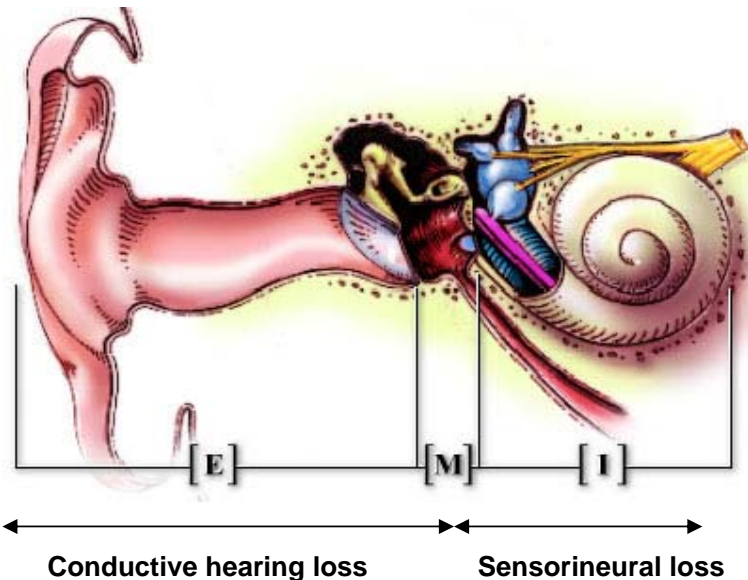




THE EAR AND HOW WE HEAR

Our hearing system can be divided into three main parts: the external (E), middle (M) and inner (I) ears. These link to the brain via the auditory nerve.

The external ear (E) consists of the ear flap, ear canal and ear drum. This section is also referred to as the outer ear and it acts as a sound funnel. The outer ear canal wall produces *cerumen*, or wax, which moves towards the outside. Wax protects the ear, removing foreign bodies and germs from the ear canal and away from the ear drum.



The middle ear (M) is an air filled space containing a chain of 3 tiny bones called the *ossicular chain*. The 3 bones (*ossicles*) are called the *malleus*, *incus* and *stapes*. The *malleus* is the first bone in the chain. It is attached to the back of the ear drum on one end and to the *incus* on the other. The *incus* attaches to the *stapes*, which rests in the oval window of the inner ear. The middle ear is connected to the back of the nose and throat via the Eustachian tube. This tube maintains equal air pressure between the middle ear and the air around us. The eardrum and the ossicular chain vibrate in response to sound waves entering the ear.

The inner ear (I) consists of the *cochlea*, a small snail-shell shaped organ set within the bone of the skull. The *cochlea* contains fluid and tiny hair cells which vibrate in response to the movements from the middle ear, and stimulate thousands of nerve endings in the hearing nerve. The hearing nerve travels through the skull, carrying sound messages to the brain, which decides what the sound is. The inner ear also contains the semi-circular canals, which contribute to one's sense of balance.

Messages from the ear travel up the auditory nerve pathways to the brain, where sounds are perceived and interpreted. Along the way, other nerve pathways communicate with the auditory pathway to help us associate sounds with memories and emotions.

Hearing Loss

Hearing requires sound to travel through the outer and middle parts of the ear to the nerve endings in the inner ear. When there is a breakdown in the passage of the sound to the inner ear it is called a conductive hearing loss. When the disorder is in the inner ear or the hearing



nerve it is termed a sensorineural hearing loss. If both middle ear and inner ear damage or disorder are present it is termed a mixed hearing loss.

Many things can cause a conductive hearing loss, including wax blockage in the ear canal, a hole in the ear drum, infection in the middle ear, or disease of, or damage to, the tiny bones of the middle ear. Conductive hearing loss can also occur with other nose or throat problems.

The inner ear or hearing nerve can be damaged by lots of loud noise, viral and bacterial infections, some diseases, some prescribed medications, head injury, blood vessel problems and the aging process. These conditions lead to sensorineural hearing loss.

There are three aspects of hearing loss:

- ◆ Loss of the ability to hear soft sounds, e.g. quiet voices, the bell on the microwave. This is particularly noticeable when there are other sounds present
- ◆ Loss of sound clarity, “I can hear people talking but I can’t make out the words”
- ◆ Increased sensitivity to loud sounds, some people find loud sounds intolerable.

Tinnitus

As with hearing loss, tinnitus can be a symptom of a problem in the ear or the auditory nerve pathways. Something as simple as wax blocking the ear canal, or an ear infection, can make you aware of internal sounds. Tinnitus often also occurs with sensorineural hearing loss.

If you have tinnitus, it is important that you have your hearing assessed by an Audiologist, and that you are examined by a doctor or Ear Nose and Throat Specialist. The information they provide will ensure that the appropriate treatment can be recommended. Conductive hearing loss and tinnitus due to problems in the outer or middle ear can often be treated, but those caused as a result of inner ear damage are not usually improved through medicine or surgery. They can, however, be managed with hearing instruments or noise generators and counselling.

If you are a pensioner or veteran you may be eligible for free hearing services through the Office of Hearing Services scheme (www.health.gov.au/hear/index.htm, ph 1800 686 126). If not, ask your doctor for a referral to an ENT and an audiologist.

A local study of hearing disorder indicated that about 22% of South Australian adults have hearing loss (Wilson, Walsh, Sanchez 1998). The incidence of hearing loss was found to increase dramatically with age. Furthermore, about 11% of those surveyed reported tinnitus. However, not all people who suffer from tinnitus have hearing loss, and even someone with normal hearing can have tinnitus.

People of any age may experience hearing loss and/or tinnitus, but it is particularly common in people who have been exposed to high levels of noise in their jobs or hobbies. In particular, people working in industries such as manufacturing, manual labour, farming and certain trades can have noise damage to the inner ear, leading to hearing loss and tinnitus.