

Editorial

Our pair of ears is an important part of our body. We can listen and gain new knowledge from other people. Furthermore, we can also relax and enjoy life by listening to music and the sound of nature.

Although we are born with a pair of ears, we often neglect to protect them. For example, we listen to loud music for a long period or pick our ears with cotton wool buds and other hard objects. These unhealthy habits will gradually damage our ears and affect our daily life. These damage to our ears and hearing may become permanent and not able to recover.

We should take care of our ears. Student Health Service's audiologist has specially prepared for us some tips on how to protect our outer ear. We hope that our students can put them into practice in their daily life.



Editorial Board Members:

Dr. HO Chun-luen, David, Ms. LAI Chiu-wah, Phronsie, Ms. CHAN Shuk-yi, Karindi,
Ms. CHOI Choi-fung, Ms. CHAN Kin-pui

Tel : 2349 4212 / 3163 4600 Fax : 2348 3968

Website : <http://www.studenthealth.gov.hk>

Health Care for Outer Ear

Student Health Service Audiologist
Mr. HO Chi Tak

Outer ear is the gateway between the auditory system and the environment. Healthy outer ear enables smooth transmission of sound vibration from pinna to the ear drums via ear canal and yet protect ear drum from the potential hazard of the environment (e.g. insects and microorganisms)

In this article, we shall discuss about the common health issues on outer ear such as ear wax occlusion, outer ear infection and foreign body in ear.

1. THE STRUCTURE OF OUTER EAR

Human outer ear has the shape of a funnel which enables sound transmission and sound localization. Outer ear includes pinna, ear canal and ear drum.

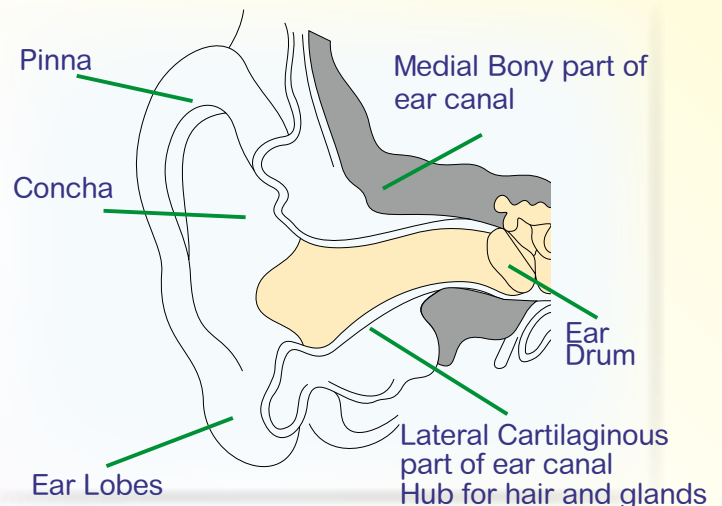
Pinna: (or auricle) are on both sides of the head. It is mainly formed from cartilaginous tissues except that ear lobes are formed from fat and other soft tissues. The shape of pinna facilitates the collection and focusing of sound. Also, it enables discrimination of the direction of sound source.

Ear Canal: is the passage way for sound transmission. Its opening is in the middle of pinna and it ends at the ear drum. The length of an adult ear canal is about 25mm long. Ear canal acts like a resonance tube which magnify sound vibration and make ear drum vibrate in response to sound.

The external 1/3 of the ear canal is formed by cartilaginous tissues. The diameter of its widest section is about 9mm. The skin layer in this section (with thickness of about 1mm) is rich in nerve endings, hair follicles, cerumen glands and sebaceous glands. The secretion from these glands and the skin shed from the canal wall would combined and form ear wax.

The internal 2/3 of the ear canal is formed by bony tissues. The diameter of its narrowest section (which is close to the ear drum) is about 5mm. The skin layer in this section is very thin (0.2mm) and adhered tightly to the bony structure. If the skin layer is swollen in this section, it could be extremely painful as the tension on the skin layer is high. The skin of the internal 2/3 of the ear canal is supplied by the vagus nerve. If the skin layer is physically stimulated e.g. by cotton bud, cough reflex can be triggered.

Ear drum: (or tympanic membrane) is an oval translucent membrane between ear canal and middle ear. Its lateral surface is tilted forward and downward. The peripheral part of ear drum, which is attached to the temporal bone of the skull, is thicker than its centre. Umbo is central part of the ear drum; it indented towards the middle ear and attached to the ossicular chain. Sound waves from the environment trigger ear drum to vibrate, and such vibration is transmitted onwards by the ossicular chain in the middle ear.



2. EAR WAX (Cerumen)

Composition

Ear wax mainly consists of

1. The keratin cells in the epidermal of the shredded skin and
2. The secretion of the glands in the external 1/3 of ear canal including modified apocrine sweat gland and sebaceous gland

Sebaceous glands are located in the base of hair; the main content is triglyceride which is anti-septic and water repellent. Unusually, these glands produce more secretion during the winter.

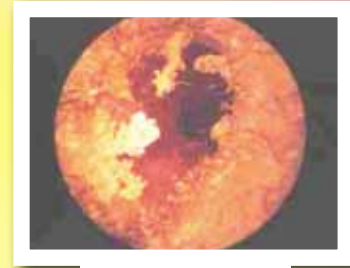
There are more than a thousand modified apocrine sweat glands (cerumen glands) in each ear canal. Some studies had shown that cerumen gland would produce more secretion when the sympathetic nervous system is stimulated. The secretion is milky in colour while it was produced but turns brown and sticky after exposure to air. Ear wax is formed when fragments of the shredded skin are combined with the secretions.

Classification

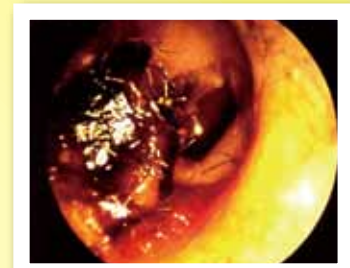
Ear wax can be classified as “dry” and “wet”. Dry ear wax is light grey in colour, with a dry and brittle texture. Dry ear wax is composed mainly by keratin cells in the epidermal of the shredded skin and secretion of sebaceous cell. The density of dry ear wax is low and it seldom causes obstruction of the ear canal.

Wet ear wax is brown in colour with sticky and wet texture; it is composed by secretion from the modified apocrine sweat gland (cerumen gland) in addition to keratin cells in the epidermal of the shredded skin and secretion of sebaceous gland. Some wet ear wax is soft and light brown in colour and some are hard and dark brown. Prolong exposure in air would harden and darken wet ear wax due to oxidization and dehydration. Wet ear wax with hair follicles and dusts would even be harder. The density of wet ear wax is high and it may sometime cause obstruction of the ear canal.

Generic studies found that the type of ear wax a person has is control by a pair of genes with wet ear wax as the dominant phenotype. Wet ear wax is found mostly among Europeans and Africans. Dry ear wax is more common among East Asian e.g. Chinese.



Dry ear wax



Wet ear wax

Function of Ear Wax

Ear wax covers the skin and hair in the ear canal, its stickiness helps to trap foreign body such as dust and insect at the outer part of the ear canal. This protects the ear drum from external threats. The oil-based compound in the ear wax lubricates the skin of the ear canal and forms a water-proof protective layer. Lack of ear wax may cause dryness and itchiness of the ear canal.

The chemicals in ear wax can protect the skin of ear canal from bacteria and fungi. Both dry and wet ear wax have similar protective functions. It is suspected that triglyceride is the main anti-septic component in ear wax.

Is it necessary to clear ear wax?

Most people do not require to clear ear wax. There are self-cleansing mechanisms in the outer ear canal that push the shredded skin out of the ear:

1. Old skin cells in the ear canal are pushed outward in a radial manner by the new skin cell grow from the ear drum
2. Skin cells of the ear canal has a “climb outside” function during cell division

Many people attempted to clear ear wax with cotton buds but these tips are not suitable for removing ear wax. Instead, ear wax would be pushed further down the ear canal when cotton bud was inserted. This is counter productive to the self-cleansing of ear canal. Furthermore, this may cause damage to the ear drum and the protective layer of ear-canal skin. Inserting contaminated object into the ear canal is a major cause for outer ear infection (otitis externa). If the cotton tip falls off inside the ear canal, it may cause obstruction or other undesirable consequences of the ear canal.

Ear wax obstruction (impacted cerumen)

Sign and Symptom

Generally speaking, even a small gap between ear wax and the ear canal wall would allow normal sound transmission. This makes ear wax presence unnoticeable except occasional itchiness. In an ear canal that is almost obstructed by ear wax, moisture entering the ear canal (during swimming or shampooing) could make the ear wax swollen. This would cause fullness of ear, blockage and temporary hearing problem.

When the ear canal is completely obstructed by ear wax, he/she may experience pulse-like tinnitus in addition to hearing problem and blockage. If ear wax is impacted onto the ear drum, it may cause dizziness. Also, jaw movement like chewing may cause pain and noise in the ear. If this occurs, please see an Ear-Nose-Throat specialist as soon as possible.

Prevalence

Ear wax obstruction (Impacted Cerumen) usually occurs among people with wet ear wax, i.e. only a fraction of the Chinese population in Hong Kong. In the Student Health Service record, only 0.5% of Primary 1 students suffer hearing loss due to impacted cerumen.

Cause

The cause of impacted cerumen may be due to excessive secretion of cerumen glands in ear canal. Closely packed keratin cell in the ear canal wall may be related to a high degree of hardness of ear wax. This increases the opportunity of accumulation and impaction of ear wax. The following conditions are related to a high opportunity of impacted cerumen:

- dust or other foreign body mixed with ear wax and form a hardened structure
- ear canal wall is stimulated and secretion of cerumen will increase
- ear canal is narrowed or blocked and prevent the shredded skin and ear wax from being pushed away

Ear Wax Removal

Under the following situations, removal of ear wax is required:

1. hearing loss suspected to be caused by impacted cerumen
2. ear drum/ ear canal is occluded by ear wax (in cases of middle ear problems) and cannot be fully visualized.
3. people who need to wear hearing aid or insert earphone regularly

For the removal of ear wax, ear wax softener should be used under the advice from health care professional. There is no evidence that ear candle can remove ear wax effectively. Instead, there are cases that such removal method can result in facial burnt and outer ear infection.

OUTER EAR INFECTION (OTTIS EXTERNA)

Outer ear infection is the infection of the ear canal skin epithelia, usually cause by bacteria but occasionally fungus or virus. The main symptoms are itchiness of ear canal, fever and pus-like ear discharge.

The most common form of outer ear infection is acute bacterial otitis externa, which is common among swimmers, and is known as "swimmers' ears". The major causes are damage to ear canal skin or loss of the protective layer due to:

- Moisture enters and traps in ear canal during swimming
- Ear picking/ scratching

These conditions allow bacteria to invade and cause infection.

Outer ear infection can be caused by improper handling of foreign bodies in the ear canal. Showering, shampooing, baby's vomitus or drooling when they are lying down could result in moisture entering the ear canal and cause infection.

In people with middle ear infection, if the ear discharge spread to the ear canal, outer ear infection may also arise. People with allergies, impaired immune system or those with diabetes are also prone to this infection.

Sign, Symptom and progress

Early symptoms of outer ear infection include mild itchiness and swelling in the ear canal. If the infection is mild, this would usually recover by itself. However, the infection may spread due to scratching or picking with foreign object. The patient would suffer from ear fullness and burning sensation and pus may appear in the ear canal. In severe cases, the lymph nodes around the ear may swell up. Other symptoms include ear ache, fever and tiredness.

Treatment

- Follow the advice of medical practitioner. Take antibiotic and use ear drops.
- Remove debris and ear wax in the canal (by medical practitioner) and keep it dry
- Stop swimming temporarily to prevent moisture from entering the ear canal
- Clear the moisture in ear canal after showering and shampooing. The remaining moisture in the canal can be removed by blow cool air to ear canal very briefly using the hair-dryer (never blow warm air into ear canal continuously or this would cause dizziness)

Prevention

- Be hygienic and do not scratch the ear canal with hard / sharp object
- Keep ear canal dry and clean. Those with history of outer ear infection may consider using water-proof ear-plug which is helpful in preventing moisture from entering ear canal during swimming, shampooing and showering.
- If water enters the ear canal, tilt the affected ear downward and pull the pinna upward and backward in order to let the water drain out naturally. Moisture can be absorbed by placing cotton ball at the entrance of ear canal. Do not use thick cotton bud in ear canal so as to prevent damage to the skin and its protective layer
- Avoid to wear ear-phones or hearing aids in a damp environment for a long time. Ear-plug of ear phones should be disinfected or changed regularly. Hearing aids should be cleaned by dry cloth after use and store in a dehumidifying container.
- Avoid bottle feeding your babies in a lying position to prevent milk from spilling into their ears

FOREIGN BODY IN EAR CANAL

As the ear canal is curved in shape, foreign bodies can easily be trapped inside. Insects like mosquito occasionally enter the ear canal. Children may put beans and eraser into the ear canal for fun. Broken tooth pick or fallen cotton tip may be stuck in the ear canal during ear-picking. Foreign bodies may cause infection and injury of the ear canal.

How to deal with foreign bodies:

- If a small insect is stuck in the ear canal, illuminate the entrance of ear canal with a torch in order to attract it to come out. For a bigger insect, try to instill olive oil into ear canal to drown it or demobilize it in order to lessen the damage.
- Avoid taking the foreign body out by force to prevent pushing it further down the canal
- Seek help from a medical practitioner as soon as possible.

CONCLUSION

Outer ear has natural protective functions so additional care is not necessary for most people. For those who have high risk of impacted ear wax and outer ear infection, they should follow the advice of health care professional.

Information Sources

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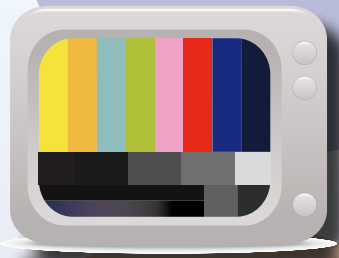
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You probably like listening to music, pop songs, the sound of the sea and the singing of birds? However, if you have hearing problem or cannot hear at all, what will you do?

We should protect our ears and keep them healthy. Let's share some tips on how to take care of our ears.

Don't watch TV with high volume!
Don't listen to music by ear phone all the time!



Use ear plug when working in noisy environment.

Don't pick your ears and don't put foreign body in your ears!

Avoid to use ear phone for music and avoid noisy environment; avoid listening to gossips and dirty languages.



Seek medical advice for hearing problems.

Stay away from noisy construction sites!

Don't use cotton wool buds to clean your ears!

Use ear plugs when swimming and washing hair!



Don't slap your ears!



Dear Health Box,

Hi! My brother got himself a new set of Hi-Fi in his bedroom. He likes to listen to popular songs with his headphones when doing his homework. He turned the volume on so loud that I could also hear the music in my bedroom. My mum and I are worried that my brother's hearing might be affected.

Regards,

Min-min

Dear Min-min,

Thank you for your letter.

I understand that you are very concerned about your brother. Prolonged use of headphones listening to loud music might result in hearing impairment. Therefore, please explain to your brother patiently and tell him to follow these preventive measures:

- When using headphones for listening to music, the volume should be kept at or below "medium". If grade 1 is the softest and grade 10 is the loudest, the volume should be adjusted to grade 5 or below.
- When using insert earphones, the volume should be adjusted to grade 4 or below.
- Listening time should be limited to less than an hour and should avoid using headphones in noisy environment.

We should always bear in mind that hearing impairment caused by prolonged exposure to loud sound is irreversible but is avoidable.

Wish you ever success in your studies!

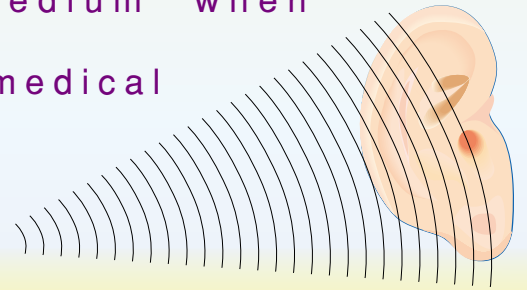
Regards
Health Box

Interesting knowledge Q&A

Tinnitus refers to the perception of sound without an external acoustic source. Which of the followings are methods for preventing of tinnitus :

1. Avoid exposing yourself to noisy environment for prolong period.
2. Set the volume setting to "medium" when using earphones.
3. Don't take medicine without medical supervision.
4. All of the above

(Answer: find it out from the newsletter)



Health Tips



If you have history of otitis externa, it is advised to keep the ear canal dry and clean when swimming or washing hair so as to reduce the chance of getting them infected again.

For enquiries of student's health problem,
please write to "Health Box"



Please write
your name
& address,
contact tel. no.
in the letter.

Health Box
4/F, Lam Tin Polyclinic,
99 Kai Tin Road,
Kwun Tong,
Kowloon

