



Menoufia Faculty of Medicine  
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## ***Electro-oculography (EOG) and its clinical application***

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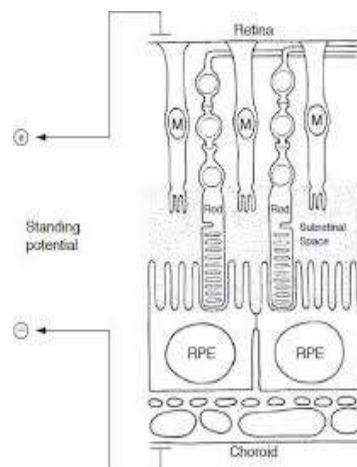
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## EOG

- What is EOG ?
- What is the principal of EOG?
- How EOG is measured?
- What is the normal EOG waveform?
- What are the clinical conditions in which EOG is affected?

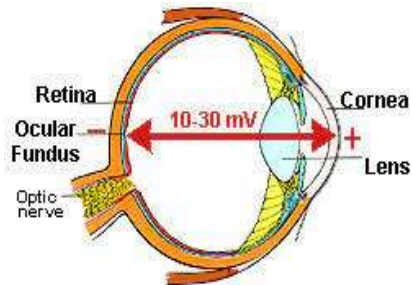
## What is EOG?

- The electro-oculogram (**EOG**) is an electrophysiologic test that measures the standing potential between the electrically positive cornea and the electrically negative back of the eye . This electrical difference is called the trans-epithelial potential and it reflects the activity of the RPE and the photoreceptors.



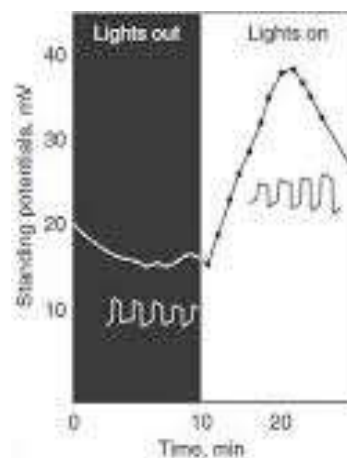
## What is the principal of EOG?

- The electro-oculogram (EOG) assesses the health of the RPE, as well as the interaction between the RPE and the photoreceptors, by measuring the changes in the corneoretinal standing potential that occur during scotopic or photopic adaptation. Estimates of trans-RPE potential range from 1 to 10 mV.



## How EOG is measured?

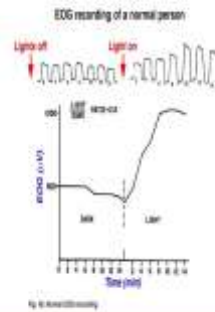
- The EOG utilizes the RPE's response to changing illumination to assess the function of the outer retina and RPE.
- The EOG is recorded during 15 min of dark adaptation followed by 15 min of light adaptation. During the 15-min period of dark adaptation, there is a fall in the standing potential typically reaching a minimum at 10–15 min, and this is referred to as the **dark trough (DT)**



## How EOG is measured?

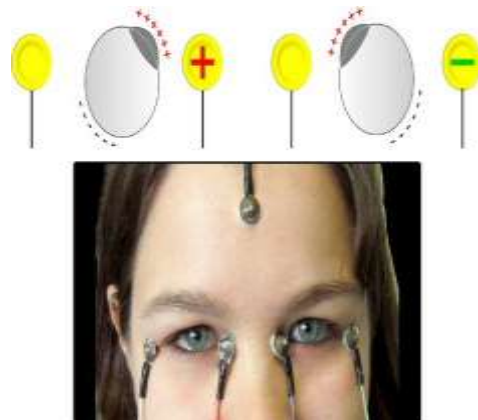
- Following light onset, there is an increase in the TEP of the RPE producing the light-rise of the EOG. The light peak is generated by progressive depolarization of the RPE basal membrane via mechanisms that are not fully understood; the protein **bestrophin** is implicated in the final opening of chloride channels.
- The light-rise normally reaches a maximum at 7–12 min after light onset and is known as the **light peak (LP)**.
- The clinical EOG is expressed as the light peak-to-dark trough ratio (**LP:DT ratio**) which is well known as **Arden's ratio**

### The standard method

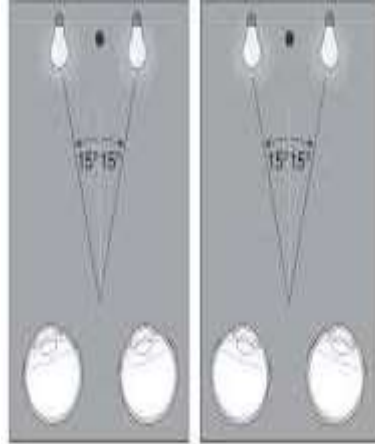


## Technique of EOG measurement

- EOG can be assessed using skin electrodes placed near the outer and inner canthi of each eye to record successive horizontal saccadic eye movements.
- Gold cup electrodes can be used



- The patient tracks alternating lights separated by a fixed angle, to enable constant eye movement excursions which are recorded as a series of positive and negative deflections that coincide with ocular rotation.



## What is the normal EOG waveform?

- The EOG is quantified by expressing the magnitude of the light peak in relation to the dark trough as a percentage known as the Arden index (or ratio).
- A normal EOG Arden index will be greater than 1.8 (180%),,,,1.65 to 1.8 is subnormal and < 1.65 is significantly subnormal

## What are the clinical conditions in which EOG is affected?

- Any disorder that affects rod photoreceptor function will affect the EOG. The light rise is typically severely reduced in any widespread photoreceptor degeneration, including RP.
- However, the principal use of the EOG in clinical practice is in the diagnosis of disorders affecting the bestrophin gene (BEST1). These include Best vitelliform macular dystrophy (Best disease), autosomal recessive bestrophinopathy (ARB) and autosomal dominant vitreoretinopathopathy (ADVIRC).
- In Best disease, a severely reduced or absent EOG light rise is accompanied by a normal ERG.
- The EOG in autosomal recessive bestrophinopathy (ARB) and autosomal dominant vitreoretinopathopathy (ADVIRC) may be mildly subnormal but is not reduced to the same extent as it is in Best disease.

### The standard method

