

# Application of OCT Tear Meniscus Imaging and New Strip Meniscometry in the Diagnosis of Dry Eye Disease

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**Purpose:** Tear volume is an important parameter in the evaluation of tear function. Over 70% of the tear volume resides in the tear meniscus on the ocular surface in normal eyes, the evaluation of which is useful in the diagnosis of dry eye disease. Anterior-segment optical coherence tomography (OCT) and strip meniscometry (SM) have been reported to be noninvasive diagnostic methods for the assessment of tear meniscus volume. We investigated the applicability of OCT meniscus imaging and a modified version of SM in the diagnosis of dry eye disease.

**Methods:** Seventy eyes of 35 patients (6 males and 29 females) with definite dry eye disease (DED) according to the Japanese dry eye diagnostic criteria and 72 eyes of 36 normal controls (10 males and 26 females) were studied. All subjects underwent questionnaires for subjective symptoms, a modified version of SM (SM Tube, Echo Electricity, Japan), the Schirmer-1 test (Colorbar Schirmer, EagleVision, USA), tear film break-up time measurement, ocular surface vital staining examinations, as well as tear meniscus height (TMH) and tear meniscus area (TMA) measurements using OCT (CASIA SS-1000, TOMEY, Japan). We evaluated the cut-off values for the diagnosis of dry eyes, looked into the correlations between TMH, TMA and SM values and checked the sensitivity and specificity of testings in the diagnosis of DED when performed alone or in combination.

**Results:** The mean values of TMH, TMA and SM scores in the patient group were  $0.187 \pm 0.126$  mm,  $0.022 \pm 0.028$  mm<sup>2</sup> and  $1.9 \pm 2.6$  mm, while those for the control group were  $0.245 \pm 0.072$  mm,  $0.032 \pm 0.017$  mm<sup>2</sup> and  $6.3 \pm 4.2$  mm. The differences between the respective values of both groups were statistically significant. The cut-off values of TMH, TMA and SM for the definitive diagnosis of dry eyes were 0.21 mm, 0.021 mm<sup>2</sup> and 4.5 mm, respectively. The SM had significant correlations with TMH ( $r = 0.73$ ,  $p < 0.001$ ) and TMA ( $r = 0.78$ ,  $p < 0.001$ ), and the sensitivity of SM was 0.91 when combined with TMH / TMA, which exceeded the value of each test when performed alone.

**Conclusions:** Analyses of OCT-TMH and TMA are useful in the definitive diagnosis of dry eye disease. Combined TMH and TMA testing with SM Tube improves the detection rate of dry eye disease.