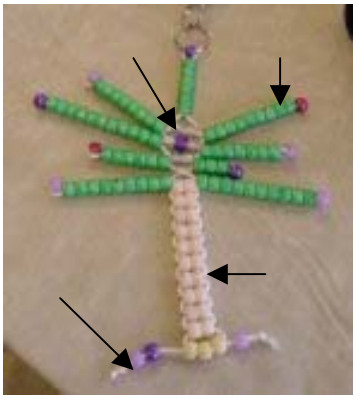
Does the color of the beads have any significance?

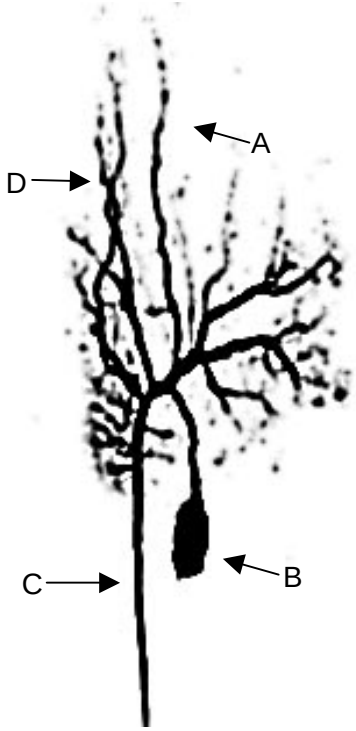
Bead colors have no relation to real life. In real life, neurons are kind of a milky color. Just select beads with contrasting colors so that you can point out the parts easily - in this image, green beads for the dendrite shaft, a red or lavender bead at the end for the receptor, white beads for the axon, etc.

Identify the following: cell body, dendrite, axon, nerve terminal



Are all neurons alike?

No, no two neurons are exactly identical in shape. Many neurons in the same brain area share similar shape characteristics.



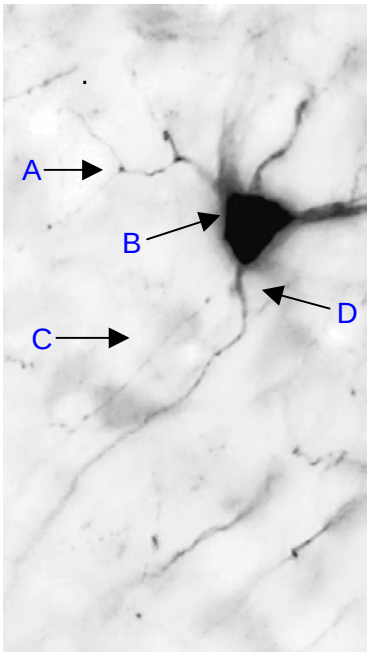
Label the parts of the neuron:

A *dendrite*

B *cell body*

C *axon*

D *dendrite*



Which part of the neuron is the input end? which the output end?

Dendrites receive input; axon nerve terminals send out chemical signals.

How does the signal transfer from one neuron's axon to the dendrite of a second neuron?

When the signal arrives at the nerve terminal, it is converted into a chemical signal to bridge the gap between the axon and the next set of dendrites.

What is a DRG?

Dorsal Root Ganglion - a sensory neuron that brings information from the skin or muscle and carries it to the spinal cord and brain.

Describe a Dorsal Root Ganglion neuron.

A DRG neuron is a sensory neuron with one very long branching axon associated with a large cell body to support it. DRG neurons live as a group outside the spinal cord on the back (dorsal) side of the body. Together, this group of neurons is called the Dorsal Root Ganglion. DRG neurons have no dendrites -- just one very long branched axon. The axon leaves the cell body and branches immediately into two long processes. One end of the branched axon - the input end - goes to skin or muscle (for example, in the baby toe) and the other end of the branched axon enters the spinal cord and runs to the base of the brain to synapse there. The DRG neuron's cell body must be big to support the long branched axon.

How does the electrical signal make it intact from input to output - especially in long neurons?

The electrical signal moves along axons faster if the axon is wider. But for very long lengths, fat axons are not feasible. So another cell wraps around the axons to provide insulation and speed up signaling. There are 2 kinds of cells that provide the insulation - their names depend upon where they live: in the brain and spinal cord (Central Nervous System, CNS) or outside of it (Peripheral Nervous System, PNS). Inside the CNS, these cells are called oligodendrocites. In the PNS they're called Schwann cells. Both oligodendrocites and Schwann cells produce a substance called *myelin* which is wrapped tightly around the axon to keep the electrical signal in the axon. Myelin is made of tightly packed oligodendrocyte or Schwann cell membranes that squeeze out all their cytoplasm as their cell membranes wrap more tightly around the axons.

Are all sensory neurons covered in myelin?

Some axons in the skin that carry pain do not have myelin; they are just bare axons that carry pain signals slowly. Pain information comes in as a constant steady signal that travels slower than other sensory information. Before you actually feel it hurt, you know you stubbed your toe from your sense of touch. Sensory information from touch and muscle stretch and position are more important to guide movements than feeling pain. So this information needs to travel rapidly into the nervous system. Pain is an important signal but other sensory information is more useful in guiding movement. This information which comes from touch, muscle position/stretch needs to travel rapidly into the nervous system. To speed this transport, sensory axons for touch and temperature are covered with myelin or *myelinated*.