3.1: Lab 3: Spinal Cord and Spinal Nerves

Measurable Outcomes

- Correctly identify the structures which constitute comprise the spinal cord and its extensions.
- Explain the differences between the meninges.
- Differentiate the spinal plexuses.
- Determine the origin, pathway and target organs of the spinal nerves.
- Classify the structures of the spinal cord on the given histology slides.
- Demonstrate an adequate understand of the material in this section.

Background

The spinal cord is made of white matter encompassed by gray matter with a central canal running through it that serves as a path for cerebrospinal fluid (CSF). The gray matter is divided into posterior (dorsal) grey horns which contain sensory neurons, and lateral and anterior (ventral) horns that contain the cell bodies of motor neurons. The surrounding white matter is divided into anterior (ventral) white columns, lateral white columns, and posterior (dorsal) white columns. The grey commissure is the gray matter posterior to the central canal where the neurons from either side of the spinal cord crossover. The same principle applies to the white commissure which lies anteriorly to the gray matter.

The spinal cord has several layers to protect it from damage. Beginning superficially and working our way deeper, the vertebral column encases the spinal cord and provides a hard shell for protection. Deep to the vertebrae are the meninges, consisting of the dura mater, arachnoid mater, and pia mater. Extensions from the pia mater, the denticulate
ligaments, suspend the spinal cord in CSF and act as a shock absorber.

The spinal cord begins at the terminal end of the brain stem and extends to approximately the L1 vertebra adults and L2 vertebrae in children; it is located within the vertebral foramen and is divided into 4 distinct regions. The cervical segment extends from C1 to the C7 vertebrae. The thoracic segment extends from T1 to the T8 vertebrae. The lumbar segment corresponds with T9-T11 vertebrae. Finally, the sacral segment extends from T12 to L2. The **cervical enlargement**, C4-T1, is a bulbous structure from which many neurons of the upper extremities invaginate. Likewise, the **lumbar enlargement**, T9-T12, is a bulbous structure from which neurons that innervate the lower limbs originate.

Note: do not confuse the regions of the spine with the regions of the spinal cord, they are not the same.

There are 31 pairs of spinal nerves: 8 cervical pairs 12 thoracic pairs, 5 lumbar pairs, 5 sacral pairs and 1 coccygeal pair. However, nerves from every other area along the spinal cord do not do this; they first converge in a network called a plexus. With the exception of the thoracic region, nerves of the cervical, brachial, lumbar and sacral regions of the spinal cord branch from a network of nerves known as plexuses.

**Vocabulary for Spinal Cord and Spinal Nerves can be found on page(s) 171-172.**