

Somatic nervous system

For the musician known as Somatic, see Hahn Rowe.

The **somatic nervous system** (SoNS) is the part of the peripheral nervous system ^[1] associated with the voluntary control of body movements via skeletal muscles. The SoNS consists of efferent nerves responsible for stimulating muscle contraction, including all the non sensory neurons connected with skeletal muscles and skin.

Nerve signal transmission

The somatic nervous system controls all voluntary muscular systems within the body, with the exception of reflex arcs.

The basic route of nerve signals within the efferent somatic nervous system involves a sequence that begins in the upper cell bodies of motor neurons (upper motor neurons) within the precentral gyrus (which approximates the primary motor cortex). Stimuli from the precentral gyrus are transmitted from upper motor neurons and down the corticospinal tract, via axons to control skeletal (voluntary) muscles. These stimuli are conveyed from upper motor neurons through the ventral horn of the spinal cord, and across synapses to be received by the sensory receptors of alpha motor neurons (large lower motor neurons) of the brainstem and spinal cord.

Upper motor neurons release a neurotransmitter, acetylcholine, from their axon terminal knobs, which are received by nicotinic receptors of the alpha motor neurons. In turn, alpha motor neurons relay the stimuli received down their axons via the ventral root of the spinal cord. These signals then proceed to the neuromuscular junctions of skeletal muscles.

From there, acetylcholine is released from the axon terminal knobs of alpha motor neurons and received by postsynaptic receptors (Nicotinic acetylcholine receptors) of muscles, thereby relaying the stimulus to contract muscle fibers.

Vertebrate and invertebrate differences

In invertebrates, depending on the neurotransmitter released and the type of receptor it binds, the response in the muscle fiber could either be excitatory or inhibitory. For vertebrates, however, the response of a muscle fiber to a neurotransmitter (always acetylcholine (ACh)) can only be excitatory.

Reflex arcs

A reflex arc is a neural circuit that creates a more or less automatic link between a sensory input and a specific motor output. Reflex circuits vary in complexity—the simplest spinal reflexes are mediated by a three-element chain, beginning with sensory neurons which activate interneurons in the spinal cord, which then activate motor neurons. Some reflex responses, such as withdrawing the hand after touching a hot surface, are protective, but others, such as the patellar reflex "knee jerk" activated by tapping the patellar tendon, contribute to ordinary behavior.

References

- [1] " somatic nervous system (http://www.mercksource.com/pp/us/cns/cns_hl_dorlands_split.jsp?pg=/ppdocs/us/common/dorlands/dorland/nine/20694579.htm)" at *Dorland's Medical Dictionary*

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