



TINNITUS

Tinnitus is described as noise in the ears or the head that is not related to an external sound, and is frequently described as buzzing, humming, hissing, ringing, whistling, etc. It can be perceived in one or both of the ears, or your head. The sounds are usually heard in the absence of external stimuli and are unrelated to an external source. Most people have experienced tinnitus at one point or another and, at times, it can be very distressing.

There are a variety of factors that can be associated with tinnitus including aging, hearing loss, loud noise exposure, allergies, head/ear trauma, certain ear diseases, stress and medications. Though there is not a known cure for tinnitus, there are many medications, devices and behavioral modifications suggested in this paper for you to consider.

Tinnitus is usually described according to location, duration, quality, pitch, and loudness. There are an estimated 40 million Americans (one out of every seven Americans) who seek physician consultation for tinnitus each year. For those people who do see a physician, 6% report that they are severely debilitated by their tinnitus. There are two main types of tinnitus, subjective and objective. These will be discussed in the next few paragraphs.

TYPES OF TINNITUS

Subjective tinnitus is much more common than objective tinnitus and refers to the perception of sound heard only by the patient. Also called idiopathic tinnitus, the mechanism of noise production is poorly understood. Subjective tinnitus has many causes (Table 1) and most often is a symptom of underlying abnormal conditions in the cochlea, cochlear nerve, ascending auditory pathway, and auditory cortex. Hyperactive hair cells and ionic chemical imbalance are also thought to contribute to the production of this type of tinnitus. Hearing loss is one of the most common causes of tinnitus and reorganization of pathways within the central nervous system (CNS) are believed to be the mechanism for the production of tinnitus (similar to phantom limb pain).

Table 1. Causes of Subjective Tinnitus

Age related hearing loss (presbycusis)*	<u>Medications</u>
Noise exposure	Aspirin
Meniere's disease	NSAIDS
Otosclerosis	Aminoglycosides
Cerumen impaction	Erythromycin
Acoustic neuromas	Tetracycline
Head Trauma	Chloramphenicol
Toxins	Vancomycin
Middle ear effusion	Quinine
Hyperlipidemia	Furosemide
Meningitis	ethacrynic acid
Syphilis	Cisplatin
	Vincristine
	Amitriptyline
	imipramine
	Idiopathic reaction

* most common cause of subjective tinnitus

Objective tinnitus refers to the perception of sound generated in the body and conducted to the cochlea via bone or the middle ear. This type of tinnitus can be heard by the examiner, is relatively rare, and is usually caused by vascular or musculoskeletal phenomenon. (Table 2) The most common type of objective tinnitus is pulsatile in nature, which can be caused by a glomus tumor, aneurysm, dehiscent jugular bulb or, rarely a persistent stapedial artery. A unique characteristic of objective tinnitus is that the sound may be audible to the examiner.

Table 2. Causes of Objective Tinnitus

Vascular	Musculoskeletal
Glomus Tumor	Temporomandibular joint disorder
Atriovenous malformation	Palatal cyclones
Aneurysm	Patulous eustachian tube
Atherosclerosis	Stapedius spasm
Venous hum	
Persistent stapedial artery	
Dehiscent jugular bulb	
Cardiac murmurs	
Pseudotumor cerebri	

SELECTIVITY AND ATTENTION

Your brain and hearing system have an automatic property of selectivity (the ability to sort out sounds that are unimportant and ignore them). You can focus on certain important, strange, or worrisome sounds for special attention and, at the same time, filter out insignificant sounds. We can distinguish distinct sounds from a group of sounds. For example, most people can pick out the sound of their name in a noisy room. Some can detect a single musical instrument in a band. However, many people with tinnitus tend to focus on the new, unfamiliar and unwanted noise when it starts then begin to worry about it.

HABITUATION

A change to the perception of tinnitus, it causes an inappropriately perceived stimulus (loud tinnitus) to return to normal (soft tinnitus).

Imagine that you have a new clock. Other people hear your new clock and notice how loud it is. At first, you hear its loud ticking. After a while, you don't hear it. You have "habituated" to it. You are not conscious of it. Your brain has decided to stop monitoring the sound. Your brain can learn to stop monitoring your tinnitus, too.

ANXIETY, TENSION & LEARNING HOW TO RELAX

It is very common to worry about tinnitus, which may cause increased tension. Tension and worry can make the tinnitus worse by creating a negative feedback cycle. The tinnitus increases anxiety and the anxiety increases the perception of the tinnitus. Learning how to relax is a large part of the relief process.

TREATMENT OPTIONS

1. RELAXATION EXERCISES

You can use simple relaxation exercises to train your body to relax. Here are two simple examples:

1. Breathing relaxation exercise:

Breathe slowly and deeply,

Hold your breath a moment.

Relax, and then let your breath out.

Wait a moment, and then breath slowly and deeply again, and so on.

2. Muscle relaxation exercise:

Sit in a chair or lay on a bed. Find a comfortable position.

Breathe slowly.

Tighten your fist. Feel the tightness in your hand and wrist.

Breathe out. As you do relax your hand and wrist, feel the difference.

Repeat this with other parts of your body.

Try it with your other hand, each arm, leg, foot, your back, neck, face and jaw.

These exercises are beneficial when done regularly during free time. You should start to feel the benefits quickly. You will gradually learn how to relax your body without having to do the exercises. As you learn to relax your body, you will also find it easier to relax your mind.

Some people find that other treatments have similar benefits to help you relax. Find what works best for you, and then practice it often.

You might also try:

- Aromatherapy
- Massage therapy
- Reflexology
- Yoga
- Resting in a relaxing environment, with special aromas, dim lights and soft music.

You can read books, listen to audiotapes, or take relaxation exercise classes to learn more about the various methods and techniques that help people relax.

2. SOUND THERAPY/SOUND ENRICHED ENVIRONMENT

Avoid quiet, your brain will try to hear any sound more clearly in the quiet. This includes the sound of your tinnitus. Increase background sounds whenever the background is rather quiet, as often and for as long as you can. This is called “sound therapy”. Sound therapy reduces the contrast between your tinnitus and background sound. This reduces the bother of your tinnitus and the tension that it causes.

It is normal for you to pay less and less attention to your tinnitus, until you are hardly aware of it. This is the “habituation” process described earlier. To adjust faster, you can increase the amount of background sound you hear.

Examples of background sounds are:

- Television, radio, or recorded music
- A fan
- Natural sounds through and open window
- “sound conditioners,” which are small devices that play sounds (like the sound of the waves, rain or a stream), or “white” noise (a continuous “shhh”-like sound).
- A hearing aid, even if you have only slight difficulty in hearing.

We suggest that the background noise you use is not too loud or too soft. Start with the loudest level you can tolerate below the sound of your tinnitus.

You may need sound therapy in bed, whether asleep or awake. Tinnitus can be annoying when you can't get to sleep, or when you wake up during the night. Try sleeping with the window open, use a fan, or listen to a ticking clock in your room.

Use headphones with your TV or radio if background sound annoys people around you. In-the-ear headphones are best. Use an under-pillow speaker or sound pillow attached to the sound sources when you are in bed, if necessary.

3. PROMOTE GENERAL HEALTH & WELL BEING

- How is your general health?
- Are you getting a well-balanced diet?
- Are you getting plenty of exercise and rest?
- Are you involved in some enjoyable activity?

If certain foods, drinks, activities, or situations aggravate your tinnitus, you could cut down a little, cut them out, or find alternatives. By reducing caffeine and alcoholic beverages and increasing light exercise, you may find that your tinnitus lessens and your general health will likely improve. It is always recommended to take a multi-vitamin to assure you are getting the required vitamins and minerals that the body needs.

In addition to eating the correct foods, it is important to live an active life that gives balance to your personal and work lives. Hobbies and interests outside of work can help you to enjoy life to the fullest. People have seen the positive side of tinnitus. It gave them a push to try something new and rekindle old interests.

4. EARPLUGS

Earplugs will not help your tinnitus. They will make the tinnitus seem louder while you wear them. If you have tinnitus, you should not wear any kind of earplugs that make it more difficult to hear, except in very loud noise. Earplugs prevent your ears from getting accustomed to normal sounds if you have abnormal sensitivity to loud sounds (hyperacusis). Do not use earplugs unless you are using them temporarily in a noise that is unbearably loud to you. Always use hearing protection when you are exposed to very loud sounds, whether or not you have tinnitus or hyperacusis.

Earplugs help prevent further hearing loss and associate tinnitus when exposed to noise. Loud sounds, such as rock concerts, fireworks displays, or loud work noises can cause dullness of hearing, tinnitus, or both immediately afterwards. This will usually disappear after a few minutes or hours. These temporary effects should be taken as a warning. There is a risk of permanent damage if you repeatedly expose your ears to loud sounds. Try to wear earplugs at anytime that you are exposed to loud or painful noises.

5. MEDICATIONS

There are several medications that physicians use in attempt to provide relief from tinnitus. These medications include Nortriptyline, Klonopin, Valium, Ativan and Effexor to name a few. Nortriptyline has been studied the most extensively with over 62% of patients reporting benefit. The goal of many of these medications is to promote better sleep and decrease anxiety which indirectly decreases patients' perception of tinnitus.

6. HEARING AIDS

Hearing loss and tinnitus are often seen together in patients. The tinnitus is not causing the hearing loss; rather it is a symptom of inner ear damage. When hearing loss is found, the audiologist will discuss with you the impact it is having on your daily life. Hearing aids can provide tinnitus relief for some patients by providing them with auditory stimulation in frequencies with hearing loss. At the very least, the hearing aids will ease communication difficulties caused by hearing loss.

7. MASKERS

Maskers are electronic devices worn at the ear level that provide a "whooshing" sound that may cover up the tinnitus. The literature demonstrate that masking devices often do not provide the narrow band masking sounds at a high enough frequency (tone) to match the tinnitus. This requires that masking sounds need to be louder at a lower frequency to provide relief. This causes several problems. First, the masking sound can interfere with communications. Many patients find the added strain of trying to hear "over" the masking noise caused them more anxiety and difficulty understanding others. Second, tinnitus can change pitch or tone, so a device that is matched to a particular frequency can lose its effectiveness if the tinnitus changes. Lastly, wearing a hearing aid or masker is not recommended during sleeping hours. Falling asleep can be challenging for some patients, so another environmental masking noise may need to be used.

8. TINNITUS HABITUATION SOUND THERAPY

SoundCure™: The newest commercial form of tinnitus therapy termed SoundCure™ is a combination of acoustic therapy with a six-month course of education and support. SoundCure uses a patented S tone customized to the pitch and amplitude of your tinnitus by generating specific brain activity that affects a patient's perception of tinnitus. This product is ideal for patients with normal hearing to a mild hearing loss.

Widex Zen: This device looks like a hearing aid, it is also available as an amplification and tinnitus therapy device for those with hearing loss. It uses fractal tones set to music in patterns of musical elements such as slower tempo (60-70 beats per minute), lower

pitch, degree of repetition and lack of emotional content. These tones are designed provide a calming effect and help in habituation.

Neuronomincs™: A low-level broadband noise is presented for several hours per day. Active treatment involves desensitizing the brain to reprogram and filter out the tinnitus.

9.SURGICAL OPTIONS

Surgery is rarely used for tinnitus due to its poor reliable results. Invasive options to treat tinnitus include electrical stimulus include electrical stimulation of the cochlea. Researchers have used transcutaneous stimulation of the auricle and tragus, decreasing tinnitus in over half of patients. Drawbacks to this therapy include sensor neural hearing loss from direct current, which can cause permanent damage. Cochlear nerve transection has also been attempted in the past with mixed results. A few surgeons have experimented with intracranial electrode to the auditory cortex with some relief in tinnitus with electrical stimulation.

CONCLUSION

Tinnitus is a common problem with an extensive differential diagnosis. Underlying medical conditions need to be identified and treated. With the aging population, tinnitus will become more common and thus research into the mechanism and treatment is needed to better help those affected. With one of the above treatment options, one should get at least some relief from tinnitus and the anxiety that it provokes. Please make an appointment to speak with one of our tinnitus trained physicians or audiologists to discuss which options we think would work best for you.

