

# NEURONS

## Neurons:

- transmit electrical signals
- have a high metabolism: require constant high levels of glucose whether at rest or active. The brain cannot use fatty acids or amino acids to produce ATP. However, during times of high stress or starvation (or low-carbohydrate diet), the brain can use ketones in the place of glucose.
- long-living, potentially our entire lives
- **amitotic**, meaning that after the newborn period, no more neurons are formed. Compare this to neuroglial cells, which are mitotic. Most brain tumors are caused by neuroglial cells, not neurons.

## Review of a two terms and introduction of two new ones:

- **Nucleus**: group of cell bodies in the CNS (always gray matter)
- **Ganglion**: group of cell bodies in the PNS (always gray matter)
- **Tract**: bundle of axons in CNS (usually white matter)
- **Nerve**: bundle of axons in PNS (usually white matter)

## Anatomy of a multipolar motor neuron

**Axon**: long process that projects toward another neuron's dendrites. **Action potentials** pass down the axon, being propagated over and over at each little patch of membrane.

**Schwann Cells**: PNS neuroglial cells that myelinate axons (wrap them in fat) for insulation. This makes sure the current doesn't fizzle out, but it also greatly speeds up the signal by allowing **saltatory conduction**. In multiple sclerosis, the body's white blood cells attack and destroy its own myelin sheaths.

**Nodes of Ranvier**: spaces between Schwann cells that allow **saltatory conduction**. This is when the current "jumps" from one node to the next, thereby traveling much more quickly than in unmyelinated axons.

**Axon terminal**: synapses with dendrites of another neuron; area where the signal briefly changes from electrical to chemical.

**Dendrites**: finger-like projections on the neuron which receive chemical signals from another neuron. These signals are in the form of neurotransmitters, tiny chemicals that bind to receptors on the dendrites. The binding of neurotransmitters to the dendrites is a stimulus that results in a **graded potential** (a tiny electric current of varying sizes) that passes up the dendrite, through the **cell body** and on to the **axon hillock**.

**Cell Body (soma)**: contains nucleus and most organelles.

**Axon hillock**: Small swelling in the neuron after the cell body and just before the axon. Graded potentials that arrive at the axon hillock may cause an **action potential** (an electric current that is always the same amplitude..unlike a graded potential).