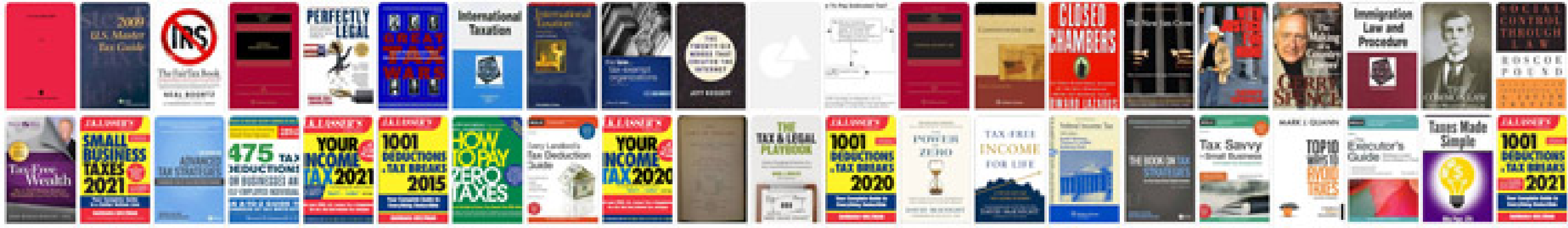

Ear diagram labeled parts

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The external outer and middle ear transmit sound waves to the internal inner ear. Here mechanical sound waves are converted into electrical impulses which are conveyed to the brain for processing. The vestibulocochlear organ within the internal ear is also responsible for equilibrium and maintains the sense of balance. The external ear outer is made up of the auricle , ear canal and lateral surface of the tympanic membrane. Its function is to trap sound waves auricle and transmit it to the inner ear by passing down the canal and causing the eardrum to vibrate. Picture of the Human Ear from Wikimedia Commons. The outer shell-shaped part of the external ear is known as the pinna or auricle. It traps sounds waves in the surroundings and directs it into the ear canal. The auricle is composed of elastic cartilage covered by a thin layer of skin. The outer margin of the ear is known as the helix and the inner elevated margin is the antihelix. The deepest depression which leads to the ear canal is known as the concha. The tragus is the small cartilaginous flap that can be pushed down to block the opening to the ear canal. The ear canal runs from the concha to the ear drum lateral side of the tympanic membrane and is known as the external acoustic meatus. It runs inward through the temporal bone of the skull tympanic part and is about 2 to 3 centimeters long,. The ear canal is an S-shaped tunnel. The outer one-third is made up of cartilage lined with skin that is similar to the skin of the auricle. Sebaceous and ceruminous glands in this outer one-third produces earwax cerumen. The inner two-thirds are bony and lined with a thinner skin. The eardrum tympanic membrane divides the external ear from the middle ear. It is a thin membrane that is about 1 centimeter in diameter. The lateral part of the tympanic membrane which faces the ear canal is lined with thin skin that is continuous with the skin of the inner two-thirds of the ear canal. The best description for the eardrum is that it looks like a satellite dish. It is concave so through the ear canal it looks like the back of a satellite dish, with a central depression known as the umbo. The tympanic membrane moves inward and outward in response to vibration, similar to speaker. Due to the auditory ossicles , which are attached to the medial surface of the eardrum , the movement of membrane transmits force to the internal ear where it can be converted into electrical impulses and passed to the brain. The middle ear is an air-filled cavity that lies between the outer ear and inner ear. It separated from the outer ear by the tympanic membrane eardrum and makes contact with the inner ear at the basal turn of the cochlea, round and oval windows. The differences in the size and orientation of the ossicles increases the force but decreases the amplitude of the vibrations. The neck and handle of the malleus hammer connects to the tympanic membrane and the head of the malleus articulates with the incus. Ask a Doctor Online Now! The incus anvil articulates with the hammer on one end and the long limb of the incus articulates with the stapes at the other end. The stapes stirrup is the smallest ossicle which articulates with the incus at one end and the base connects to the oval window. The oval window transmits vibrations from the stapes to the cochlea of the inner ear. This allows the sound waves to be converted into electrical impulses which is the transmitted to the brain. The round window is separated from the middle ear by a membrane. It allows for the transmission of force within the cochlea by vibrating in response to mechanical waves opposite phase to the oval window. The eustachian tube , pharyngotympanic tube, connects the middle ear to the nasopharynx the part of the the throat that communicates with the nasal cavity. This ensures that the air pressure of the environment which enters through the ear canal is equal to the air pressure within the middle ear. If the pressure of the environment is higher than within the middle ear, the tympanic membrane will bulge inward. Conversely, if the pressure within the middle ear is higher than the environment, then the eardrum will bulge outwards. This can affect the transmission of sound, cause pain and may even lead to a rupture of the tympanic membrane. Fluid accumulation within the middle ear effusion can also push the tympanic membrane outwards. Please note that any information or feedback on this website is not intended to replace a consultation with a health care professional and will not constitute a medical diagnosis. By using this website and the comment service you agree to abide by the comment terms and conditions as outlined on this page. External Ear The external ear outer is made up of the auricle , ear canal and lateral surface of the tympanic membrane. Picture of the Human Ear from Wikimedia Commons Ear Shape The outer shell-shaped part of the external ear is known as the pinna or auricle. Ear Ridges The outer margin of the ear is known as the helix and the inner elevated margin is the antihelix. Ear Canal The ear canal runs from the concha to the ear drum lateral side of the tympanic membrane and is known as the external acoustic meatus. It runs inward through the temporal bone of the skull tympanic part and is about 2 to 3 centimeters long, The ear canal is an S-shaped tunnel. Ear Drum The eardrum tympanic membrane divides the external ear from the middle ear. Middle Ear The middle ear is an air-filled cavity that lies between the outer ear and inner ear. Itchy Ear Inside Canal Causes. Remedies and Treatment. The ears are organs that provide two main functions â€” hearing and balance â€” that depend on specialized receptors called hair cells. Sound waves enter through the outer ear, move into the middle ear, and finally reach the inner ear and its intricate network of nerves, bones, canals, and cells. There are three bones located in the middle ear: the incus, the malleus and the stapes. Collectively, all three bones comprise the ossicles. The malleus is the outermost and largest of the three small bones in the middle ear, and reaches an average length of about eight millimeters in theâ€¦. The human ear consists of three regions called the outer ear, middle ear, and inner ear. The oval window, also known as the fenestra ovalis, is aâ€¦. The auricularis anterior muscle is located between the ear and the eye. It is in an area with few other points of insertion or origination, which isâ€¦. The posterior auricular vein is the name for a vein that is formed via the collection of several venous tributaries situated behind the ear. The vestibulocochlear nerve sometimes referred to as the auditory nerve is the eighth of twelve cranial nerves. This group includes all the nervesâ€¦. The ear canal, also called the external acoustic meatus, is a passage comprised of bone and skin leading to the eardrum. The ear is comprised of theâ€¦. The posterior auricular artery is part of the circulatory system of the head and face. The posterior auricular artery emerges at the back of the jawâ€¦. Combined with the cardiovascular system, the circulatory system helps to fight off disease, helps the body maintain a normal body temperature, andâ€¦. Humans are sexual, meaning that both a male and a female are needed to reproduce. Each is equipped with specific organs capable of producing specificâ€¦. Read this next. Incus Medically reviewed by the Healthline Medical Network. Malleus Medically reviewed by the Healthline Medical Network. Oval window Medically reviewed by the Healthline Medical Network. Auricularis anterior Medically reviewed by the Healthline Medical Network. Posterior auricular vein Medically reviewed by the Healthline Medical Network. Vestibulocochlear nerve Medically reviewed by the Healthline Medical Network. External acoustic meatus Medically reviewed by the Healthline Medical Network. Posterior auricular artery Medically reviewed by the Healthline Medical Network. Circulatory Medically reviewed by the Healthline Medical Network. The ear is made up of three parts: the outer, middle, and inner ear. All three parts of the ear are important for detecting sound by working together to move sound from the outer part through the middle and into the inner part of the ear. Ears also help to maintain balance. The outer part of the ear collects sound. Sound travels through the auricle and the auditory canal, a short tube that ends at the eardrum. The brain and auditory system work together to control how we hear and how we balance ourselves. The human ear is a complex organ and many scientists consider hearing to be the most complex of the human senses. Sound can be detected whether a person is on land, underwater or in the air. Hearing is our ability to perceive sound by detecting vibrations that travel through our ears. The main purpose of the ear is to turn sound waves from the air into electrical signals that are interpreted by the brain. Sound entering the outer ear travels through the middle ear and causes the eardrum and ossicles in the middle ear to vibrate. As it travels, it amplifies gets louder and changes from air to liquid. When the stapes moves, it pushes the oval window, which then moves the cochlea. The cochlea takes the fluid vibration of sounds from the surrounding semicircular ducts, translates them into signals sent to the brain by nerves like the vestibular nerve and cochlear nerve. The brain translates the information into recognizable sound patterns. It is a complex process but it occurs in a split-second of time. The human ear can detect different tones and loudness levels, which can help a person determine the direction of something locate where the sound comes from , and helps to pick out specific sounds despite lots of background noise. Specifically, when someone is speaking, the sounds may be vocalized or non-vocalized. When a person is speaking, the vocal cords are in vibration. There is no closure of the throat or mouth with these sounds. And, in almost all languages, words must contain at least one vowel. Non-vocalized sounds are created strictly from mouth shapes. Lipreading is the process of visually detecting non-vocalized sounds. When a person is speaking, the quietest sounds are those that are actually easier to detect visually. When a person can see someone speak, they can understand him or her better. This combination of seeing what is heard contributes to a better sense of understanding. The auditory pathways begin in the nerve fibers in the inner ear, where sound waves get converted into nerve impulses. These impulses then travel via the auditory nerve to the highest cerebral levels in the cortex of the brain. Hearing loss can happen for many reasons. Some people may be born with hearing loss while others may lose their hearing slowly over time. There are diseases, infections and cancers that affect specific parts of the ear and can lead to hearing loss in children and adults. Approximately 36 million American adults report some degree of hearing loss. Consider these facts:. Cancers of the ear usually occur on the skin of the outer ear. Cancers of the ear can develop inside the ear too, but these are very rare. There are different types of cancers carcinomas and melanomas that can affect the ear. Most ear cancers are squamous cell carcinoma on the outer ear, but basal cell carcinoma and malignant melanoma can also occur inside the ear. Symptoms: A scabbed area of skin that is jagged and irregular with crusting and oozingâ€”usually on the upper edge of the outer part of the ear. This area may be present for many years and may or may not be associated with a swelling or lump in the neck. Treatment for people with small cancers of the skin of the ear includes surgery to remove the affected area. Often no further treatment is required, especially if the cancer is confined to the outer edge of the ear. Cause: Unknownâ€”but may be more common in adults with long history of outer ear infections. Treatment for people with cancer of the auditory cancel includes surgery to remove parts of the middle ear. Cause: Unknownâ€”but may be more common in adults with history of discharge from ears for long periods of time. Treatment of people with cancer of the middle ear includes surgery and radiation, which targets rays of energy at small areas of cancer cells that might not have been removed during surgery. Otosclerosis is the buildup of spongy or bone-like tissue in the middle ear that prevents the ossicles, namely the stapes in the middle ear, from working properly. The impaired movement and function reduces the sound that actually reaches the ear. Otosclerosis usually results in conductive hearing loss , a hearing loss caused by a problem in the outer or middle ear. If the buildup of tissue spreads to the inner ear, it is called Cochlear Otosclerosis. This can cause permanent sensorineural hearing impairment due to interference with how the nerves in this part of the ear work. Scientists aren't sure about the exact cause but there is some research suggesting a relationship between otosclerosis and the hormonal changes associated with pregnancy and also with viruses. Treatment for people who are diagnosed with otosclerosis depends on the extent of hearing loss and may include surgery to replace some or all of the ossicles with artificial ones. It is important to discuss the risks and possible complications of this and any procedure, as well as the benefits, with a doctor and a surgeon. If the hearing loss is mild, surgery may not be an option but a properly fitted hearing aid may help some people with otosclerosis. A hearing aid is designed to compensate for a hearing loss by amplifying sound. In this disease, a part of the cochlea called the organ of Corti becomes swollen, leading to a loss of hearing that may come and go over time. The disease can exist in mild or severe forms. Another 45, are newly diagnosed each year. Diagnosis is based on symptoms and results of hearing tests. Researchers think that it may have to do with fluid levels in the inner ear. Surgery may also be required. Estimates suggest that 6 out of 10 people will get better on their own or can control the symptoms with diet, drugs, or devices. Germs such as bacteria and viruses can get into the ear and cause an infection. In particular, the middle ear cavity behind the eardrum can fill up with fluid. Treatment may include managing the pain and taking antibiotics, which are medications that fight infections. Ongoing fluids in the middle ear and ongoing infections over time may cause hearing problems or other difficulties. Infections of the middle ear are one of the most common reasons for children to see a doctor. Three out of 4 children experience ear infection otitis media by the time they are 3 years old. Children are more likely to have ear infections like otitis media that come from bacteria or viruses than adults because of their developing ear anatomy. The middle ear is connected to the back of the nose by the auditory tube also called the eustachian tube and its location allows easier access to germs. This may lead to a buildup of fluid and pressure, painful infections, and even hearing loss. Infections in children can affect early speech and language development. If the infection is due to bacteria, treatment is possible with antibiotics but if the infection is viral, antibiotics won't work. Surgery is another treatment option, especially for children with ongoing infections. Small tubes placed inside of childrens' ears help fluid drainage and relieve pressure in the ears so that hearing improves. Chronic otitis media can affect adults, too. It is a long-lasting middle ear infection that can damage the ossicles middle ear bones , and even lead to a perforation in the eardrum. Perforations can heal but when a chronic infection is present this is less likely and hearing loss can occur. If you're experiencing hearing difficulties and aren't sure where to turn, schedule a consultation with your local hearing healthcare professional. Put Your Hearing to the Test. Sometimes, hearing loss happens so gradually that it can be difficult to notice at first. However, there are some common signs that indicate you may have hearing loss. Want some answers now? Take this short survey to determine if it's time for you to make a hearing appointment. Find a Location Hearing Aids. View All. The Outer Ear The outer ear includes: auricle cartilage covered by skin placed on opposite sides of the head auditory canal also called the ear canal eardrum outer layer also called the tympanic membrane The outer part of the ear collects sound. The Middle Ear The middle ear includes: eardrum cavity also called the tympanic cavity ossicles 3 tiny bones that are attached malleus or hammer - long handle attached to the eardrum incus or anvil - the bridge bone between the malleus and the stapes stapes or stirrup - the footplate; the smallest bone in the body. The Inner Ear The inner ear includes: oval window - connects the middle ear with the inner ear semicircular ducts - filled with fluid; attached to cochlea and nerves; send information on balance and head position to the brain cochlea - spiral-shaped organ of hearing; transforms sound into signals that get sent to the brain auditory tube - drains fluid from the middle ear into the throat behind the nose. How Do We Hear? Vocalized and Non-Vocalized Sound. Vocalized Sound: Vowels. Vocalized sounds require a combination of air passing through the vocal cords and mouth shapes. Non-Vocalized Sound: Consonants. Auditory Pathways. Consider these facts: About 2 to 3 out of every 1, children in the United States are born deaf or with hearing loss. Nine out of every 10 children who are born deaf are born to parents who can hear. One in three people older than 60 and half of those older than 85 have hearing loss. Cancers of the Ear. Ear Infections. Put Your Hearing to the Test Sometimes, hearing loss happens so gradually that it can be difficult to notice at first. Take a 3-minute hearing test! I have trouble hearing the other person on the phone. Wondering what is the structure of the human ear, and how it performs the function of hearing? Look no further, this Bodytomy article gives you a labeled human ear diagram and also explains the functions of its different components. The human body is like a big machine, and various processes take place inside it. With the help of the various organs and tissues, it carries out some of the most marvelous tasks, that are no less than a miracle! One such organ is the ear that helps us in the process of hearing and balancing. The sound waves entering the ear get converted into electric impulses for the brain to understand and interpret. Let us take a look at the human ear structure with the help of a diagram, and understand its functions a little more closely. Would you like to write for us? Well, we're looking for good writers who want to spread the word. Get in touch with us and we'll talk The sound waves travel first through the ear canal and vibrate the eardrum. Before the sound waves enter the inner ear, the total pressure must be amplified. The ossicles in the middle ear do the job of amplification. Then the cochlea in the inner ear conducts the sound through a fluid. Cochlea is a complex part of the ear, which takes the physical vibrations caused by the sound waves and translates them into electrical information for the brain to recognize as sound. The organ of corti which contains thousands of tiny hair cells, when moved, sends electrical impulses through the cochlear nerve. The cochlear nerve then passes these impulses to the cerebral cortex and the brain interprets them, and we get to hear. We are sure that the aforementioned information must have added to your knowledge about the human body. Here is a blank human ear diagram for you to label, so that you can memorize the different parts of this vitally necessary organ, for good. Necessary cookies are absolutely essential for the website to function properly. This category only includes cookies that ensures basic functionalities and security features of the website. These cookies do not store any personal information. Any cookies that may not be particularly necessary for the website to function and is used specifically to collect user personal data via analytics, ads, other embedded contents are termed as non-necessary cookies. It is mandatory to procure user consent prior to running these cookies on your website. Skip to primary navigation Skip to main content Skip to primary sidebar Skip to footer Human Ear Diagram Wondering what is the structure of the human ear, and how it performs the function of hearing? Let's Work Together! Get Updates Right to Your Inbox Sign up to receive the latest and greatest articles from our site automatically each week give or take If you are human, leave this field blank. Kidneys Vital Role April 27, This website uses cookies to improve your experience. We'll assume you're ok with this, but you can opt-out if you wish. Cookie settings Accept. Close Privacy Overview This website uses cookies to improve your experience while you navigate through the website. Out of these cookies, the cookies that are categorized as necessary are stored on your browser as they are essential for the working of basic functionalities of the website. We also use third-party cookies that help us analyze and understand how you use this website. These cookies will be stored in your browser only with your consent. You also have the option to opt-out of these cookies. But opting out of some of these cookies may have an effect on your browsing experience. Necessary Necessary. Non-necessary Non-necessary. The ear is divided into three anatomical regions: the external ear, the middle ear, and the internal ear Figure 2. The external ear is the visible portion of the ear, and it collects and directs sound waves to the eardrum. The middle ear is a chamber located within the petrous portion of the temporal bone. Structures within the middle ear amplify sound waves and transmit them to an appropriate portion of the internal ear. The internal ear contains the sensory organs for equilibrium balance and hearing. The external outer ear consists of the auricle, external auditory canal, and eardrum Figure 1 and 2. The auricle or pinna is a flap of elastic cartilage shaped like the flared end of a trumpet and covered by skin. The rim of the auricle is the helix; the inferior portion is the lobule. Ligaments and muscles attach the auricle to the head. The external auditory canal is a curved tube about 2. The tympanic membrane or ear drum is a thin, semitransparent partition between the external auditory canal and middle ear. The tympanic membrane is covered by epidermis and lined by simple cuboidal epithelium. Between the epithelial layers is connective tissue composed of collagen, elastic fibers, and fibroblasts. Tearing of the tympanic membrane is called a perforated eardrum. It may be due to pressure from a cotton swab, trauma, or a middle ear infection, and usually heals within a month. The tympanic membrane may be examined directly by an otoscope, a viewing instrument that illuminates and magnifies the external auditory canal and tympanic membrane. Near the exterior opening, the external auditory canal contains a few hairs and specialized sweat glands called ceruminous glands that secrete earwax or cerumen. The combination of hairs and cerumen helps prevent dust and foreign objects from entering the ear. Cerumen also prevents damage to the delicate skin of the external ear canal by water and insects. Cerumen usually dries up and falls out of the ear canal. However, some people produce a large amount of cerumen, which can become impacted and can muffle incoming sounds. The treatment for impacted cerumen is usually periodic ear irrigation or removal of wax with a blunt instrument by trained medical personnel. The middle ear is a small, air-filled cavity in the petrous portion of the temporal bone that is lined by epithelium. It is separated from the external ear by the tympanic membrane and from the internal ear by a thin bony partition that contains two small openings: the oval window and the round window. Extending across the middle ear and attached to it by ligaments are the three smallest bones in the body, the auditory ossicles, which are connected by synovial joints. The bones, named for their shapes, are the malleus, incus, and stapesâ€"commonly called the hammer, anvil, and stirrup, respectively. The head of the malleus articulates with the body of the incus. The incus, the middle bone in the series, articulates with the head of the stapes. The base or footplate of the stapes fits into the oval window. Directly below the oval window is another opening, the round window, which is enclosed by a membrane called the secondary tympanic membrane. Besides the ligaments, two tiny skeletal muscles also attach to the ossicles Figure 3. The tensor tympani muscle, which is supplied by the mandibular branch of the trigeminal V nerve, limits movement and increases tension on the eardrum to prevent damage to the inner ear from loud noises. The stapedius muscle, which is supplied by the facial VII nerve, is the smallest skeletal muscle in the human body. By dampening large vibrations of the stapes due to loud noises, it protects the oval window, but it also decreases the sensitivity of hearing. For this reason, paralysis of the stapedius muscle is associated with hyperacusia, which is abnormally sensitive hearing. Because it takes a fraction of a second for the tensor tympani and stapedius muscles to contract, they can protect the inner ear from prolonged loud noises but not from brief ones such as a gunshot. The anterior wall of the middle ear contains an opening that leads directly into the auditory tube or pharyngotympanic tube, commonly known as the eustachian tube. The auditory tube, which consists of both bone and elastic cartilage, connects the middle ear with the nasopharynx superior portion of the throat. It is normally closed at its medial pharyngeal end. During swallowing and yawning, it opens, allowing air to enter or leave the middle ear until the pressure in the middle ear equals the atmospheric pressure. Most of us have experienced our ears popping as the pressures equalize. When the pressures are balanced, the tympanic membrane vibrates freely as sound waves strike it. If the pressure is not equalized, intense pain, hearing impairment, ringing in the ears, and vertigo could develop. The auditory tube also is a route for pathogens to travel from the nose and throat to the middle ear, causing the most common type of ear infection. Ear The internal inner ear is also called the labyrinth because of its complicated series of canals Figure 4, 5 and 6. Structurally, it consists of two main divisions: an outer bony labyrinth that encloses an inner membranous labyrinth. It is like long balloons put inside a rigid tube. The bony labyrinth is a series of cavities in the petrous portion of the temporal bone divided into three areas: 1 the semicircular canals, 2 the vestibule, and 3 the cochlea. The bony labyrinth is lined with periosteum and contains perilymph. This fluid, which is chemically similar to cerebrospinal fluid, surrounds the membranous labyrinth, a series of epithelial sacs and tubes inside the bony labyrinth that have the same general form as the bony labyrinth and house the receptors for hearing and equilibrium. The epithelial membranous labyrinth contains endolymph. The vestibule is the oval central portion of the bony labyrinth. The membranous labyrinth in the vestibule consists of two sacs called the utricle little bag and the saccule little sac , which are connected by a small duct. Projecting superiorly and posteriorly from the vestibule are the three bony semicircular canals, each of which lies at approximately right angles to the other two. Based on their positions, they are named the anterior, posterior, and lateral semicircular canals. The anterior and posterior semicircular canals are vertically oriented; the lateral one is horizontally oriented. At one end of each canal is a swollen enlargement called the ampulla. The portions of the membranous labyrinth that lie inside the bony semicircular canals are called the semicircular ducts. These structures connect with the utricle of the vestibule. The vestibular branch of the vestibulocochlear cranial nerve VIII nerve consists of ampullary, utricular, and saccular nerves. These nerves contain both first-order sensory neurons and efferent neurons that synapse with receptors for equilibrium. The first-order sensory neurons carry sensory information from the receptors, and the efferent neurons carry feedback signals to the receptors, apparently to modify their sensitivity. Cell bodies of the sensory neurons are located in the vestibular ganglia. Note: A closer look at the inner ear. Perilymph separates the bony osseous labyrinth of the inner ear from the membranous labyrinth, which contains endolymph. Note that areas of bony labyrinth have been removed to reveal underlying structures. Note: a Cross section of the cochlea. Sections through the cochlea reveal that it is divided into three channels: cochlear duct, scala vestibuli, and scala tympani. The cochlear duct or scala media is a continuation of the membranous labyrinth into the cochlea; it is filled with endolymph. The channel above the cochlear duct is the scala vestibuli, which ends at the oval window. The channel below is the scala tympani, which ends at the round window. Both the scala vestibuli and scala tympani are part of the bony labyrinth of the cochlea; therefore, these chambers are filled with perilymph. The scala vestibuli and scala tympani are completely separated by the cochlear duct, except for an opening at the apex of the cochlea, the helicotrema. The cochlea adjoins the wall of the vestibule, into which the scala vestibuli opens. The perilymph in the vestibule is continuous with that of the scala vestibuli. The vestibular membrane separates the cochlear duct from the scala vestibuli, and the basilar membrane separates the cochlear duct from the scala tympani. Resting on the basilar membrane is the spiral organ or organ of Corti. The spiral organ is a coiled sheet of epithelial cells, including supporting cells and about 16, hair cells, which are the receptors for hearing. There are two groups of hair cells: The inner hair cells are arranged in a single row, whereas the outer hair cells are arranged in three rows. At the apical tip of each hair cell are stereocilia that extend into the endolymph of the cochlear duct. Despite their name, stereocilia are actually long, hairlike microvilli arranged in several rows of graded height. At their basal ends, inner and outer hair cells synapse both with first-order sensory neurons and with motor neurons from the cochlear branch of the vestibulocochlear VIII nerve. Cell bodies of the sensory neurons are located in the spiral ganglion. The tectorial membrane, a flexible gelatinous membrane, covers the hair cells of the spiral organ. In fact, the ends of the stereocilia of the hair cells are embedded in the tectorial membrane while the bodies of the hair cells rest on the basilar membrane. Inner and outer hair cells have different functional roles. Outer hair cells do not serve as hearing receptors; instead, they increase the sensitivity of the inner hair cells. First, sound vibrations travel from the eardrum through the ossicles, causing the stapes to oscillate back and forth against the oval window. This oscillation sets up pressure waves in the perilymph of the scala vestibuli, which are transferred to the endolymph of the cochlear duct. These waves cause the basilar membrane to vibrate up and down. The hair cells in the spiral organ move along with the basilar membrane, but the overlying tectorial membrane in which the hairs are anchored does not move. Therefore, the movements of the hair cells cause their hairs to bend. Each time such bending occurs in a specific direction, the hair cells release neurotransmitters that excite the cochlear nerve fibers, which carry the vibratory sound information to the brain. The vibrations of the basilar membrane set the perilymph vibrating in the underlying scala tympani. These vibrations then travel to the round window, where they push on the membrane that covers that window, thereby dissipating their remaining energy into the air of the middle ear cavity. Without this release mechanism, echoes would reverberate within the rigid cochlear box, disrupting sound reception. The inner and outer hair cells in the spiral organ have different functions. The inner hair cells are the true receptors that transmit the vibrations of the basilar membrane to the cochlear nerve. The outer hair cells are involved with actively tuning the cochlea and amplifying the signal. The outer hair cells receive efferent fibers from the brain that cause these cells to stretch and contract, enhancing the responsiveness of the inner hair cell receptors. Overall, this active mechanism amplifies sounds some times, so that we can hear the faintest sounds. The mobility of the outer hair cells is also responsible for producing ear sounds otoacoustic emissions. Detection of spontaneous otoacoustic emissions is used to test hearing in newborns. The most common cause of this infection is bacteria invading the skin inside your ear canal. Prompt treatment can help prevent complications and more-serious infections. Infections caused by a fungus or a virus are less common. It may occur with a middle ear infection or a respiratory infection such as a cold. Bacteria commonly often found in water can cause ear infections. Rarely, the infection may be caused by a fungus. Your outer ear canals have natural defenses that help keep them clean and prevent infection. Protective features include:. If your infection is at an advanced stage or persists, you may need further evaluation. Initial testing. Cleaning your outer ear canal is necessary to help eardrops flow to all infected areas. Your doctor will use a suction device or ear curette to clean away any discharge, clumps of earwax, flaky skin and other debris. Ask your doctor about the best method for taking your eardrops. Some ideas that may help you use eardrops include the following:. If your ear canal is completely blocked by swelling, inflammation or excess discharge, your doctor may insert a wick made of cotton or gauze to promote drainage and help draw medication into your ear canal. A ruptured eardrum can result in hearing loss. A ruptured eardrum can also make your middle ear vulnerable to infections or injury. A ruptured eardrum usually heals within a few weeks without treatment. Sometimes, however, a ruptured eardrum requires a procedure or surgical repair to heal. If you think that you have a ruptured eardrum, be careful to keep your ears dry to prevent infection. To keep water out of your ear when showering or bathing, use a moldable, waterproof silicone earplug or put a cotton ball coated with petroleum jelly in your outer ear. If your eardrum ruptures, complications can occur while your eardrum is healing or if it fails to heal. Possible complications include:. Call your doctor if you experience any of the signs or symptoms of a ruptured eardrum or pain or discomfort in your ears. Your middle and inner ears are composed of delicate mechanisms that are sensitive to injury or disease. Prompt and appropriate treatment is important to preserve your hearing. Your family doctor or ENT specialist can often determine if you have a perforated eardrum with a visual inspection using a lighted instrument otoscope. He or she may conduct or order additional tests to determine the cause of the rupture or degree of damage. These tests include:. Most perforated eardrums heal without treatment within a few weeks. These may include:. A ruptured eardrum usually heals on its own within weeks. In some cases, healing takes months. Until your doctor tells you that your ear is healed, protect it by doing the following:. An middle ear infection acute otitis media is most often a bacterial or viral infection that affects the middle ear, the air-filled space behind the eardrum that contains the tiny vibrating bones of the ear 4. Children are more likely than adults to get ear infections. Ear infections frequently are painful because of inflammation and buildup of fluids in the middle ear. Because ear infections often clear up on their own, treatment may begin with managing pain and monitoring the problem. Ear infection in infants and severe cases in general often require antibiotic medications. Long-term problems related to ear infections â€" persistent fluids in the middle ear, persistent infections or frequent infections â€" can cause hearing problems and other serious complications. Signs and symptoms of an ear infection can indicate a number of conditions. An ear infection is caused by a bacterium or virus in the middle ear. This infection often results from another illness â€" cold, flu or allergy â€" that causes congestion and swelling of the nasal passages, throat and eustachian tubes. The eustachian tubes are a pair of narrow tubes that run from each middle ear to high in the back of the throat, behind the nasal passages. The throat end of the tubes open and close to:. Swelling, inflammation and mucus in the eustachian tubes from an upper respiratory infection or allergy can block them, causing the accumulation of fluids in the middle ear. A bacterial or viral infection of this fluid is usually what produces the symptoms of an ear infection. Ear infections are more common in children, in part, because their eustachian tubes are narrower and more horizontal â€" factors that make them more difficult to drain and more likely to get clogged. Adenoids are two small pads of tissues high in the back of the nose believed to play a role in immune system activity. This function may make them particularly vulnerable to infection, inflammation and swelling. Because adenoids are near the opening of the eustachian tubes, inflammation or enlargement of the adenoids may block the tubes, thereby contributing to middle ear infection. Inflammation of adenoids is more likely to play a role in ear infections in children because children have relatively larger adenoids. Conditions of the middle ear that may be related to an ear infection or result in similar middle ear problems include the following:. Frequent or persistent infections and persistent fluid buildup can result in some serious complications:. Your doctor can usually diagnose an ear infection or another condition based on the symptoms you describe and an exam. The doctor will likely use a lighted instrument an otoscope to look at the ears, throat and nasal passage. He or she will also likely listen to your child breathe with a stethoscope. An instrument called a pneumatic otoscope is often the only specialized tool a doctor needs to make a diagnosis of an ear infection. This instrument enables the doctor to look in the ear and judge whether there is fluid behind the eardrum. With the pneumatic otoscope, the doctor gently puffs air against the eardrum. Normally, this puff of air would cause the eardrum to move. If the middle ear is filled with fluid, your doctor will observe little to no movement of the eardrum. Some ear infections resolve without treatment with antibiotics. Symptoms of ear infections usually improve within the first couple of days, and most infections clear up on their own within one to two weeks without any treatment. Some evidence suggests that treatment with antibiotics might be beneficial for certain children with ear infections. Talk to your doctor about the benefits of antibiotics weighed against the potential side effects and concern about overuse of antibiotics creating strains of resistant disease. Your doctor will advise you on treatments to lessen pain from an ear infection. These may include the following:. After an initial observation period, your doctor may recommend antibiotic treatment for an ear infection in the following situations:. Children younger than 6 months of age with confirmed acute otitis media are more likely to be treated with antibiotics without the initial observational waiting time. Even after symptoms have improved, be sure to use all of the antibiotic as directed. Failing to do so can result in recurring infection and resistance of bacteria to antibiotic medications. Talk to your doctor or pharmacist about what to do if you accidentally skip a dose. If your child has recurrent otitis media or otitis media with effusion, your doctor may recommend a procedure to drain fluid from the middle ear. Otitis media is defined as three episodes of infection in six months or four episodes of infection in a year with at least one occurring in the past six months. Otitis media with effusion is persistent fluid buildup in the ear after an infection has cleared up or in the absence of any infection. During an outpatient surgical procedure called a myringotomy, a surgeon creates a tiny hole in the eardrum that enables him or her to suction fluids out of the middle ear. A tiny tube tympanostomy tube is placed in the opening to help ventilate the middle ear and prevent the accumulation of more fluids. Some tubes are intended to stay in place for six months to a year and then fall out on their own. Other tubes are designed to stay in longer and may need to be surgically removed. Chronic infection that results in perforation of the eardrum â€” chronic suppurative otitis media â€” is difficult to treat. Children with frequent or persistent infections or with persistent fluid in the middle ear will need to be monitored closely. Talk to your doctor about how often you should schedule follow-up appointments. Your doctor may recommend regular hearing and language tests. Tinnitus is the perception of noise or ringing in the ears 5. A common problem, tinnitus affects about 1 in 5 people. Although it can worsen with age, for many people, tinnitus can improve with treatment. Treating an identified underlying cause sometimes helps. Other treatments reduce or mask the noise, making tinnitus less noticeable. Tinnitus involves the annoying sensation of hearing sound when no external sound is present. Tinnitus symptoms include these types of phantom noises in your ears:. The phantom noise may vary in pitch from a low roar to a high squeal, and you may hear it in one or both ears. In some cases, the sound can be so loud it can interfere with your ability to concentrate or hear actual sound. Tinnitus may be present all the time, or it may come and go. A number of health conditions can cause or worsen tinnitus. In many cases, an exact cause is never found. A common cause of tinnitus is inner ear cell damage. Tiny, delicate hairs in your inner ear move in relation to the pressure of sound waves. This triggers ear cells to release an electrical signal through a nerve from your ear auditory nerve to your brain. Your brain interprets these signals as sound. Other causes of tinnitus include other ear problems, chronic health conditions, and injuries or conditions that affect the nerves in your ear or the hearing center in your brain. In rare cases, tinnitus is caused by a blood vessel disorder. This type of tinnitus is called pulsatile tinnitus. Causes include:. A number of medications may cause or worsen tinnitus. Generally, the higher the dose of these medications, the worse tinnitus becomes. Often the unwanted noise disappears when you stop using these drugs. Medications known to cause or worsen tinnitus include:. Tinnitus can significantly affect quality of life. Although it affects people differently, if you have tinnitus, you also may experience:. Treating these linked conditions may not affect tinnitus directly, but it can help you feel better. However, some precautions can help prevent certain kinds of tinnitus. Your doctor will examine your ears, head and neck to look for possible causes of tinnitus. Tests include:. In many cases, the cause of tinnitus is never found. Your doctor can discuss with you steps you can take to reduce the severity of your tinnitus or to help you cope better with the noise. To treat your tinnitus, your doctor will first try to identify any underlying, treatable condition that may be associated with your symptoms. If tinnitus is due to a health condition, your doctor may be able to take steps that could reduce the noise. Examples include:. Your doctor may suggest using an electronic device to suppress the noise. Devices include:. Possible medications include:. Some people, however, get used to it and notice it less than they did at first. For many people, certain adjustments make the symptoms less bothersome. These tips may help:. However, some alternative therapies that have been tried for tinnitus include:. Neuromodulation using transcranial magnetic stimulation TMS is a painless, noninvasive therapy that has been successful in reducing tinnitus symptoms for some people. It is still to be determined which patients might benefit from such treatments. Here are some suggestions to help you cope:. Balance problems are conditions that make you feel unsteady or dizzy. If you are standing, sitting or lying down, you might feel as if you are moving, spinning or floating. If you are walking, you might suddenly feel as if you are tipping over or generally unsteady. Many body systems â€” including your muscles, bones, joints, vision, the balance organ in the inner ear, nerves, heart and blood vessels â€” must work normally for you to have normal balance. Many medical conditions can cause balance problems. However, most balance problems result from issues in your balance end-organ in the inner ear vestibular system. Balance problems can be caused by several different conditions. The cause of balance problems is usually related to the specific sign or symptom. Sense of motion or spinning vertigo. Your doctor will start by reviewing your medical history and conducting a physical and neurological examination. To determine if your symptoms are caused by problems in the balance function in your inner ear, your doctor is likely to recommend tests. They might include:. Sound waves enter the ear canal and cause a vibration of the tympanic membrane ear drum which is then passed through three tiny bones behind the ear drum in the middle ear space: the malleus hammer , incus anvil and stapes stirrup. The sound vibrations in the ossicles are then transmitted to the nerves and fluids in the cochlea inner ear , which generates a nerve impulse that passes along the auditory nerve to the brain. The preliminary classification of hearing loss as conductive or sensorineural can be determined by a physician using a tuning fork in the office. A formal audiogram, or hearing test, is the best way to determine the type and degree of hearing loss. The distinction between these two types of hearing loss is important because many cases of conductive hearing loss can be improved with medical or surgical intervention. An otolaryngologist, also called an Ear Nose and Throat or ENT doctor, can determine the specific diagnosis and treatments for either type of hearing loss and perform surgical treatments, if necessary. Conductive hearing loss may result from diseases that affect the external ear or middle ear structures. Some of the causes of con

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ductive hearing loss include:. Many types of hearing loss can also be ameliorated with the use of conventional hearing aids. In addition, many implantable hearing devices are available for various types of hearing loss. An otolaryngologist can determine the specific cause of the hearing loss, advise patients of their treatment and rehabilitative options, and help patients achieve the best possible hearing outcome and hearing related quality of life. A hearing test should be performed for children who have frequent ear infections, hearing loss that lasts more than six weeks, or fluid in the middle ear for more than three months. They include the otoscopy, tympanometer, and audiometer. Conditions Procedures. Drugs Supplements Vitamins and Minerals. Human ear. What are the types of hearing loss? What can cause Conductive Hearing Loss? When should a hearing test be performed related to frequent infections or fluid? Mayo Clinic. Ruptured eardrum perforated eardrum. Ear infection middle ear.