

MOTOR NEURONS—3 TYPES

Somatic Motor Neurons:

- Found in the brainstem and the ventral horn of the spinal cord.
- Some of these fibers run in cranial nerves, such as somatic motor neurons in the Oculomotor nerve that move some of the eye muscles.
- All 31 pairs of spinal nerves contain at least some somatic motor neurons.
 - In the cervical and brachial regions, these somatic motor neurons exit the ventral horn, and innervate neck and arm muscles.
 - In the thoracic region, somatic motor neurons innervate the back muscles and the intercostal muscles.
 - In the lumbar and sacral region, somatic motor neurons innervate abdominal muscles, hip and leg muscles.
- When somatic motor neurons reach their effector muscle, they release acetylcholine onto the nicotinic cholinergic receptors found on the muscle.
- The action potential spreads through the muscle and causes it to contract.
- Somatic motor neurons are heavily myelinated.

Sympathetic Motor Neurons:

- Cell bodies found in the spinal cord between T1-L2.
- There are two neurons needed to get from the spinal cord to the effector site.
 - The first is called the preganglionic neuron (pre means first or before).
 - The preganglionic fiber synapses with a second neuron at a ganglion.
 - The preganglionic neuron releases Ach onto the ganglionic neuron.
 - The ganglionic neuron's postganglionic fiber then travels to its effector
 - ✓ Sympathetic targets (effectors) can be: cardiac muscle (the heart), glands (sweat, oil, salivary, lacrimal, mucus, pancreatic), or smooth muscle (which surrounds blood vessels, bronchioles, the uterus, the bladder, and the digestive tract).
- Sympathetic motor neurons that innervate the face, neck and chest cavity synapse in the sympathetic chain ganglia, located on either side of the spinal cord.
- Sympathetic motor neurons that innervate organs of the abdominal cavity synapse in front of the spinal cord on collateral ganglia. These nerves are called splanchnic nerves.
- **KEY IDEA: Postganglionic fibers of the sympathetic nervous system release NE onto the adrenergic receptors of the effectors.**

Parasympathetic Motor Neurons:

- Either found in cranial nerves, or from sacral nerves at the bottom of the spinal cord.
- About 70% of all the parasympathetic fibers in the whole body are found in the vagus nerve.
- The preganglionic fiber synapses with the ganglionic neuron on or near the effector. For example, there is a ciliary ganglion located behind the eye, and an otic ganglion located near the ear and salivary glands of the face.
- **KEY IDEA: Both the preganglionic and the postganglionic fibers release Ach onto the cholinergic receptors on the effectors.**
- Generally, the parasympathetic effectors are the same as the sympathetic; that is, cardiac muscle, smooth muscle and glands.