

Patient Guide

Tinnitus



Tinnitus

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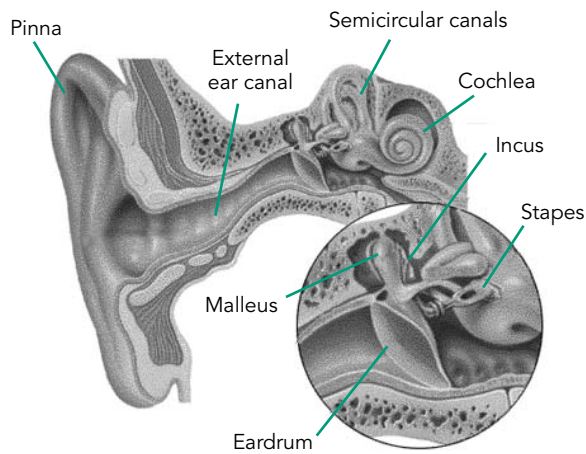
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The Mechanism of Hearing



Introduction to Tinnitus

Tinnitus is the perception or sensation of sound when no external sound is present. Tinnitus can occur in either one or both ears or may be more localized “in the head”. It may be described as a ringing, buzzing, hissing, roaring, crickets, clicking, fluttering or any number of other sounds alone or in combination. It can be intermittent, continuous or pulsatile and can fluctuate in character and intensity. Tinnitus may or may not be associated with a hearing impairment. It is important to remember that tinnitus is a symptom and not a disease.

- The **outer ear** consists of the pinna and the external ear canal. These structures collect sound waves and transmit them to the eardrum.
- The **middle ear** includes the eardrum and the space that lies between the eardrum and the inner ear. This space contains the ossicles or the three middle ear bones (the malleus, the incus, and the stapes). These are commonly referred to as the hammer, anvil, and stirrup. Once sound waves reach the eardrum, the eardrum vibrates and these vibrations are transmitted along the chain of middle ear bones into the inner ear. The eustachian tube connects the middle ear space to the back of the nose and helps to equalize the pressure between the middle ear space and the outside atmosphere.

- The **inner ear** (cochlea) is a snail-shaped structure enclosed in dense bone. It contains fluids and tiny receptor cells called hair cells. The waves within the inner ear fluids (created by the stapes moving in and out of the cochlea) are transformed into electrical impulses by the hair cells that are then transmitted along the auditory nerve.
- The **auditory nerve** undergoes several divisions resulting in a complex network of auditory pathways in the brain. At this point, the electrical nerve impulses are processed and interpreted as recognizable sound.

Classification of Tinnitus

1 Objective Tinnitus is tinnitus that is audible not only to the patient, but also to others.

- Pulsatile tinnitus may be associated with vascular abnormalities of the major blood vessels (the jugular vein and the carotid artery) such as blood vessel malformations, thickening of the blood vessel wall, and growths on the blood vessel wall. Vascular tumors frequently cause pulsatile tinnitus. Glomus tumors are the most common vascular tumor.
- Clicking tinnitus is relatively rare and can be associated with contractions of the middle ear muscles or the nasopharyngeal muscle that controls the opening/closing of the eustachian tube (the tube that connects the middle ear space to the back of the nose). This clicking type of tinnitus is called palatal myoclonus and can be treated with muscle relaxants.

2 Subjective Tinnitus is tinnitus that is only audible to the patient.

- **Non-specific tinnitus** refers to a variety of tinnitus sounds such as ringing, buzzing, hissing, humming, whooshing, chirping like crickets, whistling, and rushing, etcetera. This type of tinnitus can be associated with various problems that occur in different portions of the auditory system.
- **Conductive Hearing Loss** may cause tinnitus. It is a disruption in the conduction of sound through the ear canal, the eardrum, or the middle ear bones. Tinnitus may be associated with conditions such as impacted earwax in the ear canal, damage to the middle ear bones that causes an interruption in the connection from one bone to another, perforation of the eardrum, or a disease process of the stapes called otosclerosis.
- **Sensorineural Hearing Loss** can occur when damage occurs either in the inner ear (the sensory organ of hearing called the cochlea) or the nerve (neural) pathways that transmit the electrical impulses created in the cochlea to the brain. Tinnitus may be associated with damage that has occurred within the cochlea or auditory neural pathways resulting from infection, allergic swelling, systemic diseases, noise exposure (either sudden intense or prolonged exposure to high noise levels), head trauma or certain medications.

Considerable attention has been given to the possibility of a relationship between tinnitus and Temporomandibular Joint Syndrome

(TMJ). Symptoms of TMJ include pain at the jaw joint, joint locking, crepitus (crackling sound with movement of the jaw joint), tinnitus, and feeling of fullness in the ear. There have been numerous reports of successful resolution of tinnitus following treatment of TMJ, but no research studies have been able to conclusively explain the underlying cause of tinnitus in TMJ.

- **Autophony** refers to a tinnitus that might be described as hearing one's own breathing and is characteristically caused by a patulous (abnormally open) eustachian tube. The eustachian tube is normally closed, and opens only with yawning or swallowing to allow small amounts of air into the middle ear. The continually open tube may allow a person to hear a blowing sound when they breathe or an echoing of their own voice.
- **Hallucinations** (Nonverbal, Stereotyped Repetitive) would also be considered a form of subjective tinnitus. These hallucinations are not the same as those associated with those of psychotic individuals in which they hear voices with meaningful content. These hallucinations may be musical in which a patient reports hearing familiar tunes (vocal and/or instrumental) incessantly. Musical hallucinations occur mainly in the elderly population (more commonly women) with long-standing progressive bilateral hearing loss.
- **Auditory hallucinations** differ from musical hallucinations in that they are abrupt in onset, transient, usually are not associated

with pre-existing hearing loss and are not only musical. These may include a variety of other sounds such as bells or a waterfall. Neurological problems need to be ruled out by brain imaging or x-rays with this type of presentation.

Epidemiology of Tinnitus

Tinnitus is a common problem. According to the American Tinnitus Association, tinnitus is experienced by as many as 50 million Americans. It seriously affects about 10 million who seek treatment, and is debilitating to about one to two million who cannot function on a "normal" day-to-day basis.

Although there is no way to predict if tinnitus will become worse, two thirds of patients report no change in severity over time. There are, however, several factors that may aggravate tinnitus.

Factors that can aggravate tinnitus include:

- **Use of caffeine, salt, alcohol, aspirin and use of tobacco.** A significant percentage of patients report increased tinnitus with use of caffeine, salt, alcohol, aspirin and use of tobacco (nicotine). Keep a record of activities/occasions when tinnitus is increased or reduced and maximize or minimize these activities accordingly.
- **Noise exposure.** The prevalence of tinnitus is significantly greater for patients with extensive lifetime noise exposure. Therefore, ear protection should be used during workplace and recreational activities with

significant noise levels. As a general rule of thumb, if the noise level is high enough that you must raise your voice to talk over it, then ear protection should be used.

- **Stress.** Stress can aggravate tinnitus and tinnitus can be very stressful, creating a cycle that can be difficult to break.

Treatment

Although there is no cure for most cases of tinnitus, there are a number of strategies that can be effective in helping to control tinnitus.

- **Avoid Silence.**

Tinnitus is generally worse in quiet. In fact, studies show that when placed in a very quiet environment, 94% of people develop temporary tinnitus. Reducing the contrast between your tinnitus and the quiet surroundings will likely reduce your perception of the tinnitus.

Environmental maskers produce a constant, broad-band sound that either partially or completely conceals the tinnitus. Sound machines that generate a variety of sounds including babbling brooks, the sounds of ocean waves and thunderstorms are available through ENT and at many retail stores. Indoor waterfalls, fans, and aquariums also provide appropriate environmental masking.

- **Hearing Aids**

If you have hearing loss, environmental sounds alone may be inadequate to conceal the tinnitus. However, hearing aids can amplify environmental sounds to an audible level. Not only can hearing aids

enhance your listening and communication abilities, but they may also provide relief from your tinnitus. Even with hearing aids you will want to avoid silence. The hearing aids will be most effective for tinnitus relief when there is background sound to be amplified.

If hearing aids alone do not provide the desired relief, noise generators may be of help.

- **Noise Generators**

These devices are offered as either an in-the-ear instrument or for table top use. Devices include a ready-to-wear in-the-ear instrument, a custom made in-the-ear instrument, and a tabletop environmental noise generator. These devices emit a continuous low-level broadband noise to facilitate avoiding silence.

- **Medications**

Occasionally, medications can be used to control tinnitus, although there is no one medication that works routinely with everyone. Medications that have demonstrated some benefit include anti-depressants, benzodiazapines, calcium channel blockers, Botulinum toxin, anti-epileptic medications, and Lidocaine. You may consider medical treatment for your tinnitus, although the side effects associated with these medications can sometimes be more bothersome than the tinnitus. No medications have demonstrated significant improvement in controlled studies. Other treatments have included hyperbaric oxygen and selective cochlear nerve division.

- **Counseling**

A trained professional counselor can be very helpful when tinnitus becomes problematic (i.e. depression, stress) as well as when dealing with other factors that could be causing stress and aggravating your tinnitus. Counseling can be useful either as a primary strategy or in conjunction with any other strategy.

- **Cognitive Behavioral Therapy**

A type of counseling that can help you identify the way you react to your tinnitus, to learn new responses, and to minimize the negative thoughts and behavior patterns associated with tinnitus.

- **Tinnitus Retraining Therapy (TRT)**

TRT is a method developed to facilitate habituation to tinnitus. It combines sound enrichment therapy with directive counseling. Sound is employed to reduce the contrast between silence or ambient noise and the perception of tinnitus. This sound may be in the form of environmental sounds, amplification or broadband sound generating devices. A reduction of the perception of the tinnitus (but not complete obliteration of it) is considered essential to the process of habituation. Counseling and education serve to demystify tinnitus, providing an intellectual and emotional framework in which habituation can occur. TRT takes approximately 18-24 months. ENT does not currently offer this specific therapy, but presently offers Tinnitus Habituation Therapy which utilizes many of TRT's methods of habituation therapy and theories.

Additional Resources to Consider

- **Membership in the American Tinnitus Association**

The American Tinnitus Association (ATA) is dedicated to helping tinnitus patients through information, tinnitus materials, research, support groups, and a hot line. ATA members receive a quarterly magazine, Tinnitus Today, whose goal is “to promote relief, prevention and the eventual cure of tinnitus for the benefit of present and future generations”.

The American Tinnitus Association

Portland, OR • 1-800-634-8978
www.ata.org

Tinnitus Consultation

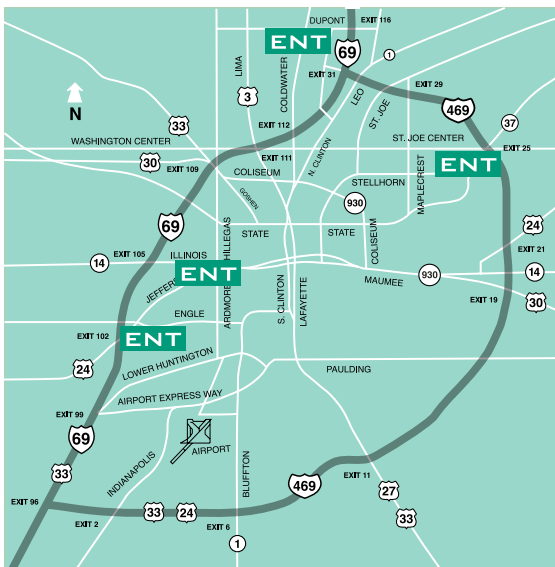
- **A Tinnitus Consultation with an Audiologist**

An audiologist at ENT can help you to determine which strategies may work best for you. The tinnitus consultation will include completion of a questionnaire regarding various aspects of your tinnitus and an evaluation consisting of several measures designed to better define your tinnitus. The physiological mechanism of tinnitus will be discussed and the various tinnitus management strategies will be reviewed.



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