TEST

Electronystagmography

Electronystagmography records eye movements to assess the inner-ear balance system and its nerve pathways.

WHAT IT MEASURES
Eye movements linked to balance-system responses

SAMPLE
None

FASTING NEEDED?
Sometimes, based on clinic instructions and nausea risk

HOW LONG IT TAKES
About 60 to 90 minutes

RESULTS IN
Same day to several days; laboratory turnaround varies

USED FOR
Helping diagnose dizziness and balance disorders

MAIN LIMITATION
Abnormal findings may not identify the exact cause

Overview

Electronystagmography, usually shortened to ENG, records eye movements using small electrodes placed on the skin around your eyes. The electrodes detect tiny electrical changes produced when your eyes move.

Your eyes and inner ears work together to keep your vision steady while your head moves. This is called the vestibulo-ocular reflex. ENG checks parts of this system by recording voluntary and involuntary eye movements, including nystagmus -repetitive movements that may occur when the balance system is stimulated.

ENG usually refers to a group of tests rather than one measurement. The appointment may include following moving lights, looking in different directions, changing head or body position, and having warm or cool air or water placed in each ear. The ear stimulation is called caloric testing .

Many centres now use videonystagmography, or VNG, instead. VNG records the eyes with infrared video goggles rather than skin electrodes. The tests provide similar types of

information, although each method has different technical strengths.

Why the test is ordered

ENG can help investigate symptoms that may involve the inner ear, the balance nerve, or the brain pathways that control eye movements. These symptoms may include vertigo, dizziness, unsteadiness, unexplained falls, or difficulty keeping vision clear during movement.

The test may help show whether one inner ear is responding less strongly than the other. It can also identify eye-movement patterns that suggest the problem may lie outside the inner ear.

ENG does not usually establish a diagnosis by itself. Your symptom history, hearing tests, physical examination, and sometimes other balance tests or imaging are considered alongside the result.

Who should have the test

ENG may be considered when dizziness or imbalance is persistent, recurrent, unexplained, or associated with abnormal eye movements. It may also be used before or after certain ear treatments to document balance function.

It is not a routine screening test for people without symptoms. It is also not necessary for every episode of dizziness. For example, some common forms of positional vertigo can often be assessed with a shorter examination that looks for symptoms and eye movements in specific head positions.

Tell the testing centre if you have significant neck or back problems, difficulty lying flat, an eardrum perforation, ear tubes, previous ear surgery, severe vision problems, or a history of strong nausea during balance testing. The test can often be adjusted.

How to prepare

Follow the instructions from your testing centre because protocols differ. Some centres ask you to avoid food for several hours, while others recommend a light meal. Eating heavily just before testing may worsen nausea.

You may be asked to avoid alcohol, caffeine, nicotine, or certain medicines before the appointment. Medicines that reduce dizziness, nausea, anxiety, or allergy symptoms can also reduce balance responses. However, stopping some medicines suddenly can be unsafe.

Key preparation points include:

Tell the centre if you are pregnant or could be pregnant. ENG itself does not use radiation, but pregnancy may affect positioning or decisions about medicines.

- Do not stop prescription medicines unless specifically instructed
- Give the centre a complete list of medicines and supplements
- Avoid eye makeup, facial oils, or heavy moisturiser near your eyes
- Bring glasses and a contact-lens case if you use them
- Ask whether you should arrange transport home

What happens during the test

You will usually sit or lie in a dimly lit room. A clinician cleans small areas of skin and attaches electrodes near your eyes and sometimes on your forehead. The electrodes are connected to recording equipment.

The test may include several parts:

Caloric stimulation changes the temperature inside the ear canal. This briefly alters signals from the balance organ and normally causes nystagmus. Comparing the responses from both ears can show whether one side responds less strongly.

You may feel spinning, warmth, pressure, nausea, or unsteadiness during this part. These effects are expected to settle after the stimulation stops. Tell the clinician if you need a pause.

- Looking at fixed or moving lights
- Following a target with your eyes
- Turning your head or moving into different positions
- Lying with your head at specific angles
- Receiving warm and cool air or water in each ear

Understanding your results

An ENG report describes how your eyes moved during each part of the test. Results are not usually reduced to one normal or abnormal number.

The report may discuss spontaneous nystagmus, gaze testing, tracking of moving targets, responses to position changes, and caloric responses. A reduced caloric response from one

ear may be described as unilateral weakness or canal paresis . This means one side responded less strongly under the test conditions; it does not identify the cause by itself.

Some patterns can suggest that the inner-ear balance organs or their nerve connections are affected. Other patterns may point toward the brain pathways controlling eye movement. A normal ENG does not rule out every cause of dizziness, especially conditions that come and go.

Ranges and interpretation vary by laboratory, equipment, age, sex, pregnancy status, medicines, and clinical context. The report should be interpreted with your symptoms and other examination findings.

What affects the results

ENG can be misleading even when the equipment is working correctly. Medicines that suppress balance responses may make an abnormal ear appear more normal. These include some antihistamines like cetirizine or loratadine , anti-nausea medicines, sedatives, benzodiazepines like diazepam or lorazepam , and medicines used for vertigo. Antidepressants like sertraline or fluoxetine , antiseizure medicines, stimulants, and other drugs may also alter eye movements or alertness.

Alcohol and recreational drugs can change eye movement and balance responses. Caffeine and nicotine may affect some people and are restricted by some testing centres.

Other influences include:

Age can alter some eye-tracking responses. The shape of the ear canal and the exact temperature or delivery of caloric stimulation can also affect the result. Tell the clinician about anything that made a test section difficult.

- Tiredness, poor concentration, or falling asleep during testing
- Poor vision or difficulty seeing the target
- Blinking, facial movements, or electrical interference
- Makeup or skin oils preventing good electrode contact
- Earwax blocking the canal
- An eardrum perforation, ear tubes, or previous ear surgery
- Inability to place the head in the required positions
- A recent severe vertigo episode or changing symptoms

Accuracy and limitations

ENG can reliably record horizontal eye movements when the electrodes have good contact. However, it is less useful for vertical movements and does not record twisting, or torsional, eye movements as clearly as video-based testing.

Caloric testing examines mainly the horizontal balance canal at a very low-frequency type of stimulation. Everyday head movement is faster and involves several balance organs. A normal caloric result therefore does not prove that the entire balance system is normal.

The chance of a missed problem or a falsely abnormal result differs according to the condition, test protocol, medicines, and quality of the recording. There is no single accuracy figure that applies to the whole ENG battery.

ENG may miss intermittent conditions if no abnormal eye movement occurs during the appointment. Conversely, poor attention, medication effects, ear-canal differences, or recording artefacts can produce findings that look abnormal when the underlying balance system is not impaired.

Other tests may be more suitable for particular questions. These include VNG, the video head impulse test, rotary-chair testing, vestibular evoked myogenic potentials, hearing tests, positional examinations, or brain imaging.

Risks and complications

ENG does not involve needles or radiation. Removing the electrodes may cause brief skin discomfort, and the adhesive may occasionally leave mild irritation.

Position changes and caloric stimulation can temporarily cause vertigo, nausea, sweating, or unsteadiness. Vomiting is possible but uncommon. Let the clinician know immediately if symptoms become difficult to tolerate.

You may feel off balance for a short time afterward. Sit until you feel steady, and follow the centre's advice about driving or returning to work.

What happens next

A clinician with training in balance testing reviews the recordings. Your referring clinician will discuss whether the pattern fits your symptoms and whether more testing is useful.

Routine follow-up may involve hearing tests, vestibular rehabilitation, another balance test, or evaluation by an ear, nose and throat specialist or neurologist. An abnormal ENG does not

automatically mean that imaging or treatment is required.

Seek prompt medical advice for sudden hearing loss, particularly in one ear. Seek emergency care for new dizziness accompanied by weakness or numbness on one side, trouble speaking, severe difficulty walking, fainting, chest pain, or a sudden severe headache. These symptoms need urgent assessment rather than waiting for an ENG appointment or result.

Common questions

Can I drink coffee before an ENG?

Some centres ask you to avoid caffeine on the day of testing because it may affect alertness or eye movements. Follow your appointment instructions; if they are unclear, contact the testing centre.

Can I eat before the test?

Instructions differ. You may be asked to fast for several hours or eat only a light meal because caloric testing can cause nausea. Continue drinking water unless told otherwise.

Can I take my usual medicines?

Do not stop prescription medicine on your own. Ask which medicines to take, and bring a complete list. The centre may prefer to test you while taking essential medicines and account for their effects during interpretation.

Does the time of day matter?

There is no universally required time. Choose a time when you are likely to be alert, and follow any medicine or fasting instructions linked to the appointment time.

Can I exercise beforehand?

Light activity is usually not a problem, but strenuous exercise may leave you tired, dehydrated, or temporarily dizzy. Avoid intense exercise immediately before testing unless the centre says otherwise.

Can I drive home afterward?

Some people can, while others remain dizzy or unsteady for a short time. Ask the centre in advance and consider arranging transport, especially if balance testing has made you very dizzy before.

Sources

- American Speech-Language-Hearing Association. Balance System Disorders: Assessment
- Johns Hopkins Medicine. Electronystagmography
- MedlinePlus. Videonystagmography
- British Society of Audiology. Recommended Procedure: The Caloric Test
- British Society of Audiology. Practice Guidance: Common Principles of Vestibular Assessment