

Nerve Tissue

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NERVE TISSUE

The principal cells of nerve tissues are neurons and neuroglia.

Neurons

Neurons (nerve cells) are the cells of the nervous system that function in

- (1) the generation and
- (2) the conduction of the nerve impulse, and the (3) secretion of a neurotransmitter at their terminals.

Neurons have a cell body with one or more processes (nerve fibers) extending from them.

Neuroglia

Neuroglia are the cells and their associated branching fibers that support neural tissue.

- Four varieties of neuroglia found in the central nervous system are (1) ependymal cells, (2) astrocytes, (3) oligodendrocytes, and (4) microglia.
- Two varieties of neuroglia found in the peripheral nervous system are (1) satellite cells and (2) Schwann cells.

NERVE TISSUE

- **Locations**

Nervous tissue forms the nervous system which is organized into the central nervous system and the peripheral nervous system.

Central Nervous System

The central nervous system consists of the

- (1) brain, and the
- (2) spinal cord.

Peripheral nervous system

The peripheral nervous system consists of all the nervous system components, such as the nerves and neurons, that extend from or are located outside of the central nervous system.

NERVE TISSUE

- **Functions**

Nerve tissue functions in

- the regulation of the body's **responses to stimuli**, and the brain has the additional function of
- **cognition**, the ability to process information, to form ideas and beliefs based upon knowledge and reasoning.

Lab Activity 21 – Nerve Tissue - Spinal Cord

- Observe a microscopic preparation labeled "Spinal cord, cross section." Illustration of the general structure of the spinal cord as seen in cross section through the spinal ganglia.

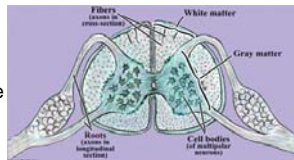


Fig. 8.74

Nerve Tissue - Spinal Cord

- Scanning power photograph of a cross section of a spinal cord through the spinal ganglia ("Spinal cord with ganglia, silver").

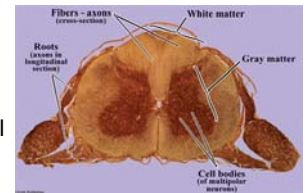


Fig. 8.75

Spinal Cord – Gray Matter

- Observe the spinal cord to identify the following: spinal cord's gray matter with cell bodies of neurons (multipolar) and the white matter with fibers (axons).
- Gray matter**
The gray matter is located to the inside of the cord and consists mostly of multipolar neurons (mostly association and motor neurons), unmyelinated fibers, and neuroglia. The gray matter is often described as being in the shape of "butterfly wings" or the letter "H."

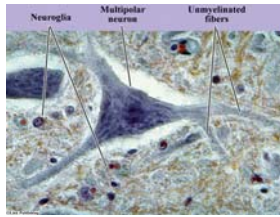
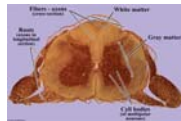


Fig. 8.76



Spinal Cord – White Matter

- White matter**
The white matter is located to the outside of the spinal cord's gray matter. The white matter contains mostly **axons and supporting neuroglia**.
- High power photograph (Fig 8.77) of the white matter of the spinal cord. Most of the axons are cut in cross section and show "remnants" of their myelin sheaths.

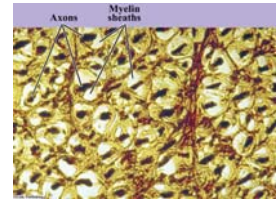
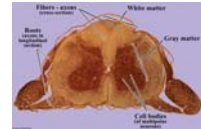


Fig. 8.77



Spinal Cord – Roots

- High power photograph of axons as seen in the roots of the spinal cord.

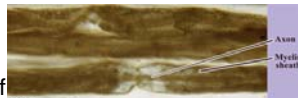


Fig. 8.78



Lab Activity 22 – Motor Neurons, Smear

- Microscopically, neurons are usually observed either in smears or in sections of nervous tissue. Microscopic observation of a single intact neuron is unusual because sectioning results in portions of the neuron being cut away, and smearing results in portions being torn and traumatized.

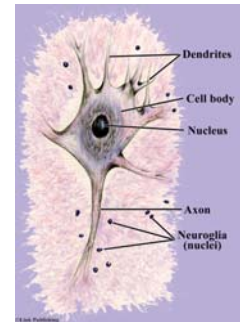


Fig. 8.79

Motor Neurons, Smear

- Scanning power photograph of a multipolar nerve cell from a slide preparation labeled "Motor nerve cells, spinal cord smear."



Fig. 8.80

Motor Neurons, Smear

- Low power photograph of motor nerve cells from a slide preparation labeled "Motor nerve cells, spinal cord smear." The general structure of multipolar neurons is observed.

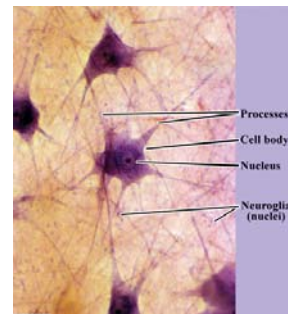


Fig. 8.81

Motor Neurons, Smear

- High power photograph of multipolar nerve cells from a slide preparation labeled "Motor nerve cells, spinal cord smear."

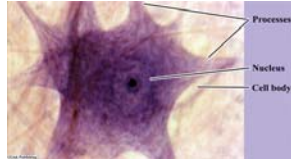


Fig. 8.82