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**Abstract Title:** Corneal physiological changes after short-term scleral lens wear

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### **Abstract**

**Purpose:** To measure various physiological changes occurring in the cornea after short-term scleral lens wear, including changes in curvature, eccentricity, thickness, sensitivity, and staining.

**Method:** A prospective study will be conducted among 20 Hong Kong Chinese subjects aged between 18 to 30 years old. During initial anterior segment evaluation, all the subjects will undergo the required tests, including corneal curvature, eccentricity, thickness, sensitivity, and staining measurement. Scleral lenses (Jupiter, Visionary Optics) are fitted via the trial lens fitting method. Each subject will wear a scleral lens only on the right eye and the left eye is regarded as the control. Preservative-free saline will be used as the filling solution. Subjects are asked to return after 6 hours for evaluation and the tests will be repeated.

**Results:** After 6 hours of lens wear, small but significant corneal swelling response was observed at 5mm area nasal to the corneal apex in the horizontal meridian immediately after lens removal (mean change  $0.019 \pm 0.11$ ,  $p=0.045$ ). There was no significant change on simulated corneal curvature, eccentricity, and corneal height at the corneal chord radius of 3mm and 5mm. The corneal staining improved significantly at central, nasal, and temporal zones in terms of both depth and extent with reference to the CCLRU grading system. The corneal sensitivity measured by Cochet-Bonnet Corneal Aesthesiometer remained unchanged after the lens wear.

**Conclusion:** Scleral lens fitting is an effective method in correcting vision problems associated with irregular corneas. Its role in ocular surface protection can be demonstrated in the study. However, the risk of hypoxia and other physiological changes in the cornea still cannot be fully eliminated because of the lens thickness as well as the large quantity of filling solution between the cornea and the lens. Given the increasing popularity of scleral lens, practitioners should be aware of those subtle corneal changes that may lead to more severe corneal complications.