

The sympathetic and parasympathetic divisions of the ans

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It answers to stress by augmenting the heart rate and flow of blood to the muscles. It encompasses quick response and hence concerned with “fight or flight”.

The parasympathetic nervous system encompasses cranial nerves (nerves of the brain) and also the lower spinal nerves i. e. nerves of the sacral region.

The action of this system counteracts the sympathetic actions by increasing digestive secretions and decreasing the heartbeat. It is concerned with “rest and digest”.

The enteric nervous system controls the digestive movements and also the digestive secretions in the stomach and intestine.

It is evident that ANS encompasses afferent pathways that include information from the viscera and brain and hence maintain the homeostasis. It has both sensory and motor neurons to carry the information to and from the brain and spinal cord.

2. Describe how an action potential is propagated along an axon being sure to include the ionic basis for each part of the action potential. Describe the effects of myelination on conduction speed.

An action potential along the axon is dependent on the influx of sodium ions and the efflux of potassium ions. The phases of the action potential are rising phase- In the resting state, the inside of the neuronal cell is polarized (-70mv) as compared to its outside charge. Therefore, it is polarized.

Excitatory neurotransmitters like aspartate and glutamate released from their pre-synaptic neurons attach to post-synaptic dendrites, sodium channels open up leading to an influx of positively charged sodium ion gradually more and more sodium ion channel opens up resulting in positive

charge inside the cell (+40mv inside the cell) and the cell is said to be depolarized.

Now sodium ion channel close (peak phase)

Falling phase- sodium ion channels are closed and potassium ion channels open up as a result of potassium being an intracellular ion moves out through these channels and by this process, there is a net loss of positive charge as potassium is a positively charged ion.

Myelinated axons prevent the back diffusion of ions to outer space and ensure fast and rapid conduction of action potentials. Myelinated neurons contain nodes of Ranvier, through this action potential jumps, this is called salutatory conduction.

3. Compared to other areas of the body, the brain has protective mechanisms/layers. What provides protection for the brain and how does it protect the brain?

The layers which protect the brain encompass: 1. Skin, 2. Skull (the bony cage). 3. Cerebral Arteries. 4. Meninges (Dura mater, Arachnoid membrane, and Pia mater) containing CSF (Cerebro Spinal Fluid) which acts as a shock absorber.