Cell Membrane and Transport

29/06/2015 11:08 AM

Describe the Characteristics of the phospholipid Bilayer.
The Phospholipid bilayer is made up of a double layer of membrane lipids that have a hydrophobic (doesn't like water) tail and a hydrophilic (likes water) head. The two hydrophobic tails consist of 1 saturated fatty acid tail and one unsaturated fatty acid tail which adds to the fluidity of the tails that are constantly in motion. The hydrophilic heads are attracted to both the intracellular and extracellular fluid.

Describe how proteins and carbohydrates contribute to the structure and function of the cell membrane.
Carbohydrates within the cell membrane provide lubrication and protection for the cell. Glycoproteins are used for recognition as certain carbs will recognize specific molecules that will then bind with the cell. Integral proteins such as channel protein are proteins that are embedded into the cell membrane. Peripheral proteins are ones that are on the inner or outer surface of the cell membrane. Channel proteins allow for water and ion movement through the cell but are molecule specific so anything cant pass through. Anchoring proteins stabilize the cell in position such as attaching it to the cytoskeleton.

Explain why the cell membrane is more permeable to lipid soluble substances and small molecules than to larger water soluble molecules.
The Phospholipid Bilayer allows substances that are lipid soluble to pass directly through the membrane. Because the tails of the phospholipids are hydrophobic water soluble substances cannot pass through. Because they can not pass directly through the membrane these substances rely on channel protein to be able to pass through. As the channels control what can pass through substances and larger molecules such as glucose must rely on carrier protein to be able to pass through.

Describe how the following mechanisms facilitate the transport of substances across cell membranes:
diffusion: diffusion refers to molecules moving from areas of high concentration to areas of low concentration
osmosis : The diffusion of water
facilitated diffusion: Uses carrier proteins to help with diffusion but doesn't require energy.

active transport: Requires energy to move across the cell membrane and does not rely on concentration gradients. This includes ion pumps and exchange pumps.
Endocytosis: Substances are wrapped in a membrane and transported into a cell.
Exocytosis: Substances are wrapped in a membrane and transported out of a cell

Describe the effects of isotonic, hypertonic and hypotonic solutions on cells.
Isotonic solutions have the same osmolality as inside a cell. This will cause an equal amount of water to enter the cell as what exits
A solution that has a higher concentration of solutes than another solution is said to be hypertonic, and water molecules tend to diffuse into a hypertonic solution. Cells in a hypertonic solution will shrivel as water leaves the cell via osmosis.
In contrast, a solution that has a lower concentration of solutes than another solution is said to be hypotonic, and water molecules tend to diffuse out of a hypotonic solution. Cells in a hypotonic solution will take on too much water and swell, with the risk of eventually bursting.

Nervous System

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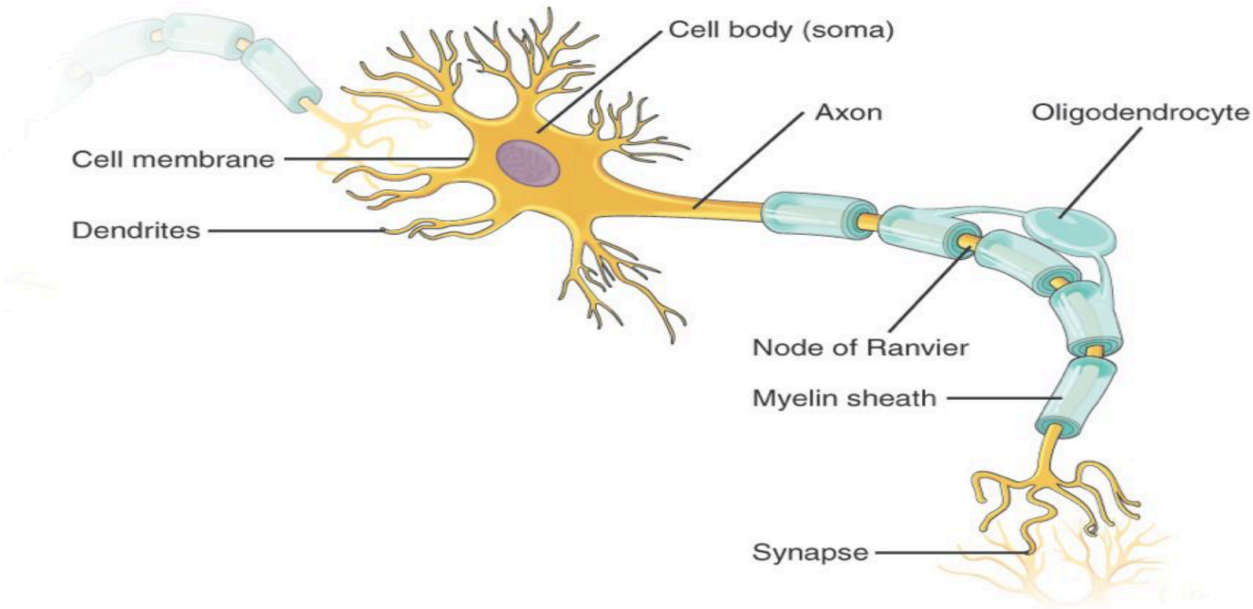
Distinguish between the anatomical and functional organisation of the nervous system and list the components of each.

The anatomical division of the central nervous system consists of the central nervous system (CNS) which consists of the brain and spinal cord and the Peripheral nervous system which consists of the peripheral nerves.

The functional division of the nervous system is made up of the central nervous system (brain and spinal cord) and the Peripheral nervous system which consists of the Afferent and Efferent divisions.

Label the structure of a typical neuron.



Describe the structure and function of the myelin sheath.

The myelin sheath is a membrane layer that is produced by the Oligodendrite and surrounds the axon. It provides electrical insulation and speed up the rate that electrical impulses can travel along the axon.

Describe how resting membrane potential (transmembrane potential) is created and maintained.

The resting potential of a cell is the transmembrane potential of an undisturbed cell. Sodium and potassium ions move in and out of a cell via a exchange pump. They are maintained by a electrical gradient to an area of negative charge. As potassium ions leak out of the cell sodium ions will

come in to maintain the . For every two potassium ions the exchange pump takes back into the cell it will expel 3 sodium ions maintaining the resting membrane potential.

Describe the events involved in the generation and propagation of an action potential.

Action potentials is a propagated change in the transmembrane potential. They are electrical impulses. Action potential are an al or none response so it either trigger a normal or full response or nothing at all. Voltage gated channels are triggered by the voltage inside the cell (-60mv for sodium ion channels) and when this is reached the channels opens and allows sodium ions to rush into a cell. This continues until the cell reaches +30mv and the channel will close. At +30mv potassium channels will open and potassium ions will rush out of the cell. This then lowers the voltage (depolarization) and the channels close at -70mv but a delay allows it to continue until -90mv.

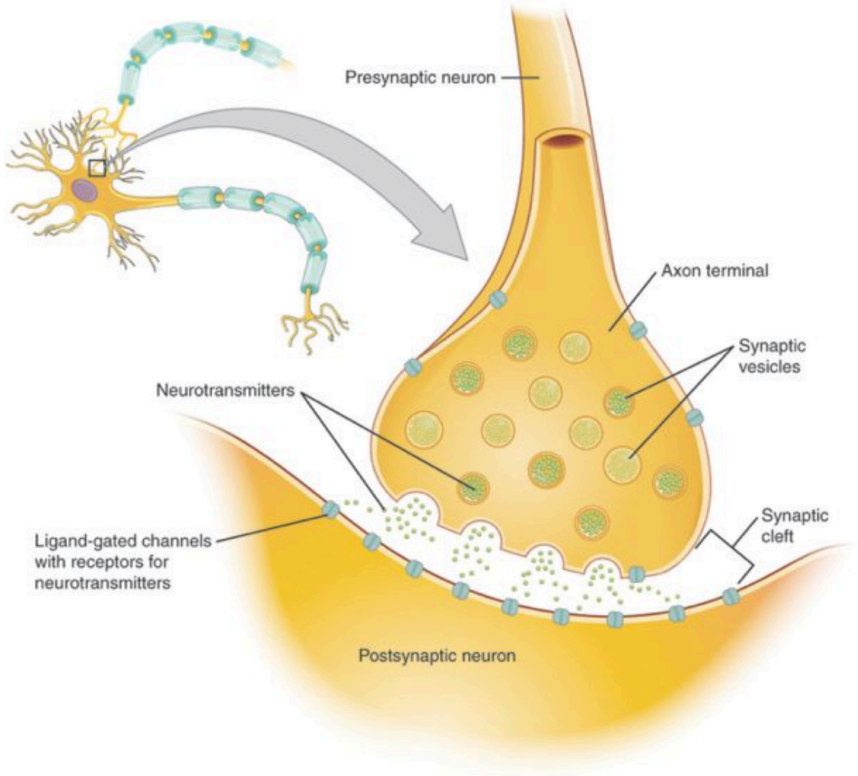
List the factors that affect the speed of action potentials.

Myelin sheath: are large and thick sheath will lead to faster action potentials.

Axon Diameter: Large = fast, Small = slow.

Describe the structure of a synapse.

At the end of an axon is a synaptic terminal. On this are many neurotransmitters that send messages to the post synaptic terminal on another cell. Between these two parts is a communication membrane int the synaptic cleft the signals are send across.



Distinguish between an electrical and a chemical synapse.

A chemical synapse involves a neurotransmitter.

An electrical synapse has direct physical contact between cells. (Rare).