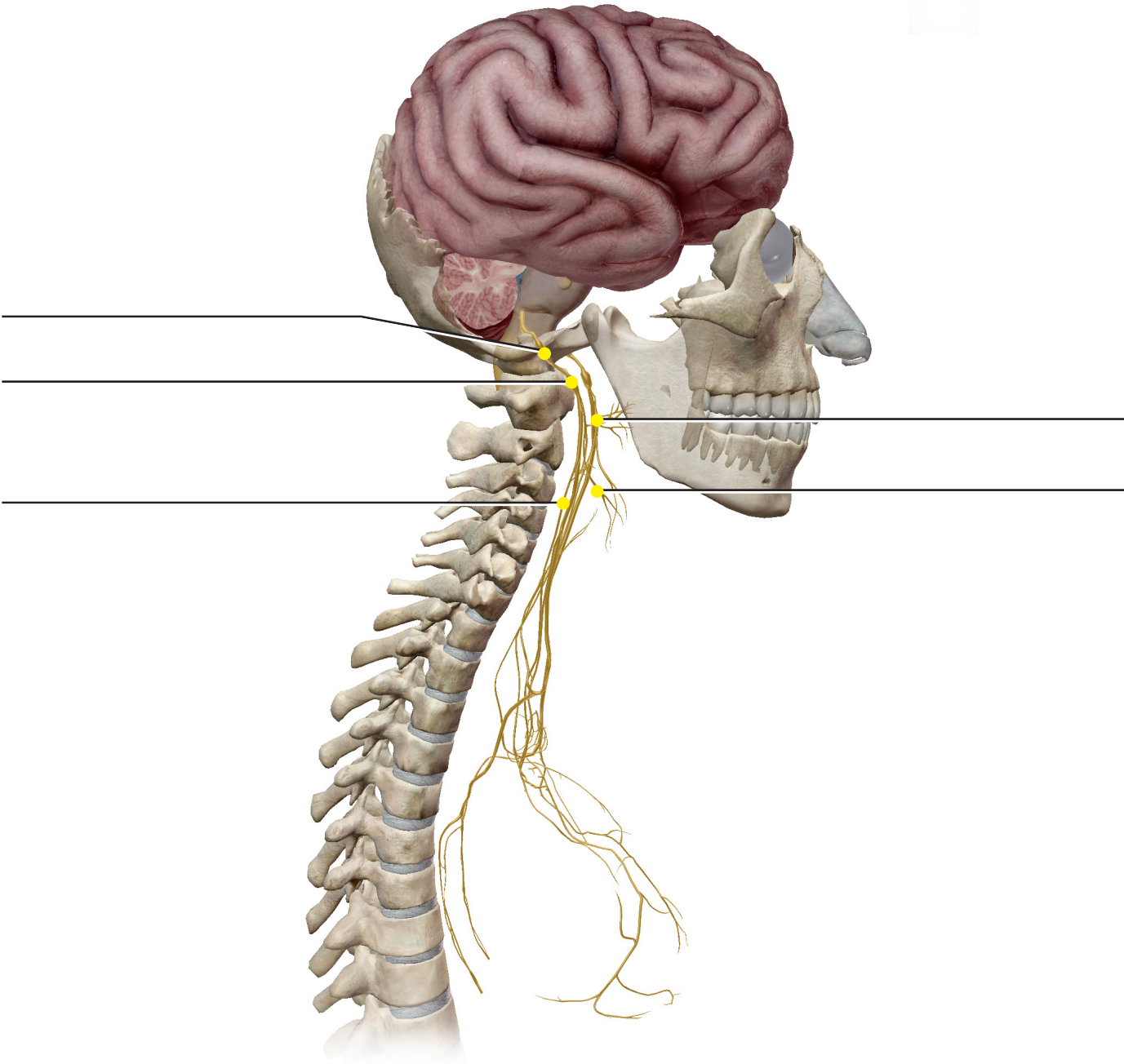
**Vestibulocochlear Nerves (VIII)**



**Glossopharyngeal Nerves (IX)**

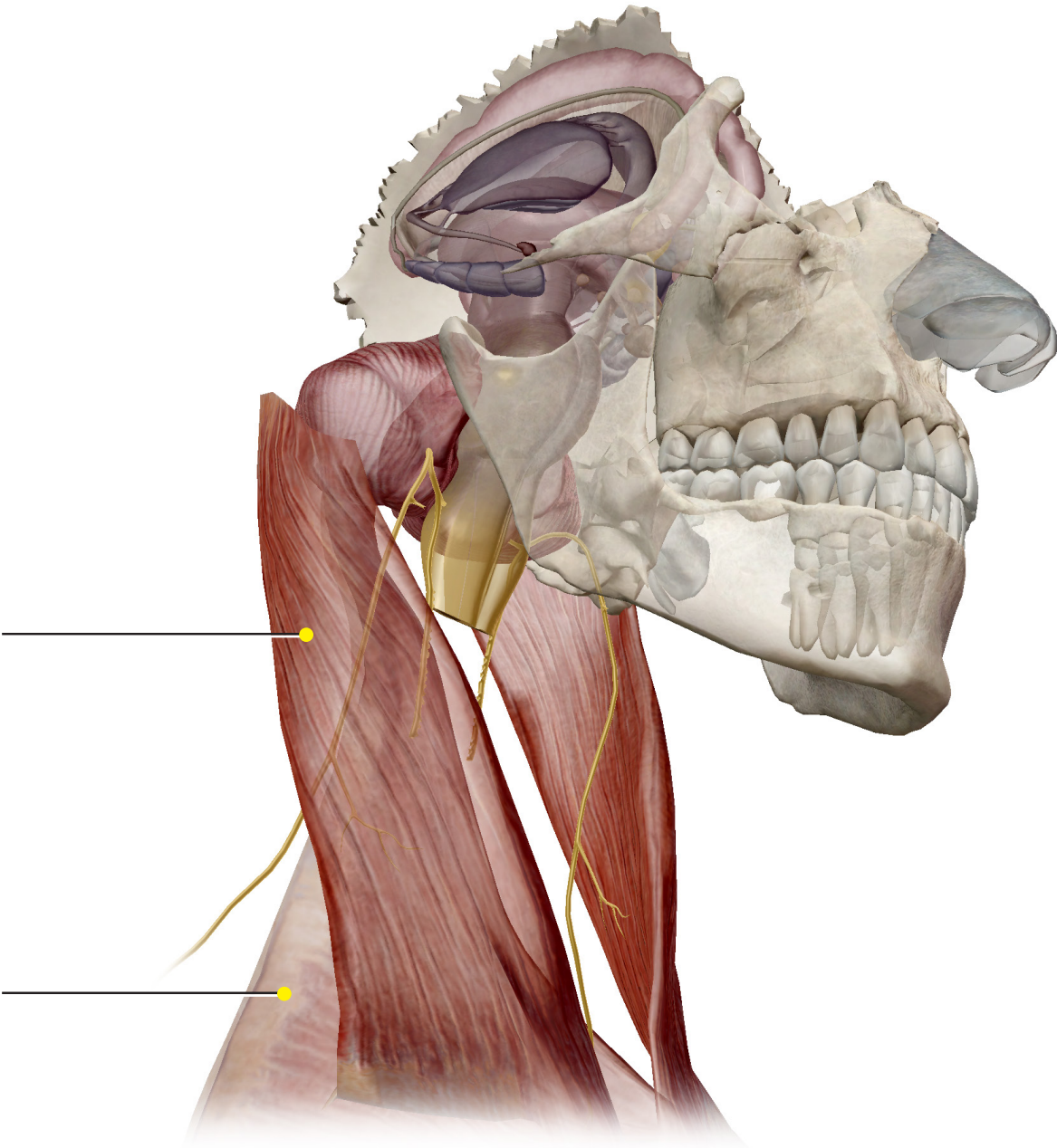


**Vagus Nerves (X)**





**Accessory Nerves (XI)**



**Hypoglossal Nerves (XII)**

