LET'S TALK ABOUT . . .

# TULLIO PHENOMENON

## Key points

- The Tullio phenomenon (TP) is sound-induced dizziness.
- TP is a symptom of an underlying condition.
- TP is usually caused by a tiny hole in the temporal bone.
- TP is a common symptom of superior semicircular canal dehiscence (SSCD)

## What is the Tullio phenomenon?

The Tullio phenomenon (TP) refers to sound-induced dizziness.

**TP is not a disorder or disease – it is a symptom of an underlying condition.**

People with TP experience disequilibrium (unsteadiness), vertigo, nausea and nystagmus (rapid involuntary eye movements). The symptoms are recurrent, brief and frequently triggered by certain types of noise or changes in middle ear pressure. Trigger sounds include loud sounds, high-pitched voices and sustained musical notes.

TP is named after Pietro Tullio, a biologist from Bologna, Italy, who first described it in 1929. Professor Tullio discovered that by drilling tiny holes in the semicircular canals of pigeons he could cause them to have balance problems when exposed to sound.

## What causes TP?

TP arises from a thinning or dehiscence (hole) in the temporal bone overlying one of the semicircular canals. Until very recently it remained a mystery how sound waves could excite nerve signals in parts of the inner ear that normally only react to motion. It is now understood that sound waves entering the inner ear through a tiny hole in the temporal bone can cause an abnormal pumping of the fluid (endolymph) within the semicircular canals. The waves moving through the canals stimulate the hair cells that send signals to the brain about head movement. The brain misinterprets this information as head rotation. The brain reacts by sending signals to the eyes. They compensate by rotating in the opposite direction. A brief spinning sensation (vertigo) and nystagmus (rapid involuntary eye movements) is the result.

The opening in the temporal bone may stem from a congenital (present from birth) problem in the development of the inner ear, certain infectious diseases and/or from trauma.

The majority of TP is associated with semicircular canal dehiscence syndrome (SCDS). 90% of people with SCDS that has been confirmed by CT scanning of the temporal bones have symptoms when exposed to loud sounds.

TP is more rarely associated with other conditions including:

- otosclerosis
- congenital syphilis
- Ménière's disease
- perilymph fistula
- cholesteatoma with semicircular canal erosion and fenestration (opening)
- head trauma
- post stapedectomy (surgery to remove a small bone from the middle ear to improve hearing)
- post tympanomastoidectomy (surgery to treat frequent ear infections that have damaged the eardrum and tissue in and near the ear)
- collapsed canal syndrome
- congenital (present from birth) deafness
- Lyme disease
- middle ear osteoma (non-cancerous tumour)

Some people who experience TP have no associated medical condition. TP might, for example, be triggered by the noise of a loud explosion.

People with TP often also have pressure-induced dizziness and nystagmus (Hennebert's sign) as well as tinnitus and hearing loss.

## Diagnosis of TP

An otolaryngologist (ENT) can often diagnose TP simply through a patient's medical history and a focused examination. This can be confirmed by a high-resolution scan of the temporal bones to look for a hole or thinning and other ear problems. Sound sensitivity tests may also be done.

## Treatment and management of TP

Treatment for milder cases of TP involve simple lifestyle changes, such as wearing earplugs. Surgery may be considered for some patients.

## Sources

View sources used for this handout:
https://bit.ly/2OiUfwu

*Handout updated August 2019*

If you find the information in this handout valuable, **we ask you for your help**. The cause of supporting those affected by balance and dizziness disorders with up-to-date, evidence-based information written for Canadians, needs you.
Will you consider becoming its champion by making a gift online or by mail?



**Contact BC Balance and Dizziness**:
325-5525 West Boulevard
Vancouver, BC V6M 3W6
info@balanceanddizziness.org
Lower Mainland: 604-878-8383
Toll free:1-866-780-2233