



Optical instruments

Lecture 5- Dark adaptation

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Goldmann-Weekers adaptometer

This photometric precision instrument is so constructed that the examiner can record the logarithm of the light threshold for a given time of dark adaptation directly on semi-logarithm paper attached to a drum effecting one rotation per hour. Dark adaptation curves of different normal individuals are never identical and sometimes vary considerably. In order to make a diagnosis of pathological dark adaptation, it is necessary to obtain data obtained under standard conditions to define the range of the physiological variation.

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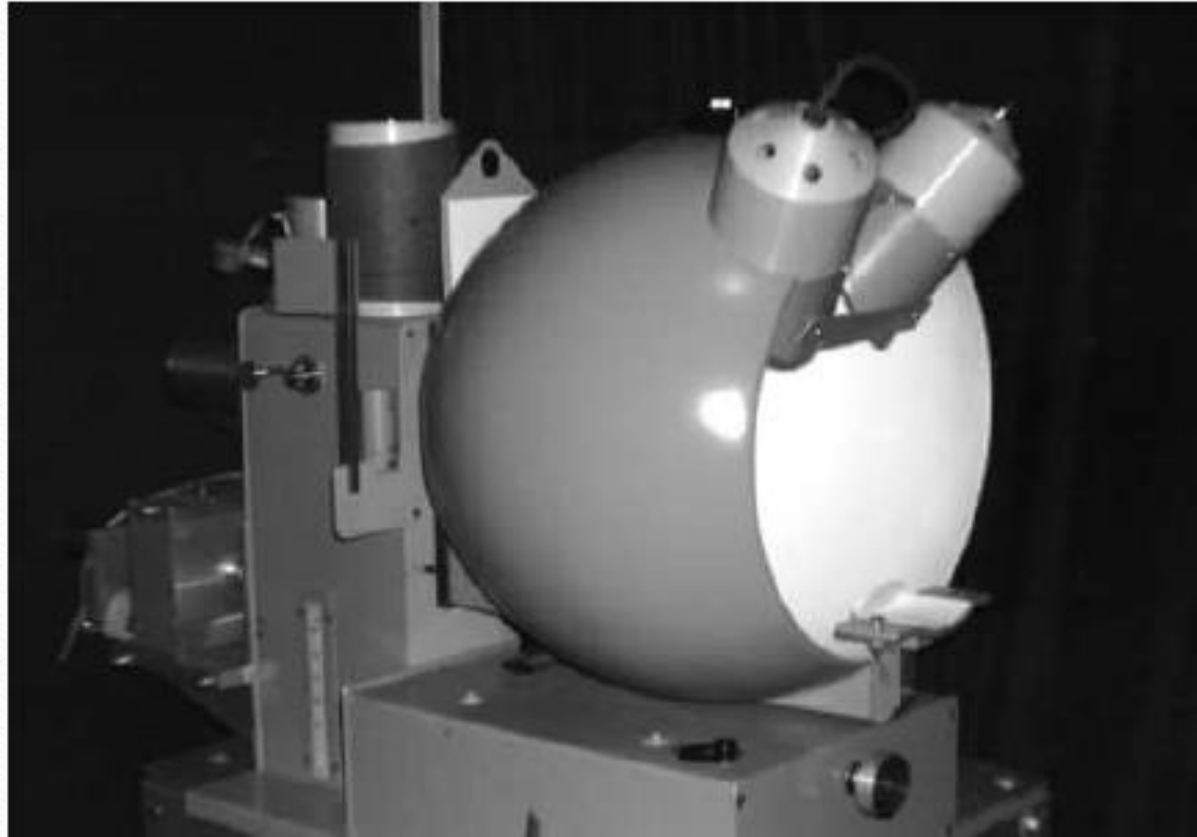
The object of this paper is

- to determine a standard curve (mean curve)
- the physiological limits of dark adaptation

How to test

After a brief preadaptation period, the subject looks into the center of a white sphere. A bright light (bleaching light), is projected in this apparatus to cause depletion of the photo-pigments, making the retina less sensitive to light.

Next, during dark adaptation, a circular stimulus field with 11 degrees of arc is presented centrally at a distance of 30 cm

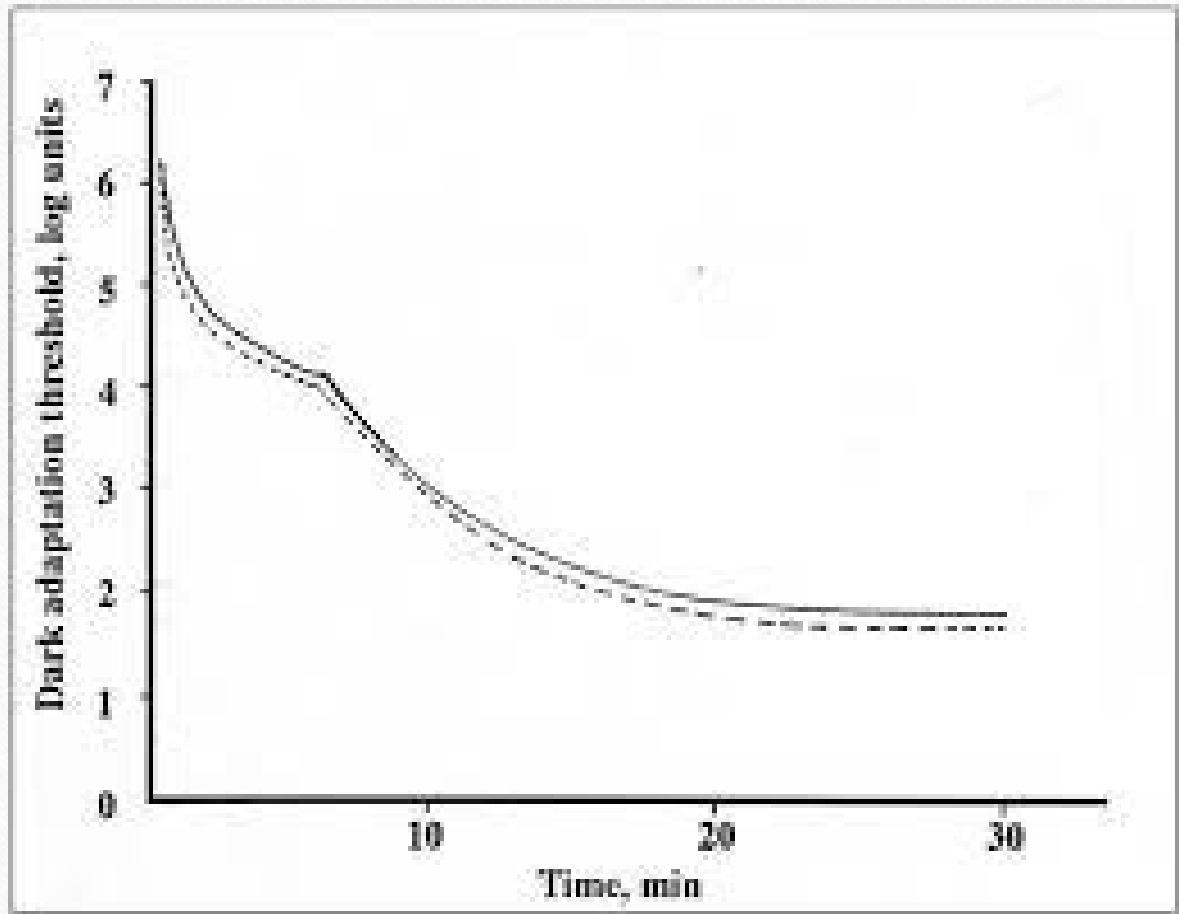


Technique

- (1) The pupil is fixed in dilatation
- (2) The examination is monocular;
- (3) 15 minutes of dark adaptation is given before pre-adaptation to light;
- (4) 5 minutes (± 15 seconds) of pre-adaptation to light is given. The brightness of the adapting field is 1,400 (white light)

Cont.

- (5) The threshold is determined at intervals of approximately 1 minute during dark adaptation (for 45 minutes). The test field used in the determination of the threshold is a 120 striped opal glass disk. The stripes are black and white, with 100 per cent. contrast. The brightness of the white stripes can be varied. The threshold is determined by increasing the brightness of the test field until the subject perceives the black and white stripes;
- (6) There is no fixation point (the eye is free to look for the test field).



Cones- Rods mechanism

Dark adaptation forms the basis of the Duplicity Theory which states that above a certain luminance level (about 0.03 cd/m^2), the cone mechanism is involved in mediating vision; photopic vision. Below this level, the rod mechanism comes into play providing scotopic (night) vision.

The range where two mechanisms are working together is called the (mesopic) range, as there is not an abrupt transition between the two mechanism.