

Pulsatile tinnitus

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Some people hear a noise in their head and/or ears which pulses in time to their heart beat. This is called pulsatile tinnitus. If you are experiencing this, please speak to your GP. This leaflet will also tell you more.

What is tinnitus?

Tinnitus is the perception of noises in the head and/or ear. Someone with tinnitus may hear steady ringing, buzzing, hissing, whistling or other noises. The sensation can present all the time or come and go. The volume of the noises heard can vary from one episode to the next.

What is different about pulsatile tinnitus?

In contrast, pulsatile tinnitus is a rhythmical noise that usually has the

same beat as the heart. It can be easily identified by feeling your pulse at the same time as listening to the tinnitus. Rhythmical sound is experienced in other types of tinnitus but these are not in time with the pulse (see more on this on page 4).

When doctors investigate cases of tinnitus, it is rare for them to find a single identifiable cause for the problem. However, with pulsatile tinnitus, the chances of finding a specific cause are more likely, though it is still difficult. Treating the underlying cause can lead to an improvement in your tinnitus.

What causes pulsatile tinnitus?

Pulsatile tinnitus is caused by a change in blood flow in the vessels near your ear or a change in your awareness of that blood flow. These vessels are located in the large arteries and veins in your neck and base of your skull, or the smaller ones in your ear itself.

The change in blood flow can be caused by a variety of factors described below. This is not a complete list of causes.



Tinnitus UK tries very hard to make sure our information is right, but it cannot tell you everything. It is not a substitute for medical advice. You should always check with your doctor or hearing health professional.

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If you are experiencing pulsatile tinnitus, you should consult your doctor.

Generalised increased blood flow

Blood that is flowing quickly makes more noise than blood that is flowing slowly. Increased blood flow throughout the body can happen due to strenuous exercise or pregnancy. It can also occur if you have severe anaemia or when if your thyroid gland is overactive, a condition known as hyperthyroidism or thyrotoxicosis.

Localised increased flow

Sometimes blood flow is increased in a single blood vessel or group of blood vessels rather than a generalised increase. For example, the stapedial artery in the middle ear normally closes before birth. In some people it can remain open and the blood flow adjacent to middle ear structures can generate pulsatile tinnitus.

Tumours of the head and neck cause the development of abnormal blood vessels. This can result in pulsatile tinnitus. The majority of tumours associated with pulsatile tinnitus are benign (harmless) rather than malignant (cancerous).

Turbulent blood flow

If the inside of a blood vessel becomes irregular due to atherosclerosis (hardening of the arteries), the blood flow will become turbulent rather than smooth. This flow then becomes noisy.

Altered awareness

Pulsatile tinnitus can also be newly heard due to other changes:

- Conductive hearing loss such as a perforated ear drum or glue ear. These conditions tend to make you more aware of sounds inside your body.

- Heightened sensitivity in the auditory pathways can alert the brain to normal noise in blood vessels. This is similar to the experience of people being aware of their non-pulsatile tinnitus for the first time.

Other causes

Some causes of pulsatile tinnitus do not fall into any of the above categories. For example, benign or idiopathic intracranial hypertension is characterised by headaches and visual disturbance as well as pulsatile tinnitus. It occurs most frequently in overweight young or middle-aged women. However, it can occur at any age and affect anyone. Its cause remains unknown.



How is pulsatile tinnitus investigated?

A medical appointment to investigate pulsatile tinnitus will usually start by the doctor taking a detailed history of your tinnitus and other medical conditions. The doctor will then examine you, paying particular attention to your ear drums and the blood vessels of your neck.

They may use a stethoscope to listen to your neck and skull. If the doctor can hear a pulsatile noise through the stethoscope this is referred to as objective pulsatile tinnitus. Pulsatile tinnitus that cannot be heard by the

doctor is called subjective pulsatile tinnitus. Further investigations may include a hearing test which is a common test for any kind of tinnitus.

People with pulsatile tinnitus will generally be referred for some form of medical imaging. The health professional will discuss with you the best investigation for your symptoms based on your medical history.

Here's a quick guide to the different imaging methods used.

Magnetic resonance imaging (MRI)

An MRI produces pictures of the head and inner ears using static magnetic fields and radio frequencies rather than X-rays. Some conditions show up more clearly with MRI, some are better shown with CT. Therefore some people may need both CT and MRI scans.

Magnetic resonance angiography (MRA)

MRA is used to produce images of the inside of arteries or veins and can show up any irregularities or narrowing of your blood vessel. This may involve an injection of a contrast agent.

Computed tomography (CT)

This technique uses X-rays to generate more detailed images of your head and neck.

Computed tomographic angiography (CTA)

This involves giving an injection of a contrast agent that shows up on X-rays and then performing a CT scan. This method creates a more detailed picture of the blood flowing through the vessels of your head and neck.

Angiography

This looks at the inside of your vessels by injecting contrast and taking a X-ray.

Ultrasound

Ultrasound scanning uses a technique called Doppler, which shows the flow within the blood vessels in your neck. This is a similar test to the scan performed during pregnancy. It is a quick and painless procedure.

Other investigations

Blood tests may be needed to investigate pulsatile tinnitus, for example, a full blood count to rule out anaemia or thyroid function tests if an overactive thyroid gland is suspected. If it is suspected that you have benign intracranial hypertension, the doctor may ask for opinions from other doctors such as ophthalmologists or neurologists who may request their own specialised investigations

What can be done about pulsatile tinnitus?

If a cause is found for your pulsatile tinnitus, this may point to a specific solution. For example, anaemia can be treated with medication or blood transfusion, glue ear can be treated with grommets, perforations can be closed with grafts and narrowed segments of artery can be repaired.

In some cases, treatment may not be possible, if, for example, the cause is due to a specific blood vessel in a difficult place.

In cases of pulsatile tinnitus with no identifiable cause, different techniques can make it easier for you to manage



the condition. For example, relaxation techniques, meditation, sound therapy and mindfulness. Cognitive Behavioural Therapy (CBT), counselling and Tinnitus Retraining Therapy (TRT) can also be helpful. Find out more about self-help methods from our other resources – a full list is at the end of the leaflet.

Other forms of rhythmical tinnitus

Myoclonus

There are a few examples of tinnitus where a rhythmical sound is experienced but the sound is not synchronised with the person's heart beat. This type of tinnitus is most commonly due to rhythmical contraction of the muscles in the middle ear.

There are two small muscles in the middle ear called the **tensor tympani** and **stapedius**. Occasionally these muscles can go into rhythmical contraction – in much the same way that the muscles at the corner of the eye can twitch when we get tired. This process is called **myoclonus**.

More rarely, this type of rhythmical tinnitus can be caused by contraction of some of the muscles of the soft palate at the back of the throat. People with these

forms of tinnitus should consult their doctor as there is a small chance that an underlying cause can be detected. However, in the vast majority of cases, a cause cannot be found.

Many people with this type of tinnitus are able to tolerate it easily once they understand that there is no serious cause. If not, it is possible to perform a surgical procedure to cut the muscles in the middle ear or to inject botulinum toxin into the palatal muscles.

Patulous Eustachian Tube Syndrome

Another rare type of tinnitus is Patulous Eustachian Tube Syndrome in which people experience a form of tinnitus that varies with their breathing. They may also feel that their ear seems blocked and their voice seems to echo inside their head.

The condition is due to excessive openness of the Eustachian tube – the tube that runs from the back of the nose to the inside of the ear. This tube is normally shut and only opens for a very short time when we yawn or swallow. If it becomes abnormally open the pressure changes caused by our breathing is transmitted via the tube to the inside of the ear.

Many people with this condition report that it started after a period of sudden weight loss.

If you think think you might have this condition you should consult your doctor. Various treatment options are available including injecting the tissue around the tube or cutting the opening of the tube to reduce its size.

Self-management techniques such as sound therapy, relaxation therapy, CBT, counselling, or mindfulness meditation can also be helpful.

Help and support

The Tinnitus UK Support Team can answer your questions on any tinnitus related topics:

Telephone: **0800 018 0527**

Web chat: **tinnitus.org.uk**

Email: **helpline@tinnitus.org.uk**

Text/SMS: **07537 416841**

We also offer a free tinnitus e-learning programme, Take on Tinnitus at **takeontinnitus.co.uk**

References

The list of references consulted in the production of this leaflet is available on request.

Alternative formats

This publication is available in large print on request.

Feedback

We welcome feedback on all our information. You can pass your comments to our Communications Team:

Telephone: **0114 250 9933**

Email: **communications@tinnitus.org.uk**

or by writing to us at the address on p6.

Tinnitus UK publications

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Our information leaflets are written by leading tinnitus professionals and provide accurate, reliable and authoritative information which is updated regularly. Please contact us if you would like to receive a copy of any of our information leaflets listed below, or they can be downloaded from our website.

For adults:

*All about tinnitus**
Complementary therapy for tinnitus: an opinion
Drugs and tinnitus
Ear wax removal and tinnitus
Flying and the ear
Food, drink and tinnitus
*Hearing aids and tinnitus**
Hyperacusis
Ideas for relaxation without sound
Information for musicians
Mindfulness for tinnitus
Musical hallucination (musical tinnitus)
Noise and the ear
Otosclerosis

Pulsatile tinnitus
Relaxation
*Self help for tinnitus**
Sound therapy
Sources of mutual support for tinnitus
Supporting someone with tinnitus
Taming tinnitus
Tinnitus and disorders of the temporomandibular joint (TMJ) and neck
Tinnitus: a parent's guide
Tinnitus: a teacher's guide
Tinnitus and sleep disturbance
Tinnitus and stress
*Tinnitus services**

For children:

Ellie, Leila and Jack have tinnitus (under 8s)
Tinnitus (8-11 year olds)
Tinnitus (11-16 year olds)
Ellie, Leila and Jack have tinnitus activity book
Tinnitus activity book (8-11 year olds)
Tinnitus activity book (11-16 year olds)



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