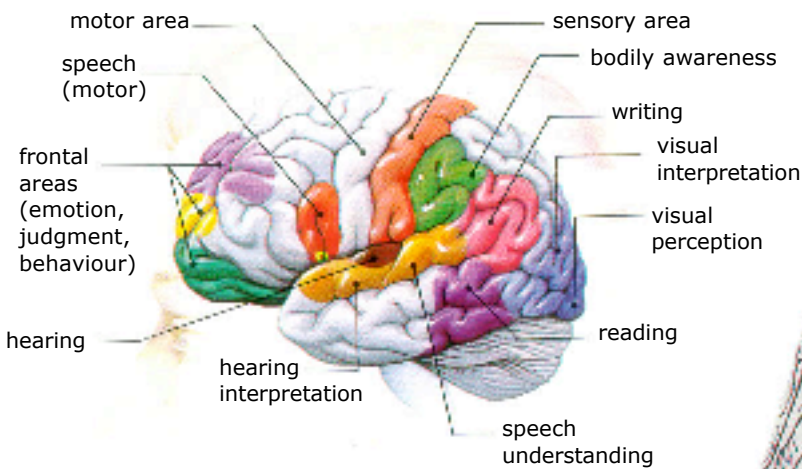
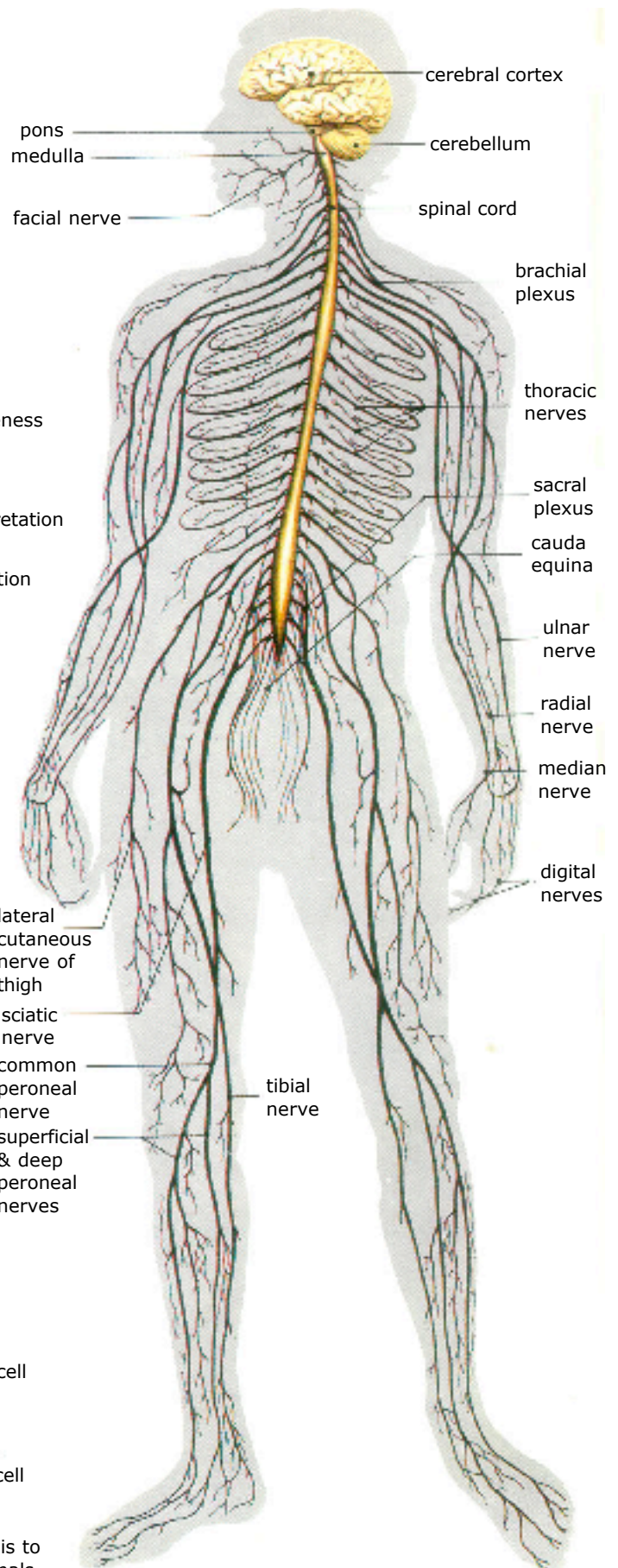
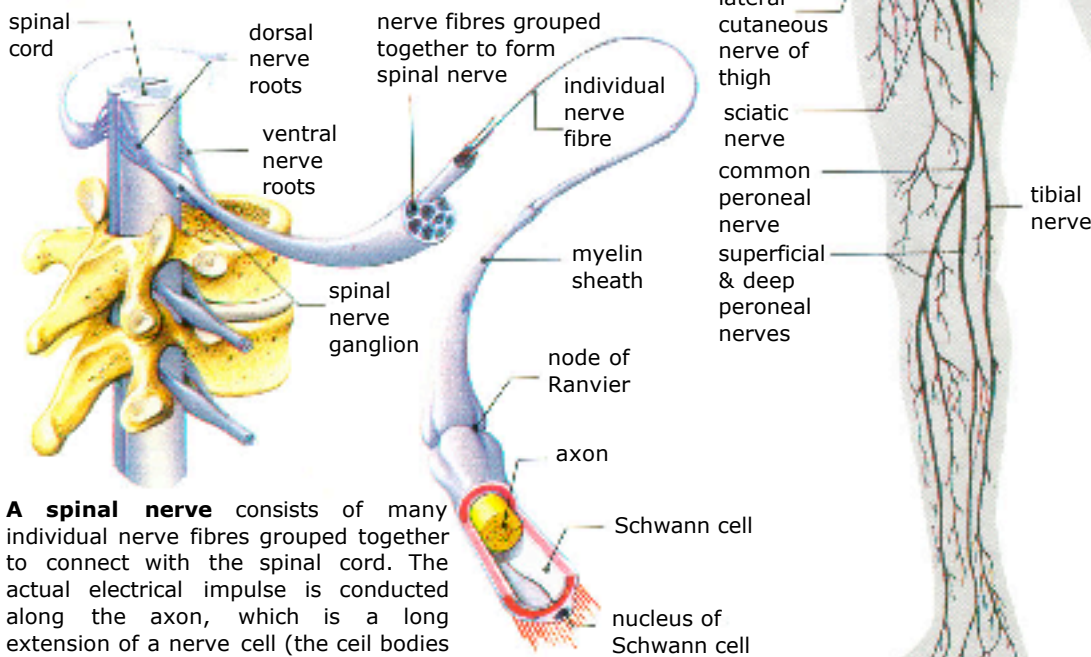


# The Nervous System 1

Nerves are complex fibres which conduct electrchemical impulses. Nerves to and from all parts of the body are grouped together within the spinal cord and conveyed to the brain, which controls and coordinates the nervous signals involved in any bodily function - innumerable in even the simplest activity. The nervous system can be divided into the motor system (muscular control), the sensory system (information from the senses to the brain) and the autonomic nervous system (bodily functions not under conscious control, e.g., digestion).



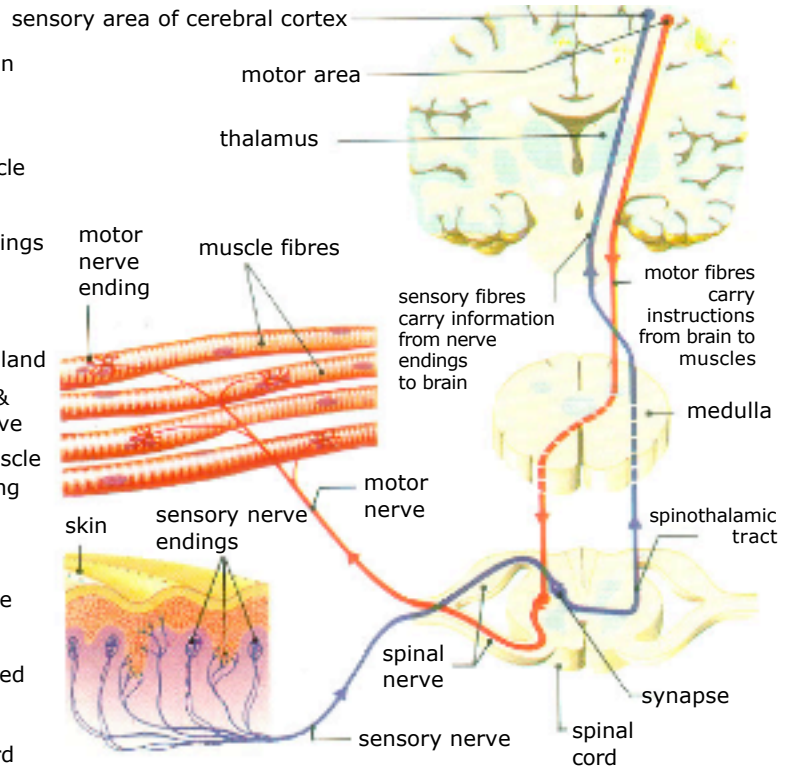
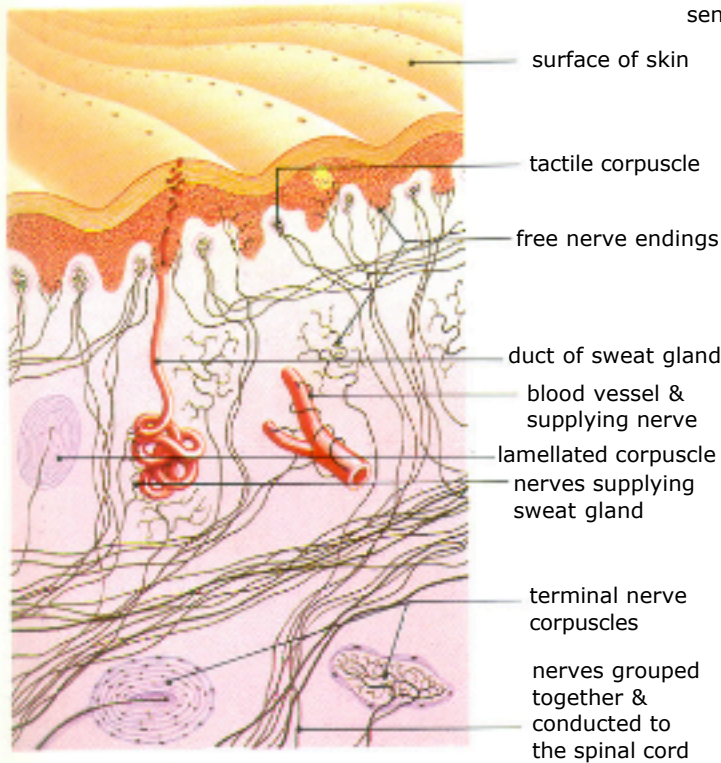
Each area of the **cerebral cortex** (outer layer of the brain) is concerned with a particular function. For example, voluntary movements are initiated in the motor area, while sensations of pain and touch are processed in the sensory area. Complex incoming signals may be collected together and processed in more than one area - for example, visual signals are perceived in one area and interpreted in another.



**A spinal nerve** consists of many individual nerve fibres grouped together to connect with the spinal cord. The actual electrical impulse is conducted along the axon, which is a long extension of a nerve cell (the cell bodies are contained in a swelling called a ganglion).

Most axons are enclosed in a fatty myelin sheath, whose function is to insulate the nerve and to accelerate the conduction of nervous signals. The sheath is part of a cell (Schwann cell) which surrounds the axon; between two Schwann cells there is an interruption in the sheath called a *node of Ranvier*.

# The Nervous System 2



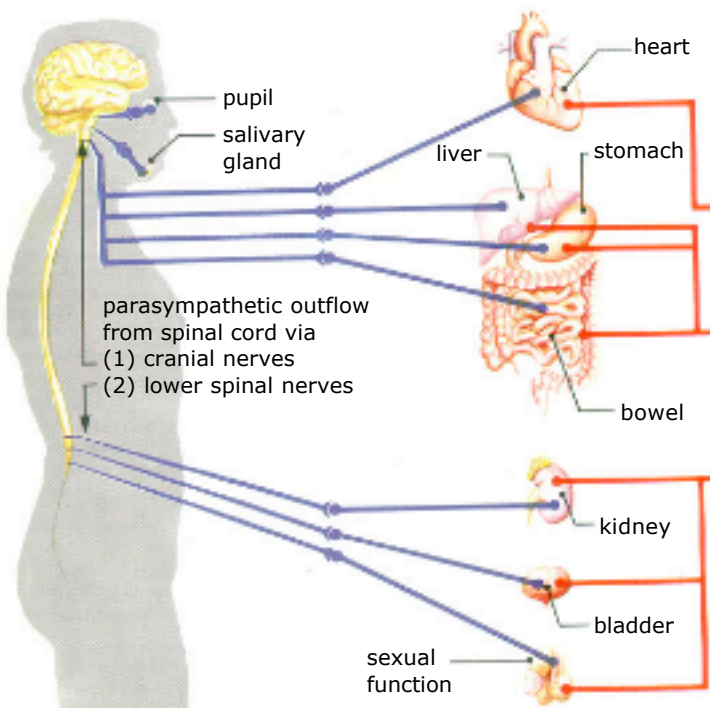
## Nerve supply of the skin

Both motor and sensory nerves are to be found in and just below the skin. The autonomic nervous system supplies nerve fibres to the sweat glands and capillaries; these control sweating and constriction or dilation of the capillaries and thus heat loss from the body through the skin. Sensory nerve fibres supplying the skin may terminate in various types of structures called corpuscles. It is not certain whether a particular type is concerned with a particular sensation, though the lamellated corpuscle is thought to be sensitive to vibration and pressure. Other sensory nerves have free nerve endings, which may be concerned with the sensation of pain. Where there are hairs, the hair follicle is also supplied by nerves from the autonomic and sensory systems.

## Motor and sensory nervous system

Sensory nerves carrying stimuli of pain, temperature, touch, etc., join the spinal cord via a spinal nerve. Those fibres carrying pain and temperature sensations (blue line) cross over to the other side of the cord; this involves the transfer of the stimuli from one nerve cell to another at a synapse. (Other sensations, e.g. touch, are conducted along a different route.) The fibres then ascend the spinal cord in the spinothalamic tract to the thalamus, and from there to the sensory cortex. Here, with the aid of other parts of the brain, the stimulus is interpreted. Motor nerves carrying nerves from the motor cortex to the voluntary muscles (red line) cross in the medulla of the brain stem before descending the spinal cord to leave via a spinal nerve.

## THE PARASYMPATHETIC NERVOUS SYSTEM



## THE SYMPATHETIC NERVOUS SYSTEM



## The autonomic nervous system

regulates the automatic functions of the body and its composed of the sympathetic and parasympathetic systems, which have opposing effects. The sympathetic system prepares the body for emergency action by reducing nonessential activities such as digestion. The sympathetic nerves are relayed from the sympathetic ganglia which form a chain long either side of the vertebral column. Stimulation of these nerves leads to increases heart and respiration rate, blood supply to the muscles and dilation of the pupils, while salivation and urine production and digestive activity are reduced. Ejaculation is also mediated by the sympathetic system, though penile erection is a parasympathetic function. The parasympathetic system involves the 3rd, 7th, 9th and 10th cranial nerves and the lower spinal nerves and comes into play during rest and sleep-slowing the heart and breathing, constricting the pupils and increasing digestion.