

Your Guide To

TINNITUS

(Ringing in the Ears)



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Your Guide to Tinnitus (Ringing in the Ears)

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Definitions

Tinnitus is the perception of a sound that has no external source. Some of the more common sounds reported are: ringing, humming, buzzing, and cricket-like.

It can also be a combination of sounds, and for many, the sound of their tinnitus actually changes. It can be constant or intermittent and is heard in one ear, both ears or in the head. Tinnitus can originate in the middle ear (behind the eardrum) or in the sensorineural auditory system. Occasionally people with tinnitus hear music or singing. This is different from someone who has a mental illness and is experiencing hallucinations. Tinnitus is not a 'phantom sound'. There is real neural activity in your brain that you are hearing as your tinnitus.



Causes

There are many causes of tinnitus, and often the cause is unknown. Just about anything that can cause hearing loss can also cause tinnitus. The most common causes are: Noise exposure (e.g. from shooting or machines at work), a natural part of the aging process, head injury (e.g. from a car accident or fall), as a side effect of medications (e.g. aspirin).

Tinnitus is almost always accompanied by hearing loss. If you have tinnitus, you should have your hearing tested by a hearing health professional. Some 30 million adults suffer from persistent tinnitus (it can also affect children). For 12 million, the problem is severe enough that it impacts their everyday life. Because tinnitus can be a symptom of a more serious disorder, it is important to have an appropriate health evaluation.



Nearly four in ten people experience tinnitus 80% of the time during a typical day; slightly more than one in four people describe their tinnitus as loud; and about one in five describe their tinnitus as disabling or nearly disabling. Tinnitus is sometimes accompanied by hyperacusis (when moderately loud sounds are perceived as very loud).

Classifications

Traditionally, many classify tinnitus as either being: Objective (it can be heard by the examiner), or subjective (it can only be heard by the person with tinnitus). But this is not always helpful because in many people with tinnitus an objective sound is emitted from the cochlea in the inner ear, which is unrelated to tinnitus in most cases. Therefore, I have suggested that tinnitus be referred to as either middle ear tinnitus, or sensorineural tinnitus. This categorizes tinnitus in the same way hearing loss is categorized, and is helpful in understanding its mechanism and treatments.

Middle ear tinnitus originates in the cavity behind your eardrum (less common). Of course, we would like to determine whether tinnitus originates in the cochlea, the neural pathways, or the brain. At present, this is not possible. It is likely that in most circumstances, tinnitus originates in the cochlear (with a noise induced hearing loss). But it might also originate in the brain stem or the brain (often with a hit to the skull). Wherever the tinnitus originates, it must be interpreted by the auditory part of the brain. Some people mistakenly suggest that it is a relatively new idea that tinnitus might be coded in the brain, but in fact this was suggested decades ago.

Middle ear tinnitus is either a result of abnormal blood flow or muscles twitching. Sometimes the tinnitus might sound like a pulsing or throbbing, or like a twitching. Often the tinnitus is only in one ear. In some of these situations, the tinnitus can be treated surgically, and thus a visit to an otologist (a physician specializing in the ear) is advisable.

Sensorineural tinnitus can have many causes (e.g. noise, medications, head injury, infections, and aging). Something is establishing abnormal spontaneous nerve activity. As represented in the brain, this might be an increase in activity, synchronous activity across nerve fibers, or an over-representation of some frequency region (or combinations of the above three).

The Impact of Tinnitus

When tinnitus first begins, most of us would be concerned and seek information. Not knowing the cause, wondering whether it is a sign of something worse, and not having control over it, could lead to distress for anyone. Discovering there is no cure can make that initial reaction even worse.

But there is help. You can do something about it. People coming to our clinic with tinnitus typically are either: Curious, concerned, or distressed. The curious patients have some basic concerns and enquire about therapies. Concerned patients are bothered by their tinnitus, and want detailed information and strategies for reducing the impact of their tinnitus. Distressed patients are very bothered. They require professional help to reduce their stress and improve their coping abilities. None of these responses are wrong. Everyone's tinnitus is a bit different, and we are all different people with different life experiences, weaknesses and strengths. Some people do not appear to be too bothered by their tinnitus, but most would wish it would go away.

Tinnitus can have a direct influence on: Thoughts and emotions, hearing, sleep, and concentration.

Thoughts and emotions

How do you think about your tinnitus?

- Do you think it will ruin your life?
- Do you think you will never be able to get to sleep?
- Do you think no one else really understands tinnitus?
- Do you think nothing can be done?

The Impact of Tinnitus

The way you think about your tinnitus will influence your emotional reaction to it. Thoughts like this might naturally lead to feelings of annoyance, depression, anxiety or anger. Tinnitus does not have to interfere with your enjoyment of life. There are many professionals that understand tinnitus and can help you. Several counseling-based approaches, such as Cognitive Behavior Therapy and Mindfulness Therapy, have been helpful to many with tinnitus. **You can change the way you think about and react to your tinnitus.**

Hearing

Some people with tinnitus (39%) say that the sound of the tinnitus competes with or masks things they are trying to hear. Most people with tinnitus also have a hearing loss, and it is not always easy to tell whether hearing difficulties are due to the hearing loss or to the tinnitus. I believe that tinnitus can interfere with hearing in some people. Often a patient will report that their tinnitus makes it difficult for them to hear a phone or a bird, that they have to listen through their tinnitus, or that they have to hear people talking above the noise of their tinnitus. **There are many things you can do to improve your listening strategies, and hearing aids often improve hearing and tinnitus!**

Sleep

It should be easy for everyone to appreciate lying in bed at night, in a quiet room, thinking about the day. But there is a constant ringing in the background. Many tinnitus sufferers (20%) report that when they are in their quiet bedroom, their tinnitus interferes with them getting to sleep. It can also make it more difficult to get back to sleep when we wake up in the middle of the night. Some even report that their tinnitus is worse after waking up in the morning, or even after a brief afternoon nap. **There are many things you can do to nurture your sleep experience, and most individuals with tinnitus benefit from sound therapy while falling asleep.**



Concentration

Some types of tinnitus can be quite distracting. A number of people (26%) with tinnitus report that they have difficulty focusing on a task because of their tinnitus. This might include reading a book or the newspaper. **There are many opportunities to improve your concentration habits.**

Effects on the activities of our lives

These direct effects on our thoughts and emotions, hearing, sleep and concentration can lead to secondary problems in the activities of our daily lives. In particular, problems in any of these areas can lead to difficulties at work, socialization with family or friends, and enjoying leisure activities. **Often people with tinnitus are surprised to learn that many of their friends have tinnitus. Most have learned to make their tinnitus less important in their lives. You can too!**

Treatment of Tinnitus

There are many things you can do to help with your tinnitus. First, it is important to understand and accept, that, at least presently, there is no cure. There is no pill or surgery that has been shown to eliminate tinnitus in replicated scientific studies with adequate control and good measurement tools. Counseling and sound therapy, including the use of hearing aids, can be very helpful. There are many things that you can do to help yourself.



In all treatments, it is important to distinguish three approaches. They might be interrelated, but it is important to appreciate the main focus.

- 1) **Eliminating your tinnitus.** Presently, there are no approaches to eliminate your tinnitus. Several approaches are being explored.
- 2) **Improving your overall well being.** If your general well being is in good shape, that will likely make it easier to cope with your tinnitus. General approaches to accomplish that, such as relaxation, healthy foods and exercise are always a good thing. In appropriate cases, treating severe depression and anxiety with medications can also be helpful. Psychological counseling can also be very helpful for some.
- 3) **The reaction to your tinnitus.** Although you might not be able to eliminate your tinnitus, there are several approaches to modifying your reactions. I will discuss several of these below.

Medications and Dietary Supplements

I want to be clear that in my opinion, despite many advertising claims, no medication or herbal supplement has been shown in well-designed studies to cure tinnitus.

Although there are no medications to treat the tinnitus, sometimes a medication can cause tinnitus, and stopping or changing that medication can eliminate the tinnitus. It can even be the interactions of taking two or more medications that can be causing the tinnitus. Of course, you should check with whomever prescribed the medication(s) before stopping them. But if you think this might be a factor in your tinnitus, it might be worth pursuing.

Medications can also be used to treat reactions to tinnitus, specifically anxiety and depression, and to facilitate sleep. These medications are not treating the tinnitus directly, but for some they can be very helpful.

In some people, tinnitus might be caused by some deficiency of some nutrient in the body. A few researchers over the years have thought they found a dietary supplement that might cure tinnitus, in at least some patients. But these have yet to be replicated in well-designed controlled investigations. You should be aware that an excess of some supplements can be harmful.



Surgery

There are some very rare forms of middle-ear tinnitus that can be treated surgically. Middle ear muscles that are twitching can sometimes be severed, and occasionally there is abnormal blood flow in the middle ear where an operation can be helpful. This condition is usually in one ear only and the abnormal blood flow sometimes sounds like a pulsing or throbbing sound. This condition is rare, but represents a good reason to have a thorough medical work up.

Some people have asked to have their hearing nerve cut so that they can eliminate their tinnitus, even though they will lose their hearing in that ear. Unfortunately, the operation is rarely successful. People lose their hearing but still have their tinnitus. The operation is rarely done today.

Alternative treatments

I will not attempt to review the hundreds of treatments that have been proposed and are often aggressively marketed. Some might have merit, but I choose to emphasize only general procedures that have scientific support and/or are widely accepted by experienced clinicians. For example, I do not believe there is sufficient evidence to recommend acupuncture or dental treatment to treat tinnitus.

Because there is no cure for tinnitus, and because so many are bothered by it, there is the potential for many exaggerated claims regarding possible new treatments. Surfing the internet produces hundreds of hits that claim, or indirectly claim, to help tinnitus. Caution is warranted, of course.

Typically, to be accepted as a viable treatment by healthcare professionals, studies need to have:

- a control condition,
- a good measurement tool,
- be studied by a group that does not benefit from a positive outcome, and
- be replicated by at least one other research team.

It is unlikely that you will be able to judge the appropriateness of a study you read about on the internet or in the press. Therefore always check with your hearing health professional, clinical psychologist or otologist about a 'new' 'treatment' you learn about.

Counseling and Sound Therapy

There are several different counseling approaches to help people with tinnitus. Some provide basic information about hearing loss and tinnitus, and some engage the patient in collaborative activities to assist in coping, accepting, thinking and reacting to tinnitus in different ways. I have used **Tinnitus Activities Treatment**, which includes individualized collaborative counseling in four areas, depending on individual needs:

- thoughts and emotions,
- hearing,
- sleep and
- concentration.



Treatment of Tinnitus

Many tinnitus sufferers report that the presence of background sound reduces the prominence or the loudness of their tinnitus. The background sound can be present in the environment (e.g. fan noise). There are non-wearable devices that produce pleasant background sound (e.g. raindrops). Additionally, wearable maskers or sound generators are available that produce a 'shhh' noise (these can also be combined with hearing aids). The use of hearing aids improves communication, reduces the stress associated with intensive listening, and also can partially mask the tinnitus. Modulated tones and soft music can also be very effective in non-wearable and wearable devices.

In the masking of tinnitus. There are two kinds of masking:

- Total Masking is when the masking sound (often noise) completely covers the tinnitus. It is like substituting the masking sound (e.g. a whooshing noise) for the tinnitus. Many people prefer this to their tinnitus, and they can control when they listen to their tinnitus and when they listen to the masking sound.
- Partial masking is when the masking sound only partly covers the tinnitus. Both the tinnitus and the masking sound are heard together. Many people prefer this to their tinnitus, because the prominence of the tinnitus is reduced, and some also report its loudness is decreased. Different types of sound therapies recommend different levels of maskers in partial masking.

Hearing aids

Most people with tinnitus also have a hearing loss, and most of you will improve your hearing abilities with hearing aids. Hearing aids can also help tinnitus. They can help in many different ways. Hearing aids improve hearing. This reduces the stress associated with the need to carefully listen. The reduction in stress makes it easier to accommodate to the tinnitus. Hearing aids amplify background sounds, and for many people this partial masking reduces the loudness or prominence of the tinnitus. In a recent study by the Better Hearing Institute we determined the following with respect to the use of hearing aids in mitigating the effects of tinnitus:



- 27.8% of hearing aid users reported receiving moderate to substantial reduction in their tinnitus when using their hearing aids.
- Two out of three people experienced tinnitus relief most of the time to all of the time, while three out of ten (29%) reported the use of hearing aids alleviated their tinnitus all of the time
- Subjects who had their hearing aids fit by hearing health professionals, who used a more comprehensive hearing aid fitting protocol, are nearly twice as likely to experience tinnitus relief than people fit by hearing health professionals who used a minimalist hearing aid fitting protocol.

If you think you need hearing aids in addition to the concerns about your tinnitus, you should see a hearing health professional. By all means ask if they are skilled in the management of tinnitus. There are adjustments to a hearing aid that can be made to maximize the benefit provided someone with tinnitus. For example, some report that loud sounds make their tinnitus worse. Hearing aids can be adjusted to reduce the chances of this happening.

Treatment of Tinnitus

Other wearable devices, including tinnitus maskers

Wearable devices are available specifically designed to treat tinnitus. Most resemble hearing aids, and fit behind or in the ear canal. They typically either produce a broadband noise (a whooshing sound) (and are called tinnitus maskers), a processed sound designed to be easy to listen to and to affect the tinnitus, or they produce music or processed music (or some combination of this).

When noise is used, people set the noise level at different levels. For years I have advocated that the noise be chosen for individuals. Some benefit from total masking of their tinnitus or trying to adjust the level to where they just hear the tinnitus through the noise. My experience is that a lower partial masking level is suitable and preferable for most people.

Non-wearable sound generating devices

Additionally, there are non-wearable sound generating devices aimed at helping tinnitus. Some sounds are environmental sounds, specially selected or processed music, or combinations of these. For example, some include waves lapping against a shore, raindrops on leaves, or easy-listening classical music. Other sounds are specially designed just for tinnitus sufferers.

Things you can do to help yourself

Managing tinnitus

There are many things you can do to help yourself manage your tinnitus.

- How you think about your tinnitus will influence your emotional reactions.
- If you have tinnitus, you likely have a hearing loss as well. The poorer your hearing, the more difficulty you will have communicating. In addition to your hearing loss, your tinnitus can also interfere with your hearing. All of us can appreciate the difficulty hearing while a loud whistle or cricket noise is going on in the background. The strategies you would normally use to help with you hearing are likely to also help with you tinnitus. Some examples are:
 - Try to distance yourself or someone you are talking with from any noise source.
 - Try to watch the face of the person who is talking
- Go to the [BHI web site](#) to learn more about aural rehabilitation strategies.
- If you have a hearing loss and tinnitus, see a hearing health professional to determine how much hearing aids will help your hearing and your tinnitus.

Sleep

There are several things we can all do to facilitate getting to sleep at night. These include:

- Not eating large meals before sleeping,
- Not drinking coffee before sleeping,
- Reducing bright light and distractions (e.g. television) from the bedroom,
- Only going to bed when you are tired.
- Additionally, you can use sound therapy when you are trying to get to sleep. This might include: A soft easy listening music that will play until you have fallen asleep, steady state noise, pre-recorded relaxation sounds, recordings designed for those with tinnitus. Some sound generators produce a sound from a pillow loudspeaker, so that another person sleeping in the room will not hear the sound. Some prefer to leave the sound on all night so that it will be present when you wake up during the night or in the morning.

Concentration

If your tinnitus interferes with your ability to concentrate, there are a few things some people have found helpful. They include:

- Separating long, complex tasks into shorter ones
- Taking frequent breaks during tasks
- Eliminating distractions

Additionally, the use of sound therapy also makes it easier to concentrate on tasks for many people with tinnitus.

Self-help Books

There are also some excellent self-help books available. I have found the following to be the most helpful:

- Davis, P. *Living with tinnitus*. Rushcutters Bay, N.S.W.: Gore & Osment; 1995.
- Hallam R S. (1989). *Living with tinnitus: Dealing with the ringing in your ears*. Wellingborough, Northamptonshire, Thorsons; 1989.
- Henry JL, Wilson PH. *Tinnitus: A self-management guide for the ringing in your ears*. Boston: Allyn and Bacon; 2002.
- Tyler RS.(Ed). *The Consumer Handbook on Tinnitus*. Auricle Ink Publishers., Sedona; 2008.

Seeking Professional help

While I hope this discussion of tinnitus is helpful, you could very well benefit from even more help by seeing a [hearing health professional](#) trained in tinnitus management, a clinical psychologist, an otologist, otolaryngologist or a psychiatrist. It should be understood regardless of which professional you visit, that they may vary dramatically in their training and ability to help you manage your tinnitus. Some will even tell you “Nothing can be done”. While it is true there is currently no cure for tinnitus there are many

Things you can do to help yourself

things that can be done to manage or alleviate the impact tinnitus has on your life. And research shows that some people report complete cessation of tinnitus after counseling and sound therapy or being fit with hearing aids.

As you seek professional help ask them to tell you in detail their training in tinnitus management. If, in your opinion, they have the credentials to treat or help you manage their tinnitus, then ask them how effective their treatments have been in managing or mitigating the effects of tinnitus in their patients.

Since most people with tinnitus have hearing loss the main tool to alleviate your tinnitus with hearing loss will be with sound therapy or hearing aids in conjunction with counseling. In our experience, people who are very good in fitting hearing aids, that is those who use best practices in fitting hearing aids, will be able to help more of their patients manage their tinnitus. For a discussion on best practices see the Better Hearing Institute's [Guide to Buying Hearing Aids](#).

Most of us can benefit from the training and experience of professionals who have helped others with similar problems to ours. Do not hesitate to seek professional help if you feel you might benefit.

Hope

Much has changed in the understanding and treatment of tinnitus in the last 5 years. There is good reason to be hopeful that you can reduce the problems that you relate to your tinnitus. And, there is good reason to believe that a treatment will be available soon that turns the tinnitus off, at least in some people. Here is why I am hopeful:

- A variety of counseling and sound therapy options are becoming more widely available by experienced clinicians.
- Device companies and pharmaceutical companies are eagerly pursuing new approaches, many with some preliminary success.
- Animal models are being developed in an attempt to link neural activity and behavior linked to tinnitus.
- Research money for tinnitus is increasing, with the direct effect that more researchers are now involved in tinnitus than ever were before.

Another reason for hope is that researchers and clinicians are now appreciating that it should be possible to identify different subgroups of people with tinnitus. Different subgroups of tinnitus will likely respond to different forms of treatments. One way you can help is to [complete a survey on our website](#) .



Some Interesting Directions

There are a few areas of study that I think deserve some mention.

- **Electrical stimulation of the cochlea** : It has been known for some time that recipients of cochlear implants who have tinnitus often report that their tinnitus is decreased by the electrical stimulation. Cochlear implants stimulate the hearing nerve electrically for those who obtain limited benefit from hearing aids. A small minority of implant recipients get tinnitus after receiving a cochlear implant. Not everyone will be helped with a cochlear implant, but many groups are studying this effect, and I believe there will be a wearable, implantable device within 5 years. Not everyone will be helped, but many will be.
- **Electrical Stimulation of the brain**: Another approach is to provide electrical activation of the brain. As I mentioned, the representation of tinnitus must be in the auditory cortex. Studies have begun to provide electrical stimulation within the skull but outside of the sheath that contains the brain. Other approaches go beneath the surface of the brain. These approaches are experimental, and they involve a higher risk.
- **Magnetic Stimulation of the brain**: Electrical current can also be produced by a changing magnetic field. Investigators have placed magnets on the surface of the skull (without any operation), and have been able to influence the perception of tinnitus (and hearing). Any reduction in tinnitus, when it is observed, is short-lived. Investigations are underway to develop a treatment protocol that produced more long-term effects, and minimizes side effects.

Conclusion

This overview provides some background to help you understand tinnitus, what options you have now, and what options you might have in the future. There are many things you can do to help yourself to adjust and accommodate to your tinnitus. And, there are many professionals prepared and motivated to help you.

References

- Davis, P. *Living with tinnitus*. Rushcutters Bay, N.S.W.: Gore & Osment; 1995.
- Hallam R S. (1989). *Living with tinnitus: Dealing with the ringing in your ears*. Wellingborough, Northamptonshire, Thorsons; 1989.
- Henry JL, Wilson PH. *Tinnitus: A self-management guide for the ringing in your ears*. Boston: Allyn and Bacon; 2002.
- Kochkin, S., Tyler RS. (2008) Tinnitus Treatment and the Effectiveness of Hearing Aids: Hearing Care Professional Perceptions. *The Hearing Review*; 15(13): 14, 16, 17, & 18.
- Kochkin, S., Tyler, RS, and Born, J. The prevalence of tinnitus and efficacy of various treatments, *Hearing Review*, November 2011.
- Searchfield, G. D. (2006). Hearing aids and tinnitus. In Tyler RS (Ed) *Tinnitus treatment: clinical protocols*. Thieme, New York. p 161-175

References

- Stouffer JL, Tyler RS. (1990). Characterization of tinnitus by tinnitus patients. *Journal of Speech and Hearing Disorders*, 55: 439-453.
- Tyler, R. (2006). Neurophysiological models, psychological models, and treatments for tinnitus. In R. S. Tyler (Ed.), *Tinnitus treatment: Clinical protocols* (pp. 1-22). New York: Thieme Publishers.
- Tyler, R. S. and Erlandsson, S. (2003). Management of the tinnitus patient. In: L.M. Luxon, J.M. Furman, A. Martini, and D. Stephens. (Eds.), *Textbook of Audiological Medicine* (pp. 571-578). London, England: Taylor & Francis Group.
- Tyler, R.S.(Ed). (2008). *The Consumer Handbook on Tinnitus*. Auricle Ink Publishers., Sedona, AZ.
- Tyler, R.S., Chang, S.A., Gehringer, A.K., Gogel, S.A. (2008). Tinnitus: How you can help yourself! *Audiological Medicine*, 6: 85-91.
- Tyler, R.S., Haskell, G., Gogel, S., and Gehringer, A. (2008) Establishing a Tinnitus Clinic in Your Practice. *American Journal of Audiology*; 17: 25-37.

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- for clinicians - *Tinnitus Treatments; Clinical Protocols*, Thieme, 2006
- for the general public - *Consumer Handbook on Tinnitus*, Auricle Ink Publishers, Sedona, AZ, 2008

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