DOWNLOAD PDF GENERAL PHYSIOLOGY OF MUSCLES AND NERVES

Chapter 1 : General Anatomy and Physiology of a Human: TEAS || theinnatdunvilla.com

Excerpt. In accordance with the title of the book, I have omitted too scientific proofs, references, &c. The names of men of science to whom the discovery of the facts is due have only been occasionally introduced.

Nerves arising from the spinal cord are the spinal nerves. There are 12 pairs of cranial nerves and these pairs of nerves passage through foramina in the skull , either individually or in groups. Cranial nerves are traditionally referred to by Roman numerals and these numerals begin cranially and run caudally. The most cranial nerve is the Olfactory nerve I which runs from the nasal cavity through to the olfactory bulb. The next most cranial is the Optic nerve II which runs from the eyes to the thalamus. Cranial nerves III to XII all exit from the brain stem and innervate the head, neck and organs in the thorax and abdomen. Many of the cranial nerves with nuclei within the brain stem contain sensory and motor neurone components. The sensory fibre components have their cell bodies located in ganglia outside the central nervous system and the motor fibre element have their cell bodies within the central nervous system. Cranial Nerve Fibre Types Prior to a full explanation of each cranial nerve function, physiology, anatomy and particularly composition, the numerous types of nerve fibre found in cranial nerves must be explained to ensure that the following can be better understood. Nerve fibres can undertake numerous roles within the body and their function is dictated by what type of fibre the nerve is composed of. A classification scheme is used to describe the type of fibres found within the cranial nerves and therefore provides a better understanding of the function and composition of that particular nerve. Below is a brief outline of this nerve fibre classification. These fibres mainly supply sensation to various areas of the head including to the skin and face via the trigeminal nerve cranial nerve V ; to the skin of the external ear via the trigeminal nerve cranial nerve V , the facial nerve cranial nerve VII , the glossopharyngeal nerve cranial nerve IX and via the vagus nerve cranial nerve X ; to the mucosae of the oral cavity via the trigeminal nerve cranial nerve V and to the meningies of the brain via the trigeminal nerve cranial nerve V and the vagus nerve cranial nerve X. Special Somatic Afferent SSA The special signifies that this fibre type is found in nerves related to the special senses which include vision and hearing. These include fibres found in the glossopharyngeal nerves cranial nerve IX and the vagus nerves cranial nerve X. Special Visceral Afferent SVA This fibre type is found again in special sense organs related to the sensing of chemicals and therefore including taste and olfaction. The olfactory sense relates to the olfactory nerve cranial nerve I and the taste senses relate to the facial nerve cranial nerve VII , the glossopharyngeal nerve cranial nerve IX and the vagus nerve cranial nerve X. The sense of taste is performed by the gustatory organ which are cells located in gustatory papillae in the mucous membrane of the dorsal side of the tongue. Taste buds can also be found in the soft palate, pharynx, larynx, lips and cheeks. Motor fibres such as these undertake numerous roles within the body such as control over the external ocular muscles via the oculomotor nerve cranial nerve III , the trochlear nerve cranial nerve IV and the abducent nerve cranial nerve VI ; or for example the muscles around the dorsal and ventral neck including the brachiocephalicus, trapezius, omotransversarius and the sternocephalicus which are all supplied by the accessory nerve cranial nerve XI. Sympathetic innervation for this type of nerve fibre comes directly from the cranial cervical ganglion. However, parasympathetic innervation comes from several cranial nerves including the oculomotor nerve cranial nerve III , the vestibulocochlear nerve cranial nerve VIII , the glossopharyngeal nerve cranial nerve IX and the vagus nerve cranial nerve X. Cranial Nerves There are three main groups of cranial nerves; special senses, innervation of the head muscles and innervation of structures originating from branchial arches. The special senses cranial nerves include the olfactory, ocular and vestibulocochlear. Cranial nerves related to the innervation of the head muscles include the oculomotor, trochlear, abducens and the hypoglossal nerves. Cranial nerves related to innervation of structures originating from branchial arches include the trigeminal, facial, glossopharyngeal, vagus and accessory nerves. Olfactory Nerve I Olfaction is part of the special senses cranial nerve group and represents the chemical senses of olfaction smell and gustation taste. When chemical substances interact with our bodies they stimulate special sensory cells which in turn generate an action potential. The resultant impulse is sent to the brain via sensory afferent fibres and it is these fibres that represent the olfactory cranial nerve. If no sensory cell exists, that chemical substance will go undetected. The olfactory neurosensory cells are found within the olfactory epithelium. The olfactory epithelium contains cilia on the surface of the cells to increase the surface area for chemical interactions. The olfactory nerve runs to the olfactory bulb which is found within the telencephalon. The olfactory nerve is a sensory nerve and is composed of many Special Visceral Afferent fibres. The olfactory nerve passes through the Cribiform plate and is surrounded by meningeal sheets including the sub-arachnoid space. Therefore the route of the olfactory nerve represents a potential site for an infection to track towards the brain. The olfactory organ in dogs is extremely well developed and species such as canines use olfaction to orientate themselves in an environment in a way that humans do not. Olfactory cells are continuously replaced and are only viable sensory cells for between 30 - 60 days. Optic Nerve II The optic nerve is part of the special senses cranial nerves and represents the connection between the receptor cells of the retina and the diencephalon. The optic nerve is a sensory nerve and is composed of Special Somatic Afferent fibres. Optic nerve axons pass from the optic disc of the retina to the brain, entering the skull via the optic canal. The majority of axons decussate at the optic chiasm before continuing as the optic tracts. The optic nerve can be examined clinically via a menace response and anopsia loss of vision can be seen in injury. Oculomotor nerve III The oculomotor nerve is part of the group of cranial nerves responsible for innervating the muscles of the head. The nerves originate from the ventral midbrain and is a motor nerve. It is composed of general somatic efferent fibres and general visceral efferent fibres. The oculomotor nerve has a pre-ganglionic nucleus in the midbrain and the nerve passes through the orbital fissure , along with the trochlear, abducens and opthalmic branch V1 of the trigeminal nerve. It synapses in the ciliary ganglion of the eye. During a clinical examination, horizontal eye movements strabismus or an absent pupillary light reflex PLR may indicate a problem. Trochlear nerve IV The trochlear nerve is part of the cranial nerve group responsible for innervation of the muscles of the head. The trochlear nerve originates from the dorsal mid-brain and is a motor nerve. It is composed of general somatic efferent fibres and is the smallest of the cranial nerves. During a clinical examination, a dorso-lateral strabismus may indicate a problem with this nerve. Trigeminal nerve V The trigeminal nerve is part of the cranial nerve group responsible for innervation of structures originating from branchial arches. The trigeminal nerve nuclei are in the area of the pons and medulla oblongata and it is the nerve of the 1st branchial arch. In general terms the trigeminal represents the sensory nerve of the head but also provides motor fibres to structures also associated with the 1st branchial arch. There are three primary branches of the trigeminal nerve; the Opthalmic nerve V1 , the Maxillary nerve V2 and the Mandibular nerve V3. Ophthalmic nerve V1 The ophthalmic nerve is a sensory nerve composed of general somatic afferent fibres and passes through the orbital fissure. As it enters the orbit of the eye it splits further into the lacrimal nerve, the frontal nerve, the nasociliary nerve and the infratrochlear nerve. Therefore the nerve supplies sensory fibres to many components of the orbit. Maxillary nerve V2 The maxillary nerve is a sensory nerve composed of general somatic afferent fibres. The maxillary nerve passes through the round foramen and the alar canal. It also runs across the wall of the pterygopalatine fossa and enters the infraorbital canal via the maxillary foramen. Whilst in the infraorbital canal, the maxillary nerve branch then branches further into the infraorbital nerve which supplies sensory fibres to the teeth. On exiting the infraorbital canal via the infraorbital foramen, the maxillary nerve branches again into the zygomatic nerve which supplies sensory fibres to the horn and to the pterygopalatine nerve supplying sensory fibres to the palate. Mandibular nerve V3 The mandibular nerve is a mixed sensory general somatic afferent fibres and motor general somatic efferent nerves. The mandibular nerve passes through the oval foramen. It provides motor branches to the masticatory muscles , the ventral throat and muscles of the palate. The mandibular nerve further branches into the masticatory nerve, the masseteric nerve and the temporal nerve. The mandibular nerve provides sensory branches called the buccal nerve, the auriculotemporal nerve, and then itself divides into two smaller branches; the lingual nerve and the inferior alveolar nerve. Abducent nerve VI The abducent nerve is part of the cranial nerve group responsible for innervation of the muscles of the head. The abducent nerve originates from the medulla oblongata and is a motor nerve. The nerve passes through the orbital fissure and can be found within the same layer of the meninges as the opthalmic branch V1 of the trigeminal nerve V. During a clinical examination, medial deviation strabismus may indicate a problem with this nerve. Facial nerve VII The facial nerve is part of the cranial nerve group responsible for the innervation of structures originating from the branchial arches. It originates from the medulla oblongata and from the second branchial arch. It has a common dura sheet with the opthalmic V1 branch of the trigeminal nerve. The facial nerve is of a mixed composite and is made up of a number of different fibre types. The facial nerve enters the petrosal bone via the internal acoustic meatus along with the vestibulocochlear nerve. The facial nerve also runs inside the facial canal. There are a number of intermediate branches which separate from the main facial nerve inside the facial canal including the greater petrosal nerve, the stapedial nerve motor and the chorda tympani. These then emerges via the stylomastoid foramen at the caudoventral aspect of the skull. There are also numerous external branches of the facial nerve once the facial nerve has left the facial canal. These include the internal auricular nerve, the auriculopalpebral nerve, the rostral auricular nerve, the palpebral nerve, the dorsal buccolabial nerve, the ventral buccolabial nerve, the ramus colli, the digastric nerve, the stylohoid nerve and the caudal auricular nerve. The facial nerve supplies motor innervation to the muscles of facial expression. These are superficial flat, thin muscles that originate from bony areas of fascia and then radiate out around the skin. They may also often from sphincters such as around the mouth and eye. During a clinical examination any facial paralysis, drooling or abscence of blinking may indicate a problem with the facial nerve. Vestibulocochlear nerve VIII The vestibulocochlear nerve is part of the special senses group of cranial nerves and is made up of two components; the vestibular nerve and the cochlear nerve. The vestibular nerve is responsible for balance whilst the cochlear nerve is responsible for hearing. The nerves send impulses from the inner ear which contains the vestibular apparatus and cochlea. The vestibulocochlear nerve is a sensory nerve made up of special somatic afferent fibres. It passes through the internal acoustic meatus and into the petrosal bone. The facial nerve also takes this route. A head tilt is also associated with this nerve. Glossopharyngeal nerve IX The glossopharyngeal nerve is part of the group of cranial nerves responsible for innervation of structures derived from the branchial arches. This nerve innervates structures related to the third branchial arch. It is also part of a group together with the vagus and accessory nerves that passes through the jugular foramen which is termed the vagus group. The glossopharyngeal nerve has cell bodies that are referred to as nucleus ambiguus.

Chapter 2 : Neuromuscular Disorders | MedlinePlus

The metadata below describe the original scanning. Follow the "All Files: HTTP" link in the "View the book" box to the left to find XML files that contain more metadata about the original images and the derived formats (OCR results, PDF etc.).

You can help by adding to it. January Microanatomy[edit] The outer surfaces of the head and neck are lined by epithelium. The protective tissues of the oral cavity are continuous with the digestive tract are called mucosa or mucous membranes. The cells of the inner oral cavity are called the buccal mucosa. The oral cavity is lined by a stratified squamous epithelium containing about three layers of cells. Blood, lymph and nerve supply[edit] Blood circulates from the upper systemic loop originating at the aortic arch , and includes: The head and neck are emptied of blood by the subclavian vein and jugular vein. Right side of neck dissection showing the brachiocephalic, right common carotid artery and its branches The brachiocephalic artery or trunk is the first and largest artery that branches to form the right common carotid artery and the right subclavian artery. This artery provides blood to the right upper chest, right arm, neck, and head, through a branch called right vertebral artery. The right and left vertebral artery feed into the basilar artery and upward to the Posterior cerebral artery , which provides most of the brain with oxygenated blood. The posterior cerebral artery and the posterior communicating artery are within the circle of Willis. The left common carotid artery divides to form the: The ICA supplies the brain. The ECA supplies the neck and face. The left subclavian artery and the right subclavian artery, one on each side of the body form the internal thoracic artery , the vertebral artery, the thyrocervical trunk , and the costocervical trunk. The subclavian becomes the axiliary artery at the lateral border of the first rib. The left subclavian artery also provides blood to the left upper chest and left arm. Bloodâ€"brain barrier[edit] The Bloodâ€"brain barrier BBB is semi-permeable membrane that controls the capillary leak potential of the circulatory system. In most parts of the body, the smallest blood vessels, called capillaries , are lined with endothelial cells, which have small spaces between each individual cell so substances can move readily between the inside and the outside of the capillary. This is not in the case of brain. In the brain, the endothelial cells fit tightly together to create a tight junction and substances cannot pass out of the bloodstream. Specialized glial cells called astrocytes form a tight junction or protective barrier around brain blood vessels and may be important in the development of the BBB. Astrocytes may also be responsible for transporting ions electrolytes from the brain to the blood. Venous drainage[edit] Blood from the brain and neck flows from: The right and left external jugular veins drain from the parotid glands , facial muscles, scalp into the subclavian veins. The right and left vertebral veins drain the vertebrae and muscles into the right subclavian vein and into the superior vena cava , into the right atrium of the heart. The lymphatic system drains the head and neck of excess interstitial fluid via lymph vessels or capillaries , equally into the right lymphatic duct and the thoracic duct. Lymph nodes line the cervical spine and neck regions as well as along the face and jaw. The tonsils also are lymphatic tissue and help mediate the ingestion of pathogens. Tonsils in humans include, from superior to inferior: Nerve supply[edit] The spinal nerves arise from the spinal column. The top section of the spine is the cervical section, which contains nerves that innervate muscles of the head, neck and thoracic cavity , as well as transmit sensory information to the CNS. The cervical spine section contains seven vertebrae, C-1 through C-7, and eight nerve pairs, C-1 through C There is the formation of an extensive network of nerve groups or tracts attaching to the spinal cord in arrangements called rami or plexus. The sensory branches of spinal nerves include: These nerve groups transmit afferent sensory information from the scalp, neck, and shoulders to the brain. The motor branches of spinal nerves include: These nerve groups transmit efferent nerve motor information from the brain to muscle groups of the scalp, neck, diaphragm anatomy , and shoulders. C5-C8, and T1 Brachial plexus , providing the entire nerve supply of the shoulder and upper limb; and includes supraclavicular branches dorsal scapular , suprascapular , long thoracic lateral cord musculocutaneous , lateral antibrachial cutaneous , lateral head of median nerve , medial cord ulnar, medial head of median nerve, medial antibrachial cutaneous , medial brachial cutaneous , posterior cord axillary, radial , controlling the arm. Cranial nerves[edit] Twelve pairs of cranial nerves emerge from the brain; these affect movements and sensation, and some special organs such as hearing of parts of the head and neck. Movements of the neck includes: The mouth has evolved to support chewing, mastication and swallowing deglutition , and speech phonation. In addition to the teeth, other structures that aid chewing are the lips, cheeks , tongue , hard palate , soft palate , and floor of the mouth. Endocrine glands[edit] Several glands of the endocrine system are found within the head and neck. Endocrine means that the secretion is used within the body. Endocrine glands are termed as ductless and release their secretions directly into the blood. The endocrine system is under the direct supervision of the nervous system, using the negative feedback principal of homeostasis , to create hormones which act as chemical instant messengers. The hypothalamus connects directly to the pituitary gland , both through the circulatory system and by direct connection of neurons. The pituitary gland secretes hormones that directly impact the body as well as hormones that indirectly control body functions because they activate other endocrine glands, such as the adrenal cortex ACTH and the thyroid gland TSH. These two glands when stimulated by pituitary hormones then release their own hormones. The pituitary gland has two lobes, the anterior lobe and the posterior lobe. The anterior lobe secretes: Antidieuretic hormone ADH , and Oxytocin. There is an intermediate lobe, in adult humans it is just a thin layer of cells between the anterior and posterior pituitary, nearly indistinguishable from the anterior lobe. The intermediate lobe produces melanocyte-stimulating hormone MSH. In the neck are the thyroid and parathyroid glands , that secrete hormones that control metabolism and blood calcium levels. The four parathyroid glands are situated upon the back surface of the thyroid gland. Respiratory system The respiratory system begins in the head and neck, with air entering and leaving the body through the mouth and nose. The respiratory system involving the head and neck includes: A critical junction between the respiratory and digestive systems is the epiglottis , a cartilage flap which shuts during swallowing to prevent aspiration. The epiglottis is normally open to support respiration and shuts during swallowing to prevent food and fluids from entering the trachea, activating the gag reflex or initiates the choking mechanism. Central nervous system[edit] Main article: The central nervous system provides control and coordination of all eleven body systems and utilizes the endocrine system to form hormone chemical messengers that transport through the blood to influence the activity of individual cells of the body and their associated tissues, organs and systems. The CNS receives sensory afferent input from the PNS and directs the flow of information to association neurons interneurons to create chemical synapse responses which in turn cause the formation of motor efferent nerve responses to stimulus. Association neurons are located in the grey matter of the spinal cord and the brain. The CNS is protected by the cranium , vertebral column , meninges , cerebrospinal fluid. The spinal cord is an extension of the brain. The spinal cord and the brain stem are joined at the base of the cranium at the foramen magnum. Most of the functions of the head and neck are directly influenced by the brain and transmitted to the PNS via the cranial nerves and spinal nerves of the cervical portion of the spine. The SNS is associated with the voluntary control of body movements through the action of skeletal muscles , and also the reception of external stimuli. The ANS is divided into subsystems:

Chapter 3 : General Physiology of Muscles and Nerves

Note: Citations are based on reference standards. However, formatting rules can vary widely between applications and fields of interest or study. The specific requirements or preferences of your reviewing publisher, classroom teacher, institution or organization should be applied.

An injury to a joint that involves a stretched or torn ligament. Muscle Strain A strain occurs when a muscle or the tendon that attaches it to the bone is overstretched or torn. Muscle strains are also called pulled muscles. Anyone can strain a muscle. However, people involved in sports or other forms of strenuous exercise are more likely to strain a muscle. Muscles are bunches of fibers that can contract. Muscle strains usually occur during activities that require the muscle to tighten forcefully. The muscle is strained either because it is not properly stretched, or warmed up, before the activity; it is too weak; or because the muscle is already injured and not allowed time to recover. So, many muscle strains occur during exercise or sports activities. They can also occur when lifting heavy objects. What are the symptoms? When a muscle is strained, it hurts and is difficult to move. You may also feel a burning sensation in the area of the injured muscle, or feel as though something has "popped. A strained muscle might spasm, which means it contracts suddenly and involuntarily, causing severe pain. How is it diagnosed? To diagnose a muscle strain, your doctor will examine the painful area, and ask how and when the injury happened. He or she may order other diagnostic tests, such as x-rays, to rule out any injury to the bone. What is the treatment? Muscle strains are treated with rest, ice, compression, and elevation, or RICE. You will be told to rest the injured area to reduce pain and swelling. If the strain is in the leg or foot area, you may need to use crutches. Ice packs are recommended at regular intervals as recommended by your doctor over the first few days after the injury. Ice causes the blood vessels to constrict, which reduces inflammation and pain. Anti-inflammatory medications might also be used to relieve pain. Compression and elevation help to reduce swelling. Your doctor may also recommend physical therapy to speed your recovery. You should avoid the type of activity that caused the injury until the muscle is completely healed. Self-care tips You can prevent muscle strains by warming up for at least 10 minutes before participating in any strenuous exercise or heavy lifting. When you warm up, you increase the blood circulation to the muscle and prepare it for exercise. Steroids[edit] Anabolic steroids, which are synthetic versions of the primary male sex hormone testosterone, can be injected, taken orally, or used transdermally. These drugs are Controlled Substances that can be prescribed to treat conditions such as body wasting in patients with AIDS, and other diseases that occur when the body produces abnormally low amounts of testosterone. However, the doses prescribed to treat these medical conditions are 10 to times lower than the doses that are used for performance enhancement. Let me be clear: These drugs can stunt the height of growing adolescents, masculinize women, and alter sex characteristics of men. Anabolic steroids can lead to premature heart attacks, strokes, liver tumors, kidney failure and serious psychiatric problems. In addition, because steroids are often injected, users risk contracting or transmitting HIV or hepatitis. Abuse of anabolic steroids differs from the abuse of other illicit substances because the initial use of anabolic steroids is not driven by the immediate euphoria that accompanies most drugs of abuse, such as cocaine, heroin, and marijuana, but by the desire of the user to change their appearance and performance, characteristics of great importance to adolescents. These effects of steroids can boost confidence and strength leading the user to overlook the potential serious long-term damage that these substances can cause. Government agencies such as NIDA support research that increases our understanding of the impact of steroid use and improves our ability to prevent abuse of these drugs. For example, NIDA funding led to the development of two highly effective programs that not only prevent anabolic steroid abuse among male and female high school athletes, but also promote other healthy behaviors and attitudes. In addition to these prevention programs and other research efforts, also has invested in public education efforts to increase awareness about the dangers of steroid abuse. We have material on our website about steroid abuse at www. Research has shown that the inappropriate use of anabolic steroids can have catastrophic medical, psychiatric and behavioral consequences. I hope that students, parents, teachers, coaches and others will take advantage of the information on our website about anabolic steroids abuse and join us in our prevention and education efforts. Some athletes abuse anabolic steroids to enhance performance. Abuse of anabolic steroids can lead to serious health problems, some of which are irreversible. Major side effects can include liver tumors and cancer, jaundice, high blood pressure, kidney tumors, severe acne, and trembling. In males, side effects may include shrinking of the testicles and breast development. In females, side effects may include growth of facial hair, menstrual changes, and deepened voice. In teenagers, growth may be halted prematurely and permanently. The therapeutic use of steroids can be realized by patients and their doctors by using them in a manner that is beneficial to the person. MyoD and other muscular factors[edit] MyoD is a protein and a transcription factor that activates muscle cell differentiation by turning on transcription of specific regulatory genes. It turns stem cells into myoblasts, a cell that can turn into many muscle cell, also called "muscle stem cell". MyoD belongs to a family of proteins knowns as myogenic regulatory factor MRFs. The positive feedback turns on transcription of other muscle proteins, cell cycle blockers, and microRNA One of the main actions of MyoD is to remove cells from the cell cycle by enhancing the transcription of p21The function of MyoD is to commit mesoderm cells to a skeletal lineage. MyoD can also regulate muscle repair. One of the main actions of MyoD is to remove cells from the cell cycle by enhancing the transcription of p Bidirectional Signalling- muscle cells and nerves cells send signals back and forth to each other. Amyotrophic Lateral Sclerosis ALS is a loss of motor neuron and this blocks the formation of neuromuscular junctions. Therefore, no muscle growth which means a potential of leading to paralysis. Stephen Hawking suffers from this disease. Neuromuscular junction sends synaptic signals to MyoD and this blcoks MyoD and stops or limits muscle development. Myostatin is a protein that also blocks MyoD. Without myostatin, muscle development increases. Myostatin Mutations In Sheep: Smooth Muscle Contraction[edit] Contractions are initiated by an influx of calcium which binds to calmodulin. The calcium-calmodulin complex binds to and activates myosin light-chain kinase. Myosin light-chain kinase phosphorylates myosin light-chains using ATP, causing them to interact with actin filaments. Calcium is actively pumped out of the cell by receptor regulated channels. A second messanger, IP3, causes the release. As calcium is removed the calcium-calmodulin complex breaks away from the myosin light-chain kinase, stopping phosphorylation. Myosin phophatase dephosphorylates the myosin. If the myosin was bound to an actin molecule, the release is slow, this is called a latch state. In this manner, smooth muscle is able to stay contracted for some time without the use of much ATP. If the myosin was not bound to an actin chain it loses its affinity for actin. It should be noted that ATP is still needed for crossbridge cycling, and that there is no reserve, such as creatine phosphate, available. Most ATP is created from aerobic metabolism, however anaerobic production may take place in times of low oxygen concentrations. Cardiac muscle is found in the heart and lungs of humans. The total quantity of ATP in the human body at any one time is about 0. The energy used by human cells requires the hydrolysis of to moles of ATP daily. This means that each ATP molecule is recycled to times during a single day. ATP cannot be stored, hence its consumption must closely follow its synthesis. On a per-hour basis, 1 kilogram of ATP is created, processed and then recycled in the body. Looking at it another way, a single cell uses about 10 million ATP molecules per second to meet its metabolic needs, and recycles all of its ATP molecules about every seconds. Lactic Acid[edit] Catabolized carbohydrates is known as glycolysis. The end product of glycolysis, pyruvate can go into different directions depending on aerobic or anaerobic conditions. In aerobic it goes through the Krebs cycle and in anaerobic it goes through the Cori cycle. In the Cori cycle pyruvate is converted to lactate, this forms lactic acid, lactic acid causes muscle fatigue. In the aerobic conditions pyruvate goes through the Krebs cycle. For more about Krebs cycle refer to chapter 2 Cell Physiology. Muscle Disorders[edit] Dermatomyositis and Polymyositis[edit] Dermatomyositis and polymyositis cause inflammation of the muscles. They are rare disorders, affecting only about one in , people per year. More women than men are affected. Although the peak age of onset is in the 50s, the disorders can occur at any age. Signs and symptoms â€” Patients complain of muscle weakness that usually worsens over several months, though in some cases symptoms come on suddenly. The affected muscles are close to the trunk as opposed to in the wrists or feet , involving for example the hip, shoulder, or neck muscles. Muscles on both sides of the body are equally affected. In some cases, muscles are sore or tender.

Chapter 4 : Nerve and Muscle Physiology MCQs | Physiology Plus

The somatic nervous system, in sharp contrast to the autonomic nervous system, controls voluntary physiological bodily functions such as voluntary muscular movement with the skeletal muscles of the body.

Nervous tissue comprises two types of cellsâ€”neurons and neuroglia. These cells combine in a variety of ways in different regions of the nervous system. In addition to forming the complex processing networks within the brain and spinal cord, neurons also connect all regions of the body to the brain and spinal cord. As highly specialized cells capable of reaching great lengths and making extremely intricate connections with other cells, neurons provide most of the unique functions of the nervous system, such as sensing, thinking, remembering, controlling muscle activity, and regulating glandular secretions. As a result of their specialization, they have lost the ability to undergo mitotic divisions. Neuroglia are smaller cells but they greatly outnumber neurons, perhaps by as much as 25 times. Both neurons and neuroglia differ structurally depending on whether they are located in the central nervous system or the peripheral nervous system. These differences in structure correlate with the differences in function of the central nervous system and the peripheral nervous system. A stimulus is any change in the environment that is strong enough to initiate an action potential. An action potential nerve impulse is an electrical signal that propagates travels along the surface of the membrane of a neuron. Once begun, a nerve impulse travels rapidly and at a constant strength. Some neurons are tiny and propagate impulses over a short distance less than 1 mm within the CNS. Others are the longest cells in the body. The neurons that enable you to wiggle your toes, for example, extend from the lumbar region of your spinal cord just above waist level to the muscles in your foot. Some neurons are even longer. Those that allow you to feel a feather tickling your toes stretch all the way from your foot to the lower portion of your brain. Nerve impulses travel these great distances at speeds ranging from 0. Parts of Neuron Most neurons have three parts: Neuronal cell bodies also contain free ribosomes and prominent clusters of rough endoplasmic reticulum, termed Nissl bodies NIS-el. The ribosomes are the sites of protein synthesis. Newly synthesized proteins produced by Nissl bodies are used to replace cellular components, as material for growth of neurons, and to regenerate damaged axons in the PNS. Lipofuscin is a product of neuronal lysosomes that accumulates as the neuron ages, but does not seem to harm the neuron as it ages. Most neurons have two kinds of processes: The plasma membranes of dendrites and cell bodies contain numerous receptor sites for binding chemical messengers from other cells. Dendrites usually are short, tapering, and highly branched. In many neurons the dendrites form a tree- shaped array of processes extending from the cell body. Their cytoplasm contains Nissl bodies, mitochondria, and other organelles. The part of the axon closest to the axon hillock is the initial segment. In most neurons, nerve impulses arise at the junction of the axon hillock and the initial segment, an area called the trigger zone, from which they travel along the axon to their destination. Because rough endoplasmic reticulum is not present, protein synthesis does not occur in the axon. The cytoplasm of an axon, called axoplasm, is surrounded by a plasma membrane known as the axolemma lemma sheath or husk. Along the length of an axon, side branches called axon collaterals may branch off, typically at a right angle to the axon. The site of communication between two neurons or between a neuron and an effector cell is called a synapse SIN-aps. Many neurons contain two or even three types of neurotransmitters, each with different effects on the postsynaptic cell. Because some substances synthesized or recycled in the neuron cell body are needed in the axon or at the axon terminals, two types of transport systems carry materials from the cell body to the axon terminals and back. The slower system, which moves materials about 1â€”5 mm per day, is called slow axonal transport. It conveys axoplasm in one direction onlyâ€”from the cell body toward the axon terminals. Slow axonal transport supplies new axoplasm to developing or regenerating axons and replenishes axoplasm in growing and mature axons. Fast axonal transport moves materials in both directionsâ€”away from and toward the cell body. Fast axonal transport that occurs in an anterograde forward direction moves organelles and synaptic vesicles from the cell body to the axon terminals. Fast axonal transport that occurs in a retrograde backward direction moves membrane vesicles and other cellular materials from the axon terminals to the cell body to be degraded or recycled. Substances that enter the neuron at the axon terminals are also moved to the cell body by fast retrograde transport. These substances include trophic chemicals such as nerve growth factor and harmful agents such as tetanus toxin and the viruses that cause rabies, herpes simplex, and polio. Dendrites conduct impulse form other neurons meant for reception of the signal. Surface area gets increased so as to receive max. Amount of the impulse. Axon has got some divisions: The axon branches out and they are called as axon collaterals ; which further branch out and end up as axon terminals. Through the axon terminals the neuro transmitters are released into the synaptic cleft or the junction from where these neuro transmitters are taken up by the dendrites of other neurons having particular receptors. The neuro transmitters are synthesized by the cell body of the neuron. Axons also have some bulges which are called as vericosities. Neuro filaments are the cytoskeletal materials which are responsible for the transportation of the impulse from cell body to the axon. Depending on the situation and the environment the neuron is exposed it may conduct the opposite signals and transport it, which changes the metabolic activity of the neuron. Structural Diversity in Neurons displays great diversity in size and shape. For example, their cell bodies range in diameter from 5 micrometers m slightly smaller than a red blood cell up to m barely large enough to see with the unaided eye. The pattern of dendritic branching is varied and distinctive for neurons in different parts of the nervous system. A few small neurons lack an axon, and many others have very short axons. As we have already discussed, the longest axons are almost as long as a person is tall, extending from the toes to the lowest part of the brain. Both structural and functional features are used to classify the various neurons in the body. Based on the functional features of the neurons they are classified as follows: Also called as sensory neurons. They either contain sensory receptors at their distal ends dendrites or are located just after sensory receptors that are separate cells. Once an appropriate stimulus activates a sensory receptor, the sensory neuron forms an action potential in its axon and the action potential is conveyed into the CNS through cranial or spinal nerves. Also called as motor neurons. They convey action potentials away from the CNS to effectors muscles and glands in the periphery PNS through cranial or spinal nerves 3. Also called as association neurons. Inter neurons integrate process incoming sensory information from sensory neurons and then elicit a motor response by activating the appropriate motor neurons. Most interneurons are multipolar in structure Analogy: For every afferent neuron there will be 10 efferent neurons and , inter neurons. The second neuron which carries the impulse away from the synapse is called as the post synaptic neuron. Not all the junctions are permanent they may be changing and not all the junctions are active at a time. Neuroglia Neuroglia or glia make up about half the volume of the CNS. We now know that neuroglia are not merely passive bystanders but rather actively participate in the activities of nervous tissue. Generally, neuroglia are smaller than neurons, and they are 5 to 25 times more numerous. In contrast to neurons, glia do not generate or propagate action potentials, and they can multiply and divide in the mature nervous system. Of the six types of neuroglia, fourâ€"astrocytes, oligodendrocytes, microglia, and ependymal cellsâ€"are found only in the CNS. The remaining two typesâ€"Schwann cells and satellite cellsâ€"are present in the PNS. There are two types of astrocytes. Protoplasmic astrocytes have many short branching processes and are found in gray matter described shortly. Fibrous astrocytes have many long unbranched processes and are located mainly in white matter also described shortly. The processes of astrocytes make contact with blood capillaries, neurons, and the pia mater a thin membrane around the brain and spinal cord. The functions of astrocytes include the following: Details of the bloodâ€"brain barrier. In the embryo, astrocytes secrete chemicals that appear to regulate the growth, migration, and interconnection among neurons in the brain. For example, they regulate the concentration of important ions such as k take up excess neurotransmitters; and serve as a conduit for the passage of nutrients and other substances between blood capillaries and neurons. Oligodendrocyte processes are responsible for forming and maintaining the myelin sheath around CNS axons. As you will see shortly, the myelin sheath is a multilayered lipid and protein covering around some axons that insulates them and increases the speed of nerve impulse conduction. Such axons are said to be myelinated. Microglia function as phagocytes. Like tissue macrophages, they remove cellular debris formed during normal development of the nervous system and phagocytize microbes and damaged nervous tissue EPENDYMAL CELLS Ependymal cells are cuboidal to columnar cells arranged in a single layer that possess microvilli and cilia. Neuroglia of the PNS: Neuroglia of the PNS completely surround axons and cell bodies. The two types of glial cells in the PNS are Schwann cells and satellite cells. Like oligodendrocytes, they form the myelin sheath around axons. However, a single oligodendrocyte myelinates several axons, but each Schwann cell myelinates a single axon c. A single Schwann cell can also enclose as many as 20 or more unmyelinated axons axons that lack a myelin sheath. Myelination As you have already learned, axons surrounded by a multilayered lipid and protein covering, called the myelin sheath, are said to be myelinated. The sheath electrically insulates the axon of a neuron and increases the speed of nerve impulse conduction. Axons without such a covering are said to be unmyelinated.

Chapter 5 : Human Physiology/The Muscular System - Wikibooks, open books for an open world

*General Physiology of Muscles and Nerves [I (Isidor) Rosenthal] on theinnatdunvilla.com *FREE* shipping on qualifying offers. This work has been selected by scholars as being culturally important, and is part of the knowledge base of civilization as we know it.*

The study of the parts and structures of the human body Physiology: The study of the functions of the human body Gross anatomy: The study of the parts and structures of the human body that can be seen with the naked eye and without the use of a microscope Microscopic anatomy: The study of the parts and structures of the human body that can NOT be seen with the naked eye and only seen with the use of a microscope The frontal plane: Also referred to as the coronal plane, separates the front from the back of the body. The front of the body Dorsal surface: The back of the body Transverse plane: Also referred to as the cross sectional plane separates the top of the body at the waist from the bottom of the body Sagittal plane: Also referred to as the medial plane separates the right side of the body from the left side of the body Anterior: Closer to the front of the body than another bodily part Posterior: Further from the front of the body than another bodily part Superior: One bodily part is above another bodily part Inferior: One bodily part is below another bodily part Cytology: The basic building blocks of the human body and the bodies of all other living species Prokaryotes: One of the two types of cells that have a nucleus containing genetic material and organelles Cell wall: The area around the cell that protects the cell membrane and the cell from threats in its external environment Extracellular: The environment outside of a cell Intracellular: Inside the cell Permeability: The ability of the cell to let particles into the cells and to get particles out of the cell Ions: Electrically charged molecules such as electrolytes in the human body Anions: Electrolytes that have a negative electrical charge Cations: Electrolytes that have positive electrical charge Cell membrane: The covering that envelopes cells and somewhat acts like the gate keeper of the cell. The substance which makes up the bulk of a living cell and contains the organelles Cytoskeleton: The part of the cell that maintains the shape and form of the cell Cell nucleus: The "mini organs" in the cell that perform a specific role. The organelle that breaks down and disposes of cellular wastes Endoplasmic reticulum: The organelle that synthesizes proteins and lipids Golgi apparatus: The organelle that processes and stores the proteins and lipids that it receives from the endoplasmic reticulum Ribosomes: The organelle that synthesize protein with the linking of different amino acids as per the instructions of the messenger RNA molecules Passive transport: The movement of molecules across membranes that does NOT require the use of cellular energy to perform this transport Active transport: The movement of molecules across membranes that requires the use of cellular energy to perform this transport Diffusion: The movement of molecule from an area of higher concentration to the area or side of the membrane that has the lesser concentration Osmosis: A type of passive transport that does NOT require the use of cellular energy to move water and solute particles Meiosis: Cell division where the resulting cells have half of the original number of chromosomes Mitosis: Cell division where the nucleus of the cell replicates itself into two identical copies of itself Tissues: A group of cells with similar structure that join together to perform a specialized function Epithelial tissue: Also referred to as epithelium, it is the type of tissue that skin and glands are made of Connective tissue: The type of tissue that ligaments, tendons and bones are made of Skeletal muscle tissue: Striated muscle that enables voluntary bodily movement Smooth muscle tissue: Muscle that is not striated and not under voluntary control Cardiac muscle tissue: Striated, involuntary muscle that is found only in the heart. This tissue enables cardiac functioning. Neural tissue in the central and peripheral nervous systems Organs: A self-contained group of tissues that serves at least one bodily function to maintain normal bodily functioning and the homeostasis, or balance, of the body. Groups of bodily tissues that group together to perform specific roles and functions in the body to maintain its homeostasis General Anatomy of the Human Body Simply stated, human anatomy is the study of the parts of the human body. Human anatomy includes both gross anatomy and microscopic anatomy. Gross anatomy includes those human structures that can be seen with the naked eye. Gross anatomy can be compared to the structure of a house as shown in a blueprint of a house or by looking at and inspecting a house in person with the naked eye. Similarly, when you view the exterior and interior of the human body with the naked eye, you are able to see its gross anatomy. For example, as you look at the human body with the naked eye, you will see its interior when the inner parts of the body are exposed, and you will see the exterior of the intact body. Microscopic anatomy, as contrasted to gross anatomy, is the study of those parts of the human body that cannot be seen with the naked eye. Structures that are viewed only with a microscope are structures included in the study of microscopic anatomy. Microscopic anatomy is further divided into the exploration of the histological and cytological studies. Cytology is the branch of microscopic anatomy that studies the cells and histology is the branch of microscopic anatomy that studies tissues. From the smallest to the largest part of the human anatomy, in that sequential order, are the:

Chapter 6 : Gantzner's Muscle

The Biodiversity Heritage Library works collaboratively to make biodiversity literature openly available to the world as part of a global biodiversity community.

Chapter 7 : Details - General physiology of muscles and nerves / - Biodiversity Heritage Library

The trochlear nerve and the abducens nerve are both responsible for eye movement, but do so by controlling different extraocular muscles. The trigeminal nerve is responsible for cutaneous sensations of the face and controlling the muscles of mastication.

Chapter 8 : Head and neck anatomy - Wikipedia

Nerves that carry impulses from the brain to the muscles and produce movement are: motor nerves The largest of the cranial nerves, also known as the trifacial nerve or the trigeminal nerve is the.

Chapter 9 : Cranial Nerves - Anatomy & Physiology - WikiVet English

General and past health your focus on the patient Anatomy and Physiology of the extraocular muscles The Extra-ocular Muscles trochlear nerve All other muscles.