Laboratory Exercise 26

Spinal Cord and Meninges

Materials Needed

Textbook
Compound light microscope
Prepared microscope slide of a spinal cord cross section with spinal nerve roots
Spinal cord model with meninges

For Demonstration:

Preserved spinal cord with meninges intact

The spinal cord is a column of nerve fibers that extends down through the vertebral canal. Together with the brain, it makes up the central nervous system.

Neurons within the spinal cord provide a two-way communication system between the brain and body parts outside the central nervous system. The cord also contains the processing centers for spinal reflexes.

The meninges consist of layers of membranes located between the bones of the skull and vertebral column and the soft tissues of the central nervous system. They include the dura mater, the arachnoid mater, and the pia mater.

Purpose of the Exercise

To review the characteristics of the spinal cord and the meninges and to observe the major features of these structures.

LEARNING OUTCOMES

After completing this exercise, you should be able to

1. Identify the major features and functions of the spinal cord.
2. Locate the ascending and descending tracts of the spinal cord.
3. Arrange the layers of the meninges and describe the structure of each.

EXPLORE

Procedure A—Structure of the Spinal Cord

1. Review the section entitled "Spinal Cord" in chapter 11 of the textbook.
2. As a review activity, label figures 26.1 and 26.2.
3. Complete Part A of Laboratory Report 26.
4. Study figure 26.3 and complete Part B of the laboratory report.
5. Obtain a prepared microscope slide of a spinal cord cross section. Use the low power of the microscope to locate the following features:

posterior median sulcus
anterior median fissure
central canal
gray matter
- gray commissure
- posterior (dorsal) horn
- lateral horn
- anterior (ventral) horn

white matter
- posterior (dorsal) funiculus (column)
- lateral funiculus (column)
- anterior (ventral) funiculus (column)

roots of spinal nerve
- dorsal roots
- dorsal root ganglia
- ventral roots

6. Observe the model of the spinal cord, and locate the features listed in step 5.
7. Complete Part C of the laboratory report.

EXPLORE

Procedure B—Meninges

1. Review the section entitled "Meninges" in chapter 11 of the textbook.
2. Complete Part D of the laboratory report.

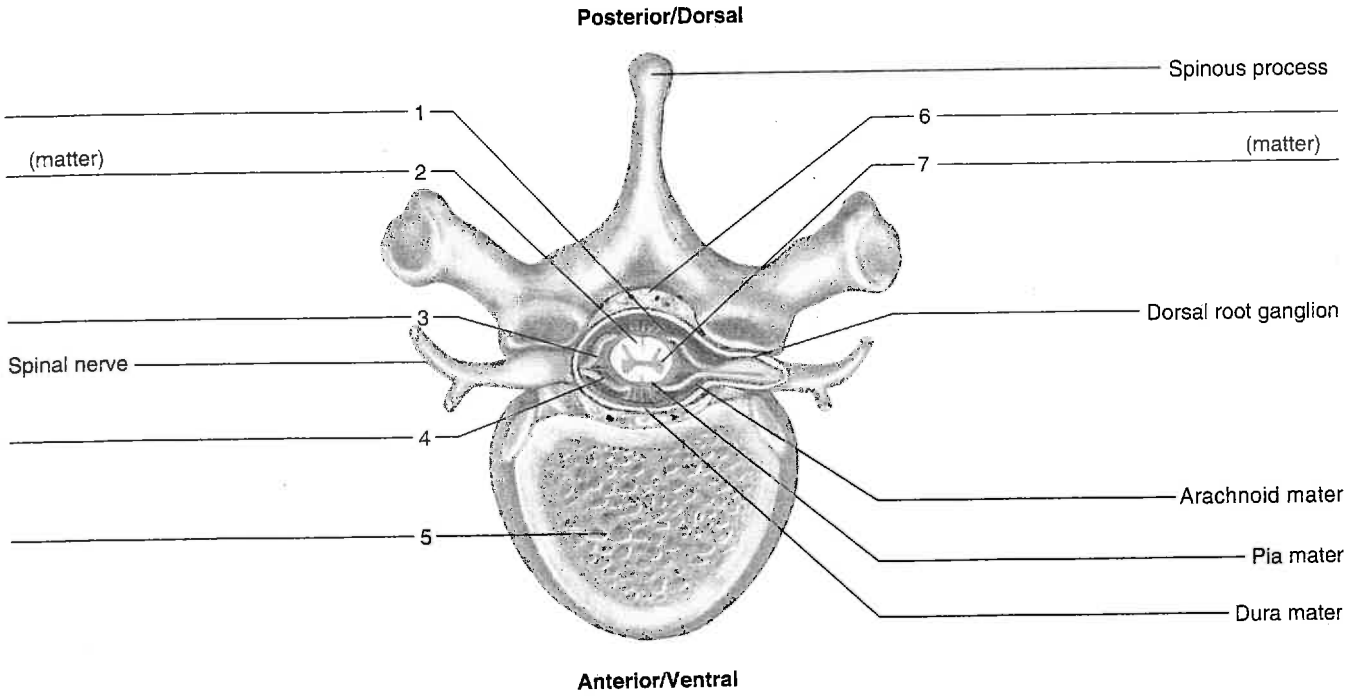

Figure 26.1 Label the features of the spinal cord and the surrounding structures.

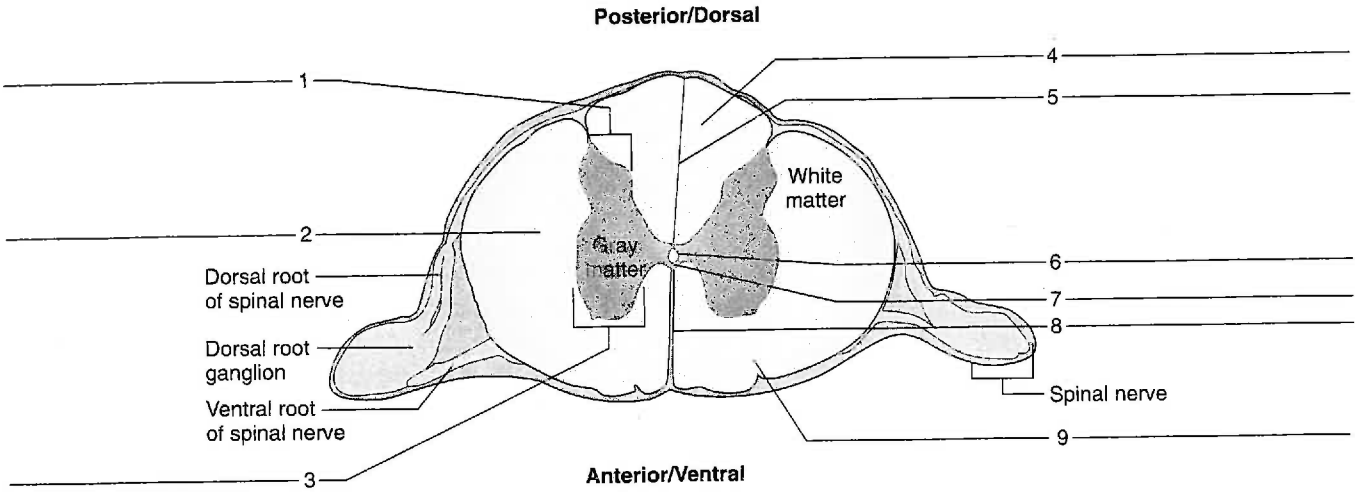

Figure 26.2 Label this cross section of the spinal cord, including the features of the white and gray matter. (*Note:* A lateral horn of the gray matter is not present at this level of the spinal cord illustrated.)

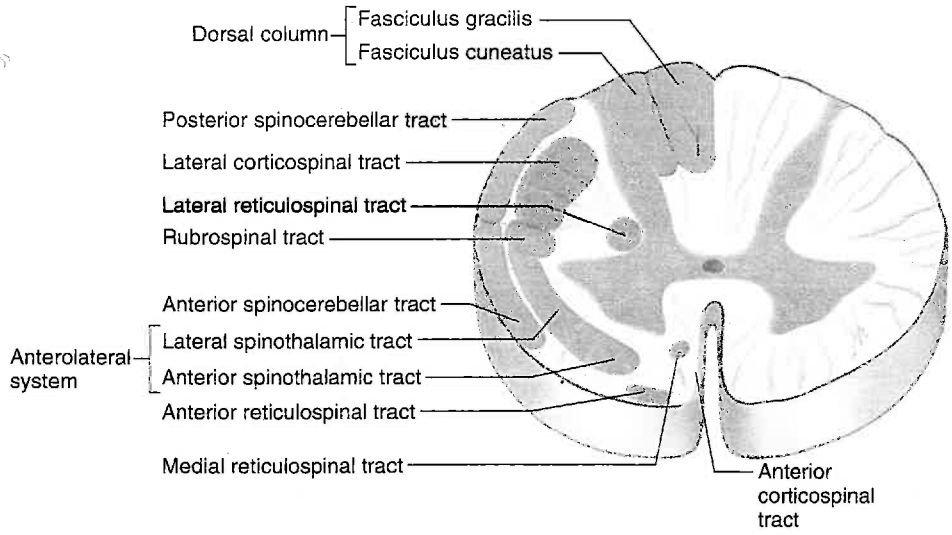

Figure 26.3 Major ascending (sensory) and descending (motor) tracts within a cross section of the spinal cord. Ascending tracts are in orange, descending tracts in tan, and are shown only on one side. This pattern varies with the level of the spinal cord. This pattern is representative of the midcervical region. (*Note:* These tracts are not visible as individually stained structures on microscope slides.)

Demonstration

Observe the preserved section of spinal cord. Note the heavy covering of dura mater, firmly attached to the cord on each side by a set of ligaments (denticulate ligaments) originating in the pia mater. The intermediate layer of meninges, the arachnoid mater, is devoid of blood vessels, but in a live human being, the space beneath this layer contains cerebrospinal fluid. The pia mater, closely attached to the surface of the spinal cord, contains many blood vessels. What are the functions of these layers?

Notes