

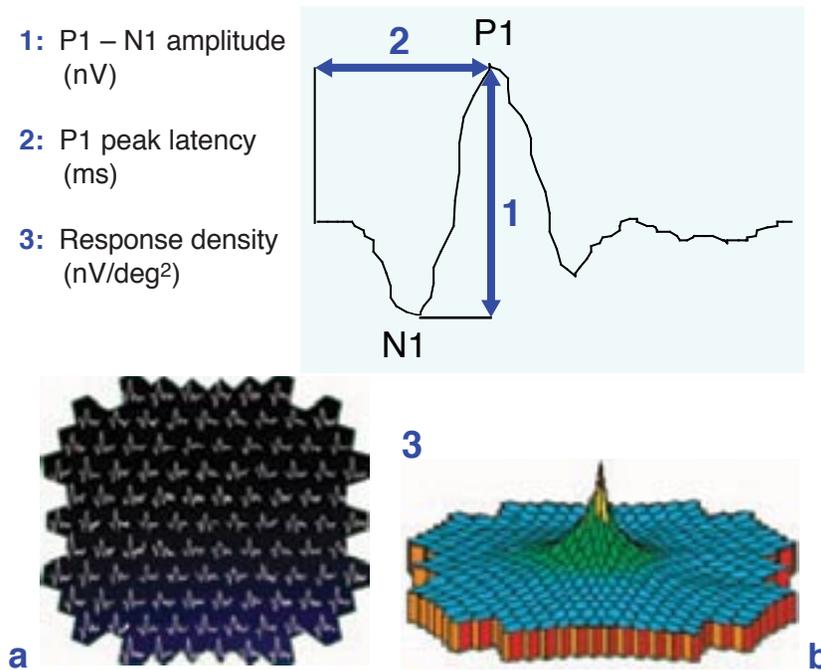
mfERG parameters

Fig. 2. Multifocal electroretinogram (mfERG) parameters calculated in this survey. The P1 and N1 indicate the 1st positive and negative wave of each mean focal flash response in the response arrays of the mfERG (a), respectively. The 3-dimensional topograph (b) represents the response density in each hexagonal area (amplitude per retinal area: nV/deg²). The mfERG parameters, that is, the P1 – N1 amplitude, the P1 peak latency and the response density are demonstrated as 1, 2 and 3 in this figure, respectively.

response density in each hexagonal area in amplitude per retinal area (nV per degree squared: nV/deg²) in the topograph (Fig. 2b). The response density was also adopted as one of the mfERG parameters (Fig. 2) and measured in the 4 mfERG areas in this survey. The recording procedure was repeated at the time when spurious potentials from eye blinks or ocular movement were involved.

OCT examination

Optical coherence tomography was used for measurement of retinal thickness in μm . The optical coherence tomography system was interfaced using fiber optics to a conventional slit-lamp biomicroscope and a fixed +78-diopter condensing lens for retinal examination. An infrared-sensitive video camera provided a view of the scanning probe

beam on the fundus so that the location of each scan on the retina could be monitored. A computer-controlled light placed in the visual field fixated the eye being scanned. Fine positioning for the OCT examination on the retina was accomplished by keyboard control for scan length, angular orientation and position relative to the patient's fixation point.

The mean retinal thickness was estimated from 9 calculation points at the foveal region within 5 degrees in the thickness estimation in the averaged OCT scans by our computer program, that is, the central and each of the other 4 points at a distance of 250 μm and 500 μm from the central portion on horizontal and vertical sections in linear pattern on OCT (Fig. 3). Retinal thickness was measured at the distance between the strongest 2 edges in each tomogram, which most likely corre-

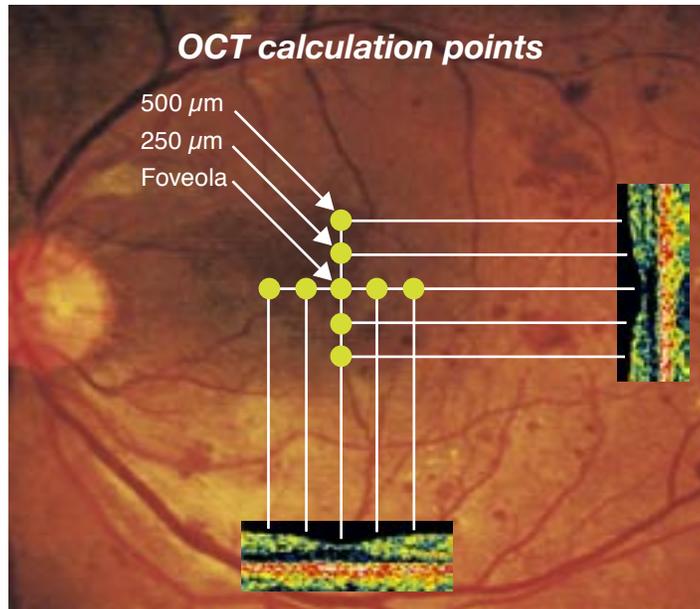


Fig. 3. Calculation points on optical coherence tomogram (OCT). The mean retinal thickness was estimated from 9 calculation points at the foveal region within 5 degrees; the central and each of the other 4 points at a distance of 250 μm and 500 μm from the central portion on the horizontal and vertical sections on OCT. Horizontal and vertical cross-sectional tomographic images are inserted in this figure.

sponded to the vitreoretinal interface and the retinal pigment epithelium, respectively.

We not only used the retinal thickness program, but also hard copies of each OCT image for checking errors, because the layer of cystoid macular edema was sometimes detected as the edge of the retinal pigment epithelium and the detached vitreoretinal membrane was also detected as the edge of the vitreoretinal interface. In OCT measurement, the subject's pupil was fully dilated with 2.5% phenylephrine hydrochloride.

Statistical analysis

All values obtained in the mfERG and OCT examinations were expressed as mean \pm SEM. Statistical analysis was performed with Mann-Whitney's *U* test. A *P* value of < 0.05 was considered statistically significant.

Results

The P1 peak latencies obtained from the 4 mfERG areas were significantly prolonged in the 14 eyes of the 9 patients with preproliferative or early proliferative diabetic retinopathy who showed no clinically significant macular edema before PRP as compared with those in 15 normal control eyes of 14 healthy volunteers at level of 1%, with no tendency for recovery throughout the course after PRP except for area 1 (within a central radius of 5 degrees) (Fig. 4).

The P1 – N1 amplitudes obtained from the 4 mfERG areas were significantly decreased in the 14 diabetic eyes before PRP as compared with those in the 15 control eyes at the 1% or 5% level, followed by a maximum decrease in the parameter 3 months after PRP. However, significant recoveries were detected in the decreased P1 – N1 amplitudes from the 4 areas at 6 months after PRP at the 1% or 5% level (Fig. 5).

The mean response density levels obtained from the 4 mfERG areas also showed almost the