# Role of eccentric viewing training with microperimeter for low vision rehabilitation in multifocal choroiditis: Case report

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## Abstract:

A 21-year-old student with healed multifocal choroiditis involving the macula presented with difficulty in seeing distance and reading her college books. Based on microperimetr'y, the location of her preferred retinal locus and the position of new trained retinal locus (TRL) were identified. With multiple sessions of biofeedback training, her mean retinal sensitivity improved from 4.8 to 8.8 dl, distance vision from 3/60 to 6/36, and near vision from N32 to N8 in the right eye. At 6-month follow-up, her TRL position and visual acuity were found to be stable. This case report highlights that eccentric viewing training using microperimeter can significantly improve the efficiency of functional vision in patients with choroiditis.

**Keywords:**

Eccentric viewing training, low vision rehabilitation, microperimeter, multifocal choroiditis

## Introduction

Multifocal choroiditis (MFC) is a recurrent, asymmetrically bilateral inflammation of the choroid that leads to loss of choriocapillaris and photoreceptor cells.[1] Patients with MFC commonly have increased blind spots, isolated scotoma, and photopsia.[2,3] Patients with macular diseases are trained to relocate their preferred retinal locus (PRL) into an area with a better sensitivity, called trained retinal locus (TRL), with the help of biofeedback function in microperimeter (MP-1).[4-6] We present a case of MFC, in which MP was performed, to attain a new TRL for eccentric viewing (EV) training to improve the visual acuity and fixation of the patient.

## Case Report

A 21-year-old female with healed MFC was referred to the low vision care clinic for rehabilitation of low vision. She had MFC with edematous optic disc in both the eyes, and her intraocular inflammation resolved with systemic modulation. She had completed undergraduate level of education, but had to discontinue further studies due to visual problems. She had difficulty in seeing distance objects and reading her college books. Her best-corrected visual acuity (BCVA) was 3/60 with −5.00 diopter sphere (D Sph)/−1.00 diopter cylinder (D Cyl) ×180° in the right eye with Bailey–Lovie LogMAR chart and counting fingers close to face with − 6.00 D Sph/−0.50D Cyl × 180° in the left eye. Her near vision was tested with MNREAD continuous-text chart and was noted to be N32 at 20 cm in the right eye and less than N64 in the left eye. Low vision trial for distance was carried out with SEE TV binocular telescope, with which the patient's distance visual acuity improved to 6/48. None of the optical devices helped to improve her near vision. Her near vision was improved to N6 with the help of portable closed-circuit television (CCTV) which provides magnification from 6× to 25× with variable contrast, with which she was able to read her college books with ease. However, she was not ready to use telescope or CCTV due to practical difficulties and cosmetic reasons.

Microperimetr'y (MP1, Nidek Technologies, Padova, Italy) using 33 stimuli in the central 20° of the macula and 4–2 threshold strategy revealed reduction of retinal sensitivity in the central retina. The mean retinal sensitivity was 4.8 dB

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in the right eye, and she was not able to perform the test with her left eye due to poor vision. Absolute scotoma was present in the right eye at multiple locations, including the foveal area. Fixation was relatively unstable, and fixation location was poor central. The mean fixation distribution was 39% within 1°. The parameters measured before and after the biofeedback training are demonstrated in Figure 1. Based on MP-1 findings, the direction of EV, the location of her PRL, and the position of new TRL (inferotemporal to the PRL) were identified. The patient was given biofeedback training to use the TRL with a better retinal sensitivity. The process of biofeedback training has been explained in Figure 2. The training session takes approximately 10 min, and after ten such training sessions, the MP-1 was repeated. Her mean retinal sensitivity had improved with the training and was 8.8 dB. Fixation stability had improved, and fixation location was predominantly eccentric. The mean fixation distribution was 90% within 1°.

The BCVA of the patient improved to 6/36 for distance and N8 at 20 cm for near in her right eye after biofeedback training. She was given higher addition of +3.00 DS to improve her near vision to read N6 prints comfortably. In addition, she was prescribed 4× dome magnifier for ease of reading. The patient was educated and trained to intentionally use EV while looking at a target at 40 cm and 1 m for at least 15 min a day at each distance. In addition to the 30 min of daily training, the patient was encouraged to use EV in her daily life. After 6 months, the patient returned to the clinic for follow-up. Her BCVA in the right eye for distance and near was noted to be 6/36 and N8, respectively. She could fixate in the direction

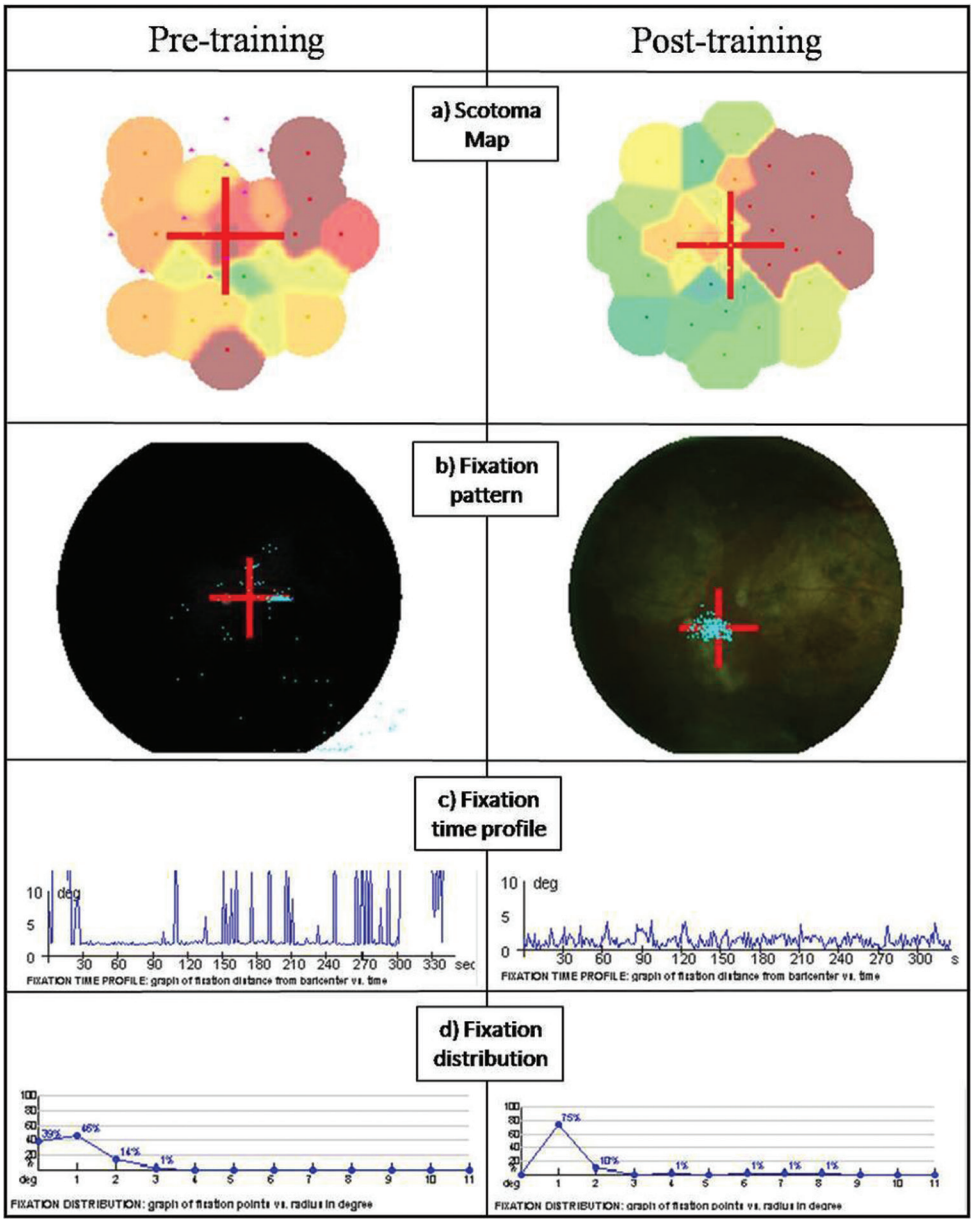


**Figure 1:** Parameters before and after biofeedback training. (a) Mean sensitivity improvement after training, (b) Fixation pattern had stabilized and localized after training, (c) Improvement in fixation before and after training, (d) Fixation stability improved to 75% after training

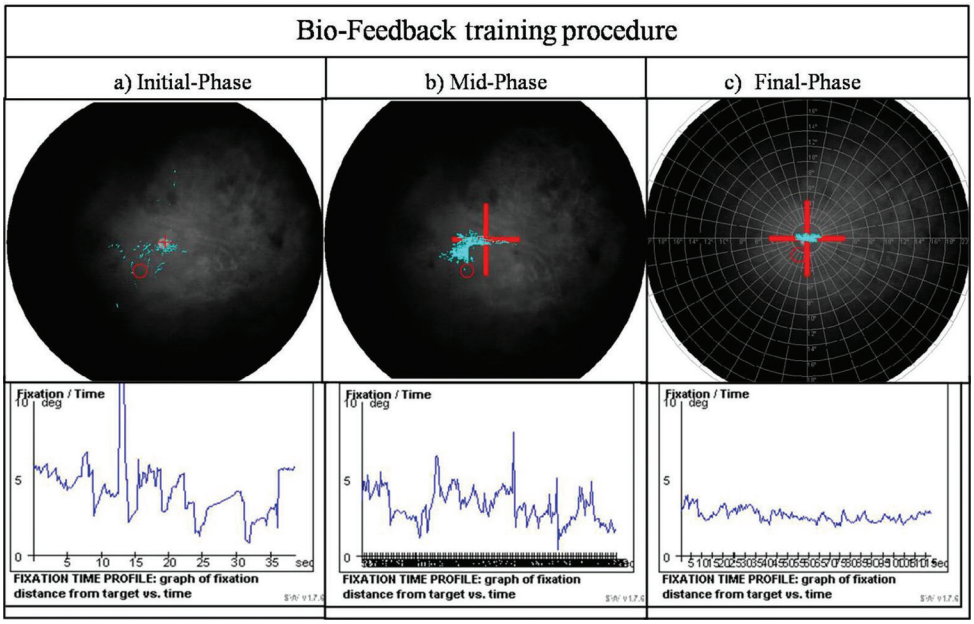


**Figure 2:** Biofeedback training procedure. (a) Initial phase, (b) Mid-phase, (c) Final phase

of new TRL, with which her retinal sensitivity and fixation stability remained stable.

## Discussion

MFC is a known cause of visual morbidities, and involvement of the macula in the disease process may lead to severe loss of vision. EV involves the use of nonfoveal PRL for viewing, which can be used as a useful strategy in these patients with central vision loss to direct the eye such that the image falls onto functioning peripheral healthy retina. PRL is an alternate retinal area outside the macular lesion or involved part which an individual can rely on for seeing. However, the technique of EV and PRL can be useful in rehabilitation of patients with macula-involving uveitis.

MP-1 is an instrument that allows objective assessment of the morphological aspects of the retina, with corresponding functional aspects, including mean retinal sensitivity, fixation behavior, and identification of PRL, and it also provides EV training using biofeedback function. Déruaz *et al*.[4] reported on the adaptation of more than one PRL through a training procedure that developed a newly selected TRL in addition to the initial spontaneously developed PRL. Here, the MP-1 helped in identifying new TRL, and the audio feedback in the biofeedback training allowed performing rehabilitative sessions to train the patient relocating the fixation. This patient had absolute scotoma due to MFC in both eyes. Biofeedback training using MP-1 improved the mean retinal sensitivity and the fixation stability. The visual acuity of the patient had a significant improvement for both distance and near after the training sessions. The patient was able to maintain the position of the TRL and visual acuity during the follow-up visit after 6 months.

A biofeedback training using MP-1 can help the brain memorize the final fixation location by increasing attention modulation, thereby providing an efficient TRL for visual tasks in patients with central scotoma.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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