

### Corneal confocal microscopy in type 1 diabetes: a six-year longitudinal study

**Aim:** This six-year longitudinal study aimed to assess corneal nerve morphology in patients with type 1 diabetes (T1DM) and the relationship between corneal nerve parameters and metabolic control of glucose and diabetic peripheral neuropathy.

**Methods:** Thirty-seven participants with T1DM (duration of diabetes  $26.2 \pm 12.0$  years at baseline) and twenty-five age and gender-matched healthy controls underwent the measurements of corneal confocal microscopy (CCM), HbA1c, corneal sensitivity and modified total neuropathy score (based on symptoms, vibration perception threshold, 10g monofilament sensation and knee and ankle reflexes).

**Results:** In patients with T1DM, no significant change in corneal sub-basal nerve density (mm/mm<sup>2</sup>) (P=0.7), corneal sensitivity (mbar) (P=0.8), HbA1c (mmol/mol) (P=0.1) and modified neuropathy score (P=0.2) were observed over the 6-year period. In healthy controls, corneal nerve density (P=0.06) and HbA1c (P=0.8) remained constant, however, a significant reduction in corneal sensitivity (P<0.001) was observed over the 6-year follow-up period. No significant relationship between corneal nerve density and modified total neuropathy score was found.

**Conclusions:** There is evidence of corneal nerve loss and reduced corneal nerve sensitivity in patients with T1DM. However, over the 6-year period, no significant changes were observed in corneal nerve morphology, corneal sensitivity and modified total neuropathy score.

**Comments.** The importance of evaluating corneal nerve morphology using CCM in patients with diabetes has grown exponentially. As expected, a significant reduction in corneal nerves was observed in patients with T1DM compared to healthy controls. This study reported no significant changes in corneal nerve morphology over a 6-year follow-up period in patients with T1DM and healthy controls, which was consistent with the study by Dehghani C et al. (*Invest Ophthalmol Vis Sci.* 2014;55:7982-90). Yet, these results contrast with the studies by Ferdousi M et al. (*Invest Ophthalmol Vis Sci.* 2020;61:48) and Dhage S et al. (*Sci Rep.* 2021;11:1859) where patients (predominantly T1DM) had similar duration of diabetes. A possible explanation for the difference between the studies could be the glycaemic control over time. The authors reported that poor glycaemic control was significantly associated with a reduction in corneal nerve density measured as mm/mm<sup>2</sup>. Interestingly, while patients with the highest HbA1c (68.1-86.7 mmol/mol) had a greater reduction in corneal nerve density (0.377 mm/mm<sup>2</sup>), patients with the HbA1c in the best-controlled tertile (35.0-54.0 mmol/mol) had an increase in corneal nerve density (1.263 mm/mm<sup>2</sup>).

A potential limitation the authors mention is the small sample size that could have had an impact on the statistical analysis. Another limitation to mention would be the lack of presenting other underlying risk factors for corneal nerve loss such as body mass index, weight, and lipid profile.

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**Reference.** Misra SL, Slater JA, McGhee CNJ, Pradhan M, Braatvedt GD. Corneal Confocal Microscopy in Type 1 Diabetes Mellitus: A Six-Year Longitudinal Study. *Transl Vis Sci Technol.* 2022 Jan 3;11(1):17. doi: 10.1167/tvst.11.1.17.

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