Nerve Impulse

The activation of a neuron by heat, light, or pressure in the nervous system results in the cells' electrical impulse and action potential. The resting potential in the nerve impulse is disrupted during the activation of a neuron causing a difference in the electrical charges in the cells (Patri, 2019). For instance, when an individual steps on a sharp object, a signal arises from the differences in the voltage potential between the inside and outside of the nerve cell region. During the action potential involving the neuron activation, nerve cells usually transmit impulses through the synaptic clefts. The nerve causing the impulse, the presynaptic nerve, releases a neurotransmitter substance that assists in binding to the receiving nerve known as the postsynaptic nerve on the adjacent cells (Holland, De Regt, & Drukarch, 2019). In the molecular cells of the human body, the postsynaptic nerves also the receiving nerves undergo a signal transduction cascade, a process in which the proteins receive and detect the stimuli.

Besides, the process of receiving the nerve impulse and stimuli involves depolarization, in which a change in the voltage-gated sodium channels within the nerve is opened with the positively charged ions of sodium getting absorbed into the neuron. The voltage-gated sodium channels in the nerve cell enhance the permeability of the nerve cell, thereby proliferating the action potential in the cells (Patri, 2019). The inner sections of the cell membrane acquire a positive charge compared to the outer sections of the cell membrane. Besides, the ligand-gated ion channels (LGICs) as critical protein-bearing membranes provide porousness in regulating the specific ions within the plasma membranes (Wang et al., 2021). Within the nerve system, an influx of ions arises from the active drive from the differences in the electrochemical gradients between the inner and outer membranes of the cells.

On the other hand, the G protein-coupled receptor (GPCR) are proteins situated in the cell membranes that attach to the extracellular materials in the cell and are responsible for ensuring the transmission of electric signals to the inner molecules of the guanine protein substances. The G-protein-linked receptor is responsible for detecting molecules external to the cell while initiating the process of activating the cell responses. Thus, the G-protein-linked Receptor is critical in binding to the neurotransmitters, thereby enhancing the passage of nerve impulses (Casas et al., 2017).

Further, agonists refer to chemical substances that imitate the approach of the neurotransmitters within the receptor sites, thereby improving the neurotransmitter effects between the presynaptic and postsynaptic clefts. The antagonists inhibit and block the action of the neurotransmitters during the resting potential within the nerve system by binding to the synaptic receptors. The agonists and antagonists could also be ingested as drugs within the body, thereby acting as the facilitators and inhibitors in the transmission of neurotransmitters within the synaptic cleft (Patri, 2019). The partial agonist refers to ligands attached to the agonist chemicals while triggering a lower response in the receptor cells' action potential, acting as an antagonist. The inverse agonist as a ligand also attaches to the receptor cells similar to the agonists' action, thereby provoking the agonist's actions within the receptor sites (Patri, 2019). During the nerve impulse, the stimuli result in the nerve endings' polarization, generating action potential along the axons that endeavor to enhance response. The generation of the electric charges within the nerve endings results in sensory transduction and consequently an individual's action.

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