Hearing Encyclopedia Article

Hearing

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Hearing is one of a human being's five senses. In order to hear sound, the outer ear--the visible part of the ear called the pinna and the external ear canal--functions like a funnel, catching sound waves and directing them to the tympanum, or tympanic membrane, called the ear drum. The sound waves cause the tympanum to vibrate and these vibrations are transferred through three tiny bones in the middle ear which lies between the eardrum and the inner ear. The middle ear is lined with a membrane containing blood vessels and secretion glands, and is connected to the back of the nose by a tiny tube called the Eustachian tube. This tube balances air pressure within the ear with the air pressure in the atmosphere, which is why our ears "pop" as we drive or fly at different elevations. It also helps us maintain our sense of balance. The three bones in the middle ear--the malleus (hammer), the incus (anvil), and stapes (stirrups)--carry the tympanic vibrations to the inner ear which is encased by rock- hard bone and which contains a coiled organ called the cochlea (which means snail). The cochlea is a complicated, fluid-filled system containing thousands of microscopic receptors called hair cells. The bending of these hairs by the wave-like action of the fluid transforms the fluid waves into electrochemical impulses which are then transmitted to the brain via the hearing or auditory nerve which runs through a small, bony, internal auditory canal. In the brain, the auditory nerve divides into an extremely complex system called the central auditory nervous system. Nerve impulses are decoded in the hearing center of the brain into recognizable sounds such as music or speech. Normal hearing in both ears (binaural hearing) allows us--among other important functions--to pinpoint and localize a sound accurately, discern speech from a noisy background, and enjoy a melody. Exposure to extremely loud sound can irreversibly damage the fragile hair cell receptors causing permanent hearing impairment or loss, as can middle ear infections, heredity, some illnesses and birth defects, and the natural aging process.