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Fact Sheet

Your Guide to
Tinnitus

Tinnitus is a common symptom of a problem anywhere in the auditory system or less commonly, the head, neck or jaw. Many people experience it, usually briefly, at some point in their lifetime. However, for others it can be more of a protracted issue, varying greatly in degree of disturbance.

What is Tinnitus?

Tinnitus can be described as conscious awareness of a sound in the absence of any external auditory stimulus. In other words, it is **the perception of sound, when there is no sound** - it is generated inside the head.

Tinnitus can vary a lot in terms of the type of sound, severity and the degree to which it causes annoyance. It is commonly referred to as "*ringing in the ears,*" however the sound itself can be anything; for example, whooshing, chirping, clicking, and can be intermittent, constant or even pulsating. The sound can change pitch or volume and there may be more than one sound present at a time.

While the perception of tinnitus is a relatively simple concept, its effects on one's well-being can be quite varied and complex. For this reason, your Hello Hearing Audiologist will be interested to discuss not only the tinnitus sound, but how bothersome or annoying the sound is to you.

Key points:

- **Tinnitus is the perception of sound when there is no sound, generated inside the head.**
- **Tinnitus is very common, with up to 10-15% of the population having had tinnitus that is intrusive or longer lasting; of these, around 10% seek medical attention.**
- **Tinnitus can become problematic when the brain perceives it as a threat to one's well-being and triggers an automatic stress response.**
- **There are generally no 'quick fix' treatments for tinnitus, however, a number of strategies can be effective in breaking down the vicious cycle sometimes caused by tinnitus and supporting the brain to habituate to it.**

What Causes Tinnitus?

Tinnitus can be triggered by any insult to any part of the auditory pathway. The most common trigger is **sensorineural hearing loss**. This is a result of damage (such as from noise, ageing, genetics) to the tiny

hair cells of the cochlear, deep in the inner ear. Some of the other more common triggers include the following:

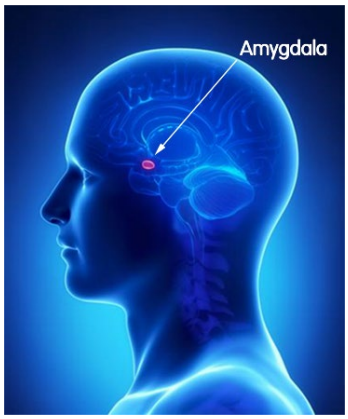
- Impaction of wax (cerumen) in the ear canal.
- Outer ear infections.
- Middle ear infections and other conditions affecting the middle ear, including otosclerosis.
- Inner ear conditions such as Meniere's syndrome or drugs affecting the inner ear (some of the more common drugs include chemotherapy drugs, certain strong antibiotics, diuretics (fluid reducing medication) and some anti-inflammatory drugs).
- Problems with the joints between your upper and lower jaws (TMJ).

Tinnitus is perpetuated by the brain's drive to overcompensate. Any time there is an interruption to the normal transmission of sound through the auditory system, our brain makes efforts to compensate for it. When there is no external sound, there are still very low-level signals running along the auditory nerve, even while you are sleeping. These signals are not generally perceived by the brain as: *a)* they are very small, and; *b)* we are very rarely (if ever) in situations where there is no sound. Tinnitus occurs when this normal low-level activity becomes heightened to the point where the brain perceives it as sound. This occurs commonly when there is any degree of hearing loss or interruption to the normal function of the auditory pathway. It is believed this is due to the brain recognising a reduction in auditory input and an attempt to compensate for it by making the neural (nerve) activity more sensitive and therefore 'pick-up' more sound. When this occurs, the normal low-level activity of the nerves becomes heightened, often to the point where it is strong enough to be recognised by the brain as sound.

The effect is much like your brain having an internal volume control. You can liken it to turning the volume of your home stereo or hi-fi system up high when there is nothing playing through it; you may hear a 'whooshing' sound through the speaker. This sound is generated internally by increasing the normal low-level activity of the amplifier. Usually this isn't heard until the volume sensitivity is increased, however despite not hearing it, it is still occurring, just at a much lower level.

Difficulties associated with Tinnitus

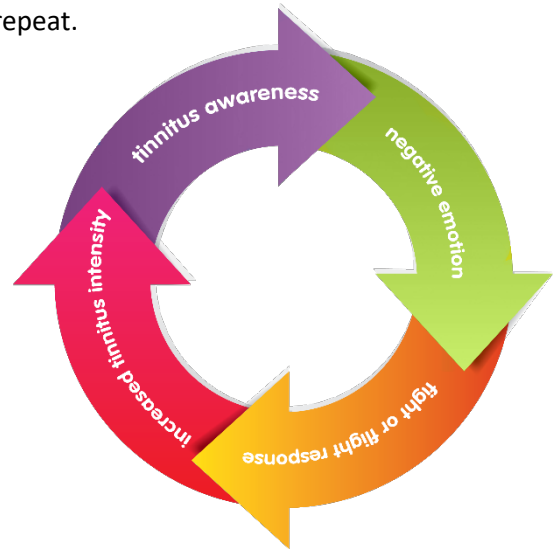
Unfortunately, tinnitus can be a more complex issue for some. Although it is a benign mechanism of no physical consequence, one's emotional reaction to the tinnitus sound is highly variable and individual. Under normal circumstances, the brain is very good at filtering out sounds that are not important. If you think about all the sounds going on in the environment at one time, we need some mechanism for filtering out sounds that are not important, otherwise we would be overloaded with sound stimuli, each competing for our conscious attention and action. Our brains are conditioned to filter unimportant and non-threatening sounds, to be aware of changes in sounds, and to focus on sounds that have the potential to cause harm or threat.



For some people, the brain classifies Tinnitus as being important and a potential threat to their well-being. The Amygdala, a part of the brain responsible for processing memory, decision making and emotional responses, is believed to be activated in those for whom tinnitus has become problematic. The Amygdala determines the emotional significance of the tinnitus and the need to trigger a stress (fight or flight) response. The 'fight or flight' response involves the release of stress hormones in response to an actual or perceived threat. This has numerous effects on the body, some of which include increasing heart rate, increasing breathing rate and increasing muscle tension – it prepares the body to confront the threat (fight) or to run away from it (flight).
In terms of tinnitus, this response can produce an acute stress reaction initially, however, as the tinnitus persists, it may create a more chronic situation contributing to anxiety and potentially other physical conditions such as sleep disorders, high blood pressure and high cholesterol.

The vicious cycle

Once the brain applies a negative association to tinnitus and the stress (fight or flight) response is triggered, this negatively reinforces the tinnitus. Often this makes it more persistent and more intense and thus causing the cycle to repeat.



Can Tinnitus be cured?

There is no 'quick fix' for tinnitus. It is, however, very treatable. The primary aim of tinnitus management is to break the cycle above. Specifically, this involves a number of strategies designed to support the brain in **habituating** to the tinnitus. Habituation can be thought of as a process of becoming accustomed to or not consciously aware of a stimulus. For example, if you wear a watch on your wrist, once you put it on, you are not aware it is there for most of the day, even though it is applying constant pressure to your wrist. Similarly, the clothes on your body or the glasses on your face are soon habituated to (along with thousands of other stimuli experienced during the day). In contrast, new stimuli or those that pose a threat, will attract and often maintain our attention. Even those with very

disturbing tinnitus often have times when they are not actively thinking about it. This often occurs when talking about things of interest with family and friends, when listening to music, when at sports events or the theatre or when watching a favourite TV show.
Tinnitus treatments aim to maximise the amount of time one is not actively thinking about it and supporting the brain to decide the tinnitus does not pose a threat, thus shutting down the stress response by the Amygdala. In time, habituation occurs such that the brain is able to tag the tinnitus as non-relevant and thus ignore it – like the watch on your wrist.

What are the treatment options?

Your Hello Hearing Audiologist will be able to provide specific recommendations based on your individual circumstances. Generally, the following items can often be very effective:

Sound enrichment
The concept of increasing the amount of sound passing through to the brain. This increases nerve activity and thus reduces the sensitivity applied to the auditory system by the brain. Recall the 'internal volume control' effect discussed above. It can be as simple as ensuring there is some degree of sound in the environment, for example the noise of a fan in your bedroom, music players, radio, TV etc.

Amplification
Amplification (such as that from hearing aids) can be very effective because along with making sounds clearer, it amplifies environmental sounds, causing tinnitus intensity to reduce. With today's technology, wireless streaming devices can be incorporated with the amplification, creating a more personalised sound therapy regime. Many of the latest hearing aids feature built-in tinnitus sound generators which work to mask the tinnitus in addition to providing the usual benefits of amplification.

Relaxation
Given the strong link between tinnitus and stress, many people find benefit from relaxation exercises that include deep breathing, progressive muscle relaxation and guided imagery. Effectiveness can be increased when used in combination with sound enrichment strategies.

Education
Understanding the mechanisms of tinnitus generation and perpetuation can often, by itself, assist significantly with reducing the negative associations applied by the brain to the tinnitus. This, in turn, can reduce impacts of the stress response.

Cognitive Behavioural Therapy (CBT)
CBT is a treatment offered by certain qualified Psychologists and works not to eliminate or reduce the auditory perception of tinnitus, but rather to change the previously negative automatic thoughts to more positive and realistic ones. The aim is to help sufferers to function better despite the presence of their tinnitus. This treatment can also often be used in combination with the above options.