Nervous System

Functions of the Nervous system

- The basic roles of the nervous system are: **Sensation, integrative and motor (movement)**

Structure of the Nervous system

The nervous system has two primary divisions: -

- **Central Nervous system (CNS)** – consists of the nerves that run through the **brain** and the **spinal cord.** The brain interprets messages from the peripheral nervous system and the spinal cord helps transfer messages in and out of the CNS

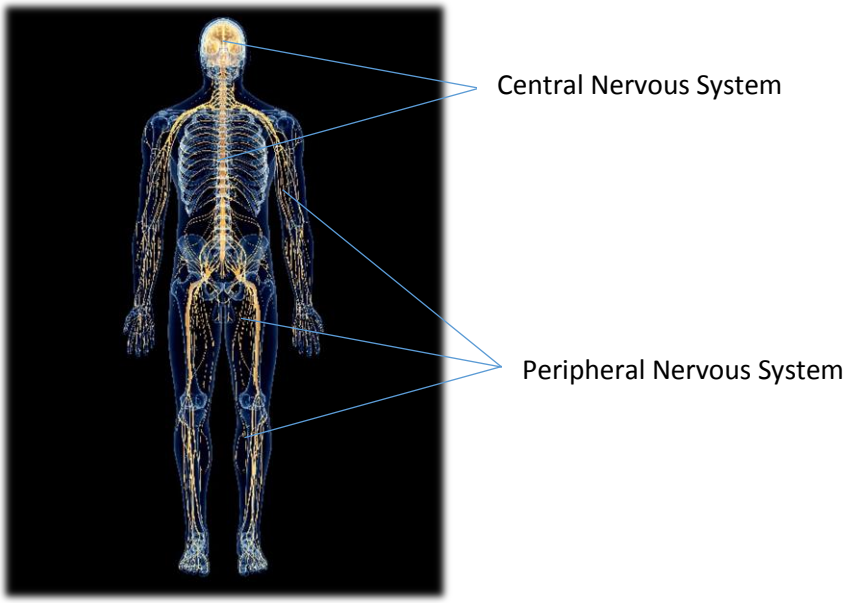
- **Peripheral Nervous system (PNS)** – consists of all of the other motor and sensory nerves throughout the body outside of the CNS. The PNS can be further divided:

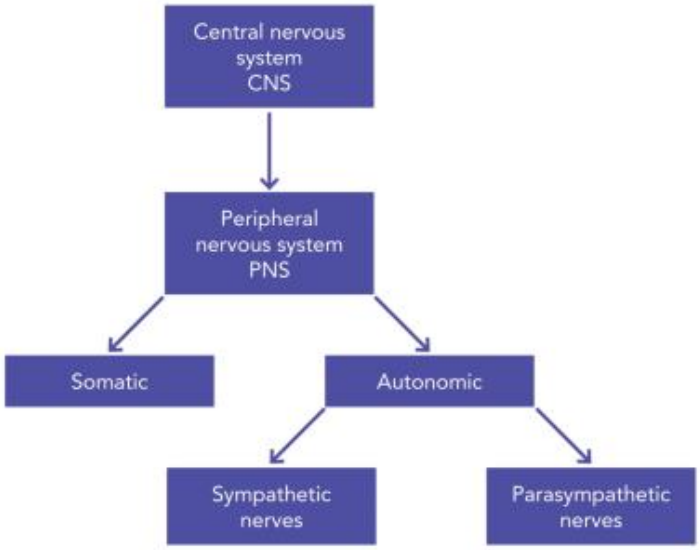
  - **Somatic** – controls all of the voluntary actions in our body e.g. muscle contractions

  - **Autonomic** – controls the actions in the body that we have no direct control over, such as heart beat. The autonomic can also be divided into two parts:

    - **Sympathetic** - responsible for speeding up processes in the body such as increasing heart rate

    - **Parasympathetic** – the opposite of sympathetic, the parasympathetic slows things down e.g. the heart rate during a cool down

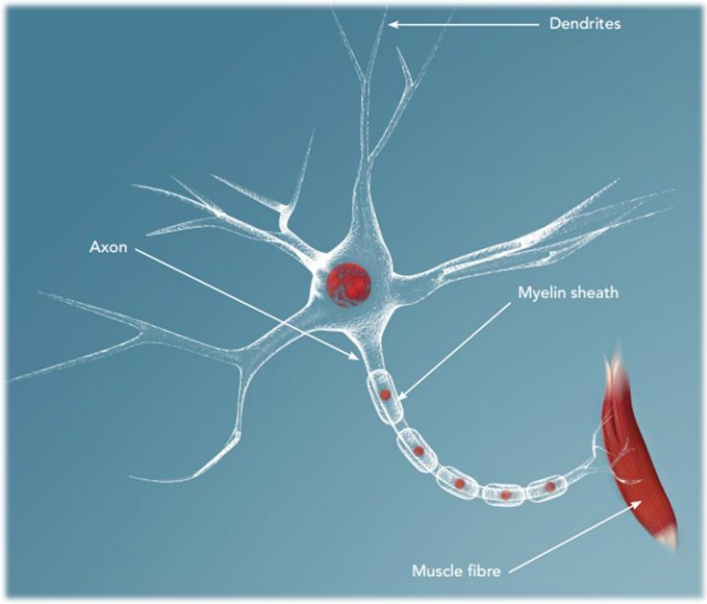




Nerve Impulses

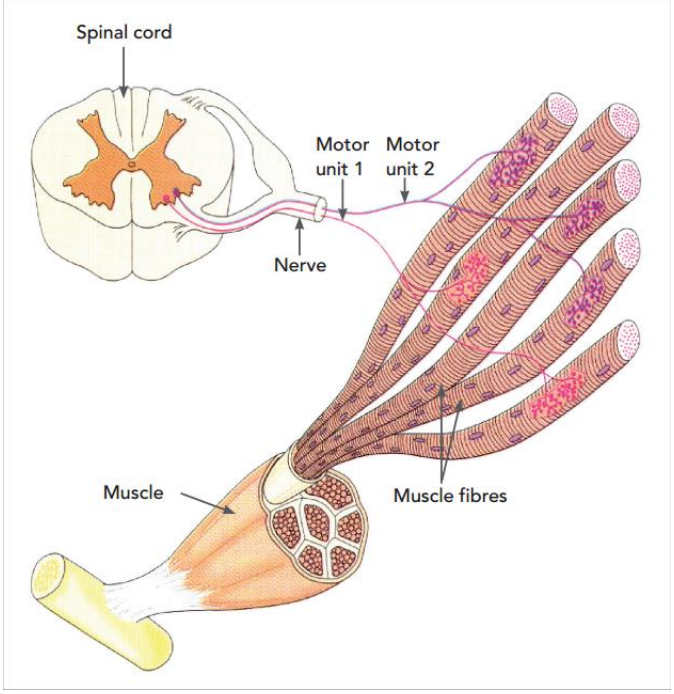
- Impulses or messages are passed through the nervous system via nerve cells called **neurons.**
- There are two types of neurons:
  - **Motor neurons** – transmit impulses from the CNS to the muscles and glands
  - **Sensory neurons** – transmit impulses from the PNS to the CNS to be interpreted by the brain e.g. heat or pain

Structure of a neuron



Motor unit recruitment

- A motor unit consists of one **motor neuron** and the corresponding bundle of **muscle fibres** it attaches to (see image below). In order for the muscle fibres to contract the neuron must receive a stimulus or nerve impulse, if there is no stimulus none of the muscle fibres will contract - this is known as the **all or nothing law**. The strength of a total muscle contraction depends on the amount of motor units that are stimulated and the frequency of the impulses.



Adaptations to exercise

- Improved frequency of nerve impulses to muscles (neuromuscular pathways) leading to an increase in motor units recruited (greater strength and control of contractions)
- Strengthening and growing new connections
- Motor units recruiting in a more synchronised fashion leading to increased strength of contractions