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## **TINNITUS: WHAT IT IS AND WHAT CAN BE DONE ABOUT IT**

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### **What is Tinnitus?**

Tinnitus describes a sound or sounds in your ear or ears, such as ringing, buzzing, or cricket-type sounds, even in a quiet setting. Tinnitus is "a phantom perception of sound"; that is, persons with tinnitus hear sounds in their ears when there is no sound. No one else can hear this sound. Tinnitus is a symptom, not a disease. It can be related to several diseases of the hearing system. Some people with tinnitus find it annoying and irritating, which may result in depression.

Tinnitus occurs in 17% of adults. The people who go see their doctor because of tinnitus usually have ongoing or chronic tinnitus. This is different from occasional tinnitus. It is normal to have a temporary sound in the ears, usually a high-pitched ringing in only one ear, which lasts only a few seconds and then fades away. This is different from true tinnitus.

### **Why is it Important to Learn About Tinnitus?**

Over 40 million people in the United States have tinnitus. For 12 million, the tinnitus is severe. About 2 million report a serious problem with tinnitus, which interferes with quality of life, causing depression and difficulty sleeping. Tinnitus afflicts about 13% of children and about 30% of people over the age of 65. Tinnitus can be a symptom of medically or surgically treatable ear disease. If you have tinnitus, especially in just one ear, you should see your doctor. Your doctor will do tests to find the cause.

### **What Causes Tinnitus?**

The source of the tinnitus sound is in rather than outside of the hearing system. Causes of tinnitus include:

- Damage from exposure to loud noises
- Aging
- Drug toxicity
- Head injury

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- Lightning injury
  - Meniere's disease
  - Metabolic disorders (e.g., hyperlipidemia)
  - Neurologic disorders (e.g., tumors, multiple sclerosis)
  - Vestibular schwannoma (hearing nerve tumor)
  - Noise-induced cochlear dysfunction
  - Presbycusis (hearing loss in aging)
  - Temporomandibular joint (jaw) disorders
  - Hearing loss from birth

### **What Symptoms Am I Likely to Notice If I Have Tinnitus?**

Tinnitus is a symptom, not a disease. People with tinnitus often have the following:

- Sleep problems
- Poor concentration (e.g., when reading, sewing, driving, working)
- Anger
- Irritation
- Guilt
- Fear
- Anxiety
- Depression

### **What Tests Will My Doctor Order to Diagnose Tinnitus?**

Usually an ear, nose, and throat doctor (otolaryngologist) will ask a number of health questions and do a physical examination, especially of the ears, nose, and throat. Sometimes laboratory studies or a brain scan will be done to make sure that the tinnitus is not a symptom of serious disease. Most people with tinnitus have an ear disorder that does not need medical or surgical treatment. However, it is important to identify the possibility of a disease. Depending upon the findings and severity of the tinnitus, more tests can be done by an audiologist (a nonmedical hearing professional). The audiologist will do a thorough set of hearing tests and suggest any treatments that might be needed.

### **How Can Tinnitus Be Prevented?**

One very common cause of tinnitus is inner ear damage from exposure to loud noises. Thus, protecting your ears from loud noises throughout your life is the best way to prevent tinnitus.

## **How Can Tinnitus Be Treated?**

Many treatments for tinnitus have been tried over the years, including, masking (i.e., using white noise to "mask" the tinnitus noise), hearing aids, biofeedback, tinnitus retraining therapy, drugs, vitamins, and herbs. Research has not proven that many of these work. There are different causes for tinnitus. The actual processes that create tinnitus are not fully understood.

Masking, a longstanding treatment for tinnitus, attempts to cover up or "mask" tinnitus with sound, usually white noise (a rushing water type sound). People with tinnitus sometimes find relief from tinnitus with maskers, but many people are not helped by this approach. Tinnitus relief has been claimed for a large variety of drugs, vitamins, and herbs, and other medical and non-medical management strategies. However, more studies are needed to prove their benefit.

The following are suggestions for anyone with bothersome tinnitus:

- Avoid silence. Always surround yourself with soft and pleasant sound.
- Purchase and use regularly in quiet settings (e.g., bedroom) an inexpensive environmental sound-generating device available from a variety of department stores and health product outlets. For some devices, the cost is less than \$20.
- Protect your ears and hearing from dangerously loud sounds (e.g., music, sporting events, shooting).
- Learn more about tinnitus. For accurate and current information on tinnitus, contact the American Tinnitus Association at [www.ata.org](http://www.ata.org).
- Consult an ear, nose, and throat doctor and an audiologist with experience in the assessment and management of tinnitus and hyperacusis for a complete diagnostic evaluation and hearing evaluation.
- Have hope. All persons with tinnitus can be helped.

## **What Is the Prognosis for Tinnitus?**

Because tinnitus is not a disease but, rather, a symptom related to many diseases and other conditions of the ear, the outcome of people with tinnitus is hard to predict. Most people with tinnitus have a good outcome; that is, the person may get to the point where the tinnitus sounds are usually not noticeable, and the tinnitus does not interfere with daily activities, such as the ability to concentrate or to fall asleep.

## **WHAT IS TINNITUS?**

Tinnitus is from a Latin word meaning, "a jingling." There are two correct ways to say the word. The best way is *tin'-it-us* (with the emphasis on the first syllable), *but tin-i'-tus*

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(with emphasis on the middle syllable) is also okay. Tinnitus is commonly called "a phantom perception of sound." A person with tinnitus hears sounds in their ears when there actually is no sound. They may hear ringing, buzzing, a cricket-type sound, or hissing. No one else can hear these sounds. Tinnitus is a symptom, not a disease. It can be related to several diseases of the hearing system. Several terms are used to describe tinnitus. See The type of sound heard is not important. Hearing more than one type of sound, such as ringing and crickets or hearing the sounds in both ears (rather than one ear) is not more serious than hearing a single sound or hearing the tinnitus in just one ear.

The source of the tinnitus sound is in rather than outside of the hearing system. With tinnitus, you are not imagining things or having a hallucination. In most cases, people with tinnitus do not need medical or surgical treatment. Tinnitus is not a disease but a symptom. Ongoing tinnitus is different from a normal temporary sound in the ears. See Many people have occasional high-pitched ringing in only one ear, which lasts only a few seconds and then fades away. This is different from true tinnitus.

### **WHY IS IT IMPORTANT TO LEARN ABOUT TINNITUS?**

Over 40 million people in the United States have tinnitus. For 12 million, the tinnitus is severe. About 2 million report a serious problem with tinnitus, which interferes with quality of life, causing depression and difficulty sleeping. Tinnitus afflicts about 13% of children and about 30% of people over the age of 65 years. Tinnitus can be a symptom of medically or surgically treatable ear disease. If you have tinnitus, especially in just one ear, you should see your doctor. Your doctor will do tests to find the cause. Some people are told, "nothing can be done for your tinnitus". This is very upsetting for people with severe tinnitus. In the past, there were no good ways to treat tinnitus. However, an increased interest in tinnitus recently has resulted in the discovery of causes and treatments for this annoying problem. Persons with tinnitus should learn more about it. There are organizations mentioned in this guideline that can help you learn more. If you are troubled by tinnitus, ask your primary doctor to refer you to a tinnitus expert (either an ear, nose, and throat doctor or an audiologist).

### **WHAT CAUSES TINNITUS?**

Because it is a symptom and not a disease, tinnitus has many different causes. The following are just a few examples of the different causes of tinnitus.

- Head injury
- Lightning injury
- Meniere's disease
- Metabolic disorders (e.g., hyperlipidemia)
- Neurologic disorders (e.g., tumors and multiple sclerosis)
- Vestibular schwannoma (hearing nerve tumor)

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- Noise-induced cochlear dysfunction
  - Presbycusis (hearing loss in aging)
  - Temporomandibular joint (jaw) disorders
  - Hearing loss from birth

These disorders and diseases and many others, including serious ones, can cause tinnitus. In most people with tinnitus, there is an inner ear abnormality. This is not from a disease but commonly results from damage from very loud sounds or from the aging process. Also disorders and certain drugs may cause tinnitus, or they can make tinnitus sound louder. An example is a person with a hearing loss due to long-term exposure to loud sounds and who occasionally notices tinnitus, but is not bothered by the tinnitus. Then when the tinnitus sounds are increased and heard constantly, because of some medication for an unrelated disease like a sinus infection or a temporomandibular joint problem, the person may become very annoyed and bothered by the louder tinnitus. Tinnitus can be a side effect for over 250 medications used for a variety of diseases. In fact, tinnitus is heard by more than 2% of people who are taking some of these drugs. In some cases, the tinnitus stops when the medication is stopped. Tinnitus can also be from treatment with drugs, which are known to damage the ear, such as certain antibiotics and even common medications, such as aspirin.

### **WHAT ARE THE SYMPTOMS OF TINNITUS?**

Tinnitus is a symptom, not a disease. People with tinnitus often have the following:

- Sleep problems
- Poor concentration (e.g., when reading, sewing, driving, working)
- Anger
- Irritation
- Guilt
- Fear
- Anxiety
- Depression

For people who have tinnitus most of the day, it can greatly affect quality of life. It can interfere with daily activities. It can cause poor concentration. It can be so loud that you are not able to fall asleep. You might even wonder if life is worth living because the tinnitus seems to keep you from doing what you find enjoyable. Other people, like your spouse, children, or employer, cannot hear the sounds that you are hearing, so they might not understand how serious it is. As soon as your tinnitus begins to irritate you and begins to affect your quality of life, seek professional help.

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## **WHAT TESTS WILL MY DOCTOR ORDER TO DIAGNOSE TINNITUS?**

Even though others cannot hear your tinnitus, it can be found by a complete medical history. This medical history will include questions about sounds in the ears. Your doctor will ask about the onset, type (e.g., ringing, buzzing), how often it is heard, and whether the sounds are heard in the right ear, the left ear, or in both ears. If a person describes a problem with tinnitus in a general history, the doctor will ask more detailed questions. For people who are annoyed and distressed by tinnitus and who say tinnitus is their major health problem, a specific questionnaire entitled can be helpful in developing a treatment plan.

People who have tinnitus often see an ear, nose, and throat doctor (an otolaryngologist). This doctor will ask questions and do an examination. This examination will include the ears, nose, and throat. Sometimes laboratory studies or a brain scan will be done to make sure that the tinnitus is not a symptom of serious disease. Most people with tinnitus have an ear disorder that does not need medical or surgical treatment. However, every effort must be made to make sure there is not a disease that has tinnitus as a symptom.

An audiologist (a non-medical hearing professional) will do the diagnostic evaluation. An ear, nose, and throat doctor will also help with the diagnosis. Your family doctor does not do this evaluation. A thorough set of hearing tests will be done. The first goal is to describe hearing and the function of the inner ear. A number of tests can be done in less than 1 hour. Most of these tests are done in a quiet, sound-treated room. None of these tests cause discomfort or pain. You may hear your tinnitus louder on the day of the testing. This is because you are paying more attention to it, and because you are in a very quiet setting.

Measurement of otoacoustic emissions (OAEs) is very useful in evaluating inner ear function. OAEs are tiny sounds produced by the ear when the ear is stimulated with soft sound. OAE measurement is a quick and simple test that causes no discomfort to the person being tested. It can even be done with newborn infants while they sleep. The person being tested with OAEs just needs to sit quietly during the test.

The audiologist also does an evaluation of the tinnitus. In a sound-treated room, you will be asked to listen very closely to your tinnitus and to describe it in different ways. The goal is to estimate the pitch. You listen for things like a high-pitch ringing and the loudness of the tinnitus. Other testing might be measurement of how much background sound is needed to cover up (mask) the tinnitus in each ear.

## **PREVENTION & TREATMENT**

### **Preventive Measures**

Many diseases can cause tinnitus, but it is most often related to ear damage from loud sounds. The commonest group of people seeking help at a tinnitus center is males age 40-70 who have a hearing impairment. This hearing impairment may be very mild. It is due to exposure to loud sounds. This type of hearing problem is not a disease. The best way to prevent tinnitus then, is to protect your ears from loud noise throughout your life.

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Not all persons with noise-induced hearing loss or other causes of hearing loss have bothersome tinnitus.

### **Treatment Options**

Distressing tinnitus is mostly due to a person's reaction to hearing the tinnitus, rather than the tinnitus itself. When the tinnitus is first heard, a person may become concerned that it is a danger signal of something wrong. This is a very logical and reasonable response to a new and unknown bodily sensation. The next step is for people with tinnitus to begin thinking more about the mysterious sound in their ears and about possible reasons. A person may try to ignore the tinnitus or to control it by changes in diet, such as taking vitamins, eliminating caffeine, or by altering their lifestyle. They may seek out quiet places in hopes that the tinnitus will go away. These attempts to deal with tinnitus are usually not helpful. The more a person tries to control the tinnitus, the louder it seems to become. At this point, doctors and audiologists can help to prevent this sequence of events. They can prevent really distressing tinnitus if they are able to reduce the person's negative reactions to it. Doctors sometimes may unintentionally give people poor or even counterproductive advice. The result then is even more concern about their problem. There is a loss of hope that anything can be done for it. Do not be discouraged if you get this type of advice. There is new information about tinnitus with which even your doctor may not be familiar. Ask your doctor to help you find a tinnitus expert in your area, and seek out patient information.

A thorough examination with an ear, nose, and throat doctor (otolaryngologist) or audiologist who specializes in tinnitus can reduce distress for a tinnitus sufferer. For 70% of persons with a distressing problem of tinnitus, the consultation can get rid of the person's feeling that further management is required.

A visit with an expert in tinnitus is itself a good method of treatment. After the appointment, most people with bothersome tinnitus had fewer hours a day during which they were aware of tinnitus. Also the tinnitus seemed less severe. Quality of life, as measured by the Tinnitus Handicap Inventory, before and at least 6 months after a formal consultation showed great improvement.

The following are suggestions for any person with tinnitus that is annoying and considered a problem:

- Avoid silence. Always surround yourself with soft, pleasant sounds.
- Purchase and use regularly in quiet settings (e.g., bedroom) an inexpensive environmental sound-generating device, which is available from a variety of department stores and health-product outlets (e.g., Bed, Bath & Beyond, Wal-Mart). For some devices, the cost is less than \$25.
- Protect your ears and hearing from dangerously loud sounds (e.g., music, sporting events, shooting).
- Learn more about tinnitus. For accurate and current information on tinnitus, suggest that the patient immediately request material from the American Tinnitus

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Association ([www.ata.org](http://www.ata.org)) or the American Academy of Audiology ([www.audiology.org](http://www.audiology.org)) about tinnitus and tinnitus treatments.

- Consult an ear, nose, and throat doctor (otolaryngologist) and an audiologist (nonmedical hearing specialist) with experience in the assessment and management of tinnitus and hyperacusis (intolerance to loud sounds) for a complete diagnostic evaluation and hearing evaluation.
- Have hope. Everyone with tinnitus can be helped.

Many treatments for tinnitus have been tried over the years. There is no proof for many of these possible treatments. One approach is to cover up or "mask" tinnitus with sound, usually white noise (a rushing water type sound). People with tinnitus can find daily relief from tinnitus by doing this. Most persons are not satisfied with this approach. Several drugs, vitamins, and herbs, and other medical and non-medical management strategies have been suggested to work. Medications are used to help the patient to cope with tinnitus, to sleep, to minimize anxiety, and to make the tinnitus less noticeable.

Claims that drugs, vitamins, and herbs treat tinnitus are usually based on the informal reports of a small number of people. These claims are not based on formal research using enough people with tinnitus. A review of studies published in scientific journals, especially well designed "randomized trials," shows that no medical and herbal therapies, including popular ones such as *Gingko biloba*, work in the treatment of tinnitus. Randomized, clinical trials and critical analyses of tinnitus treatments, including complementary and alternative approaches, are increasingly reported in the literature. The benefit of other alternative treatment techniques, such as acupuncture, is no different than placebo effects. However, more studies are underway for a few drugs that might be helpful. Ironically, certain medications used for treatment of tinnitus, such as alprazolam [Xanax], are also on the list of the drugs that are known to cause tinnitus or make the tinnitus more noticeable.

Tinnitus retraining therapy is a promising treatment. It does not require surgery or medications. Based on a neurophysiologic model of tinnitus, tinnitus retraining therapy helps a person gradually ignore tinnitus sound. Before tinnitus retraining therapy is considered, the person has a very complete diagnostic hearing assessment and an evaluation of the characteristics of tinnitus. In a tinnitus retraining therapy program, the person with tinnitus receives extensive counseling about tinnitus causes and about how the reaction to tinnitus can become a problem. Some people with tinnitus are fit with custom devices, which fit in or behind the ear. They give off a soft pleasant sound to help them "habituate" or gradually pay less attention to their tinnitus. These devices are not used to cover up or mask the tinnitus. Instead, the tinnitus is mixed into the noise. Important components of this neurophysiologic approach for tinnitus management are described in recent articles and are shown in the figure entitled. Some recent studies have shown that tinnitus retraining therapy helps to make tinnitus less noticeable or even not noticeable. Which components of the treatment program contribute to the success (e.g., counseling, sound therapy) and the exact reasons for the improvement are not fully understood and are currently debated in the literature. Information on these treatment options is available from the American Tinnitus Association and other web sites ([www.ata.org](http://www.ata.org)).



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Cognitive behavioral therapy (CBT) is another promising management approach for tinnitus. Recent studies provide evidence in support of the effectiveness of CBT for the reduction of the distress associated with tinnitus.

### **WHAT IS THE PROGNOSIS FOR TINNITUS?**

Prognosis of tinnitus is hard to predict. Most of the estimated 40 million people in the United States who report tinnitus do not consider it a health problem. They do not seek help from a health care professional. Other persons develop a strong and negative reaction when they hear tinnitus sounds. Some people who have a strong negative reaction become very upset. They even get depressed because they cannot get rid of their tinnitus. If seen soon by a professional who is an expert in tinnitus, these people almost always have a good outcome. Unfortunately, when good professional care is not available in the early period after tinnitus is noticed, some people become distressed. Recent studies with brain imaging techniques show that parts of the brain that involve emotions and fear can play an important role in the very negative reaction that these people have to tinnitus. Still, for most persons with tinnitus, outcome is good with appropriate professional care; that is, the person may get to the point where the tinnitus sounds are usually not noticeable, and the tinnitus does not interfere with daily activities, such as the ability to concentrate or to fall asleep at night.

### **ARE ANY ALTERNATIVE TREATMENTS AVAILABLE FOR TINNITUS?**

Alternative treatments for tinnitus are techniques that have not been used traditionally by physicians. Although many are not proven, there is increased investigation of the potential benefits of complementary and alternative medicine (CAM) options for tinnitus. Among the CAM approaches for tinnitus reported most often during the past few years are herbal medicine, especially Ginkgo biloba, chiropractic manipulations, acupuncture, and neurofeedback. There is no clear evidence in support of the efficacy of any of these treatment approaches to date. Randomized clinical trials are now underway in many research centers worldwide.

### **WHAT RESEARCH IS BEING DONE ON TINNITUS?**

Although tinnitus is perceived by patients, a doctor cannot measure it like he or she would measure blood pressure or a pulse. Recent research with brain imaging techniques (e.g., functional magnetic resonance imaging, or fMRI) shows that it is possible to tell what parts of the hearing system and the brain are used when a person hears tinnitus. See In the future, it is possible that some of these techniques, such as auditory brainstem and cortical evoked responses and neuroimaging techniques may be used in hospital clinics to diagnose tinnitus. The role of brain chemicals, such as serotonin, in the perception of tinnitus is now being investigated. In addition, there is increased attention to factors important in the perception of tinnitus in children.

As noted already, the management of tinnitus with drugs continues to be a popular research topic. As noted by Dobie, "Nonspecific support and counseling are probably helpful, as are tricyclic antidepressants in severe cases. Benzodiazepines, newer antidepressants, and electrical stimulation deserve further study. Future therapeutic research should emphasize adequate sample size, open trials before randomized

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clinical trials, careful choice of outcome measures, and long-term follow-up" (p. 1202). There are also studies on the effectiveness of non-medical treatments for tinnitus, such as tinnitus retraining therapy and cognitive therapy. Finally, as detailed in hundreds of papers cited in the bibliography of this guideline, important research on the causes of tinnitus is being done in laboratories around the world.