

# What is Tinnitus?

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**Tinnitus:** A condition presenting itself as a noise, such as ringing, hissing or buzzing, in the ears or head when no external sound is present. Many people experience Tinnitus intermittently or for short periods of time, while others describe it as constant. Tinnitus is said to affect approximately 17% of the general population and approximately 4% of the general population significantly suffers from tinnitus.

## What Causes Tinnitus?

Tinnitus is not a disease but a symptom. Below are eight identified triggers of tinnitus:

**Wax Build-up:** The ear canal contains wax producing glands. If a build of wax occurs and begins to compromise the hearing, tinnitus may seem louder.

**Ear or Sinus Infection:** Ear or Sinus infections can cause a temporary tinnitus which gradually lessens as the infection clear.

**Certain Medications:** Some medications are toxic to the ear and can cause permanent damage to the hair cells within the cochlea. Other medications may not be toxic to the ear however may have tinnitus as a side effect.

**Cardiovascular Disease:** Cardiovascular Diseases such as a heart murmur, hypertension, or hardening of the arteries can cause a pulsatile tinnitus. Consequently, because blood flow through the veins and arteries is compromised, the pulsatile tinnitus can be in time with the heartbeat.

**Head and Neck Trauma:** Physical trauma to the head and neck can elicit tinnitus.

**Noise Induced Hearing Loss:** Damage to the hair cells within the cochlea due to exposure to loud noise is believed to be a trigger of tinnitus. According to the American Tinnitus Association 90% of tinnitus patients have some level of noise induced hearing loss.

**Temporomandibular Joint (TMJ) Misalignment:** A misalignment of the jaw joint or jaw muscles can elicit tinnitus. Some dentists specialize in treating TMJ misalignment.

**Certain Tumors:** Tinnitus is also a symptom to tumors growing on the auditory, vestibular or facial nerve. These tumors can also cause deafness, facial paralysis and/or loss of balance.

## Treatments for Tinnitus

Tinnitus is a symptom therefore by treating the cause of the tinnitus, often the tinnitus will go away. For example, if the tinnitus is a result of a wax build-up in the ear, by removing the wax from the ear canal the tinnitus generally lessens or goes away completely. The same is true of ear infections or TMJ misalignments. However tinnitus caused by damage to the inner is generally permanent. This is because we cannot repair the hair cells in the inner ear. Although we cannot "cure" tinnitus in these cases, there is treatment to help "cope" with the tinnitus. Two of these treatments are: 1) Tinnitus Retraining Therapy or TRT and 2) Quiescence.

### 1. Tinnitus Retraining Therapy (TRT)

Dr. P. Jastreboff and his colleagues at the University of Maryland School of Medicine created TRT in 1989 based on a neurophysiological model of tinnitus. Their two objectives in developing TRT were to train the subconscious part of the brain to ignore tinnitus, and increase ones tolerance to sounds (Hyperacusis).

The goal of TRT is Habituation. Habituation is the process of no longer being as aware of your tinnitus, except when focusing your attention on it. When habituation is reached, tinnitus is no longer annoying or bothersome. This state is gradually reached using a combination of low level noise and counseling.

## What is TRT?

TRT begins with an extensive audiological evaluation in which possible causes for the tinnitus are explored. For example, is there too much wax in the ear canal? Is there an ear infection present? Is

there a tumor growing on the auditory nerve? Or is there damage to the hair cells within the cochlea? Recommendations are then made according to the results. In cases where medical/surgical attention is required, the appropriate referrals are made.

**If TRT is the best treatment option, then the two part treatment begins.**

**Directive Counseling.** The purpose of directive counseling is to make sense of the tinnitus and understand it. This is accomplished in detailed discussions using demonstrations, analogies, diagrams, and examples. By gaining knowledge of the tinnitus, fear and anxiety associated with it and/or hyperacusis are reduced.

**Sound Therapy.** Using a table-top noise generator or an ear-level noise generator, a low level, broad-band noise is emitted for several hours per day over the course of several months. The goal is to teach the brain to filter out/ignore tinnitus (habituation).

## **Pros and Cons of TRT**

Once again, TRT is not a cure for tinnitus, as tinnitus is not a disease but rather a symptom. TRT is a treatment option which helps one cope with this symptom making it tolerable and less annoying. TRT does not involve drugs or surgery and has no side effects. The downside of TRT is that it can be relatively costly and is not covered by most health plans. It generally takes 1 to 2 years to complete the TRT treatment however Dr. Jastreboff claims that 80% of patients report a significant improvement following TRT.

## **2. Quiescence**

Quiescence was developed by Spectral Visualization and Development (SVD) Inc. Quiescence is tool used to effectively match the tinnitus in frequency and intensity, as well as tinnitus management According to SVD Inc. Quiescence allows the audiologist to determine the following information:

Reliable determination of tinnitus measurements to assess the presence of tinnitus.

A more scientific description of the tinnitus, so that better defined, specific rehabilitative procedures can be designed and implemented.

The production of masking and/or residual inhibition CDs to assist the tinnitus sufferer.

Dispensing to digital programmable hearing aids to perform a frequency-specific masking function.

Like TRT, the process begins with a complete audiological evaluation in order to rule out causes such as earwax build-up. If needed, appropriate referrals are made such as to a family physician, neurologist, or ENT (Ear, Nose and Throat) specialist. Tinnitus is then evaluated using the Quiescence software. This software allows us to match the frequency or pitch of the tinnitus as well as the intensity or volume of the tinnitus.

Quiescence provides Residual Inhibition, a phenomenon that occurs when a tinnitus sufferer hears a certain sound for a short while, and then notices that the tinnitus is gone, or is much quieter for a period of time. Unlike TRT, this may provide quicker relief for shorter time periods (varying from minutes to hours to days).

### Otoacoustic Emissions (OAE's)

Otoacoustic emissions (OAE's) is a test to determine hair cell function within the cochlea (inner ear). These hair cells are necessary for normal hearing. OAE's are used to:

- screen hearing
- estimate hearing sensitivity (within a limited range)
- differentiate between sensory and neural hearing loss'
- test for functional hearing loss

Because OAE tests are objective (a behavioral response is not required), it can be performed on patients who are sleeping, comatose, or small infants/neonates. A soft probe is inserted in the ear canal and OAE's are then obtained. For a quiet cooperative patient, the recordings are usually obtained in less than 5 minutes per ear. For a rambunctious toddler, recordings may take longer or may be impossible to obtain. The most reliable results are obtained from a quiet and still patient.

OAE's are simply a screening tool to determine if hearing is normal or if there is a loss present. It is not used to determine the degree or severity of hearing loss, and it will not determine the type or

cause of hearing loss. If OAE's are not present (a hearing loss is present) more testing is then required to determine the degree and type of hearing loss.

OAE's have become a quick and easy way to rule out hearing loss in many difficult to test populations.