



## *X-Plain* *Otitis Media*

### Reference Summary

#### Introduction

Otitis media is a middle ear infection. 75% of all children experience at least one episode of otitis media before they turn 3 years old. If otitis media is left untreated, it could lead to permanent hearing loss. The infection could also travel from the middle ear to the brain.

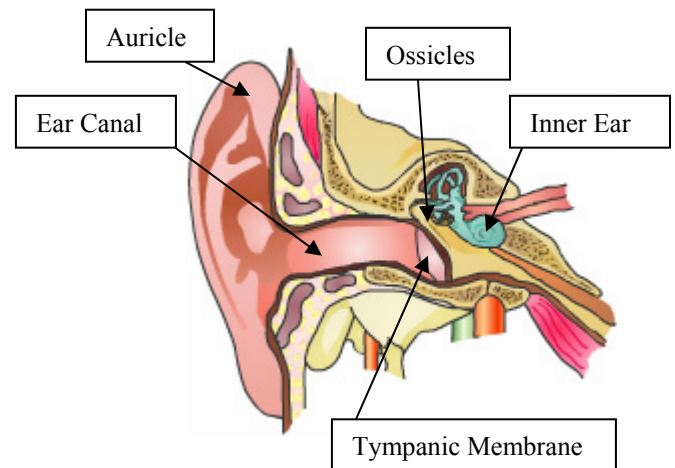
This reference summary will help you understand what otitis media is, as well as its causes, symptoms, diagnosis, and treatment options. Also included are tips for preventing middle ear infections.

#### Anatomy & Hearing

Our ears are very specialized organs that allow us to hear and keep our balance.

The ear has three parts:

- The outer ear, which includes the auricle and the ear canal. The ear canal goes inside the ear to the tympanic membrane.
- The middle ear, which is made of three small bones called the ossicles.
- The inner ear.



The auricle is cartilage covered with skin.

Unlike bone, ear cartilage continues to grow throughout life, which is why older people usually have bigger ears than younger people do.

The auricle acts like a satellite dish that collects sound waves, which are vibrations in the air.

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Sound waves enter the ear canal and cause the eardrum to vibrate. When the eardrum, or tympanic membrane, vibrates, the three small bones of the middle ear also vibrate and send the vibration to the inner ear.

Vibrations sent to the inner ear are relayed to an organ inside the inner ear called the cochlea. The cochlea has a snail-like shape and inside of it, vibrations are changed into electrical signals.

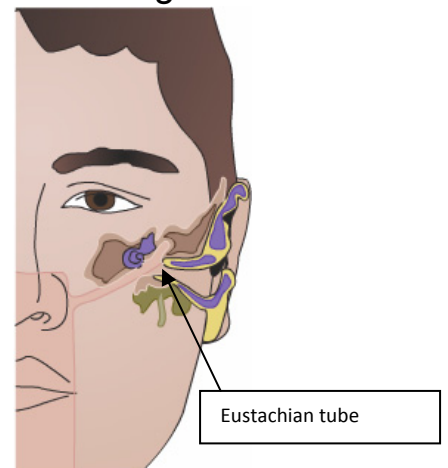
A nerve called the eighth nerve carries the electrical signals to the brain, which understands them as sounds.

A section of the inner ear, as well as the eighth nerve, are responsible for aspects of balance. This is why many times hearing problems and balance problems happen at the same time.

Having two ears helps us figure out where sounds are coming from. Sound waves reach the ear closest to them before reaching the other ear. Even though the difference is less than one second, it is enough for the brain to identify where the sound came from.

The Eustachian tube is a small passage way that connects the middle ear to the upper part of the throat.

Though the Eustachian tube is usually closed, it opens regularly to allow fresh air into the middle ear. It also equalizes middle ear air pressure in response to air pressure changes in the environment.



A Eustachian tube that is blocked by swelling or mucus cannot open to ventilate the middle ear. Without ventilation, fluid from the tissue that lines the middle ear may accumulate.

If the Eustachian tube remains plugged, the fluid cannot drain and begins to collect in the middle ear.

Adenoids are special glands that help fight infections. They are located in the upper back of the throat, near the Eustachian tubes.

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## Otitis Media

Otitis media is an inflammation or infection of the middle ear. Otitis means “inflammation or infection of the ear” and media means “middle.” While otitis media is primarily a disease that affects infants and young children, it can also affect adults.

Middle ear inflammation often begins when infections that cause sore throats, colds, or other respiratory problems spread to the middle ear. Viruses or bacteria can cause the inflammation.

Bacteria reach the middle ear through the lining of the Eustachian tube and can then produce infection. This causes the middle ear to become swollen and the Eustachian tube may be blocked.

White blood cells from the bloodstream help fight infection. As they attack and kill bacteria, white blood cells die and form pus in the middle ear. Pus is a thick, yellowish-white fluid.

As fluid builds up in the middle ear, the person may have trouble hearing because the eardrum and middle ear bones are unable to move like they should.

As an infection gets worse, the patient experiences severe ear pain. Too much fluid in the ear can put pressure on the eardrum and eventually tear it.

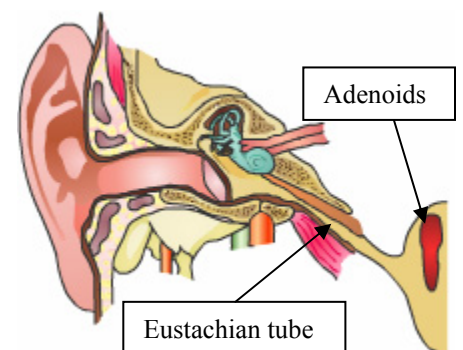


## Children

Middle ear infections can affect people of all ages. However, they are more common in children. Almost 50% of children will have three or more ear infections during their first 3 years of life.

There are three main reasons why children are more likely to suffer from otitis media than adults are.

- Children have more trouble fighting infections because their immune systems are still developing. The immune system is responsible for fighting germs in the body.
- A child's Eustachian tube is shorter and straighter than an adult's is. Adults' Eustachian tubes are steeper, so they drain better than children's do.



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- Adenoids in children are larger than they are in adults. Enlarged adenoids can narrow the Eustachian tube opening. Also, adenoids can become infected, possibly spreading the infection into the Eustachian tubes.

## Complications

Otitis media not only causes severe pain, but also may result in permanent hearing loss if pressure from the fluid and inflammation tears the eardrum.

An untreated middle ear infection can travel from the middle ear to the nearby parts of the head, including the brain, and cause more severe complications.

A child who has frequent ear infections could suffer from impaired hearing at a critical time. Without good hearing, a child cannot learn to speak and verbalize different sounds and may develop speech or language disabilities.

## Symptoms

The symptoms of otitis media are pain in the middle ear and loss of hearing. Fluid may also drain from the ear.

For infants and children who are 3 years old or younger, otitis media is often difficult to detect. Children that young do not have good enough speech and language skills to tell someone what is bothering them.



If a child has any of the following signs, parents should suspect otitis media and see a doctor immediately.

- unusual irritability
- difficulty sleeping
- tugging or pulling at one or both ears
- fever

Other signs of otitis media include:

- fluid draining from the ear
- loss of balance
- no response to quiet sounds
- sitting too close to the television

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## Diagnosis

A doctor can detect a middle ear infection by looking in the ear with an otoscope. The otoscope shines a light in the ear, showing the eardrum and allowing the doctor to see if it is inflamed.

The doctor may also use another type of otoscope to check if there is fluid behind the eardrum: the pneumatic otoscope. It blows a puff of air into the eardrum. If there is fluid behind the eardrum, the eardrum does not move as well as an eardrum with air behind it.



The doctor may also insert a small short plug into the ear canal to change the air pressure in the ear canal and measure how well the middle ear functions. This test is called tympanometry.

In order to determine if there is any loss of hearing, a hearing test may be done. An audiologist, a person who is specially trained to measure hearing, usually does hearing tests.

## Treatment

Many doctors recommend antibiotics for middle ear infections. Antibiotics are medications that fight bacteria. Several different antibiotics may need to be tried, since some bacteria are resistant to certain antibiotics.

The current recommendations of the American Academy of Pediatrics and the American Academy of Family Physicians are that all children younger than 6 months of age should be treated and so should older children with specific sets of symptoms. Older children without severe symptoms may be observed without antibiotics only if follow up visits can be secured to make sure the symptoms go away and do not worsen.

Antibiotics may also produce unwanted side effects, such as nausea, diarrhea, and rashes. Ask your doctor about possible side effects of antibiotics.

If a child is experiencing pain, the doctor may also recommend a pain reliever. Following the doctor's instructions is very important. Once started, an antibiotic should be taken for as long as it is prescribed.

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Most doctors will ask that the child return for a follow-up exam to see if the infection has cleared up.

Once a middle ear infection clears up, fluid may remain in the middle ear for several months. Middle ear fluid that is not infected often disappears in 3-6 weeks. Sometimes an antibiotic can make fluid go away faster.

If the fluid remains in the middle ear for more than 3 months and is associated with a hearing loss, many doctors recommend inserting "tubes" in the affected ears. This operation is called a myringotomy.

Myringotomy is usually done for children by an otolaryngologist, a doctor who specializes in the ears, nose, and throat. The child goes home the same day after the operation.

While the child is asleep under general anesthesia, the surgeon makes a small opening in the child's eardrum. A small metal or plastic tube is placed in the opening in the eardrum. The tube ventilates the middle ear and helps to keep air pressure in the middle ear equal to air pressure in the outer ear.

The tube normally stays in the eardrum for 6-12 months, after which it usually comes out on its own.

If a child has enlarged or infected adenoids, the doctor may recommend removing the adenoids at the same time the ear tubes are inserted.

Removal of the adenoids has been shown to reduce episodes of otitis media in some children, but not those who are under 4 years old. This operation is called adenoidectomy.

Removal of a child's tonsils does not reduce occurrences of otitis media. However, removal of the tonsils and adenoids may be appropriate for reasons other than clearing the middle ear fluid.

Hearing should be fully restored once fluid is removed from the inner ear. Some children may need to have the operation repeated if otitis media returns after the tubes come out.

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While tubes are in place, water should be kept out of the ears. Many doctors recommend that a child with tubes wear special earplugs while swimming or bathing so that water does not enter the middle ear.

## Prevention

Several contagious diseases can lead to middle ear infections. A child who is prone to otitis media should avoid contact with sick playmates.

Children who live with adults who smoke cigarettes have more ear infections than children who live in smoke-free environments. A child who is prone to otitis media should not be in rooms where there is tobacco smoke.

Infants who nurse from a bottle while lying down appear to develop otitis media more frequently than babies who breastfeed.

Research has shown that cold and allergy medications such as antihistamines and decongestants are not helpful in preventing ear infections.

## Summary

Otitis media is a very common condition that mainly affects children. It is usually treated with antibiotics. Sometimes, however, a minor surgery may be needed.

Recognizing the symptoms of otitis media in infants is important before the infection causes serious damage to the child's hearing. If hearing is impaired, the child may develop speech or language problems.

After treatment, it is important to follow-up with the doctor to make sure that the infection is gone.

Thanks to advances in medicine, otitis media can be easily diagnosed and treated, allowing children to develop with normal hearing and language skills!



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