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Cranial nerves are pairs of nerves that connect your brain to different parts of your head, neck, and trunk. Each nerve has a corresponding roman numeral between i and xii.Your cranial nerves are pairs of nerves that connect your brain to different parts of your head, neck, and trunk. There are 12 of them, each named for its function or structure.Their functions are usually categorized as being either sensory or motor. Sensory nerves involve your senses, such as smell, hearing, and touch. Motor nerves control the movement and function of muscles or glands.Keep reading to learn more about each of the 12 cranial nerves and how they function.The cranial nerves are located within the skull, on the underside of the brain. They begin in the nuclei of the brain and travel different paths to help control your senses and movement.Each nerve has a corresponding Roman numeral between I and XII. This is based on their location from front to back. For example, your olfactory nerve is closest to the front of your head, so it's designated as I. Conditions and disorders of the cranial nerves can affect processes that involve vision, smell, hearing, speaking, and balance. They can also change the way you perceive sensation on the face and prevent or alter the movement of the head, eyes, neck, shoulders, throat, and tongue. Cranial nerve palsy affects a motor nerve — one that controls movement. If a sensory nerve is affected, it can cause pain or reduced sensation.Conditions and disorders that affect the cranial nerves can include:Third nerve palsy. This disorder can cause a closed or partially closed eyelid, an enlarged pupil, and the movement of the eye outward and downward.Trigeminal neuralgia. Trigeminal neuralgia is a disorder of the fifth cranial nerve and typically causes pain on one side of the face.Fourth nerve palsy or superior oblique palsy. This disorder can cause misalignment of the eyes and can affect one or both eyes.Sixth nerve palsy or abducens palsy. This type of palsy can cause the eye to cross inward toward the nose.Bell's palsy. Bell's palsy, a disorder of the seventh cranial nerve, can cause temporary weakness or paralysis in one side of the face.Hemifacial spasm. A hemifacial spasm happens when blood vessels constrict the seventh cranial nerve and cause a facial spasm or tic.Glossopharyngeal neuralgia. This condition affects the ninth cranial nerve and can cause pain at the base of the tongue that may travel to the ear and neck.Cranial base tumors. These are tumors that can form in the skull and affect different cranial nerves.Injury, trauma, and whiplash can also cause damage to cranial nerves.Disorders affecting the cranial nerve can cause different symptoms, depending on which nerve is affected. If you experience pain in your face, a change in your ability to alter the movement of your head or eye, or changes in sensation relating to vision, hearing, smell, balance, or speaking, you may have a cranial nerve disorder.Symptoms of cranial nerve damage can include:pain in the face, tongue, head, or neckinability to focus the eyean eye that drifts to one side or downwardweakness or paralysis in the faceslurred speechvision or hearing losschanges in visionThe olfactory nerve sends sensory information to your brain about smells that you encounter.When you inhale molecules with a scent, known as aromatic molecules, they dissolve in a moist lining at the roof of your nasal cavity. This lining is called the olfactory epithelium. It stimulates receptors that generate nerve impulses that move to your olfactory bulb. Your olfactory bulb is an oval-shaped structure that contains specialized groups of nerve cells.From the olfactory bulb, nerves pass into your olfactory tract, which is located below the frontal lobe of your brain. Nerve signals are then sent to areas of your brain concerned with memory and recognition of smells.The optic nerve is the sensory nerve that involves vision.When light enters your eye, it comes into contact with special receptors in your retina called rods and cones. Rods are found in large numbers and are highly sensitive to light. They're more specialized for black and white or night vision.Cones are present in smaller numbers. They have a lower light sensitivity than rods and are more involved with color vision.The information received by your rods and cones is sent from your retina to your optic nerve. Once inside your skull, both of your optic nerves meet to form something called the optic chiasm. At the optic chiasm, nerve fibers from half of each retina form two separate optic tracts.Through each optic tract, the nerve impulses eventually reach your visual cortex, which then processes the information. Your visual cortex is located in the back part of your brain.The oculomotor nerve has two different motor functions: muscle function and pupil response.Muscle function. Your oculomotor nerve provides motor function to four of the six muscles around your eyes. These muscles help your eyes move and focus on objects.Pupil response. It also helps to control the size of your pupil as it responds to light.This nerve originates in the front part of your midbrain, which is a part of your brainstem. It moves forward from that area until it reaches the area of your eye sockets.The trochlear nerve controls your superior oblique muscle. This is the muscle that's in charge of downward, outward, and inward eye movements.It emerges from the back part of your midbrain. Like your oculomotor nerve, it moves forward until it reaches your eye sockets, where it stimulates the superior oblique muscle.The trigeminal nerve is the largest of your cranial nerves and has both sensory and motor functions.The trigeminal nerve has three divisions, which are:Ophthalmic. The ophthalmic division sends sensory information from the upper part of your face, including your forehead, scalp, and upper eyelids.Maxillary. This division communicates sensory information from the middle part of your face, including your cheeks, upper lip, and nasal cavity.Mandibular. The mandibular division has both a sensory and a motor function. It sends sensory information from your ears, lower lip, and chin. It also controls the movement of muscles within your jaw and ear.The trigeminal nerve originates from a group of nuclei — which is a collection of nerve cells — in the midbrain and medulla regions of your brainstem. Eventually, these nuclei form a separate sensory root and motor root.The sensory root of your trigeminal nerve branches into the ophthalmic, maxillary, and mandibular divisions. The motor root of your trigeminal nerve passes below the sensory root and only connects to the mandibular division.The abducens nerve controls another muscle that's associated with eye movement called the lateral rectus muscle. This muscle is involved in outward eye movement. For example, you would use it to look to the side.This nerve, also called the abducens nerve, starts in the pons region of your brainstem. It eventually enters your eye socket, where it controls the lateral rectus muscle.The facial nerve provides both sensory and motor functions, including:moving muscles used for facial expressions as well as some muscles in your jawproviding a sense of taste for most of your tonguesupplying glands in your head or neck area, such as salivary glands and tear-producing glandssending sensations from the outer parts of your earYour facial nerve has a very complex path. It originates in the pons area of your brainstem, where it has both a motor and sensory root. Eventually, the two nerves fuse together to form the facial nerve.Both within and outside of your skull, the facial nerve branches further into smaller nerve fibers that stimulate muscles and glands or provide sensory information.Your vestibulocochlear nerve has sensory functions involving hearing and balance. It consists of two parts, the cochlear portion and vestibular portion:Cochlear portion. Specialized cells within your ear detect vibrations from sound based on the sound's loudness and pitch. This generates nerve impulses that are sent to the cochlear nerve.Vestibular portion. Another set of special cells in this portion can track both linear and rotational movements of your head. This information is transmitted to the vestibular nerve and used to adjust your balance and equilibrium.The cochlear and vestibular portions of your vestibulocochlear nerve originate in separate areas of the brain.The cochlear portion starts in an area of your brain called the inferior cerebellar peduncle. The vestibular portion begins in your pons and medulla. Both portions combine to form the vestibulocochlear nerve.The glossopharyngeal nerve has both motor and sensory functions, including:sending sensory information from your sinuses, the back of your throat, parts of your inner ear, and the back part of your tongueproviding a sense of taste for the back part of your tonguestimulating voluntary movement of a muscle in the back of your throat called the stylopharyngeusThe glossopharyngeal nerve originates in a part of your brainstem called the medulla oblongata. It eventually extends into your neck and throat region.The vagus nerve is a very diverse nerve. It has both sensory and motor functions, including:conveying sensation information from your ear canal and parts of your throatsending sensory information from organs in your chest and trunk, such as your heart and intestinesallowing motor control of muscles in your throatstimulating the muscles of organs in your chest and trunk, including those that move food through your digestive tractproviding a sense of taste near the root of your tongueOut of all of the cranial nerves, the vagus nerve has the longest pathway. It extends from your head all the way into your abdomen. It originates in the part of your brainstem called the medulla.Your accessory nerve is a motor nerve that controls the muscles in your neck. These muscles allow you to rotate, flex, and extend your neck and shoulders.It's divided into two parts: spinal and cranial. The spinal portion originates in the upper part of your spinal cord. The cranial part starts in your medulla oblongata.These parts meet briefly before the spinal part of the nerve moves to supply the muscles of your neck. The cranial part follows the vagus nerve.Your hypoglossal nerve is the 12th cranial nerve. It's responsible for the movement of most of the muscles in your tongue. It starts in the medulla oblongata and moves down into the jaw, where it reaches the tongue.Your brain has 12 cranial nerves that are involved with your sensory, motor, and autonomic functions. They're located inside of your skull on the underside of the brain. They're numbered according to their location.Healthline has strict sourcing guidelines and relies on peer-reviewed studies, academic research institutions, and medical journals and associations. We only use quality, credible sources to ensure content accuracy and integrity. You can learn more about how we ensure our content is accurate and current by reading our editorial policy.Bell's palsy fact sheet. (2021). B, et al. (2021). Neuroanatomy, cranial nerve 11 (accessory). B, et al. (2021). Neuroanatomy, cranial nerve 8 (vestibulocochlear). basics: Preventing stroke. (2022). D, et al. (2021). Neuroanatomy, cranial nerve 7 (facial). nerve (superior oblique) palsy. (2022). M, et al. (2021). Neuroanatomy, cranial nerve 1 (olfactory). T, et al. (2021). Neuroanatomy, cranial nerve 5 (trigeminal). C, et al. (2021). Neuroanatomy, cranial nerve 3 (oculomotor). BJ, et al. (2021). Neuroanatomy, cranial nerve 10 (vagus nerve). SY, et al. (2021). Neuroanatomy, cranial nerve 4 (trochlear). SY, et al. (2021). Neuroanatomy, cranial nerve 12 (hypoglossal). P, et al. (2021). Cranial nerve III palsy. V, et al. (2021). Neuroanatomy, cranial nerve 6 (abducens). nerve palsy. (2020). J, et al. (2021). Neuroanatomy, cranial nerve. AM, et al. (2021). Neuroanatomy, cranial nerve 2 (optic). nerve palsy. (2020). K, et al. (2021). Neuroanatomy, cranial nerve 9 (glossopharyngeal). neuralgia fact sheet. (2021). Some Beginner Tips for Writing a Book (writing a book) Before you begin your book writing adventure, you must research your idea and see if it will fly. Who is going to read it? Who are you trying to appeal to with your words? You must have a general idea of who your intended audience will be. Check out other books. Is there a book already published that resembles your book? What will make your book unique from theirs? If there are similar books already out there, what is going to make your book different and make people want to buy it? If you are still reading, then it is safe to assume that you have your idea under control and are ready to more on in writing a book. Decide on a schedule that is best for you, one that you will be able to stick to. It will be very frustrating to you if have unrealistic expectations and then are unable to stick to them. Your schedule should begin before your research and carry through to the book being ready for publication. Make a detailed outline with the main plot, events leading to that plot, and explicit detail about the characters. By having more information about the character you will be able to become them as you are writing. By having background on them, even if it is irrelevant to the story, it may help while choosing their actions, dialogue, and feelings through out the book. An outline is also a good reference point to come back to double check your timelines and details. You may want to turn of you editing software for your first draft. While writing a book the first draft is when you begin meshing the plot, the characters, and everything together. Grammar, spelling, and punctuation can be fixed later. Remember books do not necessarily have to be written front to back. By writing different chapters or events it may be easier for you to come back and connect them later. Sometimes having the words on the paper and reading will make it easier to fill in the blanks. You are on a role and rough draft is finished. Now is the time to read it. When writing a book reading the rough draft will allow you to make sure that there are no errors in the timeline, that plots link with the characters, and that it all makes sense and flows together. Once you have accomplished that turn your editing software back on. It is time to fix your grammar, spelling, and punctuation mistakes. Now put you book aside. Let it sit for about two weeks or so before you pick it up again. This will give your mind time to be clear and fresh. Now read the book again. Does it still flow and make sense? Do you need to add something or change it? Now is the time. Choose someone to proofread your book for you. If at all possible you should hire a professional editor to do this. But if you cannot ask a colleague or maybe someone else you know with a writing or English background. While giving professional advice they will also be able to offer you and unbiased opinion. They will be able to see if there is a jump in the timeline you didn't notice or if you had a character in the beginning and they just disappeared. The last thing to do while writing a book is creating the final draft. The final draft should be error free. This is your last chance to change anything before it goes to the publisher. Now is when all that time you spent writing a book comes together to make its trip to publication. Turning your Eye to Government, Nonprofit or Small Business for you Next Job The type of business you work for can effect your job satisfaction. Your personality type may also work out better at certain types of businesses. Research different business types before going on your job search. Working for a small business or a non-profit definitely has its pros and cons. First of all, getting hired at a small business can be much easier than landing a position than at a corporation. Typically you will only have to go through one person to get the job. Usually the small business owner conducts the interview. This can be a good thing because the business owner may be willing to overlook a lack of experience or extenuating circumstances concerning your work history. Nonprofit jobs are often easier to get if you are passionate about the cause. The person that is doing the hiring is generally passionate about the cause that the nonprofit is working to assist. If they pick up on passion about the cause from you, typically you will get the job. However, that passion is necessary because they pay may not be very much. Working for a smaller company also opens up more opportunities for promotions. With fewer employees and contact with the owner, you may be able to move up in the company faster. You will be able to pick up on skills in less time than at large corporations, which often have many hoops for one to jump through before training for a new position. There may be a smaller window of time to pick up on new skills because of the limited amount of time that can be put towards training. Nonprofits may not have as many opportunities for promotions and job stability may be questionable. If the donations stop coming in or whoever funds the nonprofit decides not to fund it anymore, you could be out of a job. This is a very real concern with a nonprofit job. There are some drawbacks to working at smaller businesses. Sometimes, the staff at smaller businesses have been in place for years. New, younger employees may not be viewed favorably. This could affect working relationships with co-workers. Smaller companies also mean smaller paychecks. Independent businesses are not able to generate large paychecks. This could make staying at a small business undesirable. However, the personal interaction between you and your boss could be encouragement to stick it out with a small business. Or the opposite could be true. Government jobs can be beneficial to have for a number of reasons. First of all, government jobs offer good salaries and great benefits. You will have all government holidays off and you will be working in a position that is necessary to the maintenance of the government. That means that you probably won't have to worry about being displaced. Although, remember that if the government runs into tough times, layoffs are possible. Government jobs are usually normal business hours but not always. There are some positions that will have hours that extend a little bit beyond regular business hours but for the most part, you will be able to enjoy your life by taking advantage of vacation time. Sick days will also be available at government jobs. Some of the drawbacks of government jobs are that you may have to deal with a large amount of on the job stress. You may be responsible for processing hundreds, maybe even thousands of cases and one mistake could be very tragic for an individual. Depending on what your position is, you may be instrumental in handling paper work from a huge amount of people. Software company patent A Software Company Patent is the Door to a World of Confusion There is no universal understanding of exactly what a software company patent is. In general, owning a patent allows a company certain rights (or exclusivity) for a prescribed amount of time. Individuals or corporations seeking a patent must apply for a patent in each and every country in which they wish to have one. Unlike copyrights, patents are not automatically granted to applicants and can take quite a while in order to be approved. Another thing to remember, particularly with a software company patent, is that a patent may issue in one or more of the countries in which you've applied but not all of them. The real problem lies in the fact that there really is no central agreement about what a software company patent actually grants among any of the nations so those who are awarded patents may not be getting exactly what they think they are getting in the process. With no universal agreement there really can't be universal enforcement about the laws and the rights surrounding a software company patent. The growth of Internet business and e-commerce in general has led to many patent applications for software, particularly software that was designed for specific business applications. The problem is that while the cases are granted and successfully tried and defended in some countries, other countries offer no enforcement or legal recourse for those who do not honor the software company patent even if the patents were granted in those countries. The fine line between nations about what is and isn't patentable is another challenge when it comes to establishing and honoring patents. In other words, the issue of a software company patent is a rather confusing process at best. Patents differ greatly from copyrights, which are issued automatically and recognized and enforced internationally. Copyrights protect the source code of software from being copied and registration is generally not required in order for your work to be protected. Lately there is a new term, copyleft, which is an obvious play on words and represents the rights to not only redistribute the works that are covered by this but also to modify and freely distribute those modifications. This term is very much in the spirit of many open source types of software and music. The catch for copyleft protection is that the newly created work be distributed in the same manner and spirit in which it was received. In other words if you were freely given the software, then you must freely provide the improvements and modifications you made to that software. Of course this is a long way from the idea of a software company patent. It is also important that you are sure you understand exactly what you are applying for as far as your patent goes. Different countries will grant patents for different things and those are closely regulated and carefully regarded when it comes to software-know what you are applying for and understand what you are being granted. A software company patent means different things to different people in different places and it nearly impossible to get other countries to honor a patent that they would not have granted at the same time they shouldn't expect other countries to honor patents based on their decision to do so either. One unfortunate circumstance surrounding patents is that there seems to be an unequal and obvious disparity between the haves and the have not's. Patent enforcement for software, unlike literature and music is largely subjective. In literature and music, it is rather obvious that the copyright has been abused or that the work has been copied, this isn't as simple with software which is one other reason that software company patent is such a hotly debated subject in the software industry. Cranial nerves are pairs of nerves that connect your brain to different parts of your head, neck, and trunk. Each nerve has a corresponding roman numeral between i and xii.Your cranial nerves are pairs of nerves that connect your brain to different parts of your head, neck, and trunk. There are 12 of them, each named for its function or structure.Their functions are usually categorized as being either sensory or motor. Sensory nerves involve your senses, such as smell, hearing, and touch. Motor nerves control the movement and function of muscles or glands.Keep reading to learn more about each of the 12 cranial nerves and how they function.The cranial nerves are located within the skull, on the underside of the brain. They begin in the nuclei of the brain and travel different paths to help control your senses and movement.Each nerve has a corresponding Roman numeral between I and XII. This is based on their location from front to back. For example, your olfactory nerve is closest to the front of your head, so it's designated as I. Conditions and disorders of the cranial nerves can affect processes that involve vision, smell, hearing, speaking, and balance. They can also change the way you perceive sensation on the face and prevent or alter the movement of the head, eyes, neck, shoulders, throat, and tongue. Cranial nerve palsy affects a motor nerve — one that controls movement. If a sensory nerve is affected, it can cause pain or reduced sensation.Conditions and disorders that affect the cranial nerves can include:Third nerve palsy. This disorder can cause a closed or partially closed eyelid, an enlarged pupil, and the movement of the eye outward and downward.Trigeminal neuralgia. 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MeSH Heading Cranial Nerves Tree Number(s) A08.800.800.120 Unique IDD003391 RDF Unique Identifier Scope NoteTwelve pairs of nerves that carry general afferent, visceral afferent, special afferent, somatic efferent, and autonomic efferent fibers. Entry Combination injuries:Cranial Nerve Injuries Date Established 1966/01/01 Date of Entry 1999/01/01 Revision Date 2011/06/24 Cranial Nerves Preferred Concept UIM0005281 Scope NoteTwelve pairs of nerves that carry general afferent, visceral afferent, special afferent, somatic efferent, and autonomic efferent fibers. Terms Cranial Nerves Preferred Term Term UI T009876 Date01/01/1999 LexicalTag NON ThesaurusID NLM (1966) Author: Jana Vasković, MD • Reviewer: Nicola McLaren, MSc Last reviewed: November 03, 2023 Reading time: 23 minutes Facial nerve (lateral right view) You know when someone mentions cranial nerves and you roll your eyes all the way back to your midbrain? We know that cranial nerves have always been a challenging subject among anatomy students. So we're here to make it easier for you. Cranial nerves anatomy is essential for almost any medical specialty since they control so many body functions, such as rolling your eyes when you're annoyed by something. So let's break the stigma of them being hard to understand, and learn this important neuroanatomy topic once and for all. Key facts about the cranial nerves Definition A set of 12 peripheral nerves emerging from the brain that innervate the structures of the head, neck, thorax and abdomen. Nerves Olfactory nerve (CN I), optic nerve (CN II), oculomotor nerve (CN III), trochlear nerve (CN IV), trigeminal nerve (CN V), abducens nerve (CN VI), facial nerve (CN VII), vestibulocochlear nerve (CN VIII), glossopharyngeal nerve (CN IX), vagus nerve (CN X), accessory nerve (CN XI), and hypoglossal nerve (CN XII). Mnemonics: - Oh, Oh, Oh, To Touch And Feel Very Good Velvet, such-A Heaven - On, On, On, They Traveled And Found Voldemort Guarding Very Ancient Horcruxes. Types of nerves - Sensory: Olfactory nerve (CN I), optic nerve (CN II), vestibulocochlear nerve (CN VIII) - Motor: Oculomotor nerve (CN III), trochlear nerve (CN IV), abducens nerve (CN VI), accessory nerve (CN XI), hypoglossal nerve (CN XII). - Mixed (both): trigeminal nerve (CN V), facial nerve (CN VII), glossopharyngeal nerve (CN IX), vagus nerve (CN X). Mnemonic (by the numerical order): Some Say Money Matters, But My Brother Says Big Brains Matter Most Cranial nerves are the 12 nerves of the peripheral nervous system that emerge from the foramina and fissures of the cranium. Their numerical order (1-12) is determined by their skull exit location (rostral to caudal). All cranial nerves originate from nuclei in the brain. Two originate from the forebrain (Olfactory and Optic), one has a nucleus in the spinal cord (Accessory) while the remainder originate from the brainstem. There's a LOT to learn about the cranial nerves. You might like to ease yourself into this topic with our cranial nerves quizzes and labeling exercises. Cranial nerves supply sensory and motor information to structures of the head and neck, controlling the activity of this region. Only the vagus nerve extends beyond the neck, to innervate thoracic and abdominal viscera. We're sure that while reading textbooks, you encountered with terms such as afferent, efferent, mixed, general, visceral, special, somatic etc, these refer to modalities of the cranial nerves. They often bring confusion, so let's explain them before proceeding. The function of a nerve is to carry sensory and/or motor information between the body and the brain. If the information goes from the brain to the periphery, then it is an efferent (motor) nerve. If it travels from the periphery to the brain, then it is an afferent (sensory) nerve. Nerves that do both are mixed nerves. Unlike spinal nerves which are always mixed, cranial nerves can be purely motor, purely sensory or mixed. Now let's understand the terms special, general, somatic and visceral. The information is classified as special if it travels from our special senses (vision, smell, taste, hearing and balance), while general describes information to/from everywhere else. The information carried by a nerve is called somatic if it goes to/from the skin and skeletal muscles, or visceral if it travels to/from our internal organs. Combining these categories allows us to define the functional components of a nerve. For example, if the nerve fibers exclusively carry special sensory information, it is called a special afferent nerve. If it carries other types of sensory information, like touch, pressure, pain, temperature, then it is a general afferent nerve. If the nerve carries information to smooth muscle, cardiac muscle or glands, then it is a visceral efferent nerve. If it carries information to skin or skeletal muscle, then it is a somatic efferent nerve. As the term visceral is often a synonym for autonomic (nervous system), note that general visceral nerves carry autonomic nerve fibers to/from the target organs. The exception to this are the special visceral efferent nerves, sometime described as branchial efferent (BE). These are motor nerves, named for the embryological origin of the fibres. Information of movement and position (proprioception) from somatic structures like muscles, tendons, and joints is carried by general somatic afferent nerves. Lastly, be aware that there is no special somatic efferent classification. So to conclude, considering the possible directions and modalities, cranial nerves can be: General somatic afferent (GSA) General somatic efferent (GSE) General visceral afferent (GVA) General visceral efferent (GVE) Special somatic afferent (SSA) Special visceral afferent (SVA) Special visceral efferent (SVE) Here is a cranial nerves starter pack for you: To get familiar with these nerves, let's list all them in one place. Cranial nerves list Cranial nerve 1 Olfactory nerve (CN I) - sensory Cranial nerve 2 Optic nerve (CN II) - sensory Cranial nerve 3 Oculomotor nerve (CN III) - motor Cranial nerve 4 Trochlear nerve (CN IV) - motor Cranial nerve 5 Trigeminal nerve (CN V) - mixed Cranial nerve 6 Abducens nerve (CN VI) - motor Cranial nerve 7 Facial nerve (CN VII) - mixed Cranial nerve 8 Vestibulocochlear nerve (CN VIII) - sensory Cranial nerve 9 Glossopharyngeal nerve (CN IX) - mixed Cranial nerve 10 Vagus nerve (CN X) - mixed Cranial nerve 11 (Spinal) Accessory nerve (CN XI) - motor Cranial nerve 12 Hypoglossal nerve (CN XII) - motor Test your knowledge about the cranial nerves by taking this quiz which is specially designed to cover the most important anatomy facts about the 12 cranial nerves! If we take the first letter of each nerve, we can build a mnemonic to help remember the cranial nerve names! Oh, Oh, Oh, To Touch And Feel Very Good Velvet, Such A Heaven Olfactory nerve (CN I) Optic nerve (CN II) Occulomotor nerve (CN III) Trochlear nerve (CN IV) Trigeminal nerve (CN V) Abducens nerve (CN VI) Facial nerve (CN VII) Vestibulocochlear nerve (CN VIII) Glossopharyngeal nerve (CN IX) Vagus nerve (CN X) Accessory nerve (CN XI) Hypoglossal nerve (CN XII) Or, if you're a member of the Harry Potter fandom, you can learn this one: On, On, On, They Traveled And Found Voldemort Guarding Very Ancient Horcruxes. Remember these, and you'll always be able to recall the cranial nerves in their numerical order. In addition, to remember if a nerve is sensory, motor or both in numerical order, remember this: "Some say money matters, but my brother says big brains matter most" Sensory (CN I) Sensory (CN II) Motor (CN III) Motor (CN IV) Both (CN V) Motor (CN VI) Both (CN VII) Sensory (CN VIII) Both (CN IX) Both (CN X) Motor (CN XI) Motor (CN XII) Now that we've learned the tricks on how to remember cranial nerves and their modalities, let's get introduced to the anatomy of each one of them. Cranial nerve 1 is a special somatic afferent nerve which innervates the olfactory mucosa within the nasal cavity. It carries information about smell to the brain. Key facts about the olfactory nerve (CN I) Type SVA/SSA* Nucleus None Field of innervation Sensory: Nasal mucosa The many branches of the olfactory nerve, called fila olfactoria, pass from the nasal cavity through the cribriform plate of the ethmoid bone. They terminate in the olfactory bulb, which continues as the olfactory tract. Within the brain, the fibers of the olfactory tract disperse and end within the olfactory cortex (piriform cortex, amygdala, entorhinal cortex). The olfactory nerve doesn't have a specific nucleus of its own. Instead its cell bodies are found in the olfactory area-the nasal mucosa that covers the roof of the nasal cavity. *Note that there is an ongoing discussion about the modality of the olfactory nerve. Some authors say it's SSA, whilst the others classify it as SVA. In any case, you won't make a mistake if you simply say that it is a special afferent nerve. Find out more about the olfactory nerve in the study unit below, or take the quiz to see what you've learned so far! Cranial nerve 2 is a special somatic afferent nerve which innervates the retina of the eye and brings visual information to the brain. Key facts about the optic nerve (CN II) Type SSA Nucleus None Field of innervation Sensory: Retina Neural fibers originate from the ganglion cells of the retina. They converge at the optic disc, forming the optic nerve. The optic nerve leaves the orbit through the optic canal. On the floor of the middle cranial fossa, the nasal parts of each nerve cross to the opposite side forming the optic chiasm. The nerve fibers then continue as the two optic pathways. CN II also doesn't have its own nuclei, but instead its cell bodies are found in the retina. The optic nerve synapses with the visual relay centers of the brain. Eager to learn everything about the optic nerve? Check out this study unit and quiz we have prepared for you. Cranial nerve 3 is both a somatic and visceral efferent motor nerve. This means it has two nuclei and carries two types of efferent fibers. As the name suggests, the oculomotor nerve is the chief motor nerve supplying the eye. It originates from the midbrain and leaves the skull through the superior orbital fissure to enter the orbit where it enables eye movement, constriction of the pupil (miosis) and lens accommodation. Key facts about the oculomotor nerve (CN III) Type GSE, GVE (parasympathetic) Nuclei Nucleus of oculomotor nerve (GSE) Accessory nuclei of oculomotor nerve (Edinger-Westphal) (GVE) Field of innervation Motor: all extraocular muscles except for the lateral rectus and superior oblique (GSE); ciliary muscle, sphincter pupillae muscle (GVE) Solidify your knowledge about the oculomotor nerve with this study unit: Cranial nerve 4 is a general somatic motor nerve. The trochlear nerve originates from the midbrain and enters the orbit through the superior orbital fissure, supplying one extraocular muscle thus playing a role in eye movement. Key facts about the trochlear nerve (CN IV) Type GSE Nuclei Nucleus of trochlear nerve Field of innervation Motor: Superior oblique muscle We have you covered with the anatomy of the trochlear nerve in the study unit below. Cranial nerve 5 is a mixed nerve, containing both special visceral and general somatic fibers. The fibers originate from the brainstem, forming the trigeminal ganglion near the apex of the petrous part of the temporal bone. The trigeminal nerve divides into three divisions; ophthalmic nerve (CN V1), maxillary nerve (CN V2) and mandibular nerve (CN V3). Each of them leaves the skull through a different opening. Ophthalmic leaves through the superior orbital fissure, maxillary through the foramen rotundum and the mandibular nerve exits via the foramen ovale. Key facts about the trigeminal nerve (CN V) Type SVE, GSA Nuclei Motor nucleus of trigeminal nerve (SVE) Principal sensory nucleus of trigeminal nerve (GSA) Spinal nucleus of trigeminal nerve (GSA) Mesencephalic nucleus of trigeminal nerve (GSA) Divisions Ophthalmic nerve (CN V1) Maxillary nerve (CN V2) Mandibular nerve (CN V3) Field of innervation Motor: Muscles of mastication, mylohyoid, anterior belly of digastric, tensor tympani muscles (SVE) Sensory: Scalp, face, orbit, paranasal sinuses, anterior two-thirds of the tongue (GSA) All three branches of the trigeminal nerve supply sensation to the facial skin. The areas of cutaneous innervation (dermatomes) are as follows; Ophthalmic nerve (CN V1 dermatome) supplies the forehead, orbit and nose, maxillary nerve (CN V2 dermatome) the zygomatic region and upper lip, while the mandibular nerve (CN V3 dermatome) innervates the buccal skin, lower lip and skin of the mandibular region. To learn everything about the trigeminal nerve and its divisions, we recommend you go through the following study materials and custom quiz: Cranial nerve 6 is a general somatic efferent nerve which innervates the lateral rectus muscle (extraocular). The abducens nerve originates from the brainstem and exits the skull via the superior orbital fissure. Key facts about the abducens nerve (CN VI) Type GSE Nucleus Nucleus of abducens nerve Field of innervation Motor: Lateral rectus muscle Although it may seem the least relevant, the abducens nerve plays a very important role in eye movement. Just ask anyone with strabismus. Learn all about this nerve in the study unit below and then test what you've learned so far about the oculomotor, trochlear and abducens nerve with our qustom quiz below! Cranial nerve 7 is a multimodal nerve, carrying both general and special fibers. It originates from the brainstem as two separate divisions; a larger primary root carrying motor fibers and a smaller intermediate nerve carrying sensory and parasympathetic fibers. The two divisions leave the cranial cavity through the internal acoustic meatus and then travel through the facial canal. Here they join forming the facial nerve proper and leave the cranium together through the stylomastoid foramen. Once the facial nerve reaches the face it enables many functions, such as facial expression, secretion of glands and taste sensation. Key facts about the facial nerve (CN VII) Type GVE (parasympathetic), SVE, GVA, SVA, GSA Nuclei Superior salivatory nucleus (GVE) Motor nucleus of facial nerve (SVE) Nuclei of solitary tract (GVA, SVA) Spinal nucleus of trigeminal nerve (GSA) Field of innervation Sensory: middle ear, nasal cavity, soft palate (GVA); anterior two-thirds of the tongue (SVA); external auditory meatus (GSA) Motor: lacrimal, submandibular, sublingual, basal, palatine glands (GVE); muscles of facial expression (SVE) Even though it may seem like a never ending story, the facial nerve isn't so hard to learn if you have a good approach. We offer you one with our study unit and custom quiz: Cranial nerve 8 is a special somatic afferent nerve. It is comprised of two parts: the vestibular nerve and the cochlear nerve. The cochlear component enables hearing, while the vestibular part mediates balance and motion. At the fundus of internal acoustic meatus, both parts unite to form the vestibulocochlear nerve and enter the cranium through the internal acoustic meatus. Key facts about the vestibulocochlear nerve (CN VIII) Type SSA Nuclei Vestibular nuclei Dorsal and ventral cochlear nuclei Field of innervation Sensory: Spiral organ (of Corti), macula of utricle, macula of saccule, ampullae of the semicircular canals (SSA) The two components synapse with their respective nuclei in the brainstem. To save you from confusion, note that dorsal and ventral cochlear nuclei terminology varies. Sometimes you'll see them as anterior and posterior cochlear nuclei, and elsewhere simply grouped as the auditory nuclei. Master the vestibulocochlear nerve anatomy with our user resources: Cranial nerve 9 is another multimodal nerve. It originates from the brainstem and leaves the skull through the jugular foramen. It enables swallowing, salivation, and taste sensation, as well as visceral and general sensation in the oral cavity. Key facts about the glossopharyngeal nerve (CN IX) Type SVE, GVE (parasympathetic), SVA, GVA, GSA Nuclei Nucleus ambiguus (SVE, GVA) Inferior salivatory nucleus (GVE) Nuclei of solitary tract (SVA, GVA) Spinal nucleus of trigeminal nerve (GSA) Field of innervation Motor: stylopharyngeus and pharyngeal constrictors (SVE); parotid gland (GVE) Sensory: posterior one-third of the tongue (SVA); middle ear, pharynx, epiglottis, carotid body, carotid sinus (GVA); posterior one-third of the tongue, soft palate (GSA) Fortify your knowledge about the glossopharyngeal nerve with these Kenhub resources. Cranial nerve 10 is also a multimodal nerve, It originates from multiple nuclei in the brainstem, and exits the skull through the jugular foramen. It is the longest cranial nerve and the only one to leave the head and neck region. The vagus nerve travels into the thoracic and abdominal cavities, providing parasympathetic supply to visceral organs. Key facts about the vagus nerve (CN X) Type GVE (parasympathetic), SVE, SVA, GVA, GSA Nuclei Posterior nucleus of vagus nerve (dorsal motor nucleus) (GVE) Nucleus ambiguus (SVE) Nuclei of solitary tract (SVA, GVA) Spinal nucleus of trigeminal nerve (GSA) Field of innervation Motor: thoracic and abdominal viscera (GVE); laryngeal and pharyngeal muscles (SVE) Sensory: epiglottis (SVA); thoracic and abdominal viscera, carotid body (GVA); external acoustic meatus, retroauricular skin, posterior part of meninges (GSA) CN 10 has two ganglia, called the superior ganglion of the vagus nerve and the inferior ganglion of the vagus nerve (nodose ganglion). The former provides fibers for general sensory function, while the latter gives special sensory and visceral output. The vagus nerve controls a large number of functions, including gland secretion, peristalsis, phonation, taste, visceral and general sensation of the head, thorax and abdomen. This cranial nerve is frequently tested in anatomy exams. Use our content to swot up on the vagus nerve and ace your cranial nerve exams! Cranial nerve 11 is an efferent nerve originating from the brainstem and spinal cord. It exits the skull through the jugular foramen, acting to enable phonation and movements of the head and shoulders. Sensory fibers of the cervical plexus join the accessory nerve enabling general sensation for its target muscles. So when you feel comfortable while getting a shoulder massage, thank your cervical plexus for that. Key facts about the accessory nerve (CN XI) Type GSE/SVE* Nuclei Ambiguus Nucleus of the accessory nerve (C1-C5) Field of innervation Motor: Laryngeal muscles, sternocleidomastoid, trapezius The (spinal) accessory nerve is interesting in that anatomists still don't agree on exactly where its nerve fibers originate from. *Some debate that it is a SVE nerve, believing the spinal accessory nucleus to be continuous with the nucleus ambiguus (which is SVE). Yet others describe it as a GSE nerve, providing motor innervation to the three muscles without nucleus ambiguus involvement. There are also anatomists who believe that the CN XI contains both SVE and GSE nerves, receiving fibers from both nuclei sources. Learn everything about the accessory nerve with our Kenhub study materials. Cranial nerve 12 is a general somatic efferent nerve originating from the brainstem. It leaves the skull through the hypoglossal foramen. It's function is to enable tongue movements. Key facts about the hypoglossal nerve (CN XII) Type GSE Nucleus Nucleus of hypoglossal nerve Field of innervation Motor: Intrinsic tongue muscles, extrinsic tongue muscles (except for the palatoglossus) The hypoglossal nerve is extremely important for smooth daily functioning of every person, as it plays a significant role in important mouth functions such as speech and swallowing. Similar to CN XI, the hypoglossal nerve also interacts with the cervical plexus. It receives GSE fibers from C1 and C2 spinal nerves, and GSA fibers from the spinal ganglion of C2 spinal nerve. Master the hypoglossal nerve anatomy with our study material: All content published on Kenhub is reviewed by medical and anatomy experts. The information we provide is grounded on academic literature and peer-reviewed research. Kenhub does not provide medical advice. You can learn more about our content creation and review standards by reading our content quality guidelines. References: Blumenfeld, H. (2018). 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