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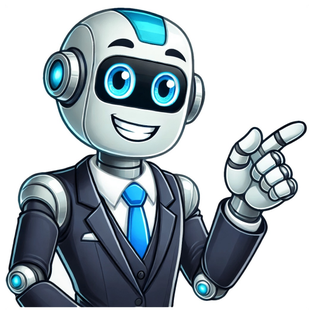

Parasympathetic nervous system

The parasympathetic nervous system is a vital component of the autonomic nervous system, responsible for regulating various bodily functions such as digestion and urination. This system works in harmony with the sympathetic nervous system to maintain homeostasis. The parasympathetic nervous system is also known as the craniosacral division, as its central components are located within the brain and sacral spinal cord. The main function of the parasympathetic nervous system is to promote relaxation and conserve energy. It slows down heart rate, relaxes sphincter muscles in the gastrointestinal and urinary tracts, and increases intestinal and gland activity. This ultimately leads to conserving energy and regulating basic bodily functions. In contrast, the sympathetic nervous system is responsible for the "fight or flight" response, which occurs during stressful situations. The parasympathetic and sympathetic systems have opposite functions, highlighting their complementary roles in maintaining overall health. The cranial outflow of the parasympathetic nervous system involves several nerves, including the oculomotor nerve, facial nerve, glossopharyngeal nerve, and vagus nerve. These nerves regulate various bodily functions such as pupil dilation, salivation, taste, swallowing, and heart rate. The sacral outflow involves the pelvic splanchnic nerves, which control the bladder, rectum, and reproductive organs. The parasympathetic nervous system consists of multiple pathways that connect its craniosacral components with peripheral tissues. Each pathway consists of two neurons: presynaptic (preganglionic) and postsynaptic (postganglionic) neurons. The presynaptic neurons are located within the medulla oblongata and sacral spinal cord, while the postsynaptic neurons are found within parasympathetic ganglia near or within target organs. ### The parasympathetic nervous system's cranial portion originates from nuclei of cranial nerves III, VII, IX and X. These nerves connect to parasympathetic ganglia in the head, enabling communication with target organs. The oculomotor nerve (CN III) carries presynaptic fibers that synapse at the ciliary ganglion, affecting the ciliary muscle and sphincter pupillae. Facial nerve (CN VII) transmits presynaptic fibers to pterygopalatine and submandibular ganglia, which then project postsynaptic fibers. The glossopharyngeal nerve (CN IX) conveys presynaptic fibers that synapse at the otic ganglion, providing parasympathetic innervation to the parotid gland via the auriculotemporal nerve. In contrast, the vagus nerve (CN X) primarily supplies parasympathetic innervation to thoracic and abdominal viscera, with presynaptic fibers originating from the dorsal nucleus of the vagus nerve and the nucleus ambiguus. These fibers synapse at various ganglia in the thorax and abdomen, leading to innervation of target organs such as the lungs, gastrointestinal tract, heart, pharynx, larynx, and soft palate. The fibers that make up the parasympathetic system exit the spinal cord through the anterior roots of the sacral nerves S2-S4 and the pelvic splanchnic nerves, which are branches of these nerves. These fibers then connect with the parasympathetic ganglia located near the descending and sigmoid parts of the colon, rectum, and other organs in the pelvic cavity. The ganglia send out postsynaptic fibers that innervate these organs. The autonomic nervous system, which includes the parasympathetic and sympathetic systems, controls and regulates various bodily functions without conscious effort. The parasympathetic system plays a crucial role in maintaining homeostasis by complementing the functions of the sympathetic system. Parasympathetic fibers are sent to various organs to control different involuntary functions, such as digestion, heart rate, and bowel movements. The cranial outflow provides parasympathetic innervation to the head, while the sacral outflow provides innervation to the pelvic viscera. However, the vagus nerve is responsible for approximately 75% of all parasympathetic outflow in the body, supplying the thoracic and abdominal viscera. The parasympathetic system also controls various functions such as pupil constriction, tear production, salivation, and digestion. The vagus nerve stimulates the release of digestive juices and enzymes from the stomach, pancreas, and gallbladder, and increases peristalsis in the gastrointestinal tract. Additionally, the parasympathetic system causes contraction of the rectum and relaxation of the internal anal sphincter to enable defecation. The vagus nerve innervates the abdominal viscera by forming plexuses along the length of the intestine, including the submucosal nervous plexus. The parasympathetic nervous system plays a crucial role in regulating various bodily functions, including heart rate and digestion. The myenteric plexus, located in the muscularis externa of the digestive tube, contains both parasympathetic and sympathetic fibers from the vagus nerve (CN X). Parasympathetic stimulation slows heart rate by acting on the atrioventricular node, while also relaxing peripheral blood vessels, leading to vasodilation. In contrast, sympathetic stimulation constricts coronary vessels in response to reduced oxygen demand. The parasympathetic nervous system also contracts smooth muscles in the tracheobronchial tree, causing bronchoconstriction and increased mucus secretion. In addition, it stimulates the internal sphincter of the urinary bladder, promoting urination, and causes erection of the penis/clitoris. Diabetic cardiac autonomic neuropathy is a serious complication of diabetes that can lead to severe morbidity and mortality due to its effects on cardiovascular function. The condition involves degeneration of sympathetic control over the heart, followed by parasympathetic stimulation in later stages. This leads to cardiovascular disturbances such as resting tachycardia, exercise intolerance, and postural hypotension. The parasympathetic nervous system is a crucial part of the autonomic nervous system, which regulates various involuntary functions in the body. This system uses four cranial nerves and connects to vital internal organs such as the heart, lungs, and digestive tract. The vagus nerve, comprising about 75% of the parasympathetic nervous system, extends from the mouth to the chest and abdomen. It plays a significant role in regulating digestion, bowel movements, and bladder function. Your parasympathetic nervous system is a vital part of your autonomic nervous system, which regulates various involuntary functions in your body. It consists of neurons that generate and receive signals to control processes such as digestion, breathing, and heart rate. The system uses four cranial nerves, with the vagus nerve being the most important, connecting to organs like the heart, lungs, and bladder. The parasympathetic nervous system works to conserve resources and restore homeostasis, often in opposition to the sympathetic nervous system. Its components are similar to those found in other parts of your nervous system. The parasympathetic nervous system (PSNS) plays a vital role in maintaining the body's internal balance and function, working in harmony with the sympathetic nervous system to regulate various bodily processes. As part of the autonomic nervous system, the PSNS utilizes nerves and neurotransmitters to control organs and tissues, adapting to the body's needs. The system is responsible for promoting relaxation, digestion, and restful sleep, while also regulating heart rate, blood pressure, and breathing. Functions of the parasympathetic nervous system include secreting saliva, maintaining a resting heart rate, producing digestive enzymes, balancing fluid levels in the kidneys, constricting pupils, and regulating focus and concentration. These functions are finely tuned to meet the body's needs, such as when focusing on details or during relaxation. The PSNS is often described as promoting a rest-and-digest state, but it also collaborates with the sympathetic nervous system to regulate cellular and organ activity. The body relies on a delicate balance between these systems, and an imbalance can lead to issues such as anxiety, stress, and digestive problems. Engaging in activities that stimulate the parasympathetic response, such as relaxation techniques like meditation or deep breathing, can help promote overall well-being. However, individuals who struggle with anxiety or stress may require guidance from a therapist or coach to learn how to deliberately engage their PSNS. Some medical conditions are linked to the deregulation of the parasympathetic nervous system. This can cause issues like heart disease, respiratory problems, sleep disorders, mental health conditions, and behavioral conditions. Many physical and mental health disorders involve fluctuations in symptoms that affect the autonomic nervous system. For instance, anxiety disorders may lead to overeating or loss of appetite, as well as indigestion, nausea, and vomiting. Symptoms of parasympathetic dysfunction can include dizziness, confusion, anxiety, sadness, excessive sleepiness or insomnia, rapid heart rate, shortness of breath, cold hands and feet, sweating, dry mouth, throat tightness, and stomachaches. These symptoms can develop quickly and resolve just as fast. Most people experience parasympathetic dysfunction in response to unexpected stressful events, which is considered a normal response in frightening or anxiety-provoking situations. Certain medications or drugs may also induce parasympathetic overactivity or underactivity that persists until the substance is metabolized and eliminated from the body. The parasympathetic nervous system involves nerves that release hormones and neurotransmitters, as well as those that respond to them. Activation and response of the parasympathetic nervous system occur throughout the body, primarily in the brain, heart, lungs, stomach, intestines, muscles, liver, kidneys, reproductive organs, eyes, and mouth. The vagus nerve, one of the cranial nerves, is closely linked to parasympathetic activity and runs from the brainstem to the throat, heart, lungs, and digestive system. Several interventions aim to regulate the activity of the parasympathetic nervous system by targeting the vagus nerve. Living with parasympathetic dysfunction can be challenging, and treatment may involve a combination of behavioral therapies and medication to manage symptoms and prevent life-threatening complications. The parasympathetic nervous system, often referred to as the "rest-and-digest" portion, plays a crucial role in maintaining basic bodily functions such as heart rate, breathing, digestion, and sleep. While it operates autonomously, individuals can influence its activity to promote relaxation and reduce stress. Symptoms of parasympathetic instability may arise, necessitating professional guidance from a healthcare provider. The parasympathetic nervous system is one half of the autonomic system, functioning in tandem with the sympathetic nervous system. Both systems begin in the brain and extend to organs via nerve fibers. The parasympathetic system regulates various bodily functions, including tear production, saliva secretion, stomach contractions, and blood vessel dilation. Special receptors in the heart, known as muscarinic receptors, inhibit sympathetic activity, maintaining a healthy resting heart rate. In contrast, the sympathetic nervous system increases heart rate, providing energy for physical activity. The parasympathetic nervous system's performance can be evaluated through resting heart rate, with normal rates ranging from 60 to 100 beats per minute. However, factors such as medication use or medical conditions may affect this measurement. For instance, heart failure can impair the vagus nerve's function, leading to abnormal heart rhythms. The parasympathetic nervous system plays a vital role in maintaining the body's balance and overall health. It is responsible for promoting relaxation, reducing stress, and conserving energy. The system has 12 cranial nerves that control various functions such as heart rate, digestion, urination, and respiratory movements. The parasympathetic nervous system can be activated by certain stimuli, leading to increased heart rate, which helps the body pump more blood throughout its systems. This is essential for maintaining adequate oxygenation and nutrient delivery to tissues. Some of the key functions of the parasympathetic nervous system include: - Stimulating salivation to aid in digestion - Producing tears to lubricate eyes - Contracting the bladder to facilitate urination - Regulating digestion by stimulating peristalsis and releasing bile - Constricting sphincters to move digested food down the digestive tract Proper functioning of the parasympathetic nervous system is crucial for maintaining overall health. Any dysfunctions can lead to various bodily issues, making it essential to consult a doctor if you suspect any problems.