



Notes:

Will exclude nearly all causes such as vascular variants & vascular skull base tumours

TINNITUS

- Tinnitus, a buzzing or ringing in the ear, may be pulsatile or continuous (non-pulsatile). [1](#)
- Pulsatile tinnitus (a discrete, repetitive sound that accompanies the patients pulse) suggests the presence of vascular abnormality (a tumour, a congenital anomaly, a malformation, or an acquired vasculopathy). [1](#)
- Patients with non-pulsatile tinnitus (constant, unremitting noise) may require exclusion of cerebellopontine angle tumour, most often a vestibular schwannoma. [1](#)
- The distinction, with a detailed clinical evaluation, determines the most appropriate imaging study. [1-3](#)
- In vast majority, no pathology is identified. [1-3](#)

MAGNETIC RESONANCE IMAGING IN NON-PULSATILE TINNITUS

- Gadolinium enhanced MRI (with thin transverse and coronal T1- and T2- weighted images through the temporal bones, and transverse images through the entire brain) is the study of choice for evaluation of non-pulsatile tinnitus. [1-2](#)



- Helps exclude a vestibular schwannoma or other neoplasm of the cerebellopontine angle cistern in patients with non-pulsatile tinnitus. Brainstem pathology such as stroke or multiple sclerosis is also a consideration, and will be adequately imaged with MRI [1-2](#)
- Limitations: limited availability and high expense.

COMPUTED TOMOGRAPHY

- Contrast-enhanced CT scan of the temporal bones and brain is the imaging modality of choice for investigation of pulsatile tinnitus. [1-4](#)
- Allows delineation of the bony abnormalities that are associated with some of the vascular diseases. [4](#)
- Useful in delineation of the location and size of the jugular bulb and the course of the carotid artery in order to exclude an aberrant carotid artery or a vascular mass of the middle ear. [3](#)
- CT angiography of the head and neck may be required to exclude a vascular cause of pulsatile tinnitus.
- Advantages: relatively inexpensive and widely available.
- Limitations: ionising radiation and use of contrast agent.

MAGNETIC RESONANCE IMAGING (MRI/MRA/MRV) IN PULSATILE TINNITUS

- Indications:
 - To evaluate patients with objective tinnitus or severe subjective tinnitus with or without otoscopic abnormality and normal CT scan findings. [5](#)
 - To delineate an abnormality detected on CT.
 - To detect rare causes of pulsatile tinnitus such as multiple sclerosis and a Chiari I malformation not seen on CT. [1](#)
- Addition of MRA and MRV to conventional MRI greatly enhances the ability to show vascular lesions. [5](#)
- Superior to CT for enhancement of vascular tumours, typically paragangliomas. [6,7](#)
- Limitations:
 - Low yield in patients with subjective pulsatile tinnitus and a normal otoscopic examination. [5](#)
 - May not detect dural fistulas. [8](#)

ANGIOGRAPHY

- Indicated when there is high clinical suspicion of dural arterio-venous malformation or fistula and the cross-sectional imaging studies (CT and MRI) are normal. [4,9](#)





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6. Olsen WL, Dillon WP, Kelly WM, et al. **MR imaging of paragangliomas.** AJNR 1986;7:1039-42. (Level IV evidence)
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9. Shin EJ, Lalwani AK, Dowd CF. **Role of angiography in the evaluation of patients with pulsatile tinnitus.** Laryngoscope 2000;110:1916-20. (Level III evidence)

FURTHER READING

1. Lockwood AH, Salvi RJ, Burkard RF. **Current concepts: Tinnitus.** NEJM 2002;347(12):904-10.
2. Willinsky RA. **Tinnitus: imaging algorithms.** Can Assoc Radiol J 1992;43:93-9.
3. Branstetter B, Weissman J **The radiological evaluation of tinnitus** Eur Rad (2006); 16: 2792-2802

Website

For more information go to www.imagingpathways.health.wa.gov.au

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