

## VISIBLE BODY®

## The Brain: Part II: Cerebrum and Cerebellum A nervous system lab activity using Visible Body Suite

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#### **IN-LAB EXERCISES**

### Use the following modules in Visible Body Suite to guide your exploration of the brain. Be sure to select the book icon in the content box to learn more about the structures you are exploring.

You are responsible for the identification of **all bold terms** and all answers to the questions.

A. Explore the 3D anatomical views in Modules 20.17 Cerebrum, 20.18 Cerebral Hemispheres, 20.19 Lobes of the Cerebral Cortex, 20.23 Functional Regions and Cortex Anatomy, and 20.24 Hemispheric Lateralization and examine the illustration in Module 20.22 Functional Regions of the Cerebral Cortex. Use these modules to answer the following questions.



1. In Module 20.17 Cerebrum, select the cerebrum from the left-side menu and use the book icon to read its definition.

a. What are the main roles of the cerebrum?

b. The outer layer of the cerebrum contains \_\_\_\_\_\_ that appear gray, giving this tissue the name \_\_\_\_\_\_. This layer is called the cerebral

\_\_\_\_\_, which means "rind" in Latin.

2. Select the **basal ganglia** from the left-side menu and use the book icon to read their definition. The basal ganglia include structures from the telencephalon, diencephalon, and mesencephalon. (*Note: The term "ganglia," normally reserved for groups of neurons in the PNS, is used here for historical reasons.* Some people use the term "basal nuclei." For a different view of the basal ganglia, you can refer to Module 20.21 Basal Ganglia.)

a. These paired structures are composed of groups of \_\_\_\_\_\_ surrounding the \_\_\_\_\_\_.

b. The basal ganglia regulate \_\_\_\_\_\_ by processing input from the

c. Select the upper, C-shaped part of one of the basal ganglia. What is this structure called?

d. Select the lower, oval-shaped part of one of the basal ganglia. What is this structure called?

e. Note the many bridges that connect the upper and lower parts of the basal ganglia. Select the basal ganglia from the left-side menu again and use the Hide Others tool to remove the other brain structures from the view. Then, rotate the view to see the inner side of one of the ganglia and select one of the two oval structures on the medial side of the **putamen**. These two structures are called the lateral and medial \_\_\_\_\_\_.

3. Use the right arrow at the bottom of the left-side menu to open Module 20.18 Cerebral Hemispheres. Select the right or left **cerebral hemisphere** from the left-side menu and use the book icon to review the cerebrum definition.



a. What space separates the right and left hemispheres?

b. Rotate the view to examine the inferior portion of the brain and observe how the two hemispheres are connected in the center of the brain. Select the connecting structure, which is called the \_\_\_\_\_\_\_. It is a white commissure, meaning that it is made up of \_\_\_\_\_\_\_ connecting the two hemispheres.

4. Use the right arrow at the bottom of the left-side menu to open Module 20.19 Lobes of the Cerebral Cortex and answer the following questions about the four lobes that comprise each hemisphere.



a. Select the **frontal lobes** from the left-side menu and use the book icon to read their definition.

i. Each frontal lobe extends from the anterior of the cerebrum to the \_\_\_\_\_\_ which separates it from the **parietal lobe**. Select one of them to highlight this major cerebral landmark in the view. (*Note: You can also view these sulci in Module* 20.20 Features of the Cerebral Cortex.)

ii. Anterior to each central sulcus is the	gyrus of the frontal
lobe. This gyrus is also called the	because it is responsible
for	(Note: You can also view these
gyri in Module 20.20 Features of the Cerebral Cortex.)	)

gyr in module 20.20 r catales of the cerebral contex.

iii. The speech center, also known as \_\_\_\_\_\_ is in one of the frontal lobes, depending on which side of the brain is dominant.

iv. The definition mentions two "higher functions" of the frontal lobe, which are

b. Select the parietal lobes from the left-side menu and use the book icon to read their definition.

i. Each parietal lobe extends from the central sulcus anteriorly to the

\_\_\_\_\_\_ sulcus posteriorly, which separates the parietal lobe from the \_\_\_\_\_\_ lobe.

ii. The parietal lobes integrate \_\_\_\_\_\_ and play a role in

iii. The gyrus of the parietal lobe that is adjacent to each central sulcus is the \_\_\_\_\_\_, also known as the \_\_\_\_\_\_.
Its role is to receive \_\_\_\_\_\_\_ and produce the sensation of \_\_\_\_\_\_\_. (Note: You can also view these gyri in Module 20.20)

Features of the Cerebral Cortex.)

c. Select the **temporal lobes** from the left-side menu and use the book icon to read their definition.

i. Separating the superior surface of each temporal lobe from the frontal and anterior parietal lobes is the \_\_\_\_\_\_\_ sulcus, another important landmark.
 Select one of these sulci to highlight it in the view and learn its location. (Note: You can also view these sulci in Module 20.20 Features of the Cerebral Cortex.)

ii. Each temporal lobe contains an \_auditory cortex\_ that receives input from the \_\_\_\_\_\_ nerve and **association areas** that integrate

d. Select the **occipital lobes** from the left-side menu and use the book icon to read their definition. The occipital lobes receive input from the \_\_\_\_\_\_ and process

5. Examine the illustration in Module 20.22 Functional Regions of the Cerebral Cortex to learn about the four functional areas of the brain.



a. Which lobes are mainly responsible for the transmission of motor signals?

b. Which lobes are mainly responsible for processing the sensations of touch and taste?

c. Which lobes are mainly responsible for processing auditory signals?

d. Which lobes are mainly responsible for processing visual signals?

e. What is the role of association areas?

2. Use the right arrow at the bottom of the left-side menu to open Module 20.23 Functional Regions and Cortex Anatomy.



a. Explain the relationship between the motor areas, the sensory areas, and the central sulci.

b. The most posterior motor area gyrus is the \_\_\_\_\_ gyrus.

c. The most anterior sensory area gyrus is the\_\_\_\_\_ gyrus.

3. Use the right arrow at the bottom of the left-side chapter menu to open Module 20.24 Hemispheric Lateralization to learn about how the functions of the hemispheres are not completely symmetrical. Some functions are performed in only one hemisphere. Each hemisphere controls the opposite side of the body, so right-hand dominance is controlled by the left hemisphere in right-handed people and the opposite is true for left-handed people.



a. Which hemisphere is normally responsible for most language and calculation?

b. Which hemisphere is normally responsible for most visual, emotional, and artistic awareness?

## B. Explore the 3D anatomical views in Modules 20.10 Cerebellum Anatomy and 20.11 Cerebellum Function, and then answer the following questions.

1. In Module 20.10 Cerebellum Anatomy, select the cerebellum from the left-side menu and use the book icon to read its definition.





positions in the view. Rotate the view to observe the anterior portion of the cerebellum and find either of the paired **floccular** (flocculonodular) **lobes** behind the anterior and posterior lobes. In total, the two cerebellar hemispheres have \_\_\_\_\_\_ lobes. 3. Select the **vermis** from the left-side menu. The vermis lies between the two cerebellar

\_\_\_\_\_. (Note: The word vermis means "worm" in Latin; it refers to the shape of

the structure.)

4. Select the **arbor vitae** from the left-side menu and use the book icon to review the cerebellum definition. Then, tap anywhere outside the view to remove the highlighting. In the unhighlighted view, you can see the light-colored branches of the arbor vitae and its surrounding cortex of **gray matter**.

a. The arbor vitae is composed of tracts of \_\_\_\_\_\_, which consist of

b. Arbor vitae means "living tree" in Latin. How does this name relate to its structure?

c. Select **cerebellar peduncles** from the left-side menu and use the book icon to review the cerebellum definition. What is the role of the cerebellar peduncles?

6. Use the right arrow at the bottom of the left-side chapter menu to open Module 20.11 Cerebellum Function. Select the cerebellum and then the cerebrum from the left-side menu, noting the relative positions of these brain regions. They are the two largest regions of the brain. Describe the way these two regions work together to coordinate muscular movement. (*Note: Without the cerebrum, movements would be jerky and difficult to control. The cerebellum also has many other roles not discussed here.*)



#### **PUTTING IT ALL TOGETHER**

1. The cerebellum is the second largest region of the brain. Describe the main role of the cerebellum.

2. The cerebrum is divide	d into left and right	by the
3. The cerebral cortex is f	olded into	_ that are separated by
	The cortex consists of	matter, consisting
mostly of	This tissue is res	sponsible for most "higher" brain functions.
4. Motor processing areas	s are found anterior to the	and
	processing areas are found	d posterior to them.
5. Each cerebral hemisph	ere is divided into four	, each responsible for
different cortical function	s. What are the four lobes?	
6. Under the cortex is the	cerebral	, which consists mostly of myelinate
neuronal processes that r	nake it appear	
7. The basal ganglia, whic	h consist of clusters of neurona	al cell bodies called
are found deeper in the c	erebrum. The basal ganglia are	associated with
8. The left cerebral hemis	phere generally controls the	side of the body
and is usually associated	with	The right cerebral hemisphere controls
the	_ side of the body and is usuall	y responsible for



## VISIBLE BODY®

# **Student Practice**

Label the structures in the following figures.

#### Module 20.17 Cerebrum



#### Module 20.18 Cerebral Hemispheres



#### Module 20.19 Lobes of the Cerebral Cortex



#### Module 20.23 Functional Regions and Cortex Anatomy



#### Module 20.24 Hemispheric Lateralization



#### Module 20.10 Cerebellum Anatomy (Part 1)



#### Module 20.10 Cerebellum Anatomy (Part 2)



#### Module 20.11 Cerebellum Function

