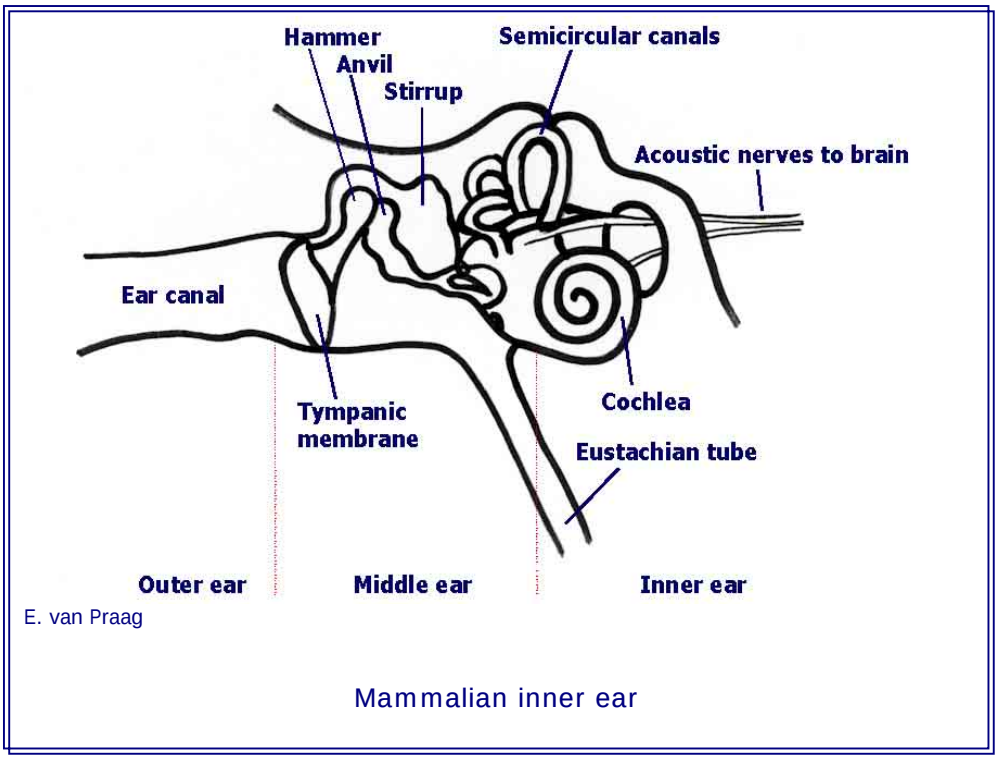
Otitis media and *interna*

Esther van Praag, Ph.D.

Otitis media and *interna*, Latin names for inflammation of the ear chambers located behind the tympanic membrane (ear drum), involve about 50% of all cases of acute vestibular disease. The middle ear is the region located directly behind the tympanic membrane (eardrum). It is made of the different bones and nerves responsible for the diffusion of the sound coming from the outer ear to the brain. The middle ear is connected to the nasal cavity by the Eustachian tube, opening that enables the adjustment of the air pressure inside the middle ear. The inner ear is most close to the brain, and is responsible for balance.



Mammalian inner ear

Otitis media, or middle ear infection, is typically located behind the eardrum. The presence of bacteria, fungi, yeast, or parasites triggers the production of fluid and pus, which results in inflammation and pain, and may lead to the loss of hearing.

e-mail: info@medirabbit.com

Z. Aizenberg

Head-tilt due to inner-ear infection

When the infection is severe, rupture of the tympanic membrane can occur. The pus contained in the middle ear will flow into the ear canal and the infection can spread to outer ear. Progress of middle ear infection to the inner ear is possible too (*otitis interna* or labyrinthitis). This development of the disease is marked by head-tilt, and ataxia (lack of balance).

Pasteurella multocida, a natural host of the nasal cavity of rabbits, is often associated with middle and inner ear infection. Healthy rabbits can be carriers of this bacterium, without showing clinical signs. The development of the disease depends on the general resistance of the host and the virulence of the *Pasteurella* spp. strain. The bacterium is believed to migrate from the nasal cavity to the middle ear along the Eustachian tube or mandibular molar root abscess with exposure to the Eustachian tube.

Staphylococcus aureus is considered an opportunistic pathogen of the nasopharyngal cavity of rabbits. Its presence in the ear can lead to severe middle or inner ear infection. *Staphylococcus aureus* occasionally shows resistance to one or more antibiotics.

Further bacteria, known to cause inner ear infection, include *Streptococcus* spp., *Escherichia coli*, *Enterococcus* spp, *Proteus* spp., *Pseudomonas* spp.. Sporadic cases of yeast infection, e.g. *Candida* spp. or *Pityrosporum* spp., are found in rabbits. Fungal infection, e.g. *Cryptococcus sp.*, is rare.

Symptoms

Clinical signs for *otitis media* can be absent. More often, they cannot be distinguished from an external ear infection: shaking of ears, scratching with paws, rubbing, anorexia, depression and pain. Discharge is observed in the external ear canal upon rupture of the eardrum.

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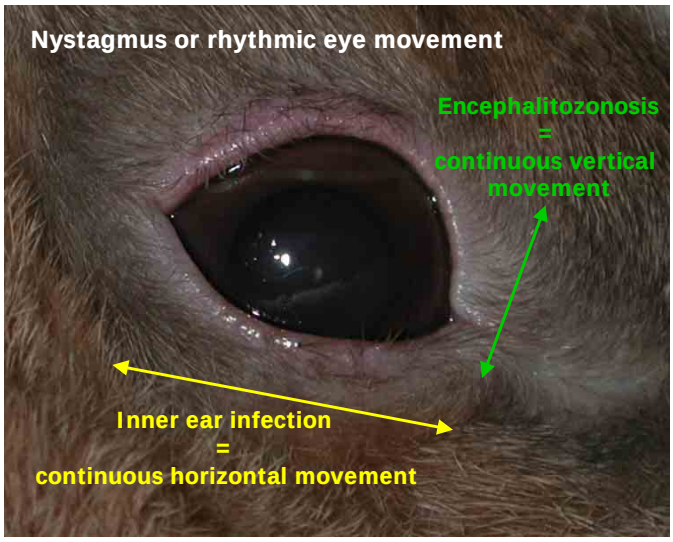
Inner ear infection is accompanied by ataxia (circling, rolling stumbling), leaning to one side and head-tilt, continuous horizontal or rotary nystagmus (involuntary rhythmic eye movement).



Inner ear infection is accompanied continuous horizontal or rotary nystagmus

Diagnosis

It is important to differentiate ear infection from other causes of vestibular diseases. See: Head tilt and their various causes

Otitis media is visible on X-rays, on the contrary of *otitis interna*. Changes of the soft tissue density are observed in the middle ear, with appearance of an opaque grayish mass. It is sometimes accompanied by sclerosis and bone proliferation, which may reach up to the temporal bone or the temporo-mandibular joint. X-ray furthermore will help rule out dental problems.

If discharge is present in the outer ear, the presence of bacteria, yeast or fungi should be determined by means of a culture, followed by a sensitivity culture in order to determine the most effective antibiotic or antifungal treatment.

Cytological methods will help determine the presence of bacteria, yeast, fungi and certain types of cancer.

Treatment

The antibiotic treatment should be based on the result of the sensitivity culture. This is not always possible; in that case, antibiotics known to pass the blood-brain barrier must be administrated.

Chloramphenicol and penicillin (bicillin) antibiotics pass the blood-brain barrier and have successfully treated middle or inner ear infection in rabbits. Trimethoprim sulfate is sometimes advised, but shows poor results in rabbits. This could relate to the fact that half-life of this drug is about 40 min in rabbits. Ciprofloxacin has been successful to treat a case of inner ear

e-mail: info@medirabbit.com

infection in a dwarf rabbit. Antibiotic mixtures can be given, e.g. enrofloxacin/chloramphenicol.

The treatment must be aggressive and long, a minimum of 6 weeks, or 2 weeks after disappearance of the symptoms. If no improvement is observed after 14 days, it is recommended to switch to another antibiotic. In order to minimize the appearance of resistance in the pathogenic bacteria, it is best to administrate a cocktail including the old antibiotic and the new one.

An otoscopic examination is necessary to determine if the eardrum is ruptured. If this is the case, antibiotic-containing eardrops will lead to ototoxicity. The consequence is permanent deafness, loss of balance or death. A safe alternative to remove pus and debris is to wash out the outer and middle ear with a saline solution.

The antibiotic therapy should be accompanied by NSAIDS (non-steroidal anti-inflammatory drugs) pain medication. Meloxicam can be used over a longer period of time, without reported side effects in rabbits.

The use of glucocorticosteroids in the treatment of ear infection is controversial. They are advisable during the first days of treatment, in order to reduce the inflammation, but their use of should not extent over 5 days, due to their immunodepressive properties.

The administration of meclizine, a motion sickness drug, is advisable in case of *otitis interna*.

If the rabbit has trouble eating and drinking, force-feeding and administration of SC fluids are necessary.

If the middle ear or the nerves are damaged, deafness or head-tilt is irreversible.

Prognosis of surgical drainage, e.g. bulla osteotomy, is poor and is accompanied by post-operative complications in rabbits. It should be used in extreme cases only, where antibiotics do not keep the situation under control.

Acknowledgement

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Further Information

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e-mail: info@medirabbit.com

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e-mail: info@medirabbit.com