

Electrodiagnostic Study

Electrodiagnostic testing includes a battery of tests which are used to provide information about the visual system beyond the standard clinical examination of the eye. These tests include:

- Electroretinography (ERG) to measure the electrical response of the retina to flashes of light.
- Electro-oculogram (EOG) to measure the difference in the electrical potential between the front and back of the eye in response to dark and light.
- Visual Evoked Response (VER) to measure the conduction of electrical impulses from the optic nerve to the occipital cortex of the brain resulting from a visual stimulus.

Electrodiagnostic studies are performed in selected Calgary health centres.

Why it is performed

The primary objective is to assess the function of the visual pathway from the photoreceptors of the retina to the visual cortex of the brain. Information obtained from these diagnostic tests helps establish the correct diagnosis or may rule out related ophthalmic diseases.

How to prepare

ERG testing: small electrodes are placed on the cornea at the front of the eye to record the electrical response of the retina to flashes of light.

EOG testing: skin electrodes are placed on the face at each side of each eye to record the difference in the electrical potential between the front and back of the eye in response to dark and light.

VER testing: small electrodes are placed on a patient's scalp to record the responses from the stimuli.

How it is performed

ERG testing: performed in a specially shielded room to reduce electrical interference. Special contact lenses that have a thin metal ring which detects the small electrical signal produced by the eye are placed on the patient. A flash of light is used to stimulate the retina: a dim light to stimulate the rods and a more intense or flickering light to stimulate the cones. The response is sensed by the lens, amplified, and displayed on a computer screen.

EOG testing: the patient is positioned in front of a bowl-shaped illuminator. Multiple small lights positioned across the back of the bowl are used to direct the patient's

direction of gaze from left to right. The test begins with the white background light inside the bowl on. After a few minutes, or when it appears that the baseline voltage is stable, the white light is turned off. The patient is now in total darkness, but still following the small target lights. Subsequently, the white background light comes back on for several minutes.

VER testing: the eye is stimulated by a bright flash of light or a checker-board-like stimulus and the resulting electrical response is recorded from electrodes strategically placed on the scalp.

Results

A normal ERG shows the appropriate responses with increased light intensity. An abnormal ERG is found in conditions such as arteriosclerosis of the retina or detachment of the retina.

In normal eye, the EOG tracing demonstrates a dark trough where there is low voltage during darkness, and a light peak where there is higher voltage during illumination. Deviations from that may indicate the presence of Best's vitelliform macular dystrophy.

A normal VER tracing shows the appropriate amplitude and response time to the stimuli. Any deviation e.g., low amplitude or delayed response time may indicate certain optic nerve disorders, such as optic neuritis.

How it feels

There is no pain or discomfort associated with the electrodiagnostic studies.

What the risks are

There are no known risks.