Axon Encyclopedia Article

Axon

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Axon

The axon, also called the nerve fiber, is the part of the nerve cell (neuron) which transmits nervous impulses. The axon leaves the nerve cell body (or soma) at an area called the axon hillock. Little offshoots from the axon are called axon collaterals, and may connect with other neurons. The area where the axon terminates, connecting with other nerve cells or with muscle cells, is called the synapse.

The nerve impulse originates in the soma, runs down the axon (possibly branching off to run down any axon collaterals), and ultimately reaches the end of the axon. At this synapse, the nerve impulse may be passed on to another neuron's soma, or to a muscle cell.

An axon may be quite short, or it may extend for as long as three feet throughout the nervous system. The thickness of axons also varies. Thicker axons tend to carry nerve impulses more quickly.

Many axons throughout the brain and body are covered by a specialized type of cell. In the brain and spinal cord, these cells are called oligodendrocytes. In the rest of the body, this wrapping function is performed by cells called Schwann cells. Oligodendrocytes or Schwann cells may be wrapped many times around the axon, so that the axon is covered with a thick layer of the oligodendrocyte's or Schwann cell's fatty membrane. This fatty white layer is referred to as the axon's myelin sheath, and greatly increases the speed of nerve conduction along the axon. Myelinated axons appear white, while unmyelinated axons appear gray. This is why some areas of the brain and spinal cord are referred to as containing white matter, while other areas are referred to as containing gray matter. Tiny interruptions in the myelin sheath are called nodes of Ranvier. These gaps are also considered to contribute to the speed of nerve conduction.

Problems which may affect axons include injury and disease. When an axon in the body is injured, but its soma remains intact, it is sometimes possible for the soma to grow a new axon. This may take up to two years. When an axon in the brain or spinal cord is injured, or when the neuron's soma is damaged or destroyed, no new axon will develop. Multiple sclerosis is a disease which destroys the myelin sheath along axons, slowing nerve impulses which travel along those axons.