

The British Tinnitus Association

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Pulsatile Tinnitus

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This information is not a substitute for medical advice. You should always see your GP / medical professional

What is tinnitus?

Tinnitus is the sensation of sound in the absence of an external source. The perceived sound may simply be a ringing, whistling, or rushing sound, or it may be more complex like machinery or the twittering of birds. Although the sound may not be present all the time, when it is noticeable it tends to be a steady noise with no frequent or regular changes in its loudness.

What is different about pulsatile tinnitus?

By contrast, pulsatile tinnitus is a rhythmical noise with the same rate as the heart. This is easily checked by feeling the pulse at the same time as listening to the tinnitus. When doctors investigate most cases of tinnitus it is rare for them to find a single identifiable cause for the problem. With pulsatile tinnitus, the chances of finding a specific cause are greater than in the non-pulsatile form. This is therefore an important subgroup that merits detailed investigation. However, even with pulsatile tinnitus it is common not to identify a definite cause.

What causes pulsatile tinnitus?

Pulsatile tinnitus is due to a change in blood flow in the vessels near the ear or to a change in awareness of that blood flow. The involved vessels include the large arteries and veins in the neck and base of the skull and smaller ones in the ear itself. The blood flow can be altered by a variety of factors:

Generalised increased blood flow.

Blood that is flowing quickly generates more noise than blood that is flowing slowly. Increased blood flow throughout the body can occur in strenuous exercise or pregnancy. It can also occur in severe anaemia or when the thyroid gland is over active, 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, during foetal development we all have an artery in our middle ear called the stapedia artery. This normally closes before birth but it can occasionally persist and in this case blood flow adjacent to middle ear structures can generate pulsatile tinnitus.

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 in the same way that a smoothly running river will become noisier at a set of rapids or waterfall.

Altered awareness.

Awareness can be increased by several factors:

- Conductive hearing loss such as perforated ear drums or glue ear tend to make patients more aware of sounds inside their body because they no longer have the masking effect of external sounds.
- Heightened sensitivity in the auditory pathways can alert the brain to normal noise in blood vessels in much the same way that the awareness of non-pulsatile tinnitus is generated.

Miscellaneous

Some causes of pulsatile tinnitus do not fall into any of the above categories. In particular, there is a condition called benign intracranial hypertension, also known as idiopathic intracranial hypertension or pseudotumor cerebri. This is characterised by headaches and visual disturbance as well as pulsatile tinnitus. It is said to occur most frequently in overweight young or middle aged women. However, it can occur at any age and in men as well as women. Its cause remains unknown.

It is important to state that this is not an exhaustive list of the causes of pulsatile tinnitus and that anyone with this symptom should seek assessment by an appropriate doctor.

How is pulsatile tinnitus investigated?

The doctor will start by taking a detailed history of the tinnitus and any other medical conditions that may affect the patient. The doctor will then examine the patient paying particular attention to the ear drums and the blood vessels of the neck.

A stethoscope may be used to listen to the 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. Patients with any form of tinnitus will have a series of hearing tests and pulsatile tinnitus is no different in this respect.. Patients with pulsatile tinnitus will generally then undergo some form of medical imaging. This has changed dramatically in recent years and a wider range of techniques are now available:

Ultrasound

This is a similar test to the scan performed on a pregnant woman. Modern ultrasound scanning uses a technique called Doppler, which can show the blood flow within vessels.

CT scanning

This uses computer controlled X-rays to generate X-ray –slices’ of the body.

Magnetic resonance scanning (MRI)

This produces similar pictures to CT scanning but uses magnetic fields rather than X-rays.

Magnetic resonance angiography (MRA)

Some MRI scanners can produce scans of flowing blood. This produces an image of inside of the artery or vein in which the blood is flowing and can show up irregularities or narrowings of the vessel.

Angiography

This is the old fashioned and time consuming way of looking at the inside of vessels by injecting contrast medium directly into the vessel under investigation and taking a conventional x-ray. It still produces clearer, more detailed pictures of vessels than any of the other techniques and therefore is still used in selected cases.

Other investigations

Blood tests may be needed in the investigation of pulsatile tinnitus. For example, a Full Blood Count (FBC) may be required to rule out anaemia or Thyroid Function Tests (TFTs) may be requested if an overactive thyroid gland is suspected. If benign intracranial hypertension is suspected, 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 specific cause is found 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.

Some causes are less amenable to treatment: if a patient is born with ‘odd’ blood vessels in the neck these may not be treatable.

For those patients with pulsatile tinnitus who have no demonstrable abnormality, standard methods of tinnitus treatment will be used. These include techniques such as Tinnitus Retraining Therapy (TRT), counselling, sound therapy and relaxation therapy.