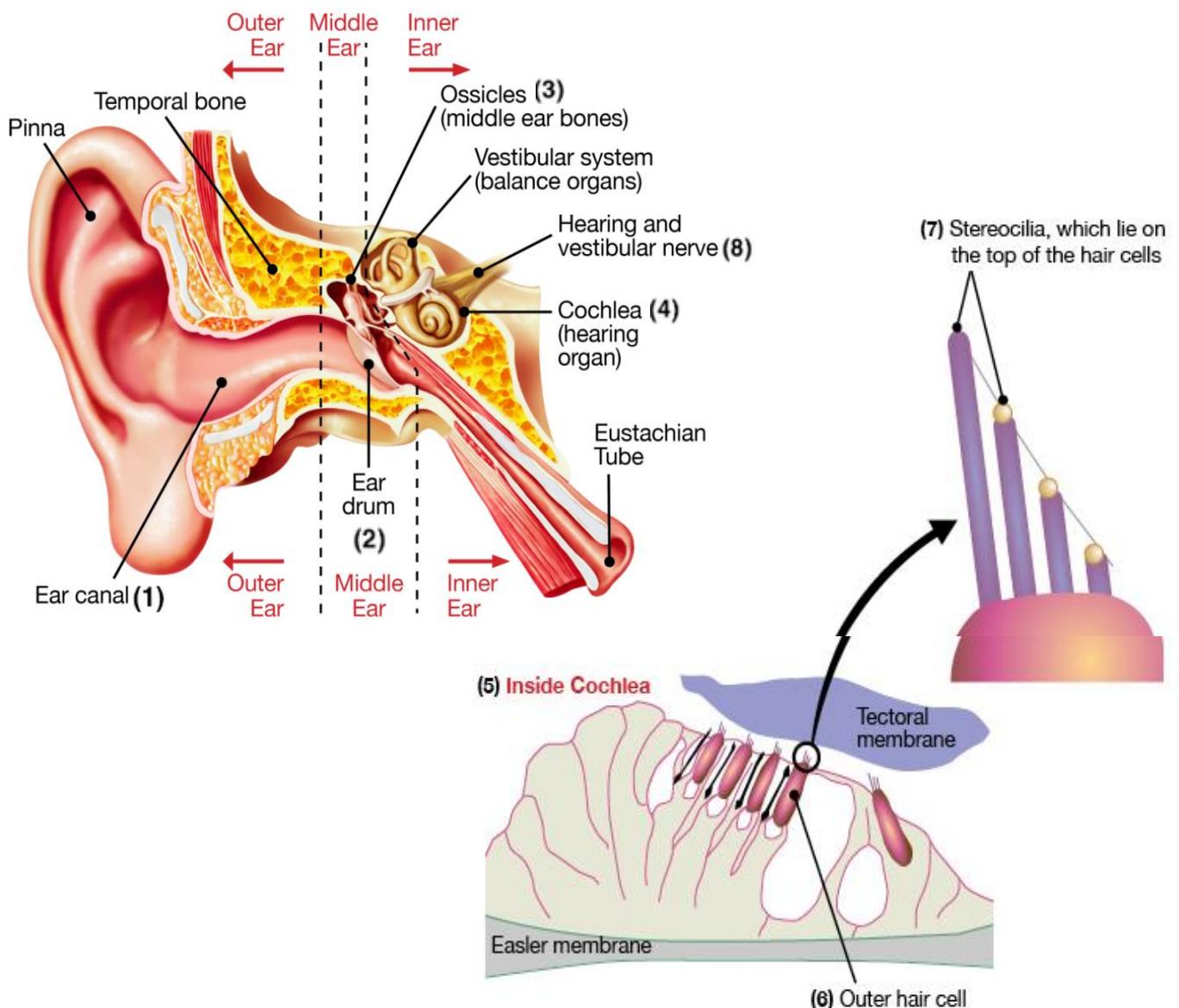


Noise induced hearing loss

Noise

Noise which can cause damage to our ears comes in many forms. Noise emissions from industrial machines, road-working equipment, drills, lawn mowers, aeroplanes and loud music, all have potential to cause damage to hair cells within the hearing organ (cochlea), leading to a hearing loss as described below.



Mechanism of how loud noise damages our hearing

The diagram on the previous page demonstrates the pathway of how sound is heard. Sound waves travel down the ear canal (1) and vibrate the ear drum (2). This vibration causes three tiny bones in the middle ear (3) to move against the cochlea (4). The cochlea consists of three fluid filled compartments which bathe the structures that allow us to hear (5) including the outer hair cells (6). On top of the outer hair cells are tiny hairs called stereocilia (7). When sound waves travel along the basilar membrane inside the cochlea they move the outer hair cells and its stereocilia. Stereocilia bend as they push up against the tectorial membrane and send messages through the hearing nerve (8) to the brain. When the sound is too loud, the stereocilia are forced up against the tectorial membrane causing the tiny hairs to break, resulting in loss of hearing. This hearing loss may be temporary or permanent.

Noise and the damage to our ears

Following exposure to a loud noise, stereocilia is damaged or broken and the outer hair cells swell. This causes a hearing loss at the mechanism which allows us to hear and the hearing loss may be temporary or permanent.

A Temporary Threshold Shift (TTS) causes reduced hearing ability and tinnitus (head/ear noises). Although the effects usually last less than an hour, it is possible for symptoms to last many hours or even days as the cochlea regenerates and reduces the swelling of the hair cells. If the damage in TTS is extensive, the hearing loss can become permanent.

Permanent Threshold Shift (PTS) occurs when there is incomplete recovery after TTS. The swollen hair cells rupture beyond repair as a result of prolonged noise exposure.

Noise intensity and duration

Noise can be steady, fluctuating, intermittent or impulsive, but all can be equally damaging. With increasing noise volume, a person is at increased risk of TTS or PTS. The longer that a person is exposed to a loud noise, the greater the risk of TTS or PTS. For example, a moderately loud sound may be tolerated for eight hours before causing damage; however a very loud noise may cause damage in less than one hour. As the noise increases in intensity, damage becomes more likely. The longer the exposure to the noise, the more likely damage will occur.



Hearing protection

Correct use of hearing protection when exposed to loud noise will decrease the chance of permanent hearing loss. For further information of hearing protection, consult your audiologist.

Personal music player use

Personal music players, such as iPods, used with earphones/ear buds can get surprisingly loud. Listening for more than five minutes at full volume could be putting your long-term hearing at risk¹. However extended listening at 10 to 50 per cent of full volume has shown to cause no hearing problems¹. People also tend to increase the volume when in places with background noise, such as crowds of people, or on public transport. In these situations, earphones which actively or passively reduce background noise can help the user listen to music at a lower, safer volume. Many devices such as iPods can also have volume limiters set, which can be locked; a useful feature for parents. Instructions for this feature can be found at the Apple Support website <http://support.apple.com>.

¹ Study recommends safe listening levels for iPod use, CBC News (2006).
<http://www.cbc.ca/news/health/story/2006/10/19/music-earphones.html>

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