

Difference Between Oligodendrocytes and Schwann Cells

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Key Difference – Oligodendrocytes vs Schwann Cells

Neuroglia or glial cells are nonneuronal cells which support the function of central and peripheral nervous systems. These cells protect neurons and prevent the loss of signals during the transmission through neurons. Glial cells surround neurons and form insulating layers around the axons. There are different types of glial cells. They include oligodendrocytes, astrocytes, ependymal cells, Schwann cells, microglia, and satellite cells. Oligodendrocytes are the glial cells which surround neurons of the central nervous system and insulate axons. Schwann cells are the glial cells which surround neurons of the peripheral nervous system and insulate axons. The key difference between oligodendrocytes and Schwann cells is that **a single oligodendrocyte can extend up to 50 axons and form myelin sheaths which are 1 μm length in each axon while a single Schwann cell can wrap around only a single axon and form one myelin segment.**

What are Oligodendrocytes?

Oligodendrocytes are glial cells that insulate the neuron axons of the central nervous system of higher vertebrates. These cells are found only in the central nervous system, which comprises of the brain and spinal cord. Oligodendrocytes are the prime supportive cells of the brain and spinal cord. They have a small cytoplasm surrounding a round nucleus and several cytoplasmic processes branch from the cell body.

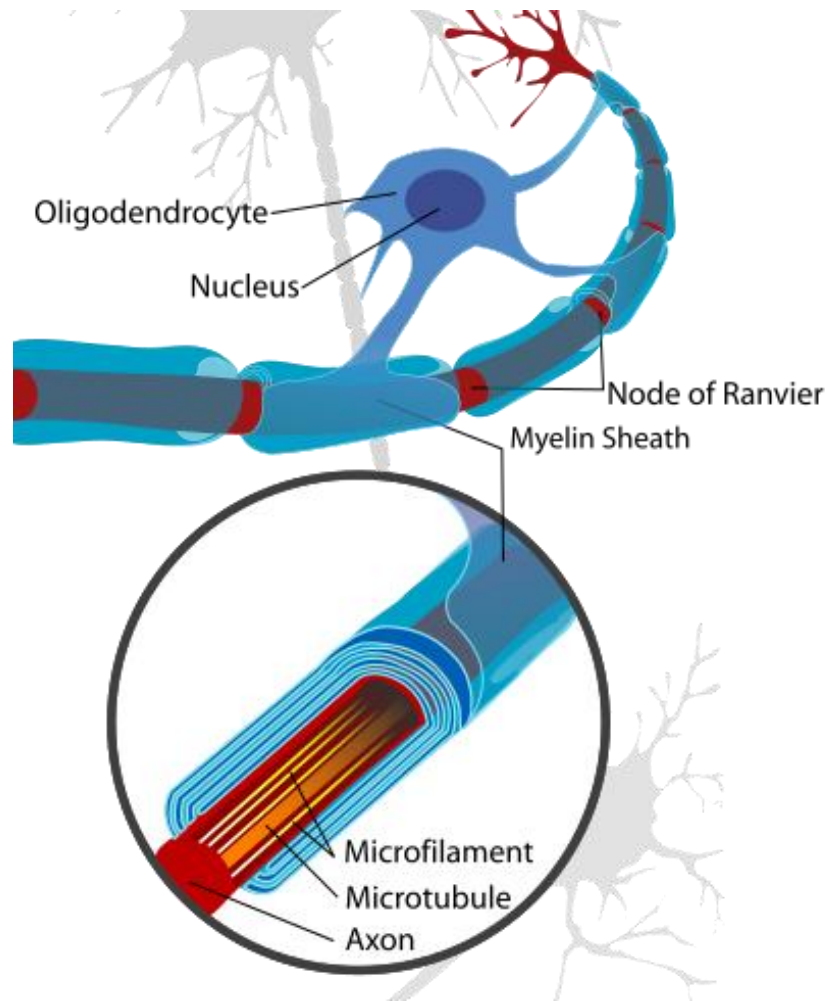


Figure 01: Neuron with oligodendrocytes

Oligodendrocytes form myelin sheaths around axons. Myelin sheaths insulate the axons to avoid the loss of signals and to increase the rate of signal transmission. A single oligodendrocyte is capable of creating myelin sheath segments for about 50 axons since cytoplasmic processes of a single oligodendrocyte can extend up to 50 adjacent axons and form myelin sheaths.

What are Schwann Cells?

Schwann cell (also called neurilemma cell) is a cell in the peripheral nervous system that forms the myelin sheath around the neuron axon. Schwann cells were discovered by German physiologist Theodor Schwann in the 19th century; hence they are named as Schwann cells. Schwann cells wrap the axon while keeping gaps between each cell. These cells do not cover the entire axon. Unmyelinated spaces remain between cells in the axon. These gaps are known as nodes of Ranvier.

All neuron axons are not wrapped with Schwann cells. Axons are wrapped with Schwann cells and insulated with myelin sheaths only when the speed of the electrical signal that travels along the neurons needs to be increased. Neurons with axons wrapped with Schwann cells are known as myelinated neurons and others are known as unmyelinated neurons. Schwann cells play a major role in increasing the speed of signal transmission through neurons. Hence, Schwann cells are considered as the principal support of the neurons.

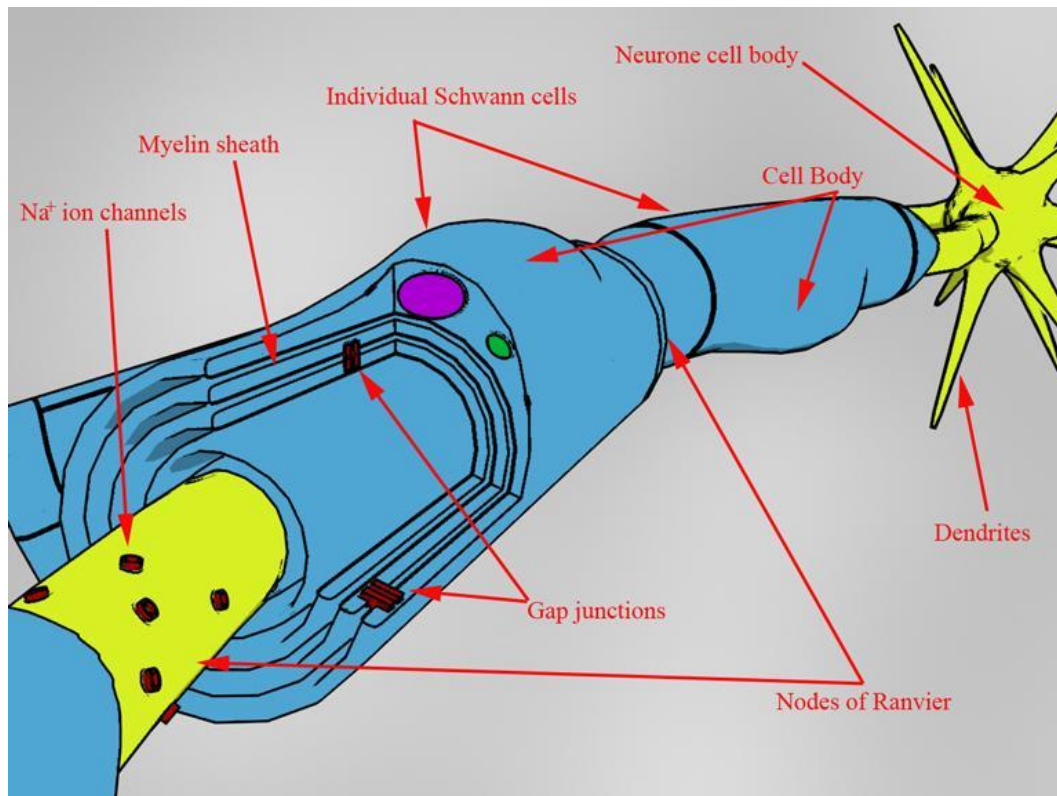


Figure 02: Schwann cells

What are the similarities between Oligodendrocytes and Schwann Cells?

- Oligodendrocytes and Schwann cells form myelin sheaths around the axons.
- Both cells are glial cells.
- Both cells support the signal transmission through the nerve cells.

What is the difference between Oligodendrocytes and Schwann Cells?

Oligodendrocytes vs Schwann Cells	
Oligodendrocytes are the cells which create myelin sheath around the axons of central nervous system.	Schwann Cells are the cells which create myelin sheath around the axons of peripheral nervous system.
Main Function	
Oligodendrocytes' main function is the insulation of the nerve axons in the central nervous system.	Schwann Cells' main function is the insulation of nerve axons in the peripheral nervous system.
Axons	
A single oligodendrocyte can extend into 50 axons.	A single Schwann cell can wrap only one axon.
Cytoplasmic Processes	
Oligodendrocytes have cytoplasmic processes.	Schwann cells do not have cytoplasmic processes.

Summary – Oligodendrocytes vs Schwann Cells

Oligodendrocytes and Schwann cells are glial cells which protect and support signal transmission through neurons. Both cells are capable of forming myelin sheaths around the neuron axons. Oligodendrocytes are found only in the central nervous system. They form myelin sheaths around the axons of neurons in the central nervous system. Schwann cells are found in the peripheral nervous system. Schwann cells form myelin sheaths around the axons of neurons in the peripheral nervous system. Oligodendrocyte surrounds many axons while Schwann cell wraps only around one axon. This is the difference between oligodendrocytes and Schwann cell.

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Image Courtesy:

1. "Neuron with oligodendrocyte and myelin sheath" By Neuron_with_oligodendrocyte_and_myelin_sheath.svg: *Complete_neuron_cell_diagram_en.svg: LadyofHatsderivative work: Andrew c (talk) – Neuron_with_oligodendrocyte_and_myelin_sheath.svg (Public Domain) via [Commons Wikimedia](#)
2. "Schwann" (CC BY-SA 3.0) via [Commons Wikimedia](#)

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