

VISIBLE  BODY®

## The Spinal Cord & Spinal Nerves

A nervous system lab activity using Visible Body Suite

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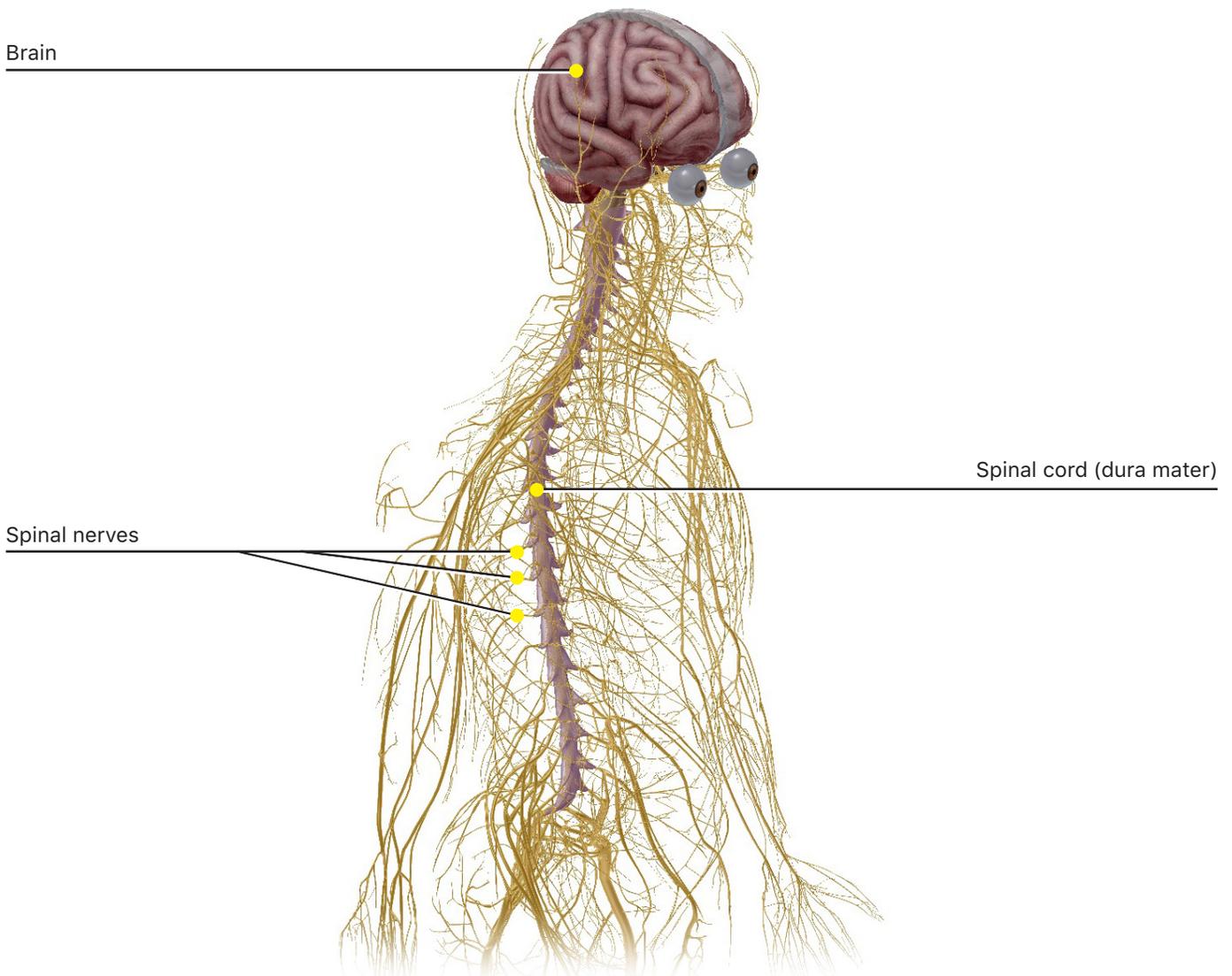
## PRE-LAB EXERCISES

Open Visible Body Suite. Search for and select each of the Nervous System Views noted in the exercises below.

You are responsible for the identification of all **bold terms**.

### A. Nervous System Overview

Open the Nervous System View "Nervous System." Use the systems icon to open the systems tray and deselect the two skeletal system icons to remove the bones, tendons, and ligaments from the view. Rotate the view as needed to examine the nervous system structures and answer the following questions.



1. The **nervous system** is anatomically separated into two parts: the **central nervous system** and the **peripheral nervous system**. The central nervous system consists of the \_\_\_\_\_ inside the **cranium**, and the \_\_\_\_\_ inside the **spinal column**.

2. Examine the view from either side and use it to answer the following questions.

a. Select any part of the outer protective connective tissue layer surrounding the **spinal cord**. This layer is called the \_\_\_\_\_. This tough structure also protects the **brain**.

b. Use the Hide tool to remove the outer protective layer from the view, and then select the spinal cord. Use the book icon to read its definition. The spinal cord extends from the upper border of the spinal column (**atlas**) to the lower border of the first, or upper border of the second, \_\_\_\_\_ **vertebra**.

c. What part of the brain is continuous with the spinal cord?

3. Paired **spinal nerves** exit the spinal cord along its length, forming the peripheral nervous system. Select any part of a spinal nerve, and then use the arrow in the content box to choose Peripheral from the selected structures list. Use the book icon to read a description of the peripheral nervous system.

a. How many pairs of spinal nerves are there?

b. Why are spinal nerves called **mixed nerves**?

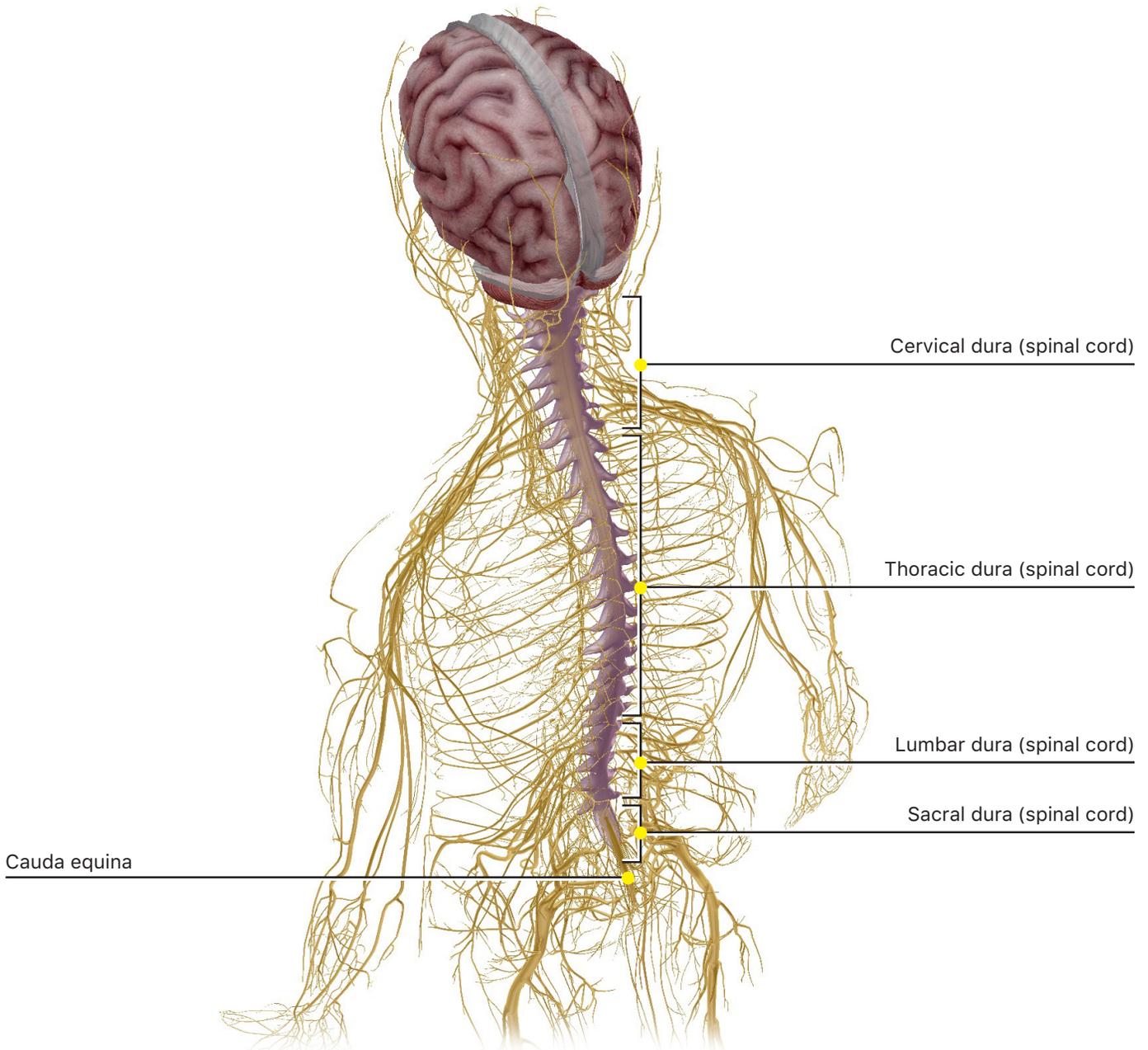
## IN-LAB EXERCISES

Open Visible Body Suite. Search for and select each of the Nervous System Views noted in the exercises below.

You are responsible for the identification of all **bold terms** and the answers to all questions. You should be able to locate all the structures discussed below.

### A. The Spinal Cord

Open the Nervous System View "Nervous System." Use the systems icon to open the systems tray and deselect the two skeletal system icons to remove the bones, tendons, and ligaments from the view. Rotate the view as needed to examine the nervous system structures and answer the following questions.



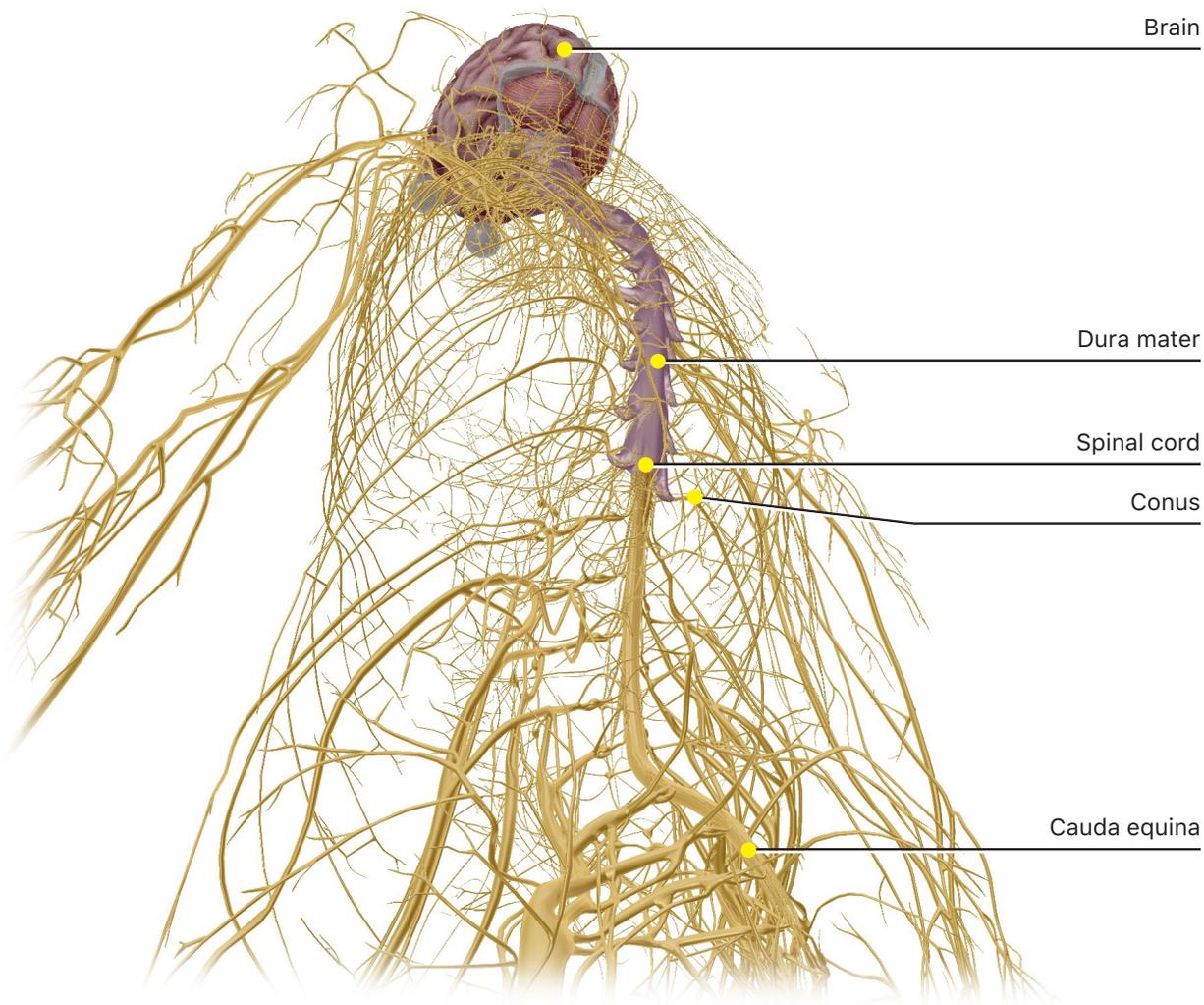
1. Rotate the view to examine the posterior portion and select the **dura mater**—the protective layer that covers the spinal cord. What are the four regions of the spinal dura mater?

2. View the spinal cord from either side. The lowest segment of the dura mater bends posteriorly, and a nerve bundle extends beyond the dura mater.

a. What is the name of this group of nerves? (Hint: It means “horse tail.”)

b. Select the **cauda equina** to view its length. Which two regions of the dura mater protect the cauda equina?

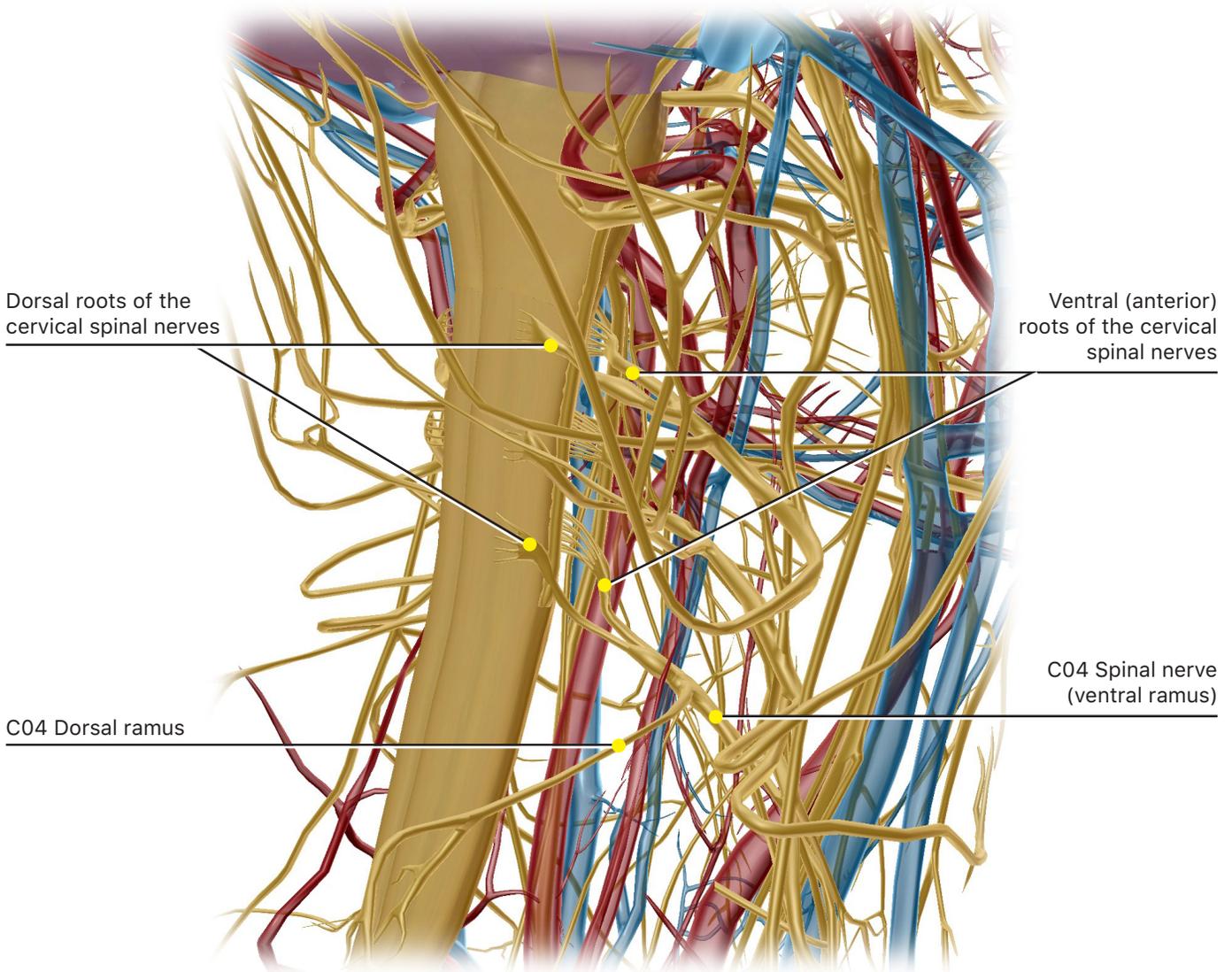
c. Use the Hide tool to remove the bottom two dura mater regions from the view. Select the cauda equina again and use the book icon to read its definition. Then, select the region of the spine where it originates, which is the \_\_\_\_\_, found in the \_\_\_\_\_ region of the spinal column.



d. The cauda equina innervates the \_\_\_\_\_ and \_\_\_\_\_.

## **B. The Cervical Plexus**

Open the Nervous System View "Phrenic Nerves." In the systems tray on the left side of the screen, deselect the two skeletal system icons to remove the bones, tendons, and ligaments from the view. Use this view to answer the following questions.



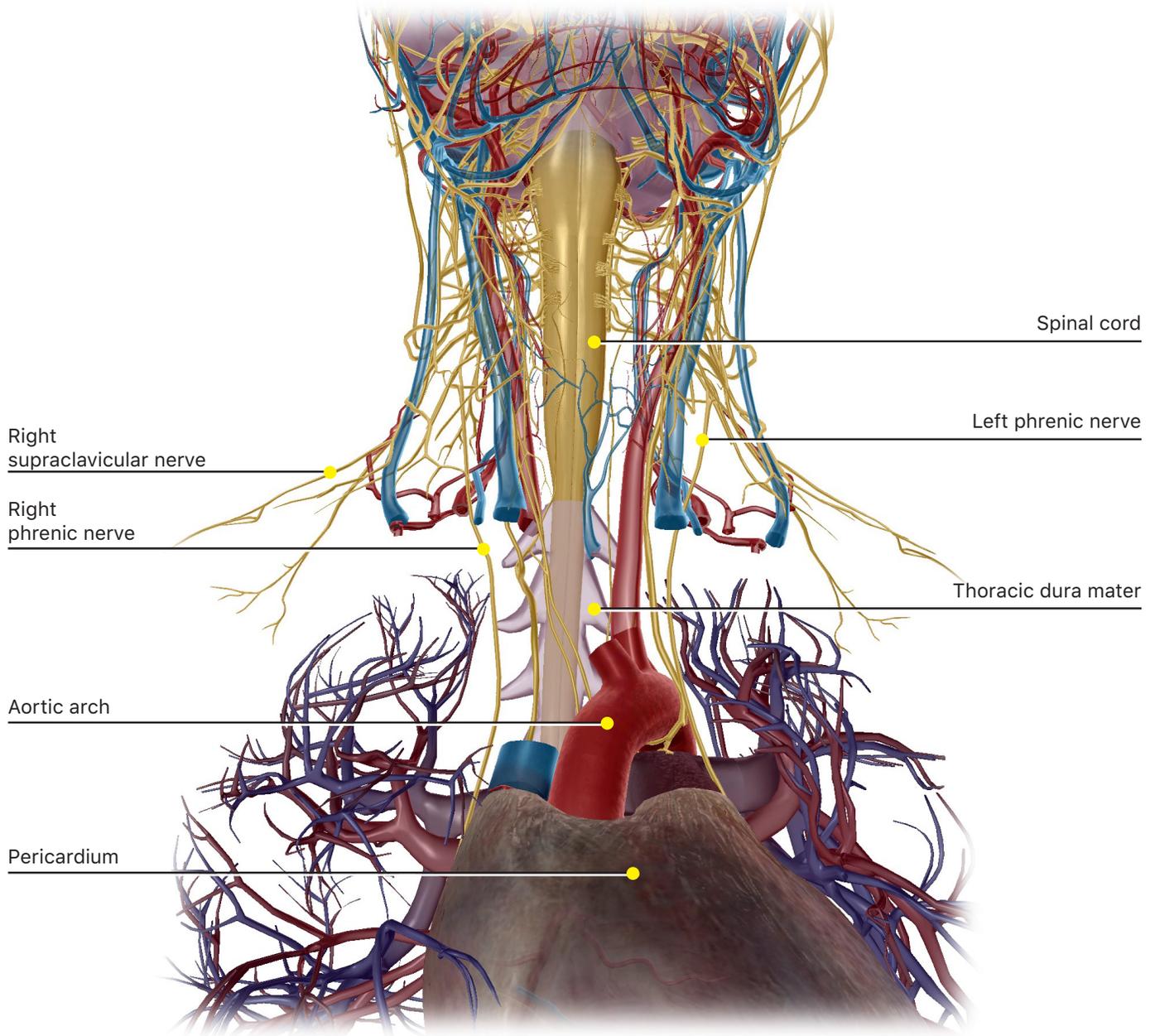
1. Rotate the view to examine the dorsal portion and use the Hide tool to remove the cervical region of the dura mater from the view. Observe the four pairs of spinal nerves that are attached to the back of the spinal cord and select any of the finger-like segments that attach them to the spinal cord on either side. These segments are the \_\_\_\_\_ of the cervical spinal nerves.

2. Rotate the view to examine the spinal nerves from the side.

a. The spinal nerve segments that connect to the front of the spinal cord are the \_\_\_\_\_ of the cervical spinal nerves.

b. Locate the point where the two roots of a spinal nerve meet after they exit the spinal column. This short section soon branches into a \_\_\_\_\_ and a \_\_\_\_\_.

3. Select any **ventral ramus**, and then use the arrow in the content box to choose **Cervical plexus** from the selected structures list. Use the book icon to read a description of this nerve network, which is formed by the ventral rami of the cervical spinal nerves. Note its many **anastomoses**.



a. Which cervical spinal nerves contribute to the cervical plexus?

b. The part of the cervical plexus that extends into the shoulder is the \_\_\_\_\_.

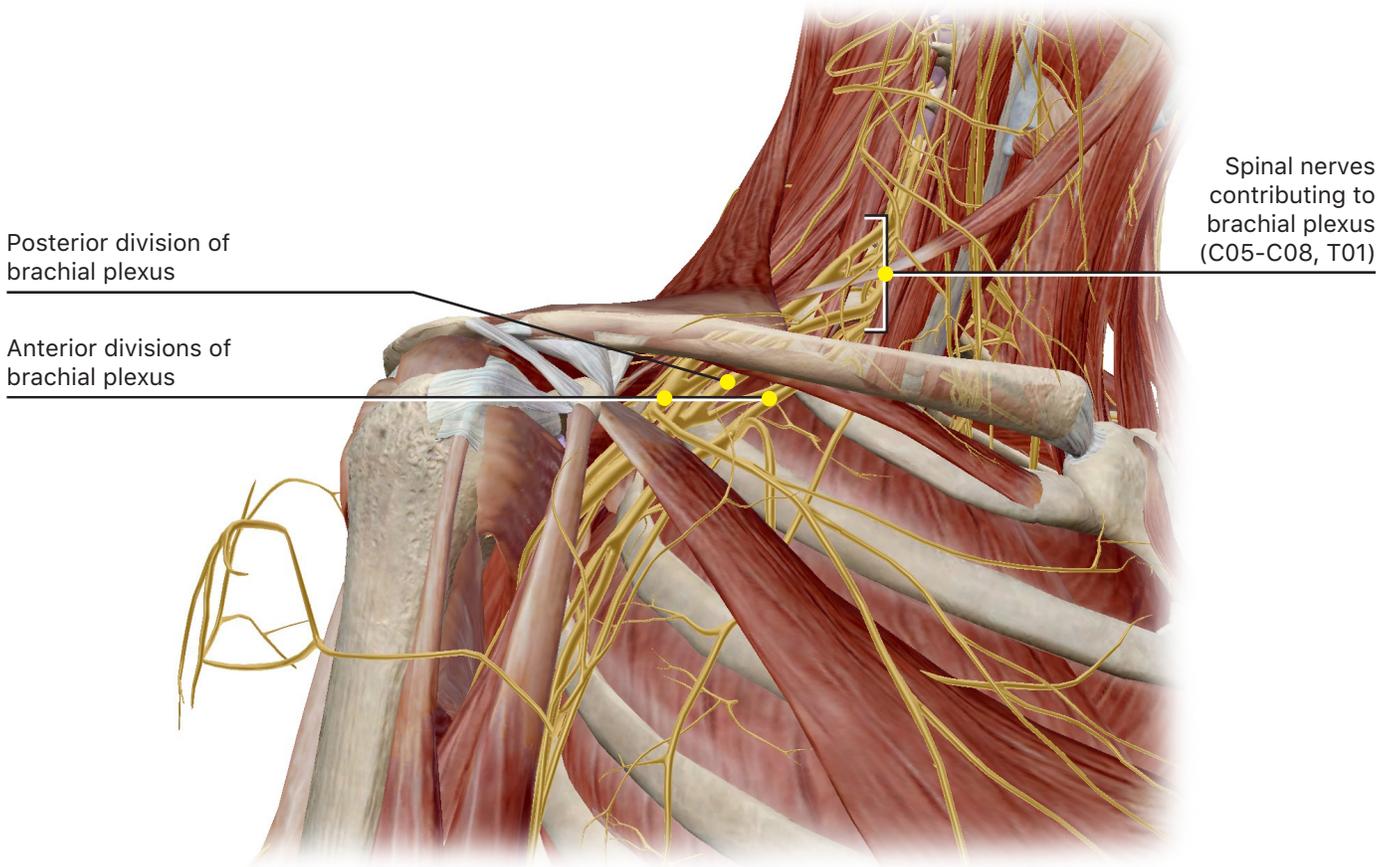
c. With the cervical plexus highlighted, rotate the view to examine the anterior portion and locate the paired nerves that extend into the thorax. What are these nerves called?

d. This pair of nerves innervates the \_\_\_\_\_.

e. What is unique about this pair of nerves?

### C. The Brachial Plexus

Open the Nervous System View "Brachial Plexus." Use this view to answer the following questions.

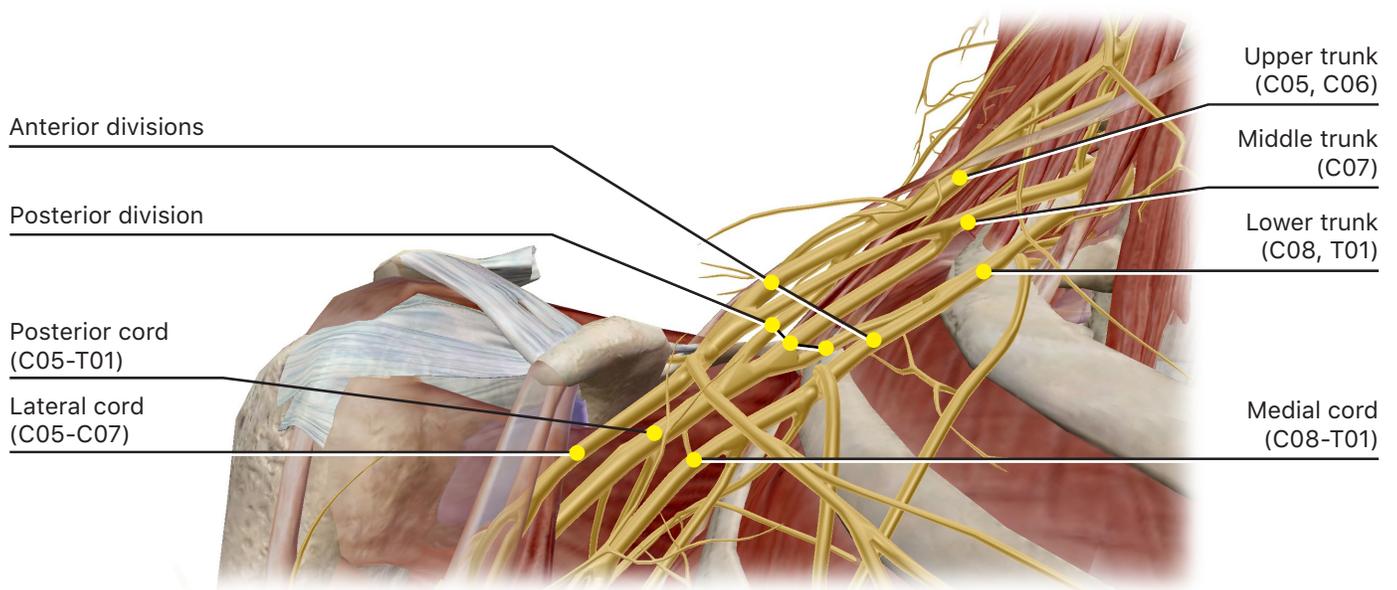


1. Select any of the nerves traveling under the **clavicle**, and then use the arrow in the content box to choose **Brachial plexus** and Upper Limb from the selected structures list. Use the book icon to read a description of the brachial plexus.

a. The brachial plexus innervates the \_\_\_\_\_ and \_\_\_\_\_.

b. Which spinal nerves contribute to the brachial plexus?

2. Select any branch of the brachial plexus that runs directly under the clavicle.



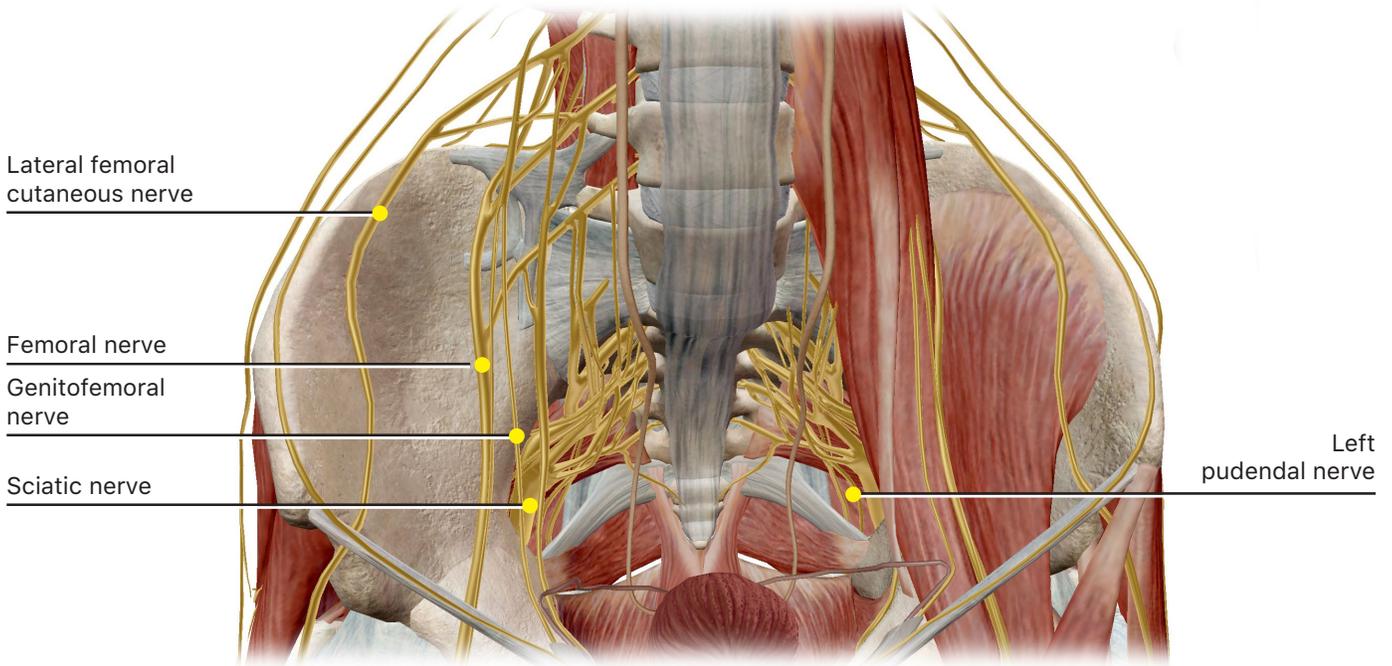
a. These segments are the \_\_\_\_\_ and \_\_\_\_\_ divisions of the brachial plexus.

b. The divisions arise from the upper, middle, and lower \_\_\_\_\_.

c. The divisions unite to form three \_\_\_\_\_. What are they called?

## D. The Lumbosacral Plexus

Open the Nervous System View "Lumbosacral Plexus." Select any of the large nerves passing over the hip bone on either side, and then use the arrow in the content box to choose Lumbosacral plexus and lower limb from the selected structures list. Use the book icon to read a description of the lumbosacral plexus and answer the following questions.



1. Which spinal nerves contribute to the **lumbosacral plexus**?

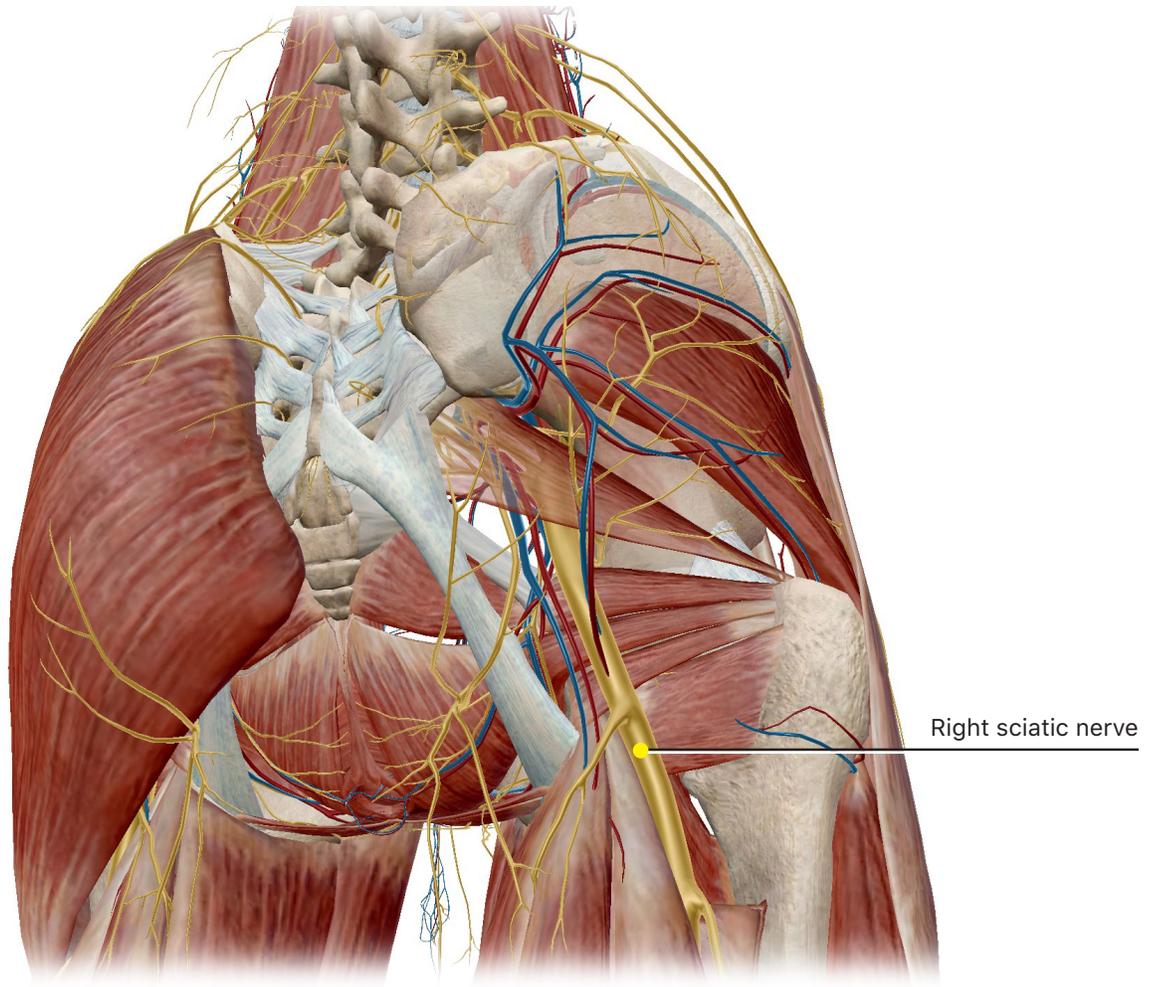
2. This large plexus can be divided into two smaller ones. The \_\_\_\_\_ plexus derives from the spinal nerves \_\_\_\_\_ and the \_\_\_\_\_ plexus derives from spinal nerves \_\_\_\_\_.

3. Select any nerve of the **lumbar plexus** and use the arrow in the content box to choose Lumbar plexus (R or L) from the selected structures list, highlighting all the right or left lumbar spinal nerves. What are the three major nerves of the lumbar plexus?

4. Select any nerve of the **sacral plexus** and use the arrow in the content box to choose Sacral plexus (R or L) from the selected structures list, highlighting all the right or left sacral spinal nerves. The two major nerves of the sacral plexus are the \_\_\_\_\_ and the \_\_\_\_\_.

## E. The Sciatic Nerve

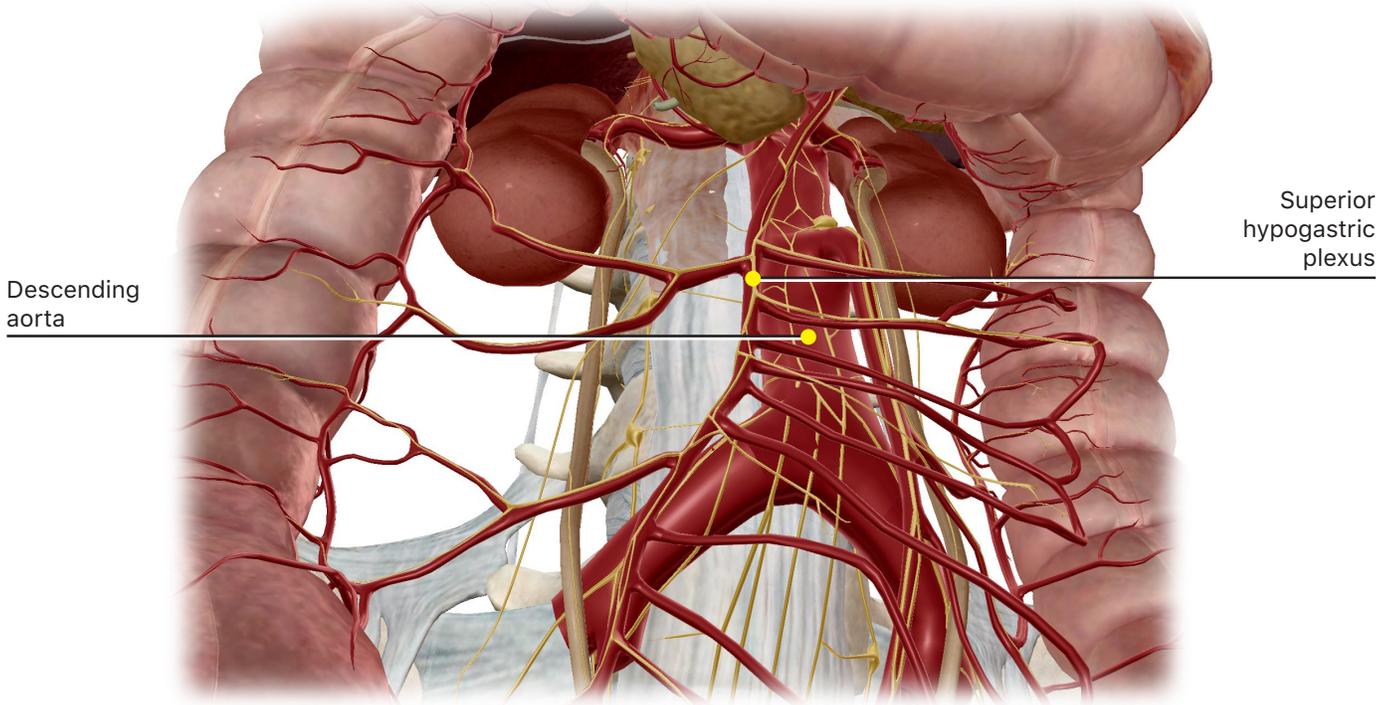
Open the Nervous System View "Sciatic Nerve." Select the large right sciatic nerve and follow its course down the back of the right leg. Use the book icon to read its definition and answer the following questions.



1. The **sciatic nerve** is the largest nerve in the body. Its two main branches are the \_\_\_\_\_ and the \_\_\_\_\_.
2. Where does it split into these two branches?
3. Describe the route taken by the sciatic nerve.
4. List the structures innervated by the sciatic nerve and its branches.

## F. Autonomic Nerves

Open the Nervous System View "Autonomic Nerves."



1. Zoom in and select the **superior hypogastric plexus**—the set of nerves that travels in front of the **descending aorta** and into the pelvis. Use the arrow in the content box to choose **Autonomic** from the selected structures list, highlighting all the abdominal and pelvic **autonomic nerves**. Then, use the book icon to read a description of the **autonomic nervous system** and answer the following questions.

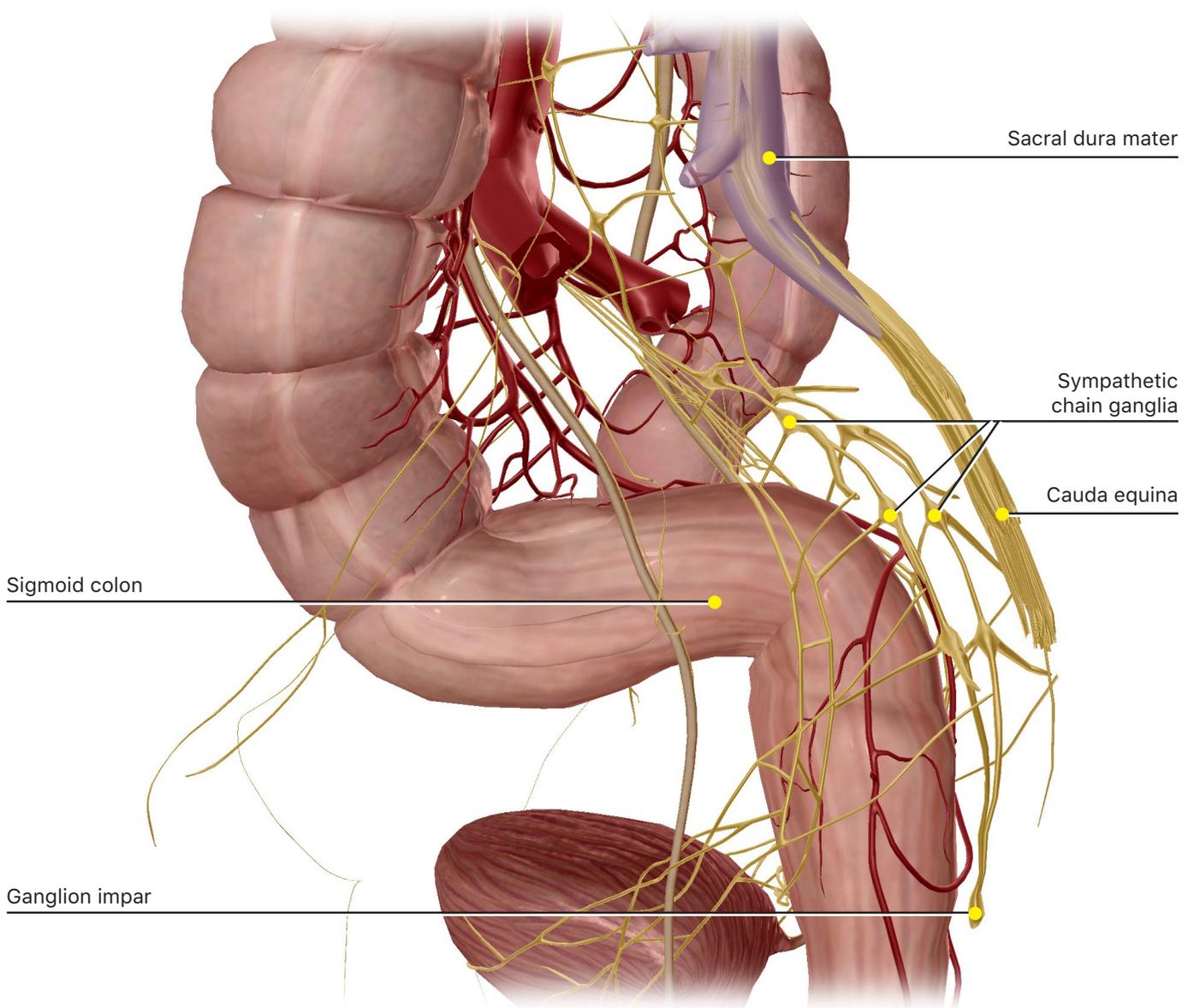
- a. The autonomic nervous system is the division of the peripheral nervous system that regulates \_\_\_\_\_.
- b. The autonomic nervous system is composed of two sets of fibers connected by **ganglia**. The \_\_\_\_\_ arise from the central nervous system, and the \_\_\_\_\_ extend from the ganglia to the visceral organs.
- c. What are the two divisions of the autonomic nervous system?
- d. Which central nervous system nerves supply these divisions?

e. Which division increases heart rate and other body functions in response to an emergency?

f. Which division is responsible for rest functions such as digestion?

g. The sympathetic nerves form which three major plexuses?

2. In the systems tray on the left side of the screen, deselect the two skeletal system icons to remove the bones, tendons, and ligaments from the view. Rotate the view to one side to examine the autonomic nerve fibers that innervate the colon and the urinary system. The paired sympathetic chain ganglia—a series of swellings in the nerves—are visible.



- a. Select one of the ganglia near the sigmoid colon. They originate from the \_\_\_\_\_ spinal nerves.
- b. The nerves connecting the ganglia make up the \_\_\_\_\_.
- c. With a ganglion selected, use the arrow in the content box to choose **Sympathetic chain** from the selected structures list. In the systems tray on the left side of the screen, deselect the respiratory and digestive system icons to get a better view of the sympathetic chain. What is the highest (most superior) of the chain ganglia?
- d. What is the lowest of the chain ganglia?
- e. Each sympathetic chain extends from the \_\_\_\_\_ to the \_\_\_\_\_.

## **PUTTING IT ALL TOGETHER**

1. What are the two main parts of the nervous system and where are they found?
2. Describe how the peripheral nervous system (PNS) is further divided in terms of function.
3. Which nerves give rise to the two divisions of the autonomic nervous system?
4. List the major plexuses and state which spinal nerves give rise to them.

5. In the following image, label all the following:

Cauda equina

Conus medullaris

Any dorsal root

Any ventral root

Either phrenic nerve

Any part of the cervical plexus

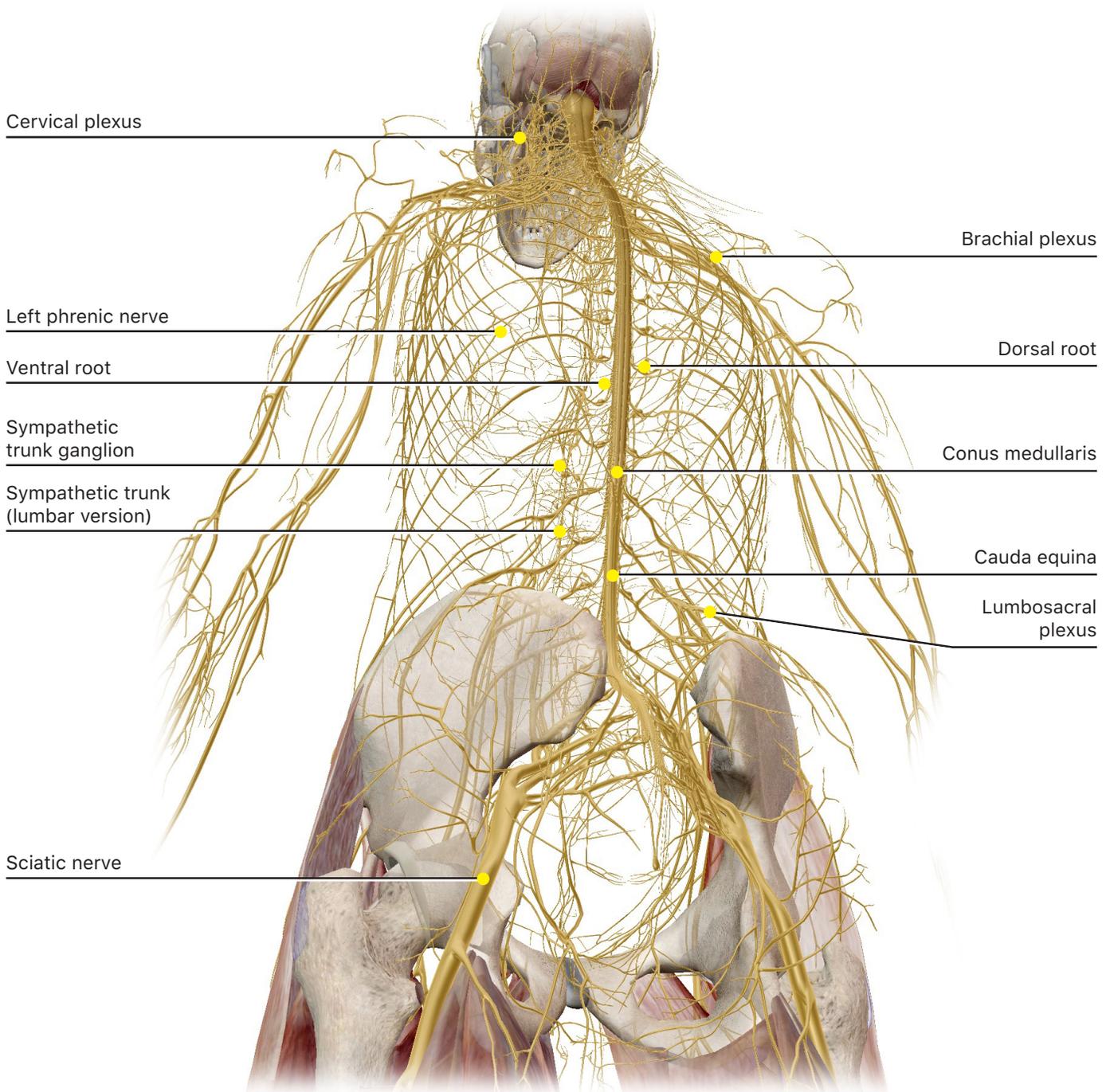
Any part of the brachial plexus

Any part of the lumbosacral plexus

Either sciatic nerve

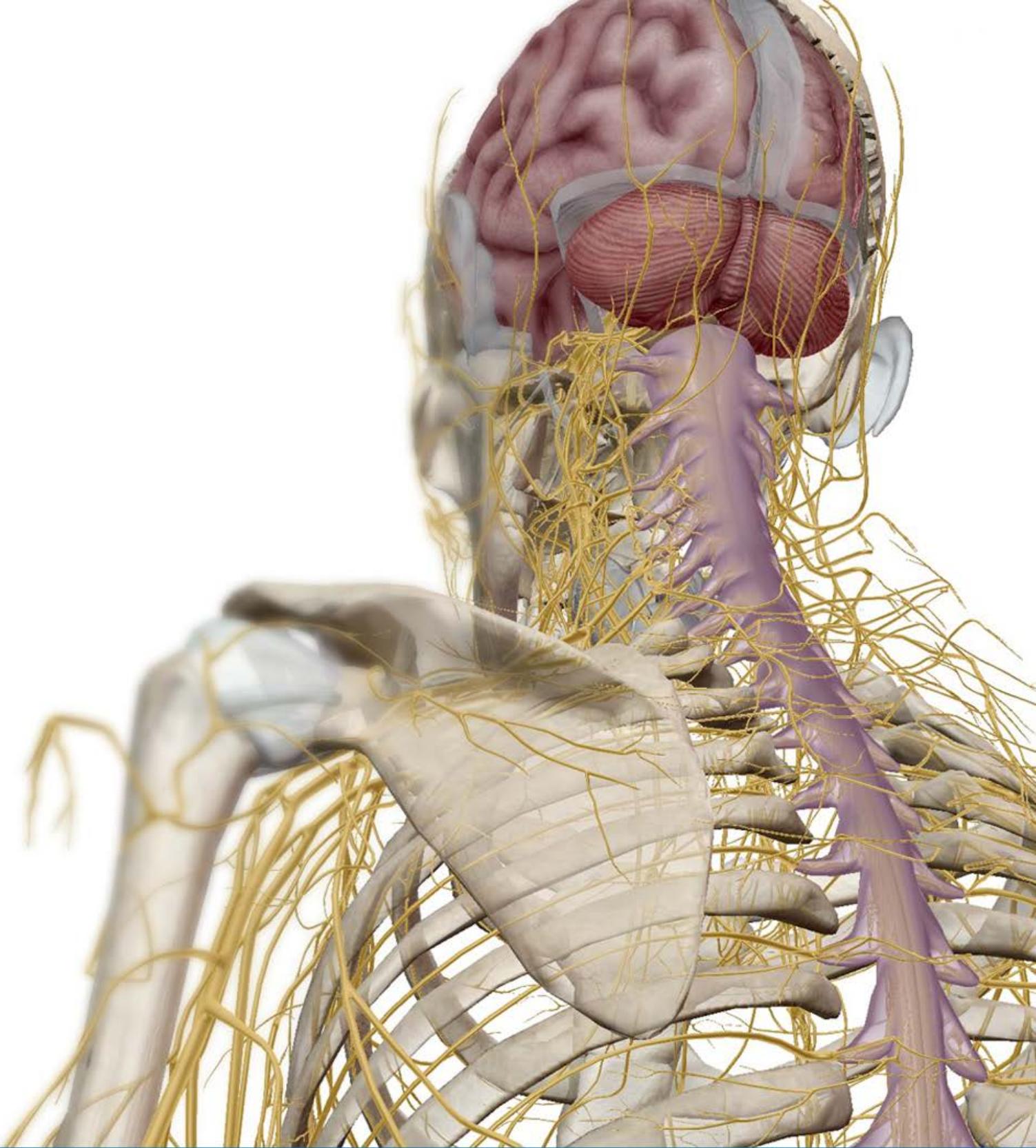
Any ganglion of the sympathetic chain

Any sympathetic trunk



**TIME TO PRACTICE!**

**SEARCH FOR AND TAKE THE FOLLOWING NERVOUS SYSTEM QUIZZES:  
CERVICAL PLEXUS, BRACHIAL PLEXUS, LUMBAR PLEXUS, SACRAL PLEXUS,  
LOWER LEG, AND THORACIC NERVES**

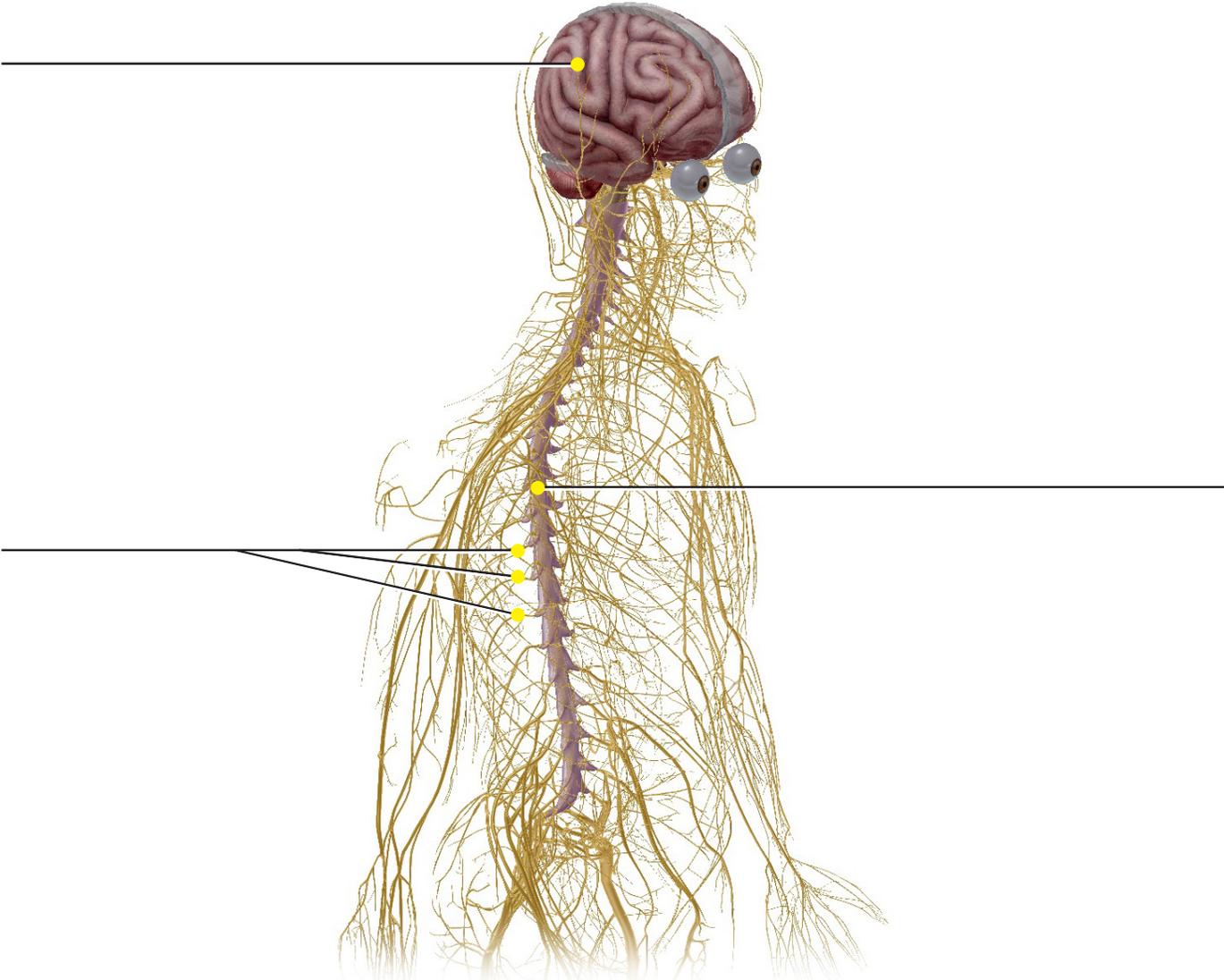


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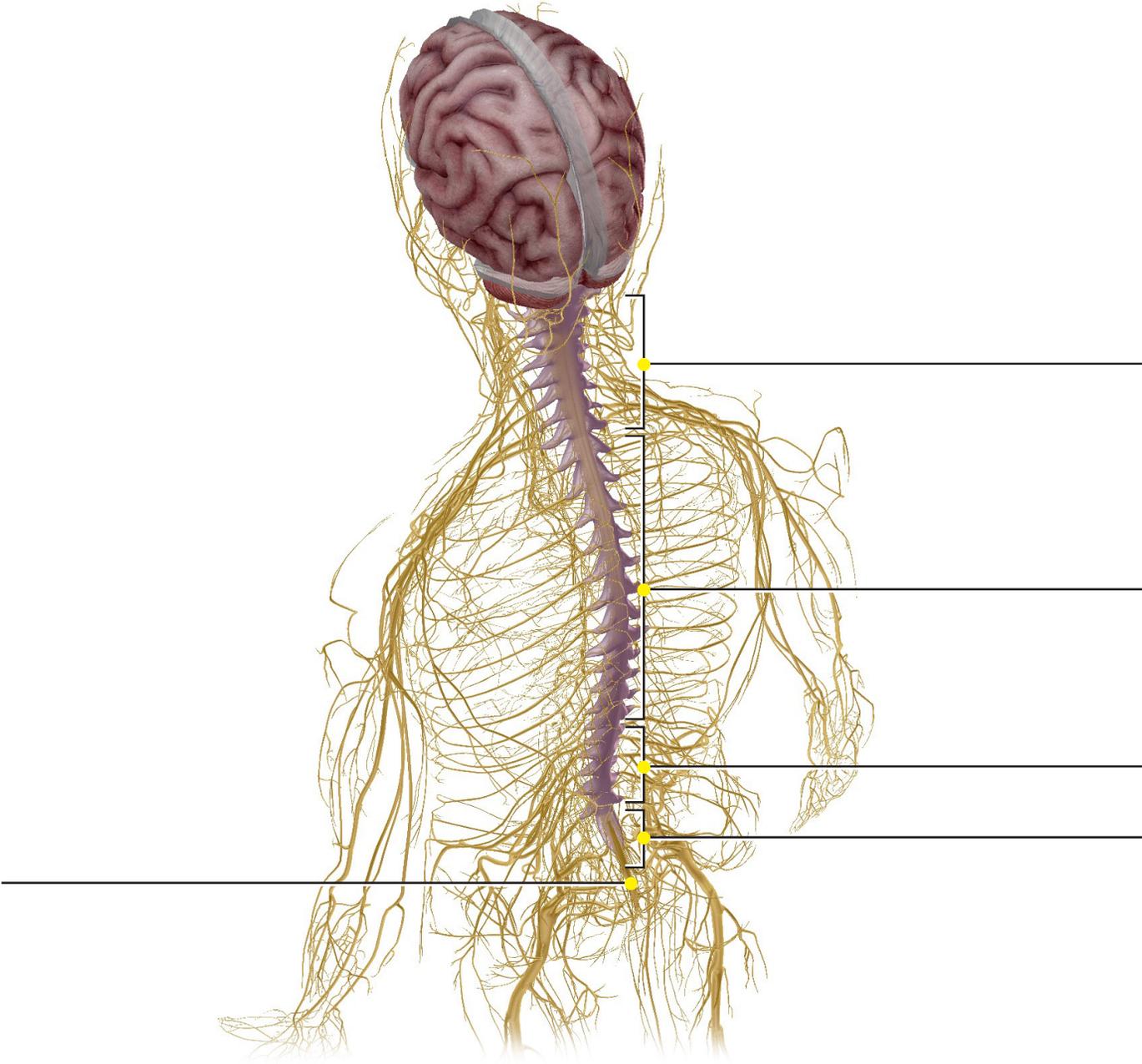
## Student Practice

Label the structures in the following figures.

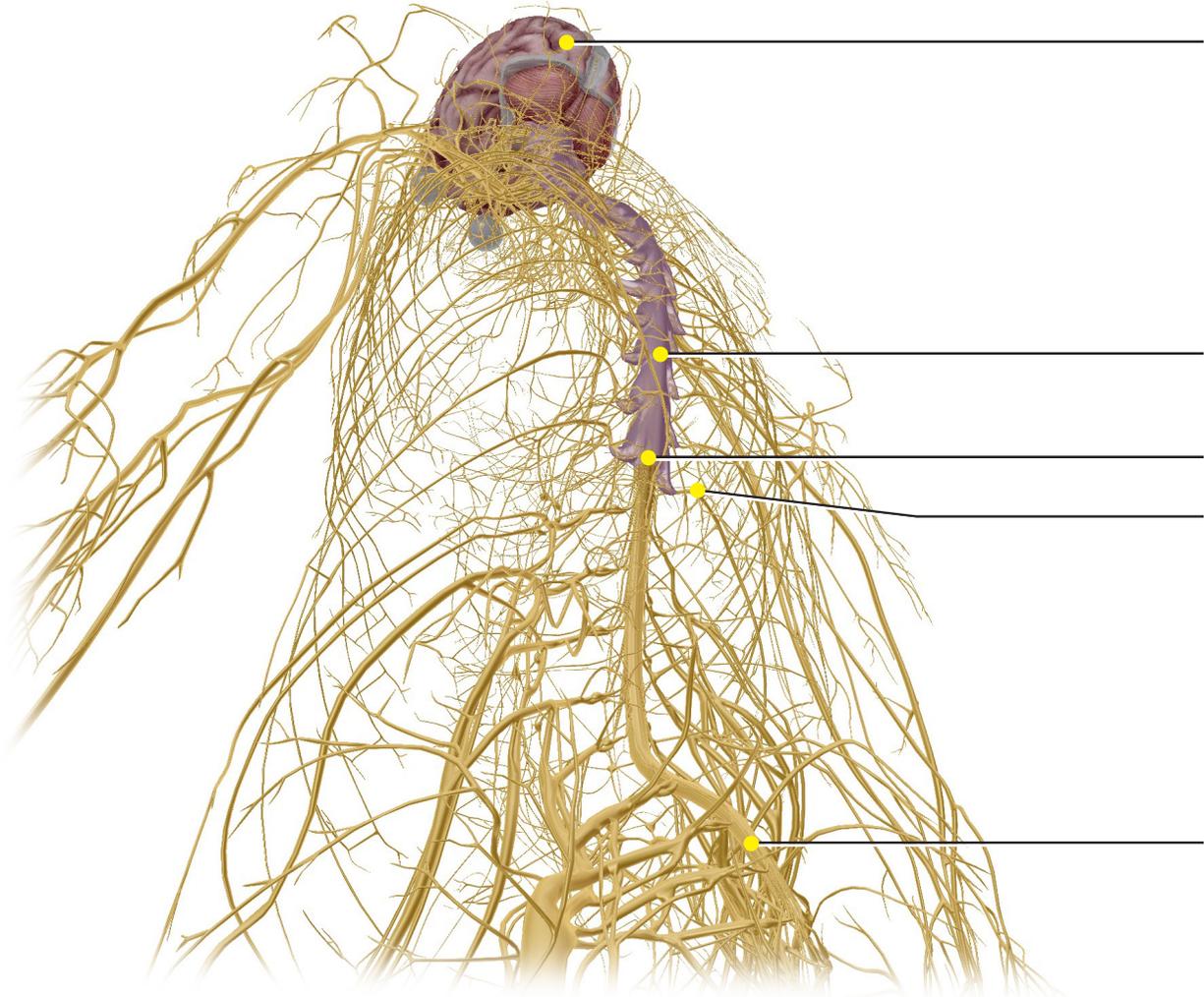
Source: Nervous System View "Nervous System"



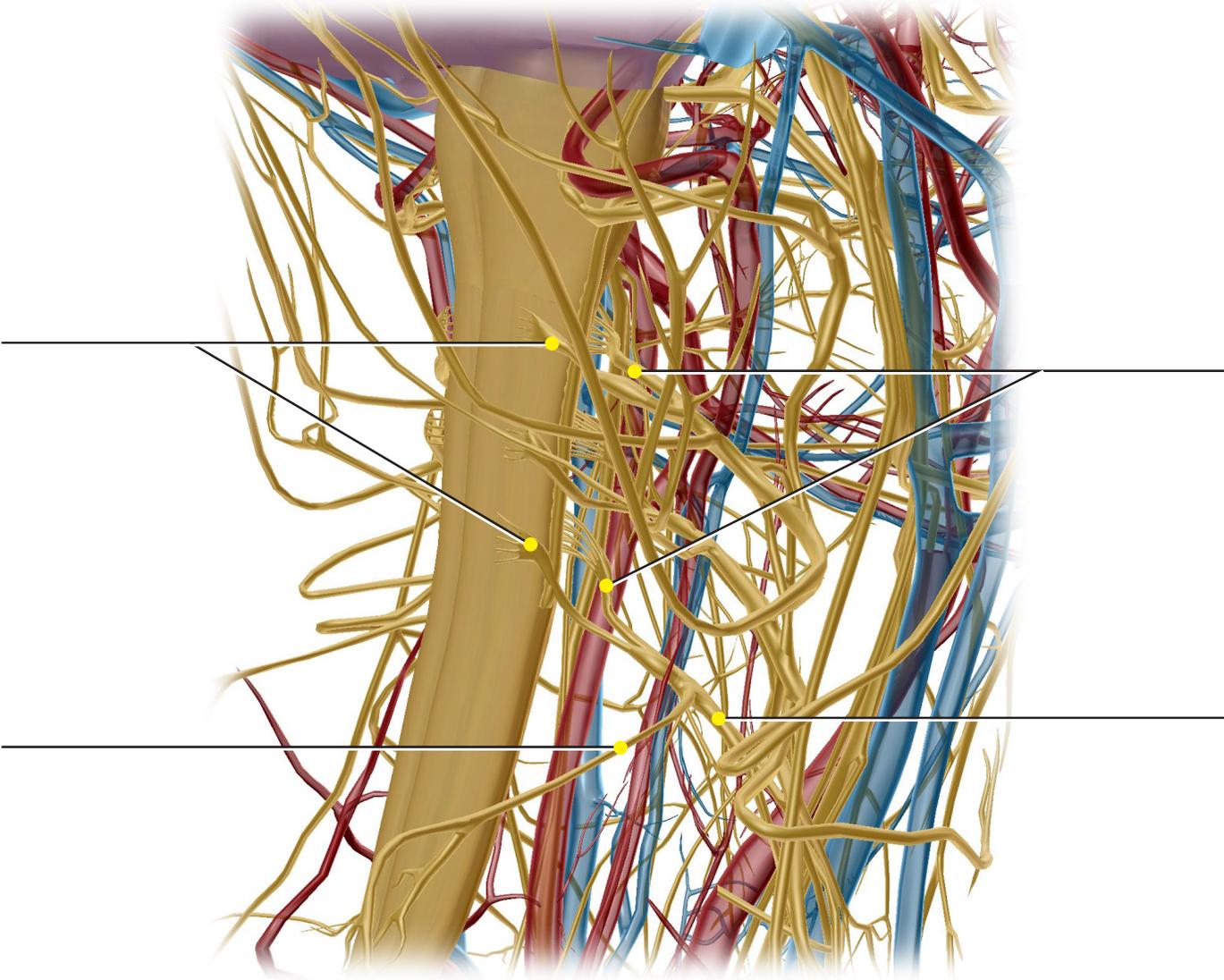
Source: Nervous System View "Nervous System"



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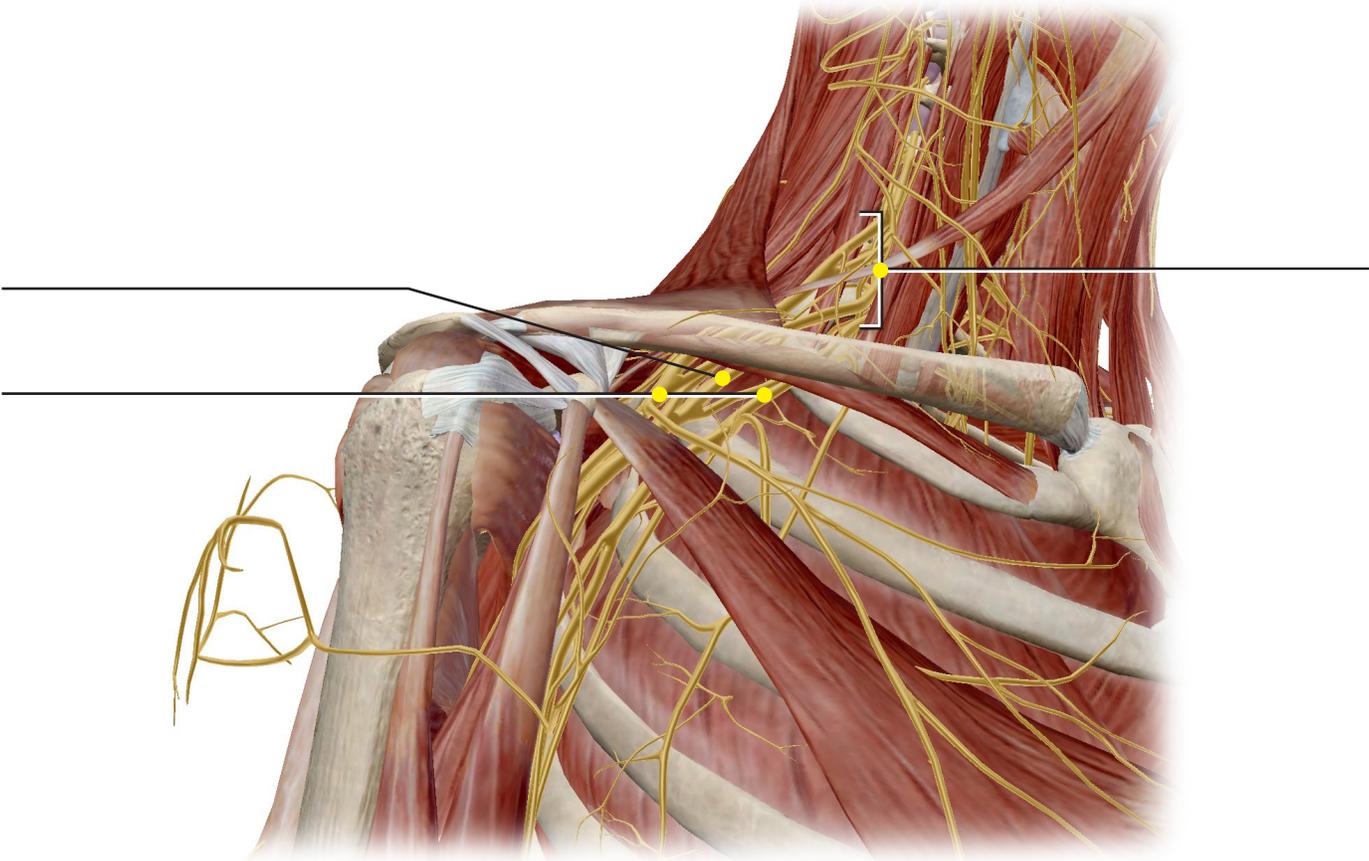


Source: Nervous System View "Phrenic Nerves"

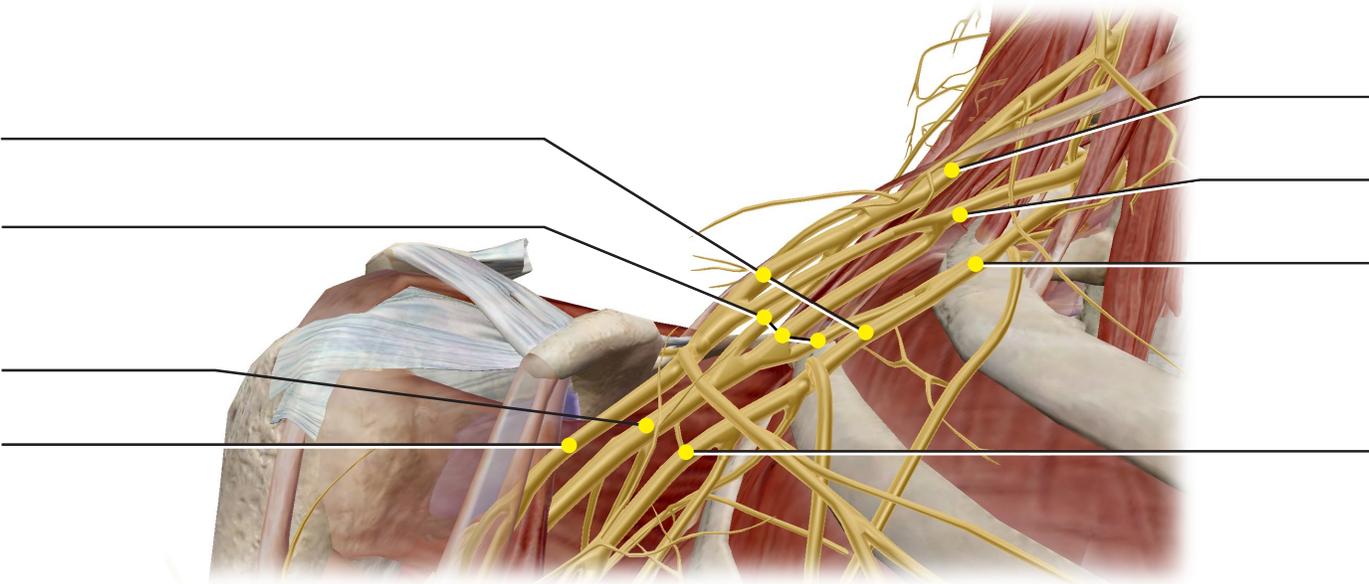




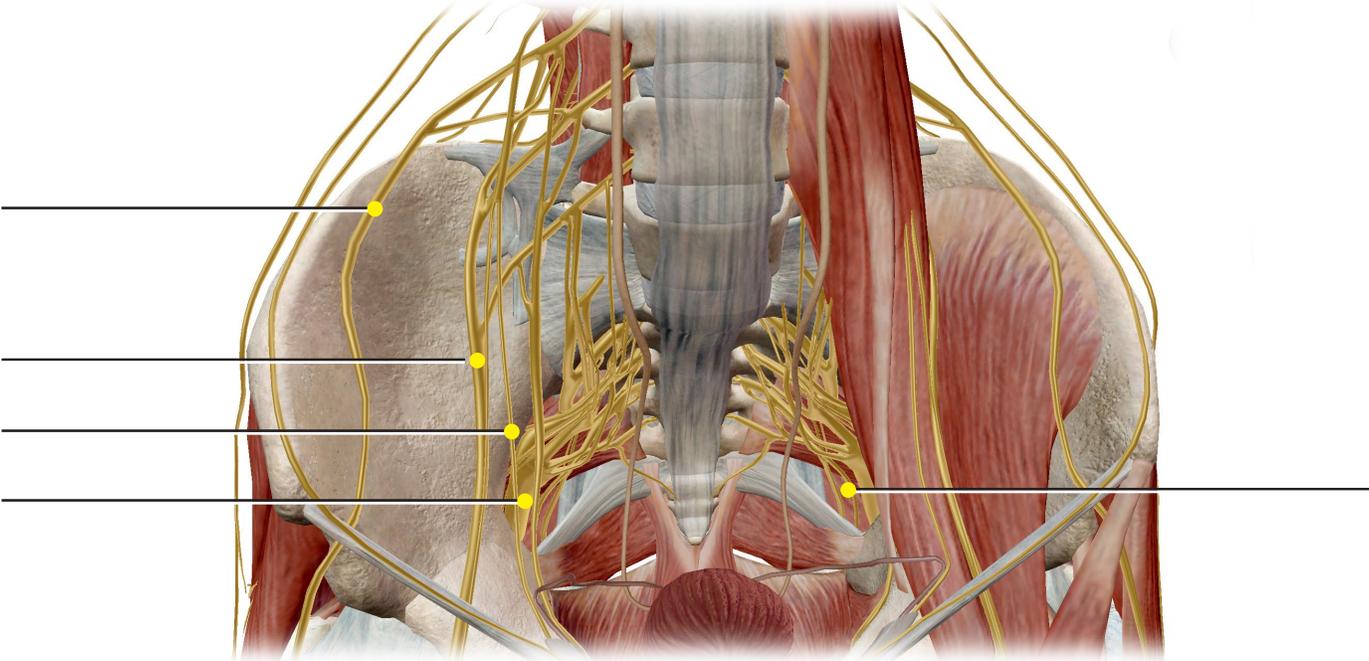
Source: Nervous System View "Brachial Plexus"



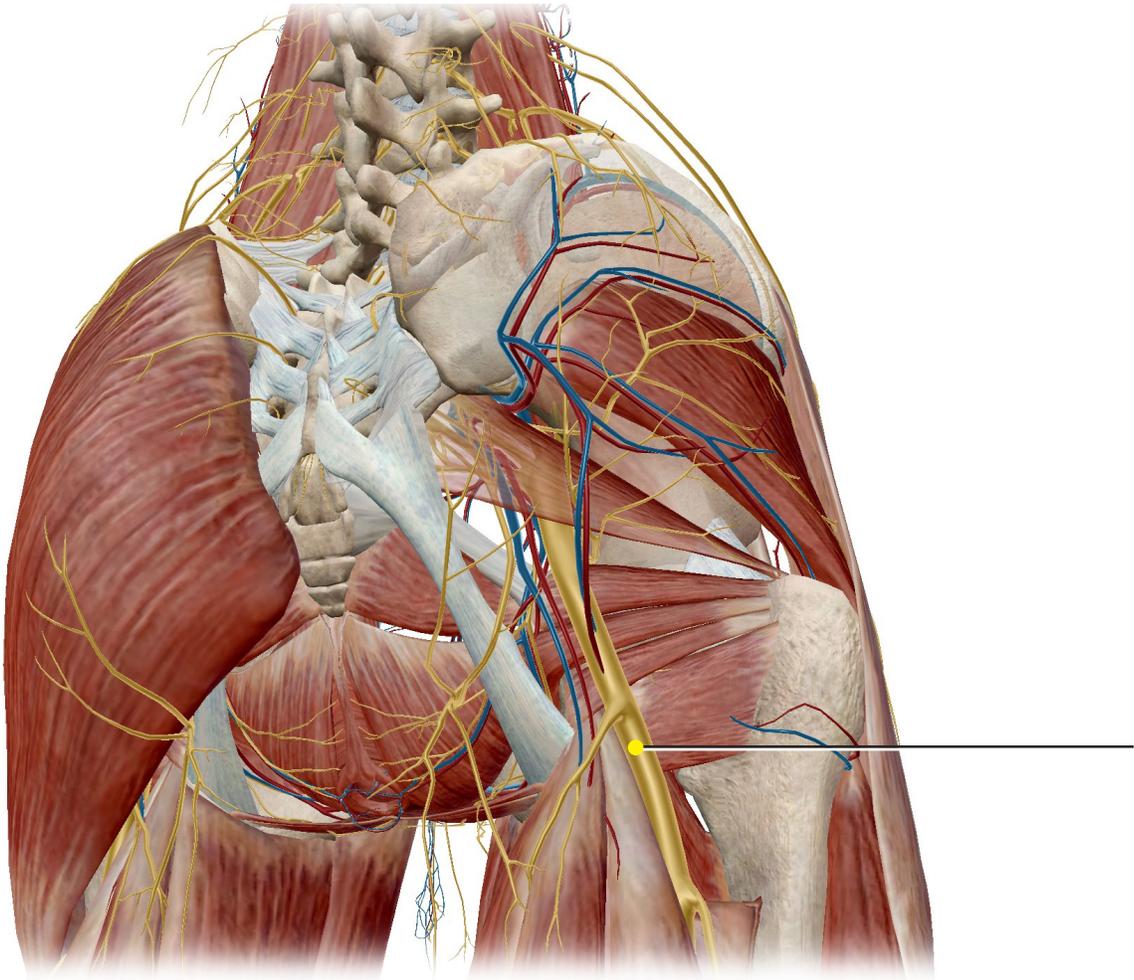
**Source: Nervous System View "Brachial Plexus"**



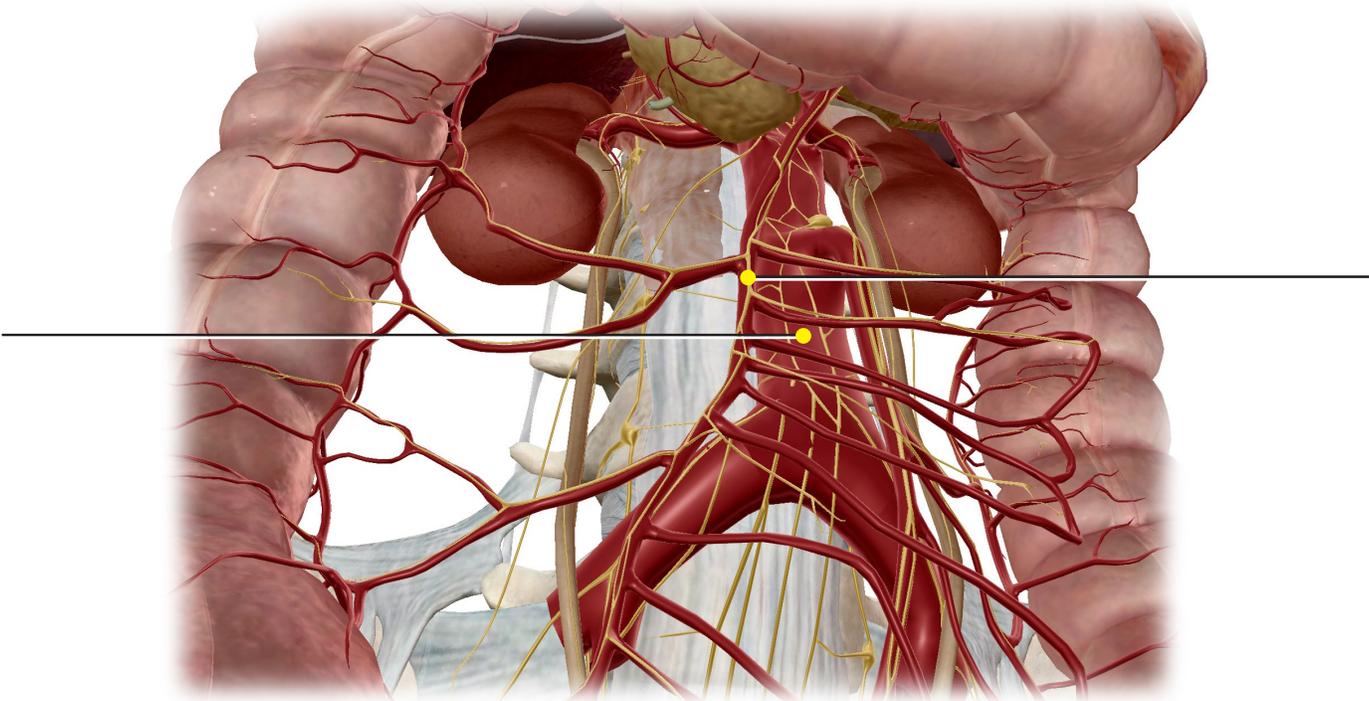
Source: Nervous System View "Lumbosacral Plexus"



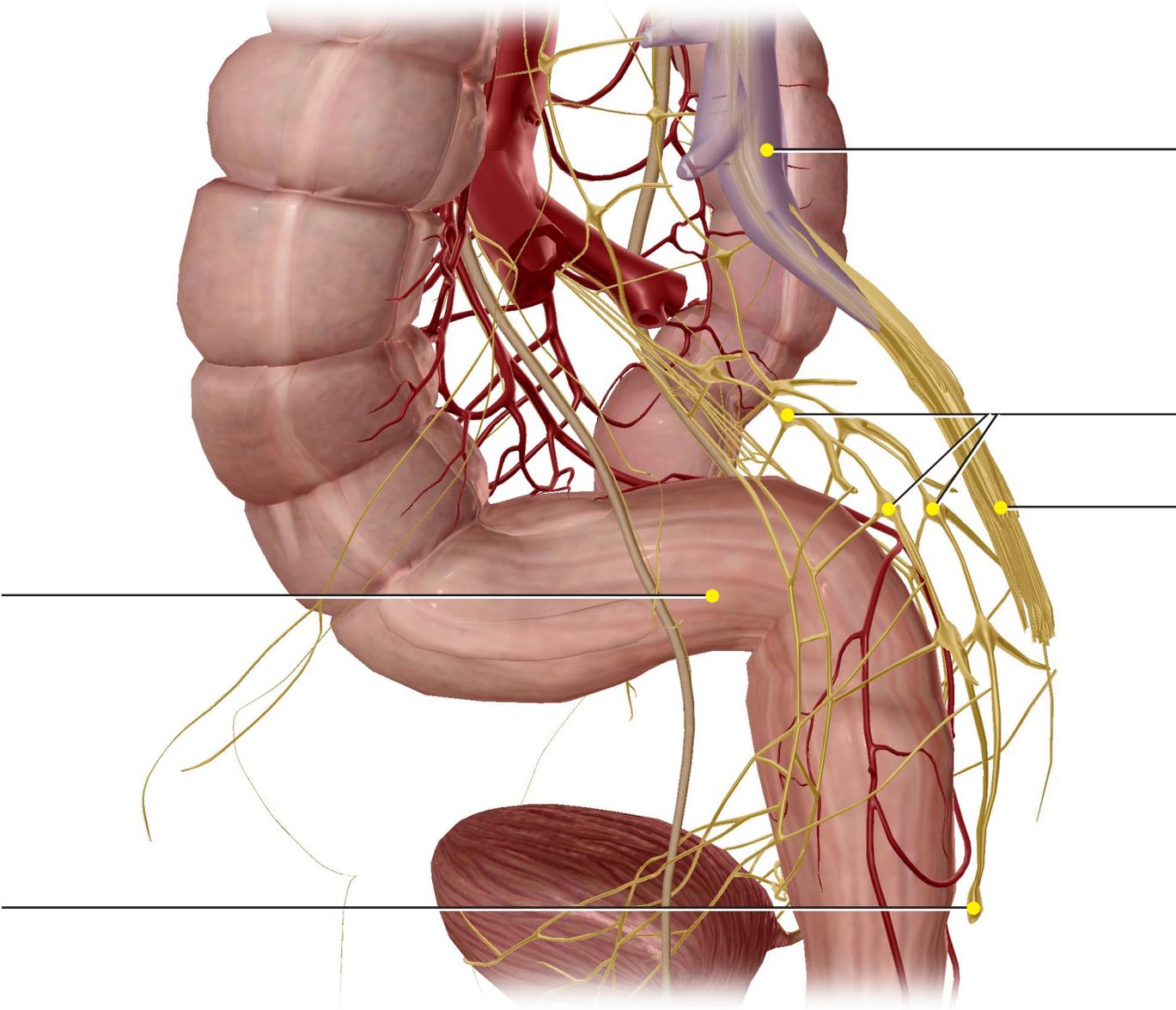
**Source: Nervous System View "Sciatic Nerve"**



Source: Nervous System View "Autonomic Nerves"



Source: Nervous System View "Autonomic Nerves"



**Source: Nervous System View "Nervous System"**

