TEST

Tympanometry

Tympanometry checks how your eardrum and middle ear respond to changing air pressure

WHAT IT MEASURES
Eardrum movement as ear-canal air pressure changes

SAMPLE
None; a soft probe sits in the ear canal

FASTING NEEDED?
No

HOW LONG IT TAKES
Usually a few minutes for both ears

RESULTS IN
Usually immediate; formal report timing varies by clinic

USED FOR
Supporting diagnosis and monitoring of middle-ear problems

MAIN LIMITATION
Poor probe seal or blockage can create misleading traces

Overview

Tympanometry is a quick test of how your eardrum and middle ear respond when the air pressure in your ear canal changes. The middle ear is the air-filled space behind the eardrum.

A clinician places a soft probe at the entrance to your ear canal. The probe changes the pressure slightly, plays a tone, and measures how much sound is reflected back. The result is shown as a graph called a tympanogram.

The test does not measure hearing directly. It can suggest whether sound may be having difficulty passing through the eardrum and middle ear, but it cannot tell how well the inner ear or hearing nerve works. Hearing tests such as pure-tone audiometry are used for that purpose.

Why the test is ordered

Tympanometry is often used with an examination of the ear and a hearing test. It may help investigate:

It may also be repeated to monitor a known middle-ear problem. A tympanogram alone does

not establish the cause of ear symptoms.

- Possible fluid behind the eardrum, sometimes called middle-ear effusion
- Eustachian tube dysfunction, where pressure is not equalised normally
- A hole in the eardrum
- Whether a ventilation tube, or "grommet," appears open
- Eardrum scarring or unusually restricted movement
- Possible problems with the tiny middle-ear bones
- Hearing concerns when an ear examination is uncertain

Who should have the test

You may be offered tympanometry if you have hearing changes, a blocked-ear feeling, repeated middle-ear infections, or an abnormal or uncertain ear examination. Children are commonly tested when there are concerns about hearing, speech development, or persistent middle-ear fluid.

The test can be used at most ages. Babies usually require a different probe tone because their ear canals and middle ears respond differently from those of older children and adults.

Testing may need to be delayed or modified if the ear is very painful, actively draining, blocked by wax, or contains a foreign object. Tell the clinician about recent ear surgery, a known eardrum hole, or ventilation tubes before testing.

How to prepare

No fasting is needed. You can eat, drink, take your usual medicines, and brush your teeth normally.

You do not usually need to avoid coffee or exercise. Bring hearing aids if you use them, although they will be removed during the test.

Tell the clinician if you have current ear pain, discharge, recent ear surgery, or a known eardrum perforation. An ear examination is often performed first to look for wax, infection, tubes, or other conditions that could affect testing.

Young children may find it helpful to see or touch the probe before the test. They do not need to respond to the tones, but they need to remain reasonably still for a few seconds.

What happens during the test

You will sit in a chair while the clinician looks into your ear. A soft rubber tip is then placed at the entrance to the ear canal to make an airtight seal.

You will hear a tone and feel a brief change in pressure, similar to the pressure sensation in a lift or aeroplane. The probe records how the eardrum moves across the pressure range.

Try not to talk, swallow, chew, or move while each measurement is being taken. Each ear usually takes only a few seconds, although the test may be repeated if the seal breaks or the tracing is unclear.

The clinician can usually see the graph immediately. A full explanation may follow after tympanometry, ear examination, and hearing-test findings have been considered together.

Understanding your results

A tympanogram is interpreted by looking at its shape and measurements. These include how freely the eardrum moves, the pressure at which it moves best, and the estimated volume of the ear canal.

Results are sometimes grouped into patterns:

These labels are not diagnoses. For example, a flat trace is interpreted differently depending on the estimated ear-canal volume. A small or unexpected volume may also mean wax, poor probe placement, or blockage of the probe.

A typical tympanogram does not prove that hearing is normal. Inner-ear hearing loss can be present even when the eardrum and middle ear move normally.

Expected measurements and interpretation vary by equipment, clinic or laboratory, age, sex, pregnancy status, medicines, and clinical context. Age and probe tone are particularly important in babies.

- Type A: A peak within the expected pressure area, usually suggesting typical middle-ear movement
- Type As: A shallow peak, suggesting reduced movement
- Type Ad: A very high peak, suggesting unusually flexible movement
- Type B: A flat trace, which can occur with middle-ear fluid, a perforation, or an open ventilation tube
- Type C: A peak at negative pressure, suggesting reduced middle-ear pressure

What affects the results

Most misleading tympanometry results come from the ear canal or the way the measurement was taken, rather than a problem with the equipment.

An incomplete seal around the probe may prevent the pressure from changing correctly. Talking, swallowing, crying, coughing, or moving can disturb the tracing. The clinician may simply repeat the measurement.

Wax, skin debris, a foreign object, or a probe pressed against the ear-canal wall can block the test opening. A very soft ear canal, especially in a young baby, may move during testing and produce a confusing result.

Recent rapid pressure changes, such as flying or diving, can temporarily alter middle-ear pressure. A cold, nasal congestion, or allergies may also affect how the Eustachian tube equalises pressure.

Ventilation tubes, a known eardrum perforation, and previous ear surgery change how the graph should be interpreted. A blocked ventilation tube may produce a different result from an open one.

Food, coffee, exercise, blood transfusions, and most medicines do not directly alter tympanometry in the way they can affect some blood tests.

Accuracy and limitations

Tympanometry provides objective information because it does not rely on you pressing a button when you hear a sound. However, it is best used alongside an ear examination and, when needed, a hearing test.

It can miss a middle-ear condition if that condition does not produce a clearly abnormal tracing at the time of testing. Some ears containing fluid may not have the classic flat pattern.

It can also suggest a problem when none is present. A poor seal, wax, movement, crying, or use of an unsuitable probe tone can produce an abnormal-looking trace. Negative middle-ear pressure does not by itself prove that fluid or infection is present.

Tympanometry cannot measure the degree or type of hearing loss. Pure-tone or play audiometry is better for measuring hearing levels. Tests such as otoacoustic emissions or auditory brainstem response may be more suitable for assessing inner-ear or hearing-nerve function, particularly in babies or people unable to complete standard hearing tests.

Risks and complications

Tympanometry does not use radiation and does not damage the eardrum when performed correctly. You may notice brief pressure, fullness, or mild discomfort.

If your ear is already inflamed or painful, the pressure may be uncomfortable. The clinician can stop the test if needed.

What happens next

A typical result may need no further action, particularly if your ear examination and hearing are also reassuring.

An unusual result may lead to repeat tympanometry, a formal hearing test, treatment or monitoring of an identified ear condition, or referral to an audiology or ear, nose and throat service. Routine follow-up depends on your symptoms, examination, age, hearing results, and whether the finding persists.

Tympanometry findings are not usually an emergency. However, seek urgent medical assessment for hearing that suddenly decreases over hours or a few days, especially in one ear, rather than waiting for a routine test appointment. Seek emergency care for ear or hearing symptoms after a major head injury, or when they occur with new facial weakness, severe balance problems, confusion, or other sudden neurological symptoms.

Common questions

Can I drink coffee before tympanometry?

Yes. Coffee does not usually affect the movement of your eardrum or middle-ear pressure enough to change the result.

Does the time of day matter?

Usually not. Tympanometry can be performed at any time. Temporary congestion or recent pressure changes may matter more than the hour of testing.

Can I exercise beforehand?

Yes. Ordinary exercise does not usually affect the result. If you have just been swimming, tell the clinician because water in the ear canal can interfere with the probe seal.

Does tympanometry hurt?

It should not be painful, but the brief pressure change may feel strange or uncomfortable. Tell the clinician if you have pain so the test can be stopped or adjusted.

Can it be done if I have earwax?

A small amount may not prevent testing. Wax that blocks the canal or probe opening can make the result unreliable and may need to be managed first.

Does a normal result mean my hearing is normal?

No. A normal tympanogram mainly shows that the eardrum and middle ear are moving as expected. You can still have hearing loss arising from the inner ear or hearing nerve.

Sources

- British Society of Audiology. Recommended Procedure: Tympanometry . Professional procedure guidance.
- American Speech-Language-Hearing Association. Tympanometry . Technical report on measurement and interpretation.
- Rosenfeld RM, Shin JJ, Schwartz SR, et al. Clinical Practice Guideline: Otitis Media with Effusion (Update). Otolaryngology-Head and Neck Surgery . 2016;154(1 Suppl):S1-S41. doi:10.1177/0194599815623467.
- Onusko E. Tympanometry. American Family Physician . 2004;70(9):1713-1720.
- National Institute for Health and Care Excellence. Otitis media with effusion in under 12s . NICE guideline NG233, 2023.