meningeal artery, ascending pharyngeal artery, internal carotid artery, and the artery of the pterygoid canal.[8]

The inner ear is supplied by the anterior tympanic branch of the maxillary artery; the stylomastoid branch of the posterior auricular artery; the petrosal branch of middle meningeal artery; and the labyrinthine artery, arising from either the anterior inferior cerebellar artery or the basilar artery.[8]

Function

Hearing

Main article: Hearing
Sound waves travel through the outer ear, are modulated by the middle ear, and are transmitted to the vestibulocochlear nerve in the inner ear. This nerve transmits information to the temporal lobe of the brain, where it is registered as sound.

Sound that travels through the outer ear impacts on the eardrum, and causes it to vibrate. The three ossicles bones transmit this sound to a second window (the oval window) which protects the fluid-filled inner ear. In detail, the pinna of the outer ear helps to focus a sound, which impacts on the eardrum. The malleus rests on the membrane, and receives the vibration. This vibration is transmitted along the incus and stapes to the oval window. Two small muscles, the tensor tympani and stapedius, also help modulate noise. The two muscles reflexively contract to dampen excessive vibrations. Vibration of the oval window causes vibration of the endolymph within the vestibule and the cochlea.[9]



The inner ear houses the apparatus necessary to change the vibrations transmitted from the outside world via the middle ear into signals passed along the vestibulocochlear nerve to the brain. The hollow channels of the inner ear are filled with liquid, and contain a sensory epithelium that is studded with hair cells. The microscopic "hairs" of these cells are structural protein filaments that project out into the fluid. The hair cells are mechanoreceptors that release a chemical neurotransmitter when stimulated. Sound waves moving through fluid flows against the receptor cells of the organ of Corti. The fluid pushes the filaments of individual cells; movement of the filaments causes receptor cells to become open to receive the potassium-rich endolymph. This causes the cell to depolarise, and creates an action potential that is transmitted along the spiral ganglion, which sends information through the auditory portion of the vestibulocochlear nerve to the temporal lobe of the brain.[9]

The human ear can generally hear sounds with frequencies between 20 Hz and 20 kHz (the audio range). Sounds outside this range are considered infrasound (below 20 Hz)[10] or ultrasound (above 20 kHz)[11] Although hearing requires an intact and functioning auditory portion of the central nervous system as well as a working ear,