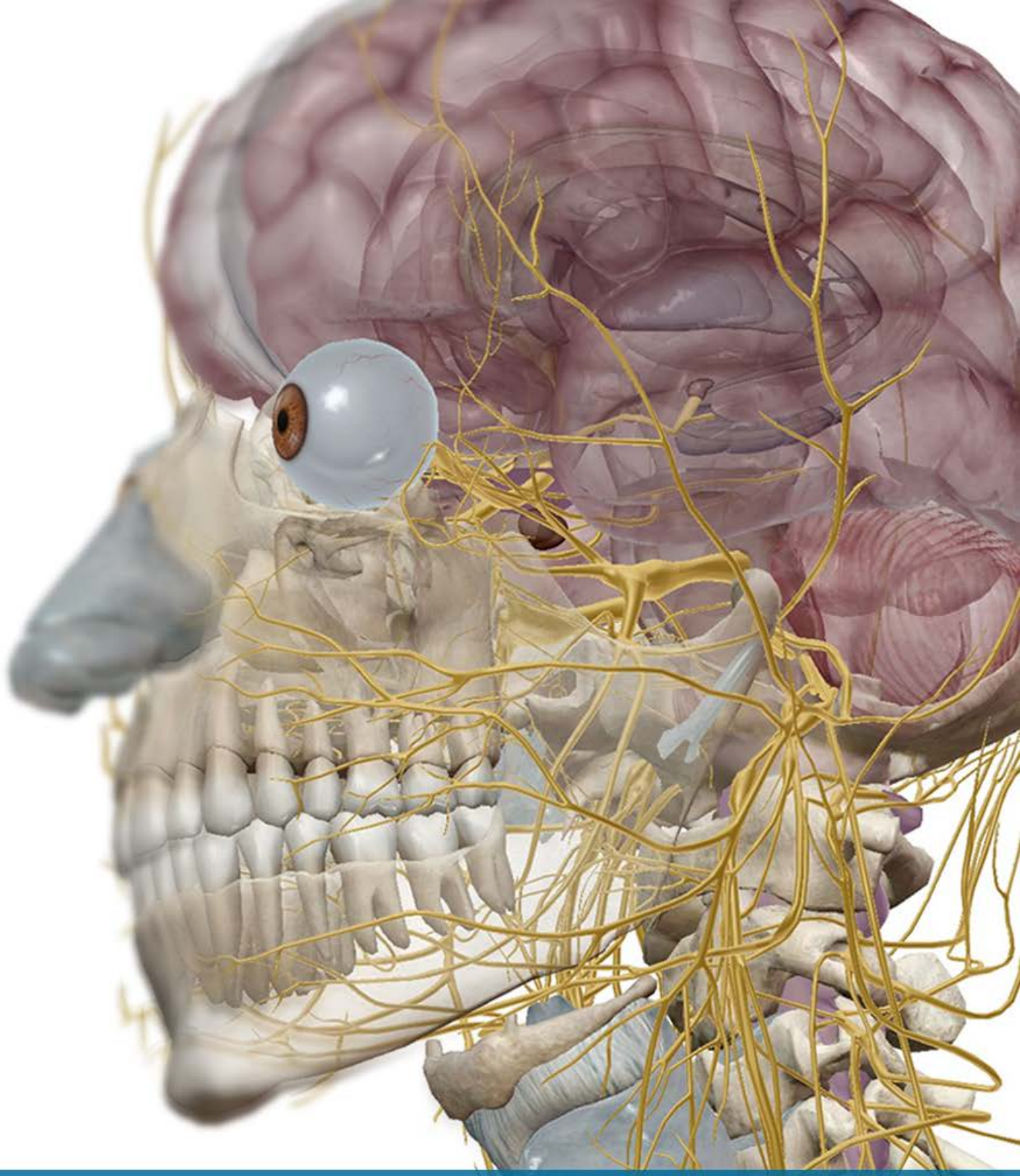

VISIBLE BODY®

Cranial Nerves (Part 1)

A nervous system lab activity using Visible Body Suite

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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.

PRE-LAB EXERCISES

A. Open Visible Body Suite. Search for and select the Nervous System View "Brain." Use this view to make the following observations:

1. Which two structures make up the central nervous system (CNS)?

2. This view demonstrates the location of bones that form the cranium. What important roles does the cranium play in regard to the brain?

3. Identify each of the bones that form the cranium. Hide each of these bones after you've identified them:

   a. **Frontal**

   b. **Parietal (left)**

   c. **Occipital**

   d. **Temporal (left and right)**

   e. **Sphenoid**

   f. **Zygomatic (left and right)**

   g. **Ethmoid**

4. Rotate the image so that you are viewing the lateral surface of the left cerebral hemisphere. Select and identify each of the following regions of the brain:

   a. **Frontal lobe of the cerebrum**

   b. **Precentral gyrus of the frontal cortex**

   c. **Postcentral gyrus of the parietal lobe**

   d. **Parietal lobe of the cerebrum**

   e. **Temporal lobe of the cerebrum**

   f. **Occipital lobe of the cerebrum**

   g. **Cerebellum**

   h. **Midbrain**

i. **Cerebral crus of the midbrain**

j. **Superior colliculus of the midbrain**

k. **Inferior colliculus of the midbrain**

l. **Pons**

m. **Medulla oblongata**

5. While it is not visible from this view, what part of the nervous system would extend below the medulla oblongata?

6. Select any of the cranial nerves in this view. Then, in the content box, select the caret at the top left. The caret will open a breadcrumb trail with a hierarchy of structures. In this hierarchy, select "Cranial nerves" and use the definition to answer the following questions:

a. How many pairs of cranial nerves are there in the human body?

b. Cranial nerves are named for their connection to which part of the central nervous system?

c. How many pairs of spinal nerves are there in the human body?

B. In preparation for more extensive learning in lab, open the Nervous System View "Cranial Nerves" to identify the 12 pairs of cranial nerves. Be sure to use the Systems Tray on the left side of the screen to deselect the skeletal, muscular, and digestive systems for the best view of the nerves. Use the space below to write out the scientific name of each nerve and a brief description of its location.

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 (XI)**

10. **Cranial nerve 10 (X)**

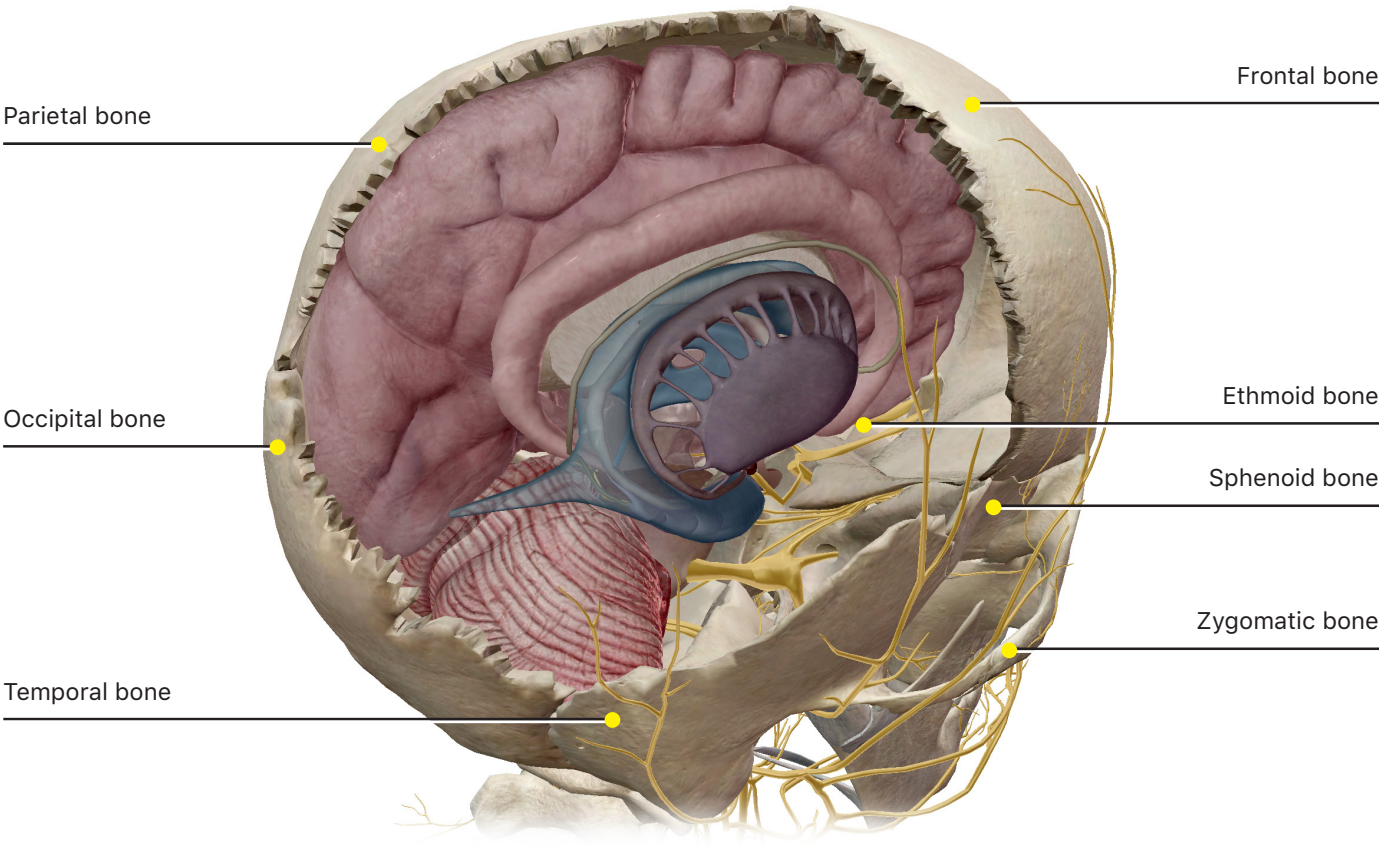
11. **Cranial nerve 11 (XI)**

12. **Cranial nerve 12 (XII)**

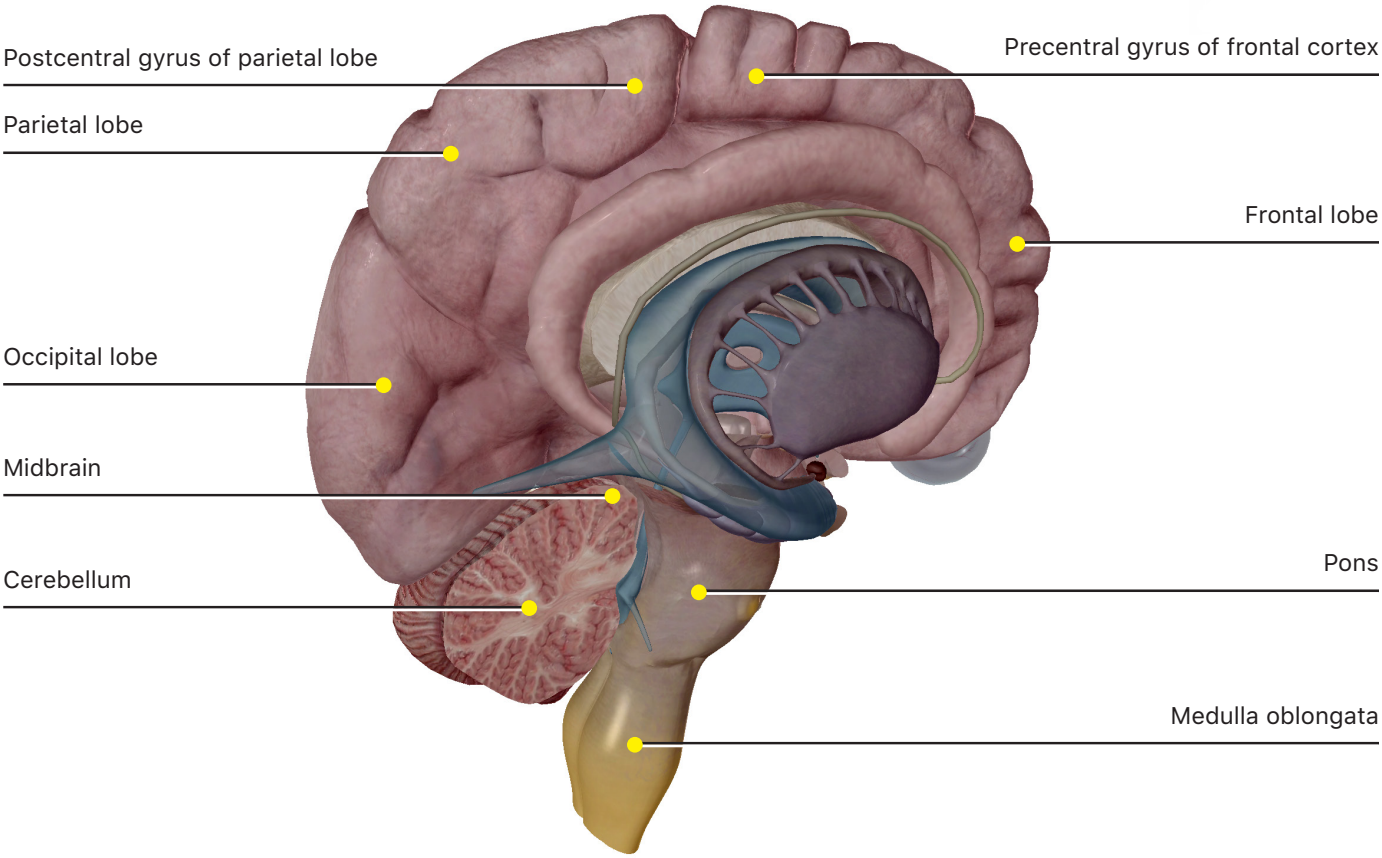
IN-LAB EXERCISES:

Obtain a brain model or a preserved specimen. Use the following modules to guide your exploration of the brain and cranial nerves, opening 3D model views where instructed. As you identify structures in the models, use the book icon to access definitions so you can answer the questions below.You are responsible for the identification of all bolded terms.

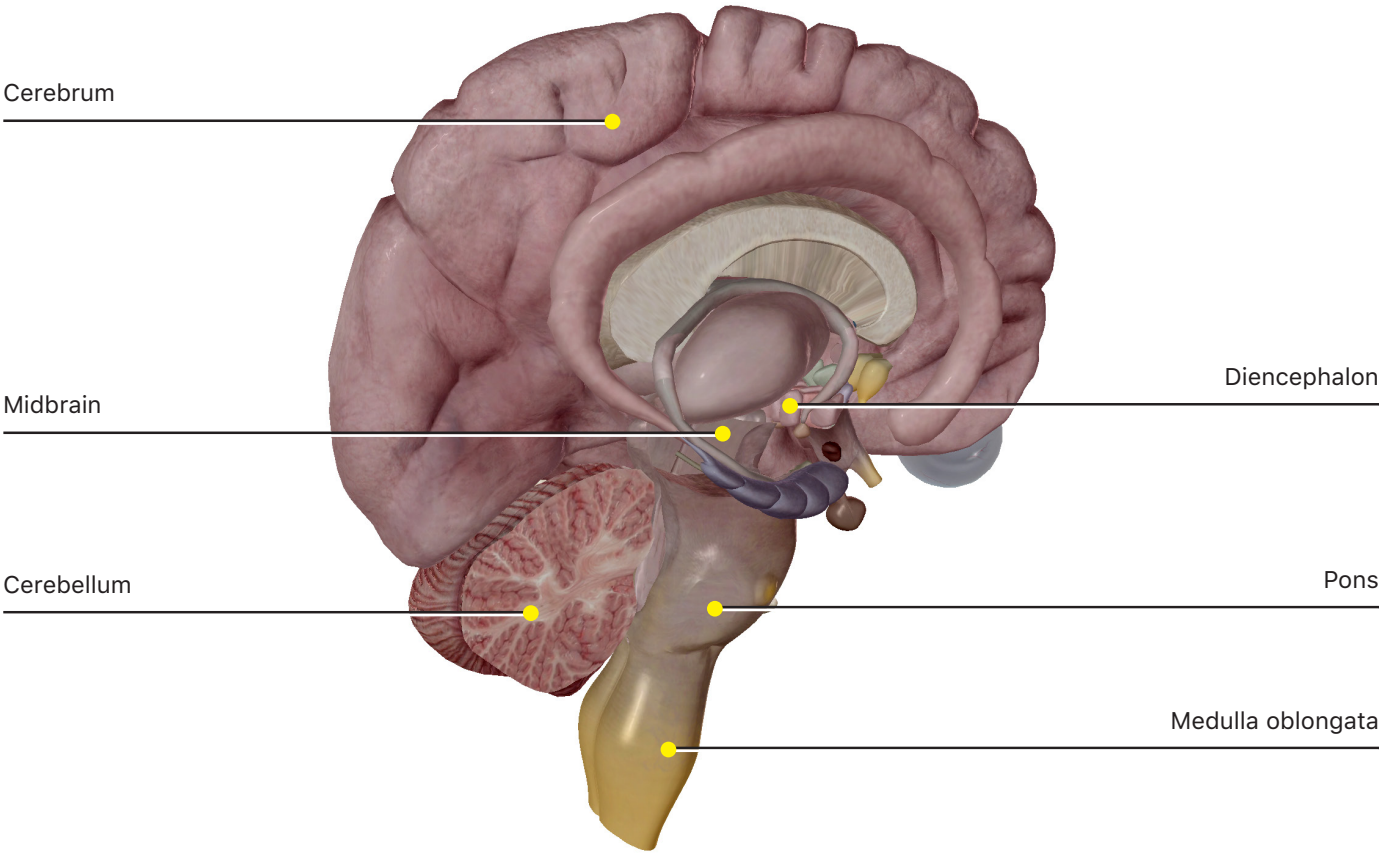
1. Brain



2. Brain


Postcentral gyrus of parietal lobe
Precentral gyrus of frontal cortex
Parietal lobe
Frontal lobe
Occipital lobe
Midbrain
Cerebellum
Pons
Medulla oblongata

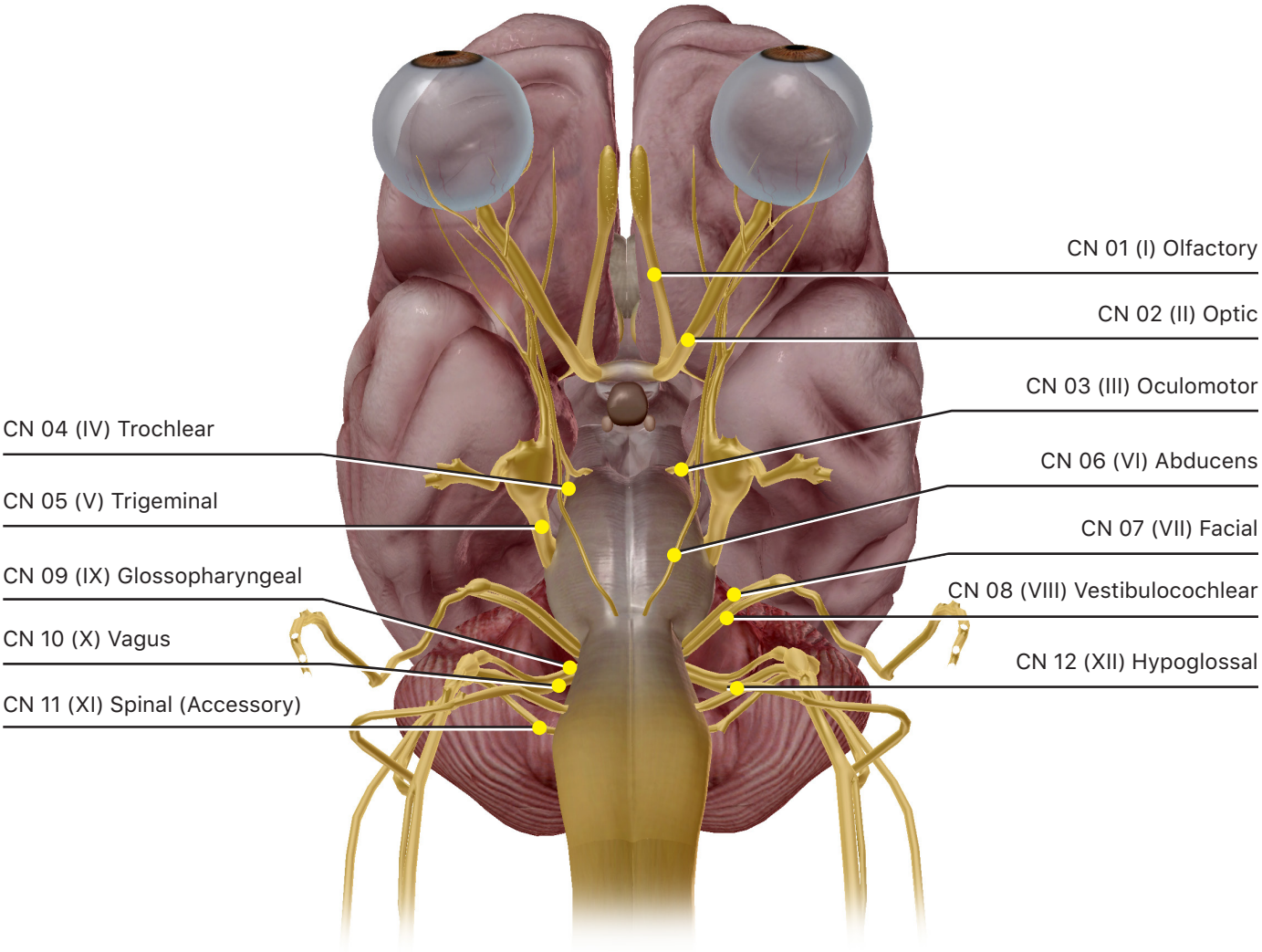
3. Brain



A. Begin by reviewing locations of major brain regions. Open the Nervous System View "Brain," and use it to help you identify the following structures on your specimen:

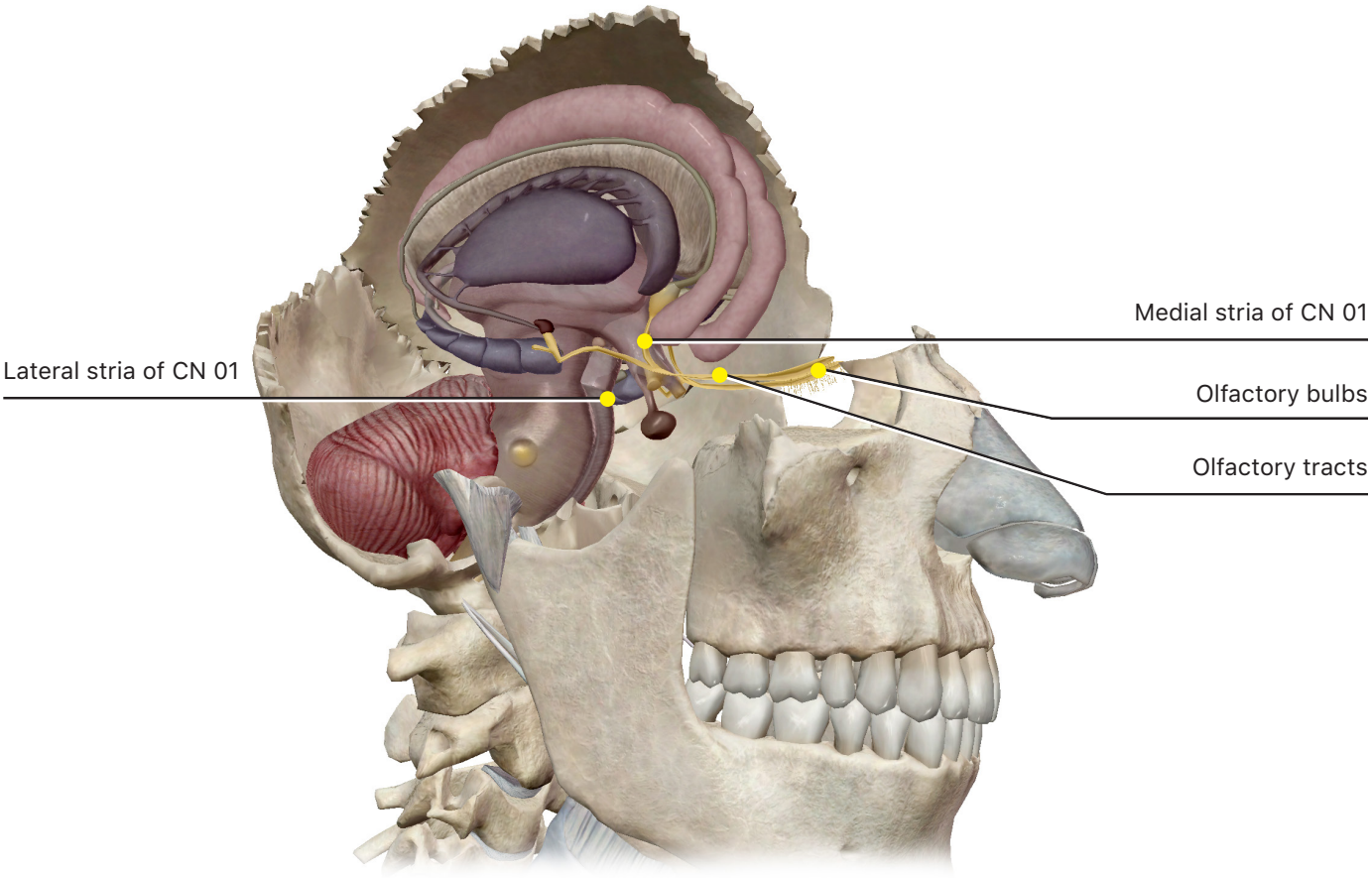
1. Cerebrum
2. Cerebellum
3. Diencephalon
4. Midbrain
5. Pons
6. Medulla oblongata

Cranial Nerves



B. Identification of the Olfactory Nerves (I)

Olfactory Nerves (I)



1. Open the Nervous System View "Cranial Nerves." Hide the sphenoid, frontal, and temporal bones to best see the required structures. Select any part of the **olfactory nerve** and answer the following questions:

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

    b. These nerves are responsible for the sense of _____.

    c. Where do these nerves originate?

2. Using this same view, identify the following structures and answer questions based on their descriptions.

    a. **Cribriform plate of the ethmoid bone**

        i. Fade the cribriform plate and observe its relationship with the olfactory nerves.

ii. The cribriform plate supports the _____ - the terminus of the _____ - and is perforated by numerous _____ for the passage of the branches of the _____.

b. **Olfactory bulbs of CN 01**

i. Are olfactory bulbs seated superior or inferior to the cribriform plate?

ii. Zoom in to see the projections on the inferior surface of the bulbs. *(Tip: You may need to hide the ethmoid bone to see them well.)*

iii. Within each bulb, axons of olfactory _____ form synapses with dendrites and cell bodies of other _____.

iv. If you are attempting to view the olfactory bulbs on a preserved specimen, they may be missing or incomplete. Why do you think this is?

c. **Olfactory tracts of CN 01** - Olfactory tracts are formed by axons/dendrites (circle one).

d. **Lateral stria of CN 01** - Follow this tract to see which region of the brain it terminates in:

e. **Medial stria of CN 01** - Follow this tract to see which region of the brain it terminates in:

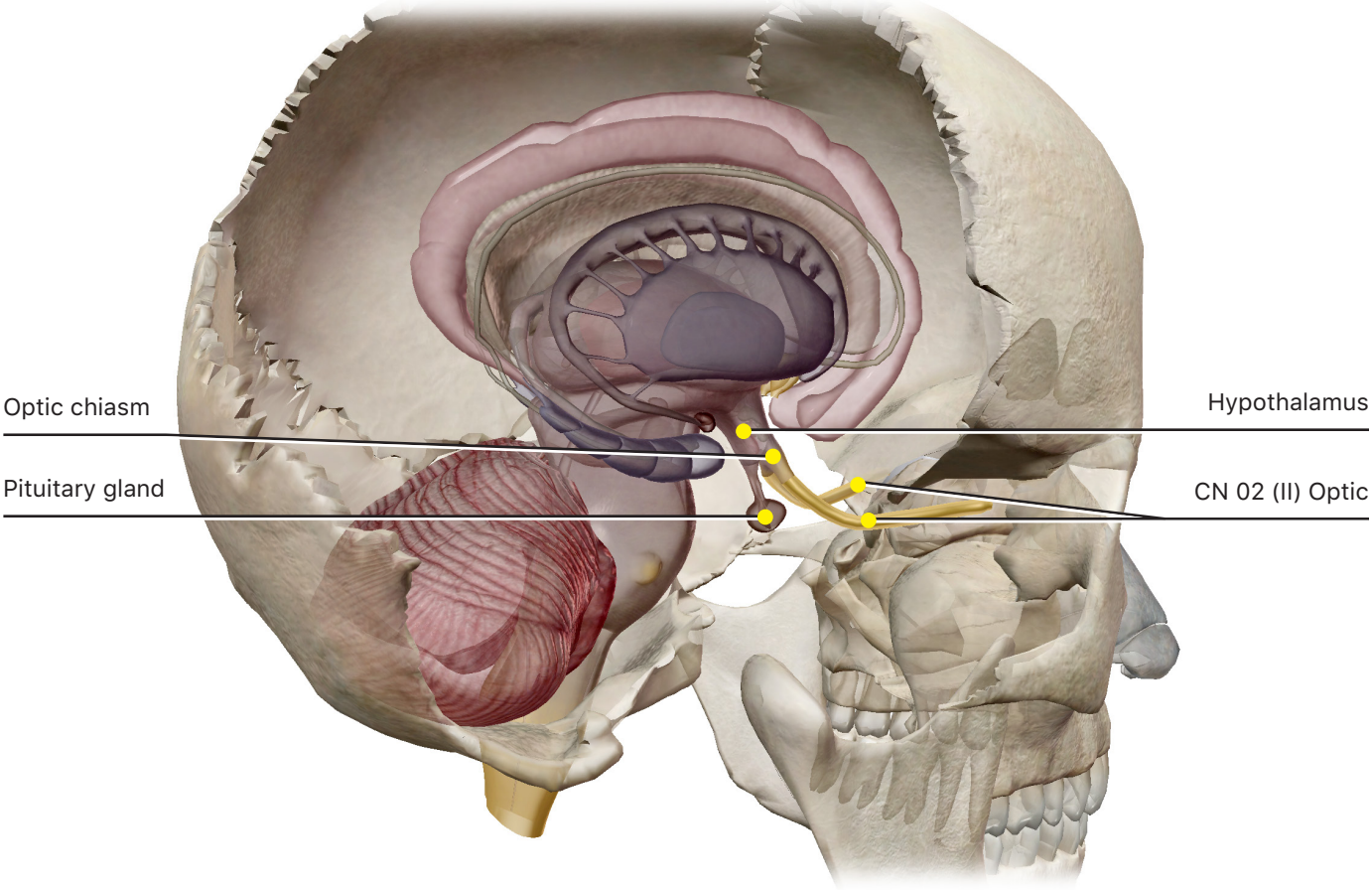
f. Signals transmitted along the olfactory tracts terminate in the _____ area in the _____ lobe of the cerebral cortex.

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

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

C. Identification of the Optic Nerves

Optic Nerves (II)



1. Open the Nervous System View "Cranial Nerves." Rotate the image so you are looking into the empty socket of the right eye. Select the **optic nerve** and then use the Select Others and Fade buttons for a better view. Observe its location and read the description.

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

b. These nerves are responsible for the sense of _____.

c. They originate in the _____ of each eye.

d. Which bone contains the optic foramina that the optic nerves pass through (be sure to identify this structure)?

e. At which point do the right and left optic nerves converge?

f. Where do the **optic tracts** exist?

2. Rotate the image so you are looking into the right cerebral hemisphere. Select the **optic chiasm** and read the description.

a. The optic chiasm is the crossing point of the optic nerves. Is it a partial or a complete crossing?

b. The crossed fibers occupy the medial/lateral (circle one) part of the chiasm.

c. The uncrossed fibers occupy the medial/lateral (circle one) part of the chiasm.

d. Where is the optic chiasm located in relation to the pituitary gland?

e. Where is the optic chiasm located in relation to the hypothalamus?

f. Posterior to the optic chiasm, fibers from the optic nerves travel in the form of optic _____ to the _____.

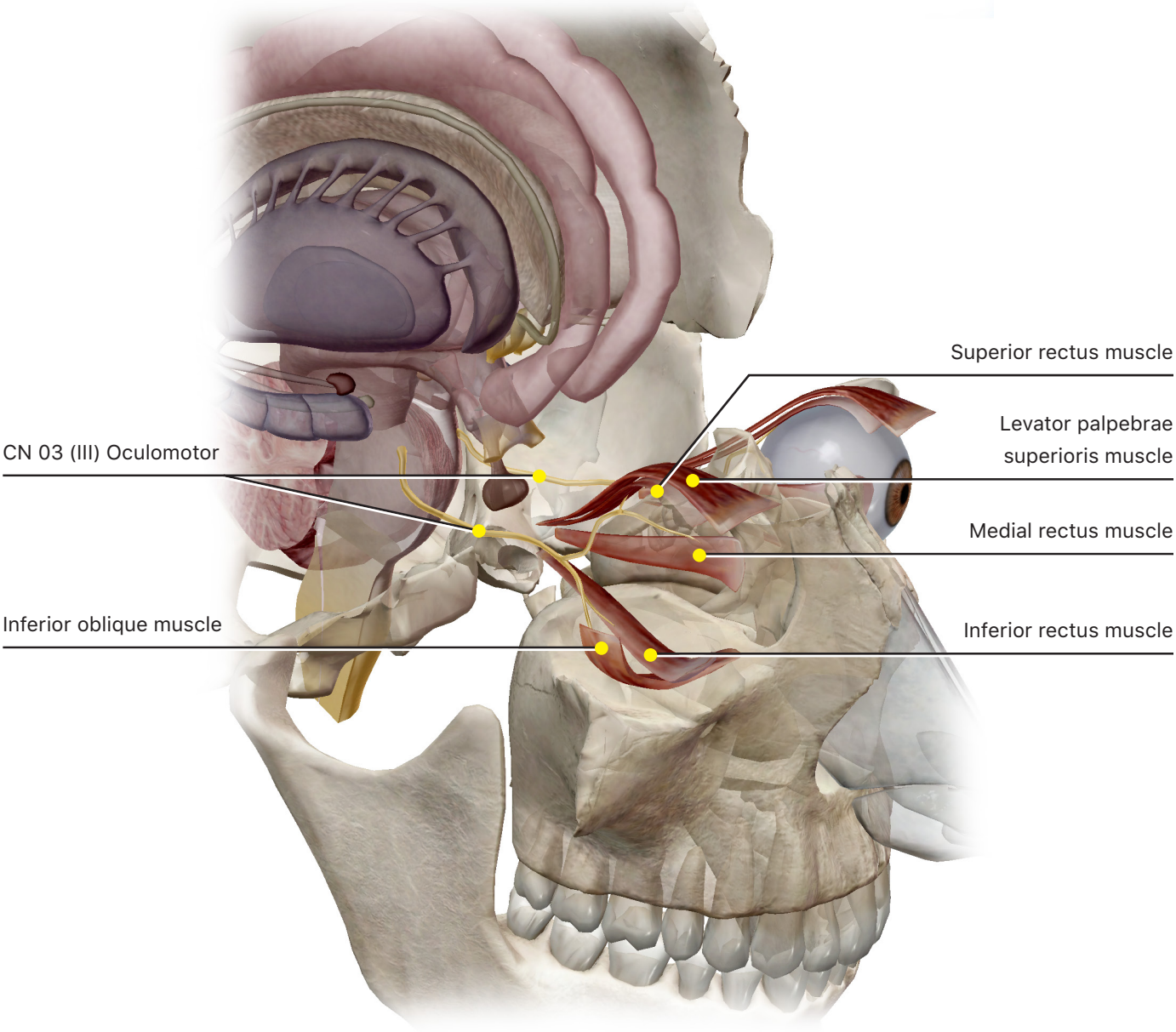
g. Based on the anatomy of the optic chiasm, do you think the right cerebral hemisphere will process vision from the right eye, left eye, or both eyes?

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

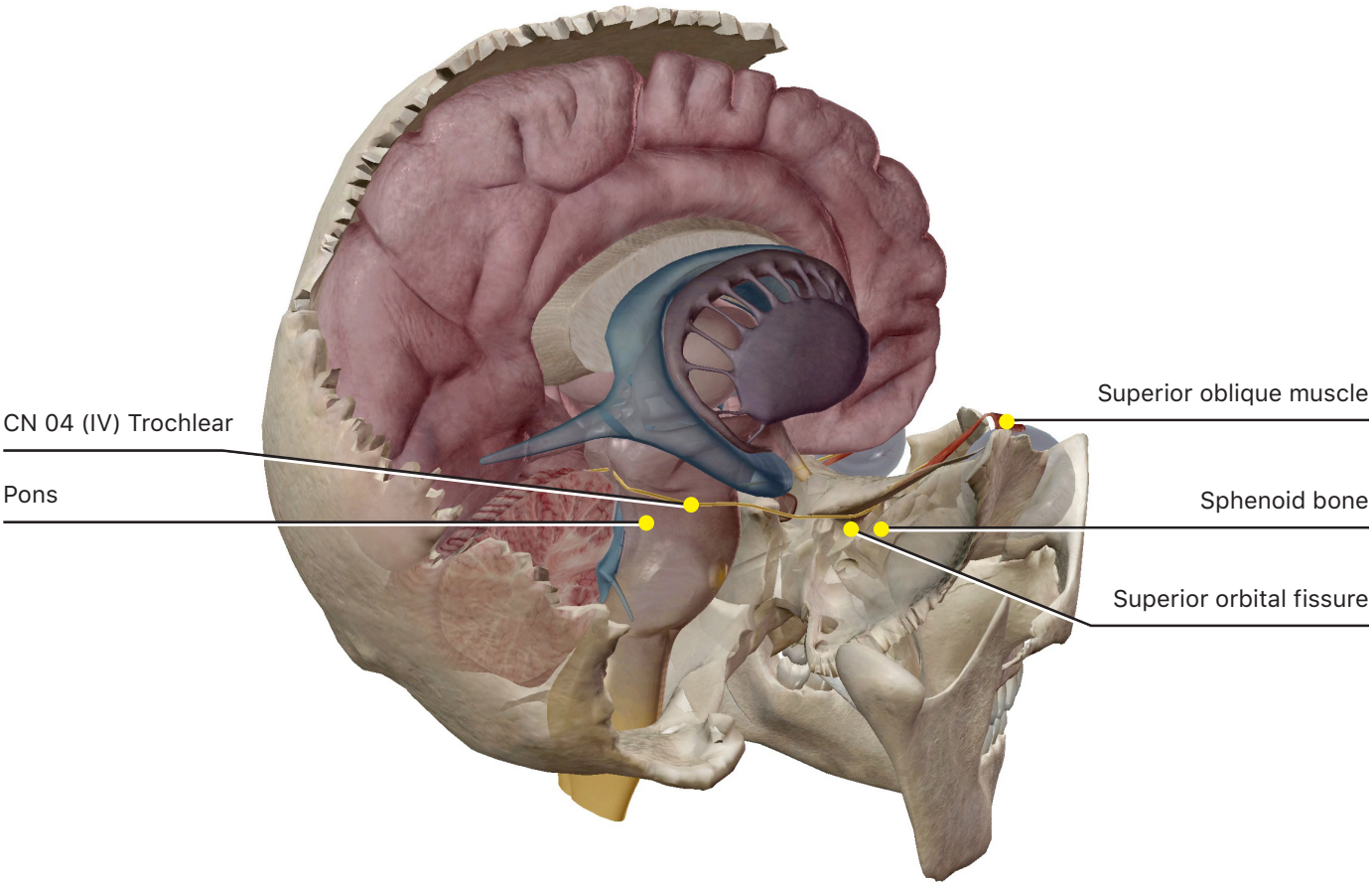
4. What types of tests would you devise to test the function of this nerve in patients?

D. Identification of the Oculomotor Nerves (III), Trochlear Nerves (IV), and Abducens Nerves (VI)

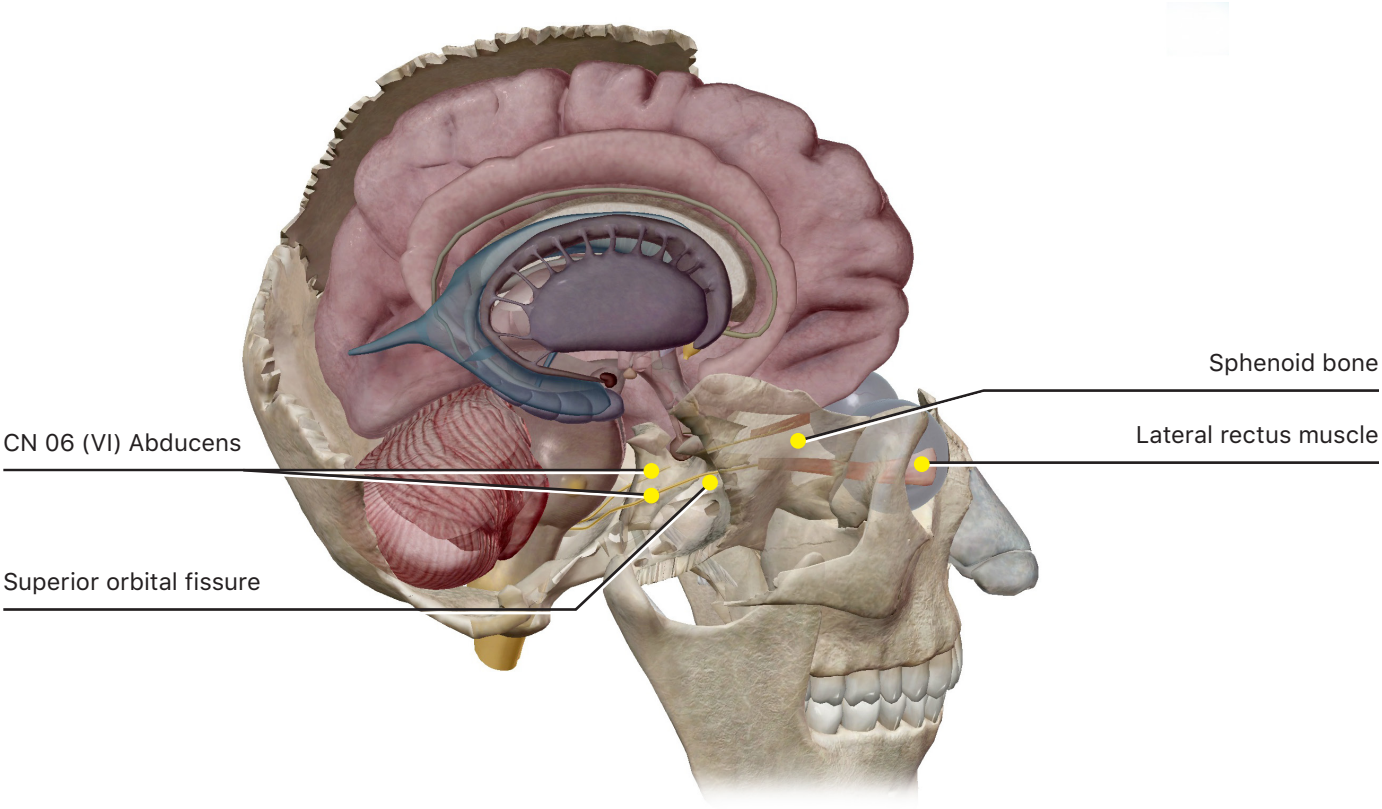
Oculomotor Nerves (III)



Trochlear Nerves (IV)



Abducens Nerves (VI)



A. Open the Nervous System View "Cranial Nerves." Hide the sphenoid, frontal, and temporal bones to best see the required structures. Select any part of the olfactory nerve and answer the following questions:

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

    a. Are these nerves sensory/motor/mixed (circle one)?

    b. Where do fibers of this nerve originate?

    c. Which foramina do the oculomotor nerves pass through? Which cranial bone are these foramina associated with?

d. Be able to identify the following effector targets of the oculomotor nerves, along with their functions:

i. **Levator palpebrae superioris muscle**

ii. **Superior rectus muscle**

iii. **Medial rectus muscle**

iv. **Inferior rectus muscle**

v. **Inferior oblique muscle**

e. Use the search bar to identify these additional targets of the oculomotor nerve. Write their function in the space provided below:

i. **Ciliary muscles**

ii. **Pupillary sphincter of the iris**

2. Select the **trochlear nerves**, and use the Select Others and Fade buttons for a better view.

a. Where do fibers of this nerve originate?

b. Which foramina do the trochlear nerves pass through? Which cranial bone are these foramina associated with?

c. Which extraocular muscle is innervated by each trochlear nerve? What is its function?

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

a. Where do fibers of this nerve originate?

b. Which foramina do the abducens nerves pass through? Which cranial bone are these foramina associated with?

c. Which extraocular muscle is innervated by each abducens nerve? What is its function?

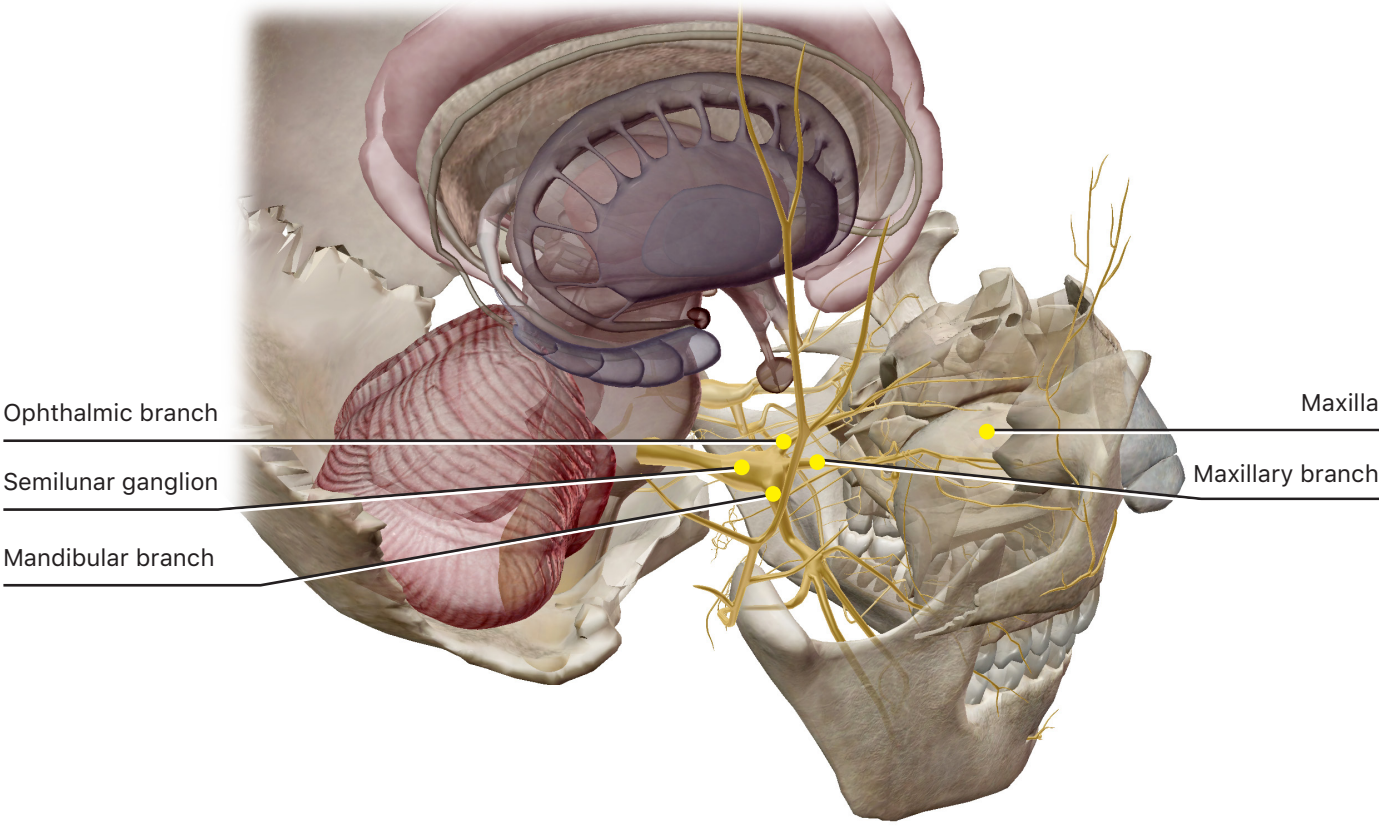
d. What is the function of sensory fibers of the abducens nerves?

4. What is the common purpose of the oculomotor, trochlear, and abducens cranial nerves?

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

6. What types of tests would you devise to test the function of these nerves in patients?

E. Identification of the Trigeminal Nerves (V)



1. Select the region of the **trigeminal nerve** closest to the brain stem. How does its size compare to that of the other nerves you have studied?

2. Each trigeminal nerve divides into _____ major branches.

3. Identify the **semilunar ganglion**.

4. Select the **ophthalmic branch of the trigeminal nerve** and read its description:

   a. This branch is sensory/motor/mixed (circle one).

   b. These sensory fibers originate from receptors associated with which regions:

c. As this branch transmits nerve impulses toward the brain, which cranial foramen does it pass through? Which cranial bone is this foramen associated with?

d. Which brain region do the fibers of this branch terminate on?

5. Select the **maxillary branch of the trigeminal nerve** and read its description:

a. This branch is sensory/motor/mixed (circle one).

b. These sensory fibers originate from receptors associated with which regions?

c. Which foramen in the maxilla allows branches of this nerve to innervate the skin of the face?

d. Which foramen in the zygomatic bone allows branches of this nerve to innervate the skin of the face?

e. Select the **maxilla** and hide it. Observe the many branches off the maxillary branch of the trigeminal nerve.

f. As this branch transmits nerve impulses toward the brain, which cranial foramen does it pass through? Which cranial bone is this foramen associated with?

g. Which brain region do the fibers of this branch terminate on?

6. Select the **mandibular branch of the trigeminal nerve** and read its description:

a. This branch is sensory/motor/mixed (circle one).

b. These sensory fibers originate from receptors associated with which regions?

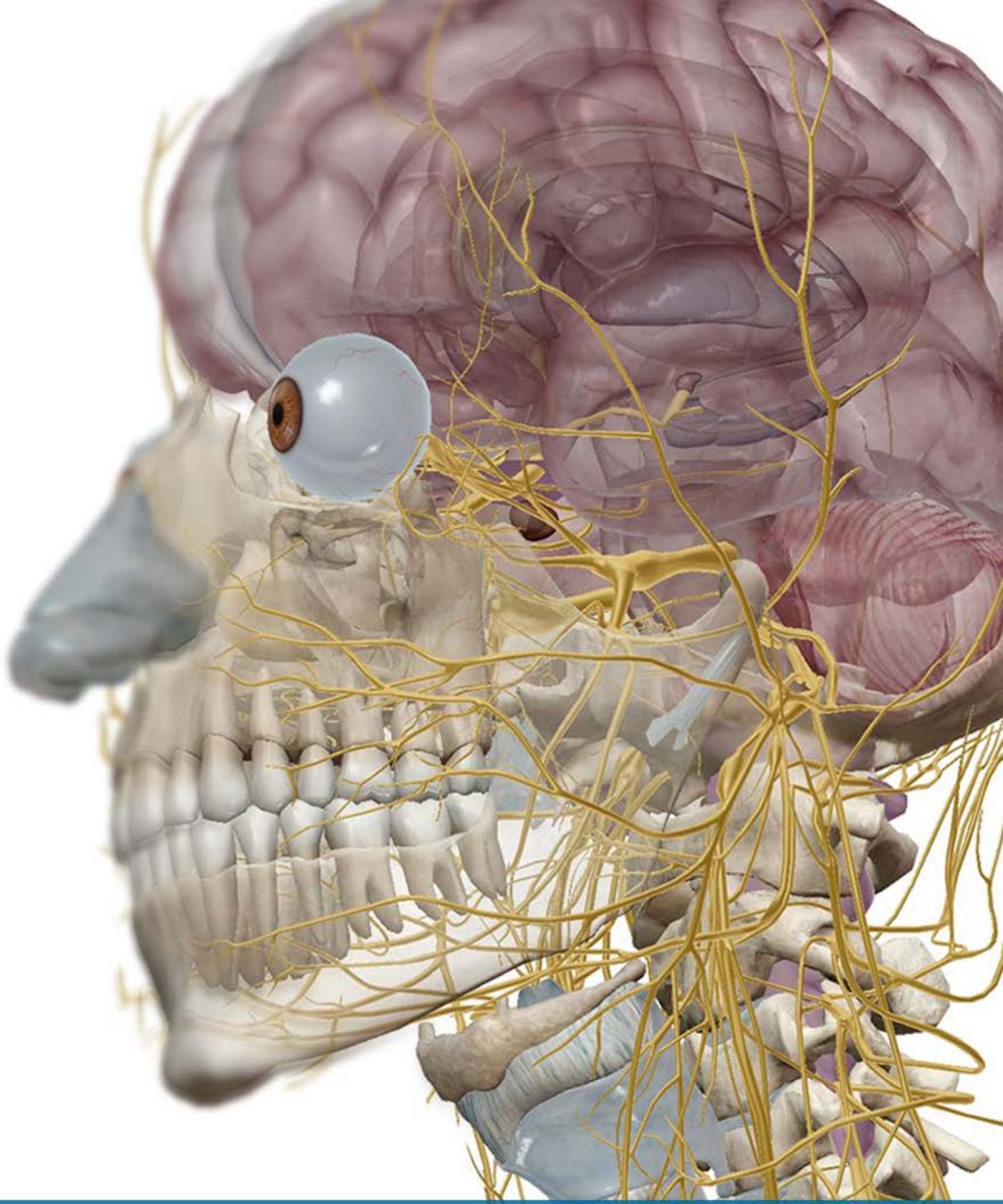
c. These motor fibers terminate on which structures?

d. As this branch transmits nerve impulses to and from the brain, which cranial foramen does it pass through? Which cranial bone is this foramen associated with?

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

8. Click on the pathology icon and write out the symptoms of **trigeminal neuralgia**:

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

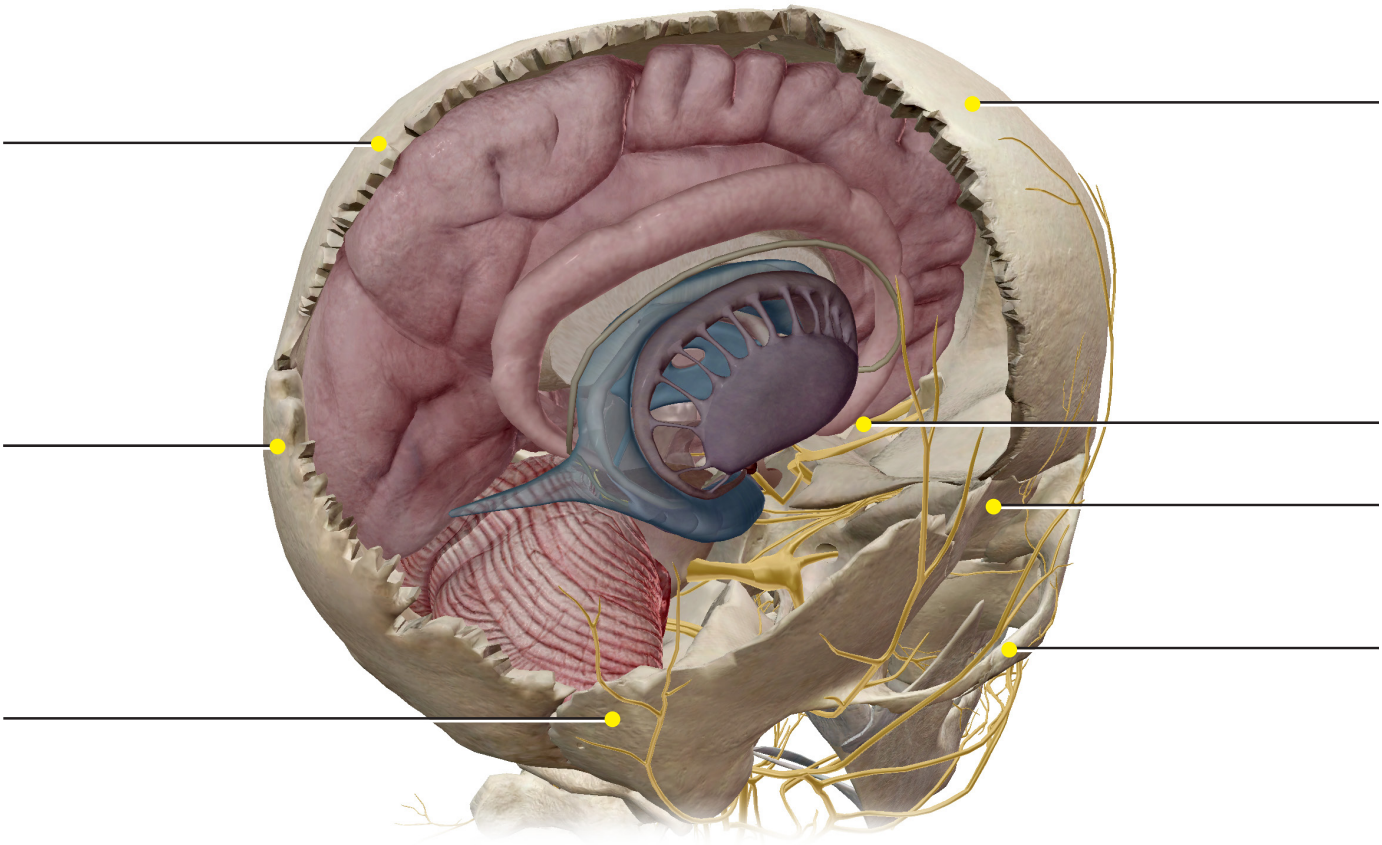


VISIBLE BODY®

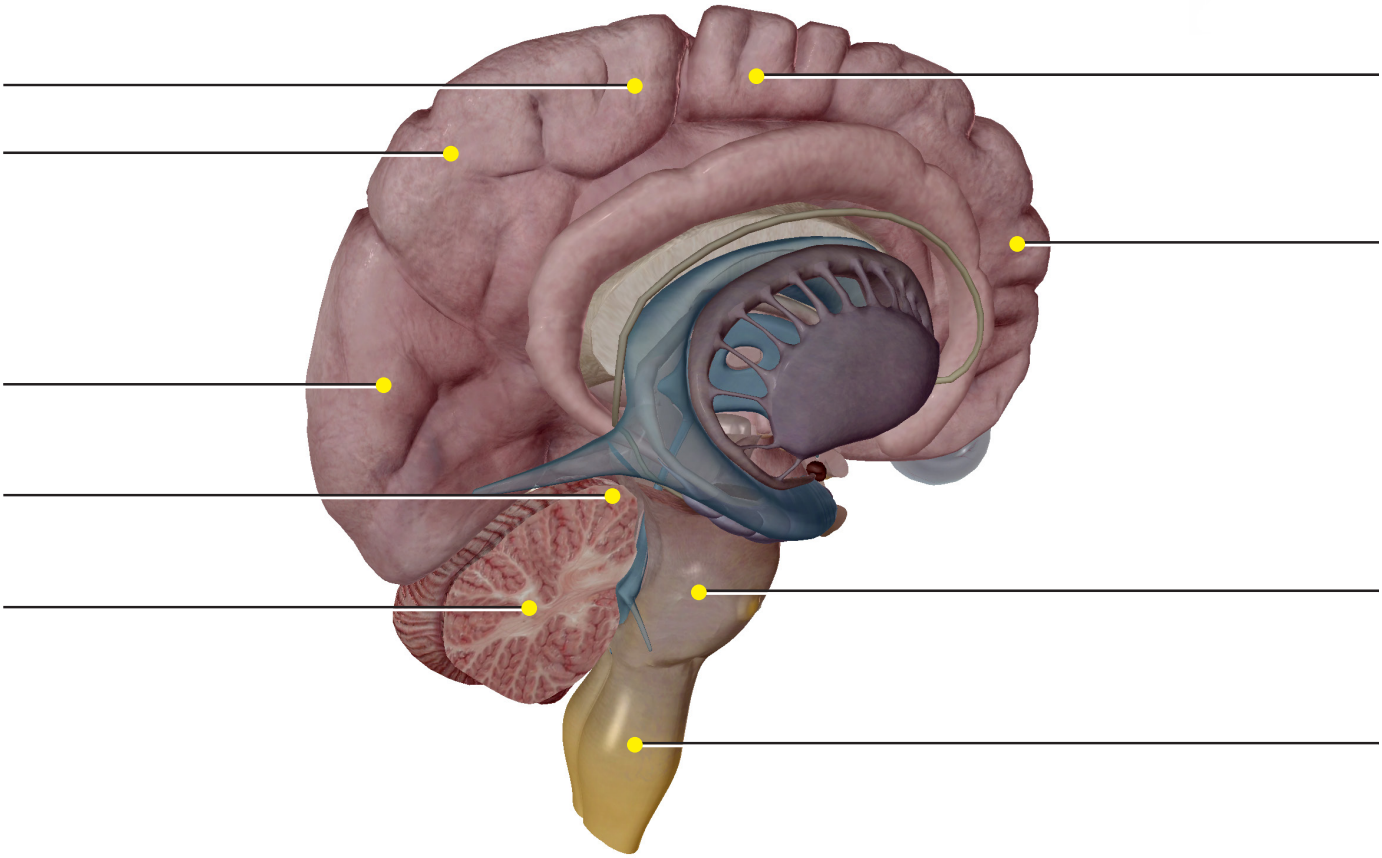
Student Practice

Label the structures in the following figures.

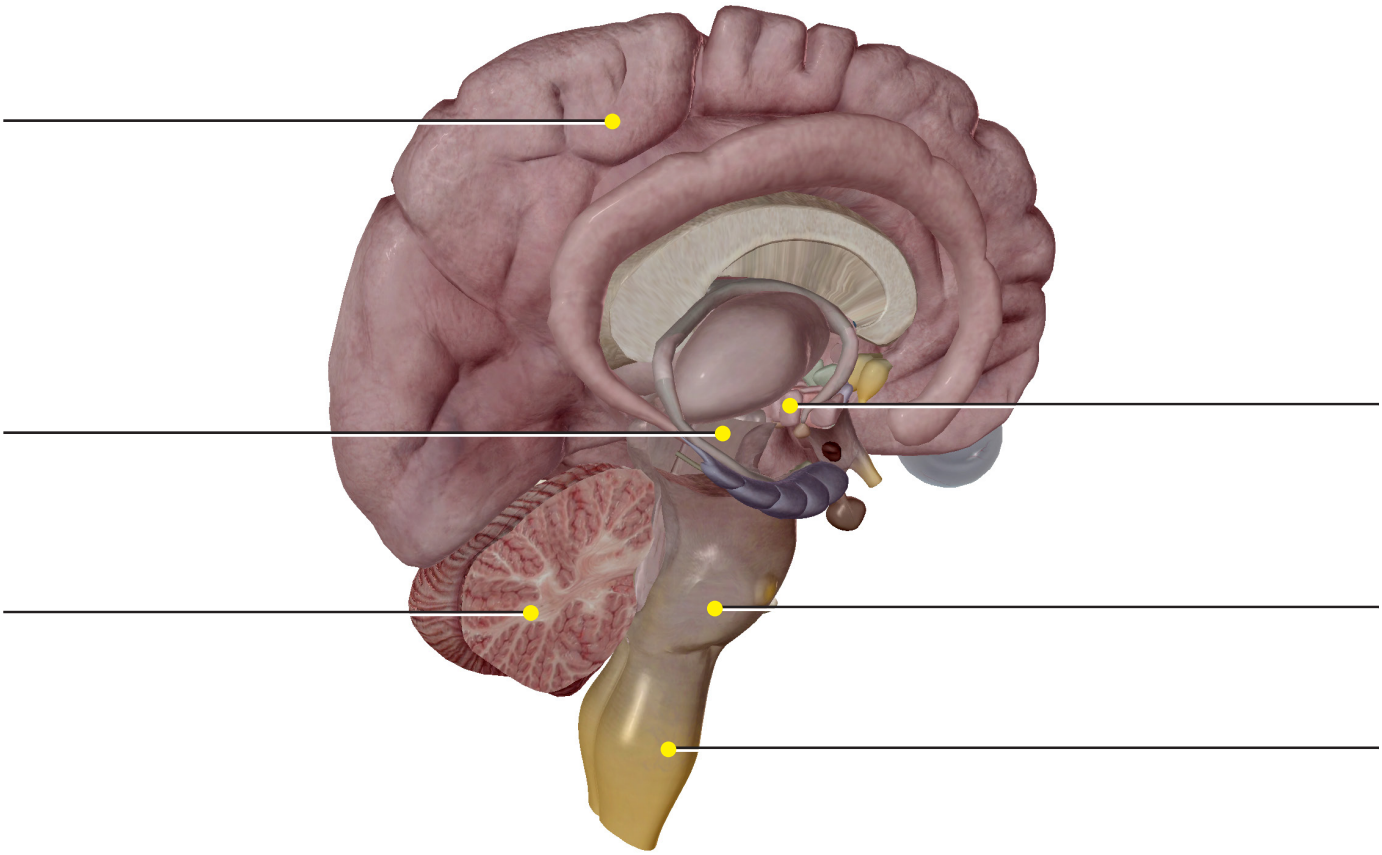
1. Brain



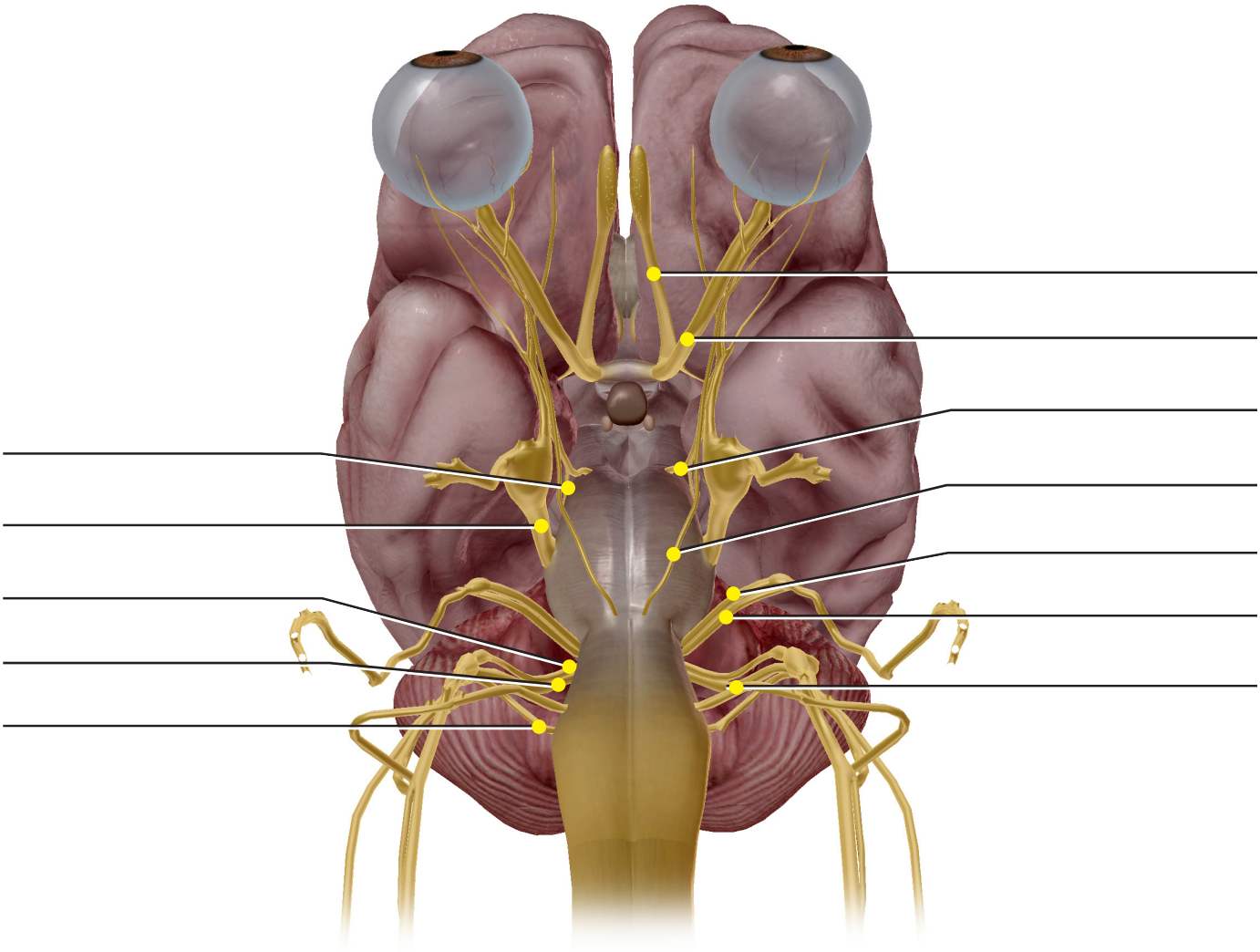
2. Brain



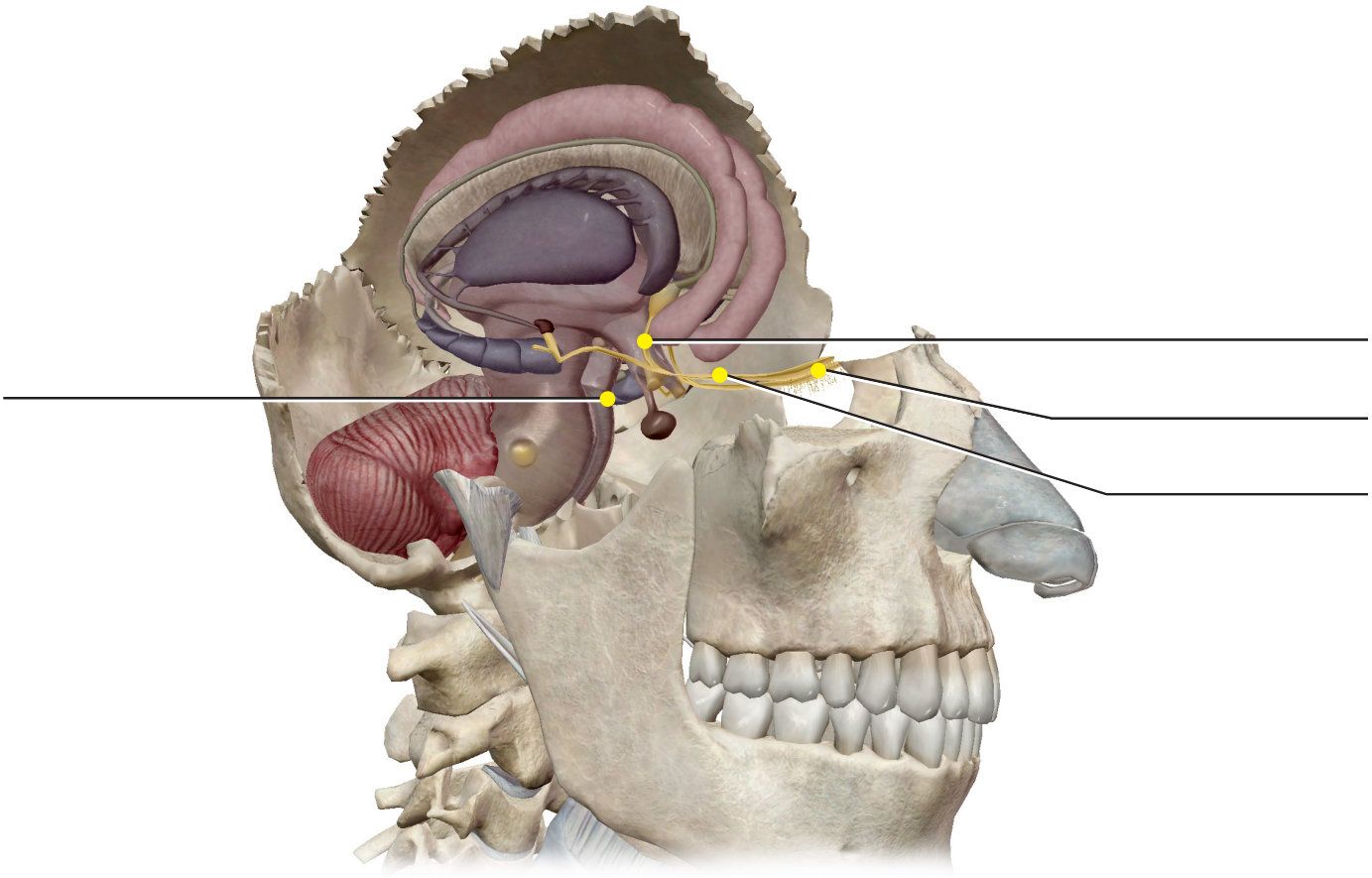
3. Brain



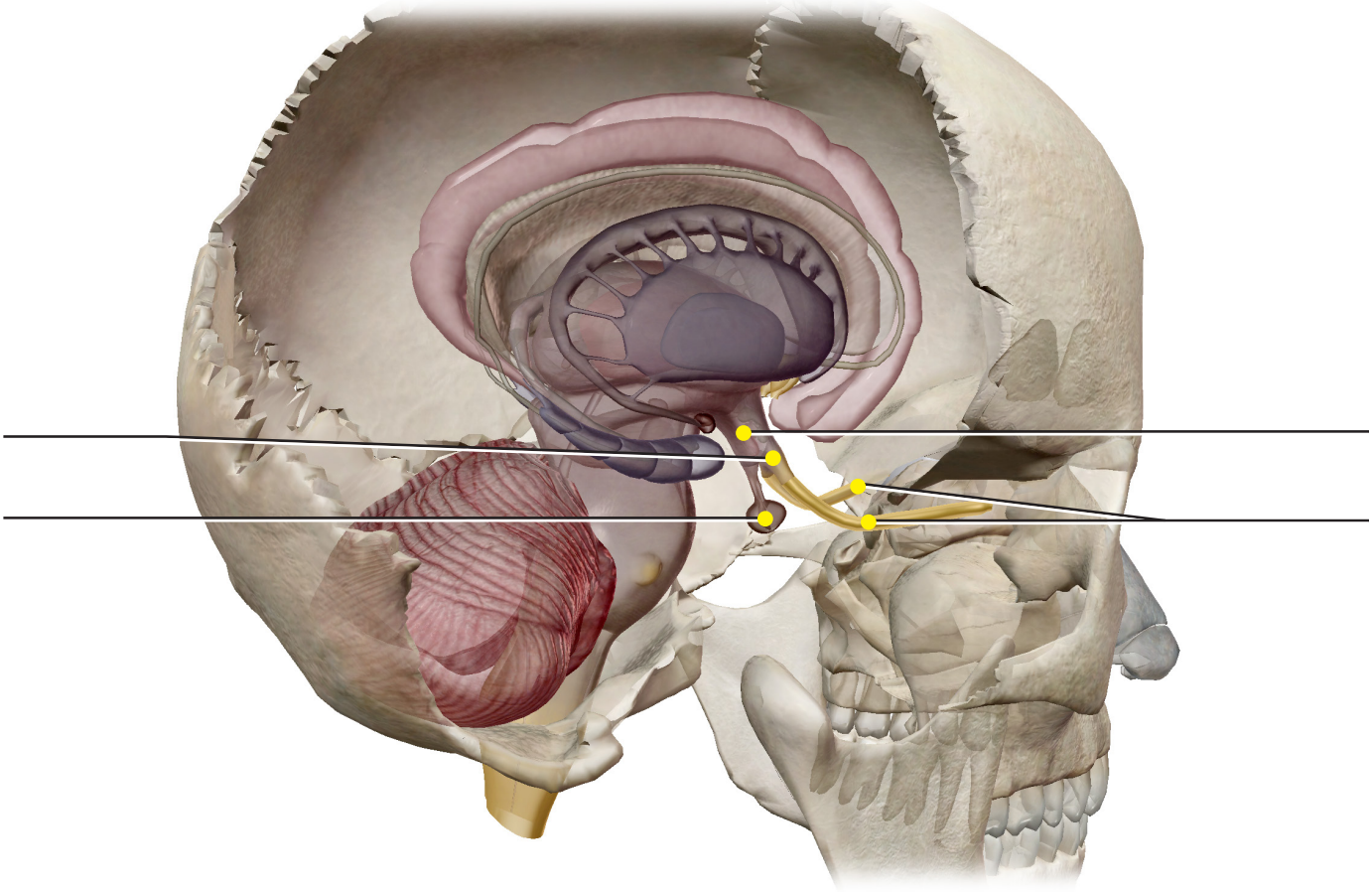
Cranial Nerves



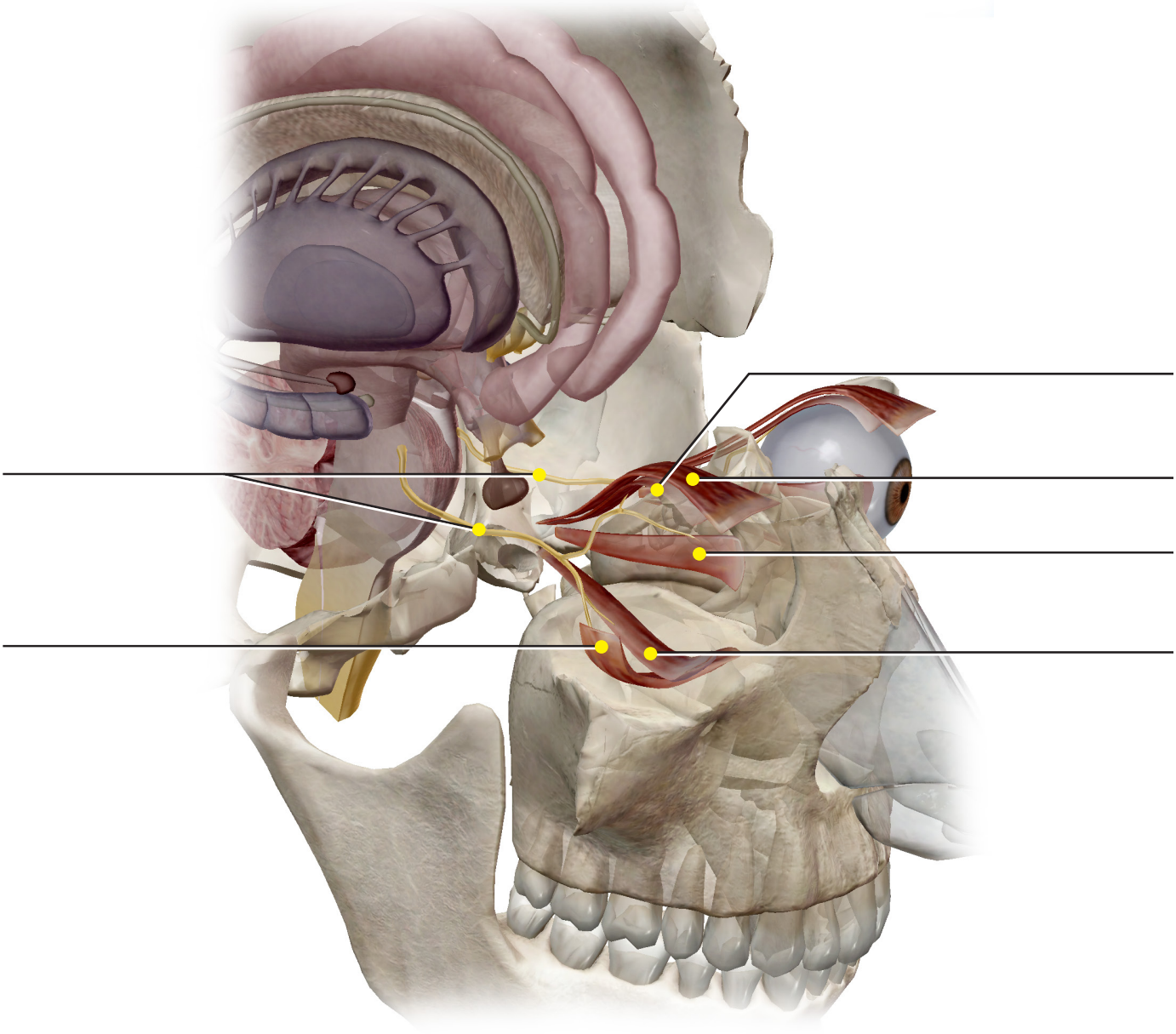
Olfactory Nerves (I)



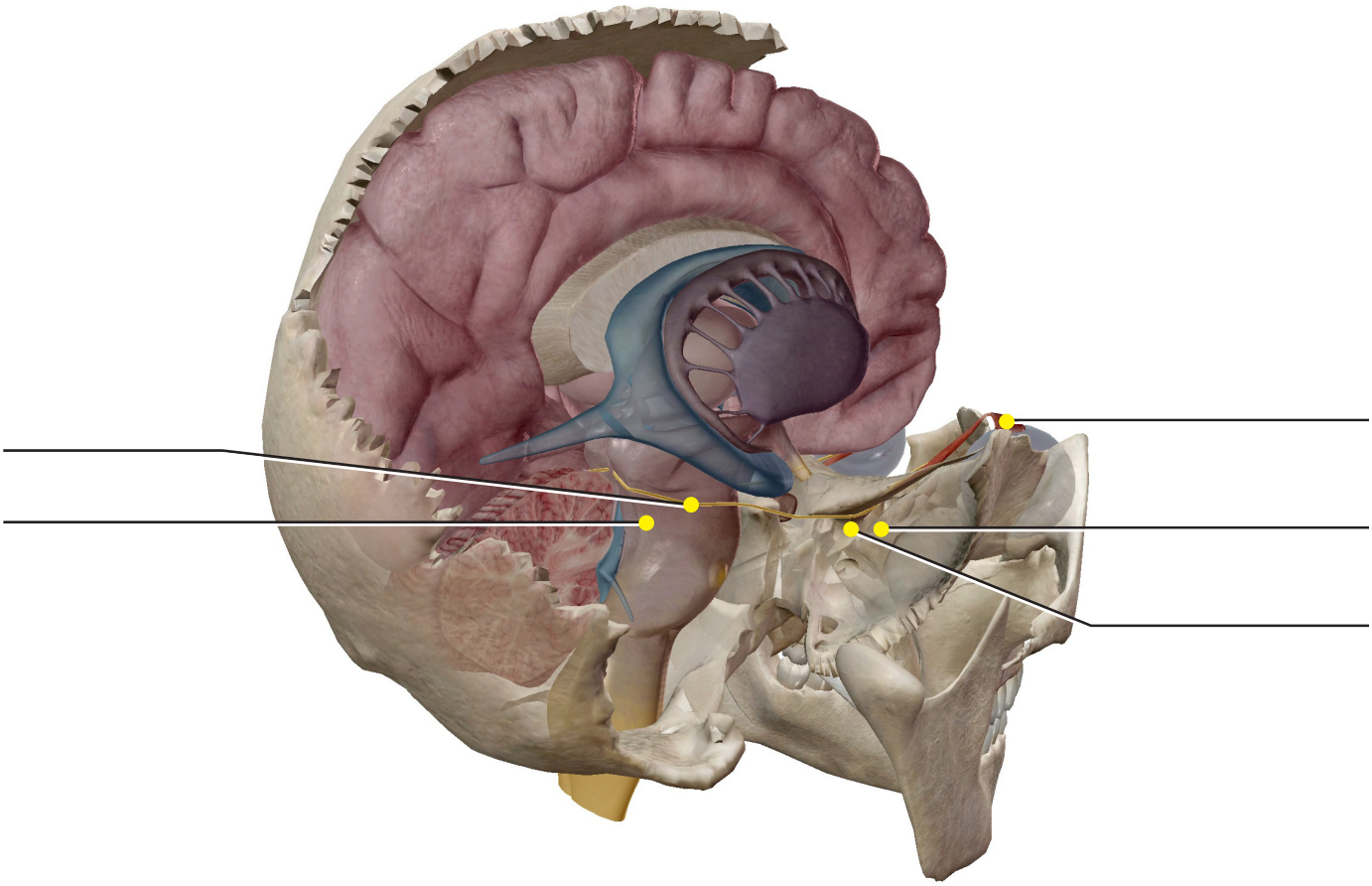
Optic Nerves (II)



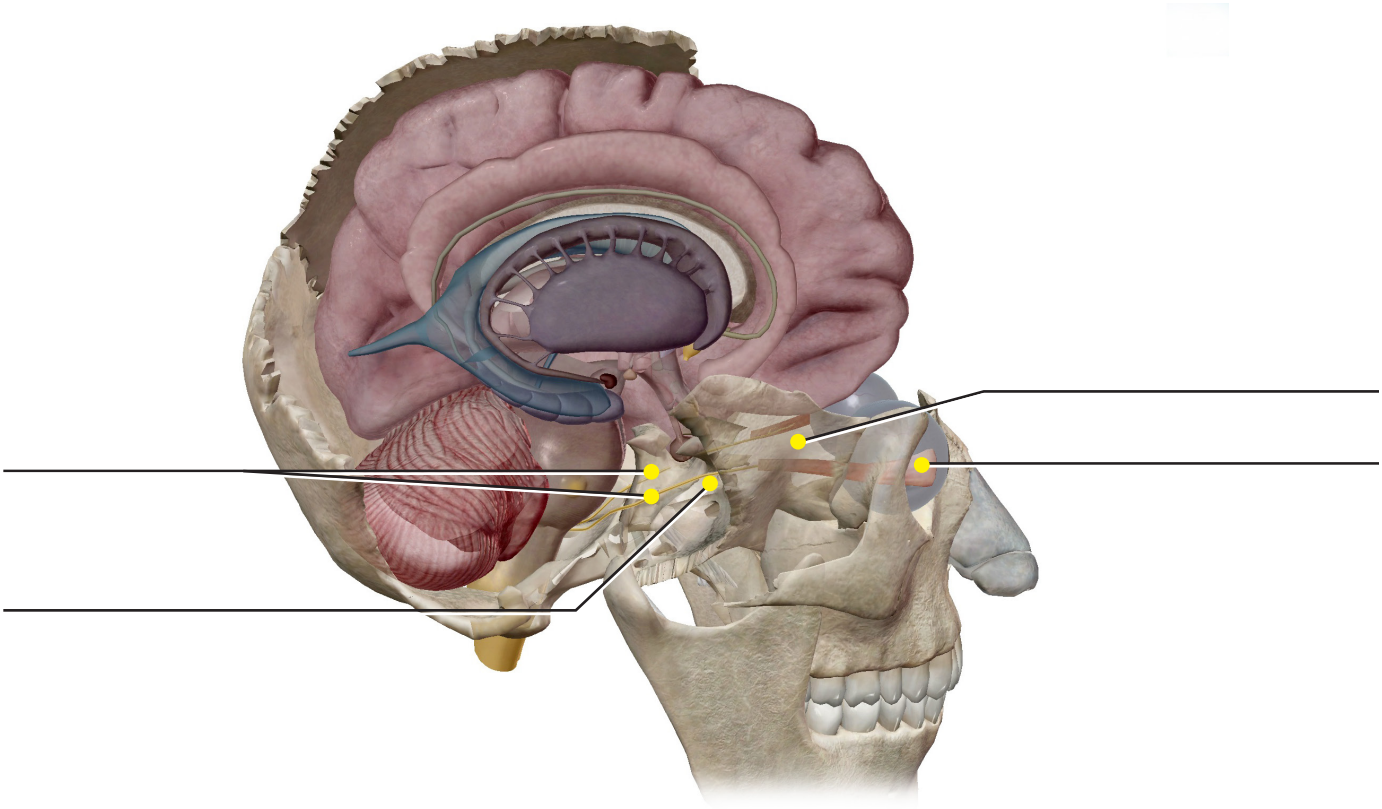
Oculomotor Nerves (III)



Trochlear Nerves (V)



Abducens Nerves (VI)



Trigeminal Nerves (IV)