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**Abstract Title:** Collagen Crosslinking by Combined Riboflavin/Ultraviolet-A (UVA) Treatment can stop the progression of Keratoconus  
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**Purpose:** In the course of keratoconus a penetrating keratoplasty is required in approximately 20% of the patients. In previous experimental studies with rabbit and porcine corneas we detected a significant increase in corneal biomechanical stiffness after Riboflavin/Ultraviolet-A induced collagen crosslinking.

The aim of this prospective non-randomized clinical pilot study was to evaluate the effect of the new collagen crosslinking method on progression of keratectasia in patient with keratoconus.

**Methods:** Sixty eyes of 48 patients with progressive keratoconus with moderate or advanced keratectasia (maximal k-reading, 41.70 to 72.47 D) were included. After removal of the corneal epithelium photosensitizing Riboflavin drops (0.1% Riboflavin-5-phosphat, 20% Dextran) were applied every 5 minutes and the cornea was exposed to UVA (370nm, 3mW/cm<sup>2</sup>) in a 1-cm distance for 30 minutes. Data to verify a preoperative progression of keratoconus were available up to 42 months before treatment. Postoperative follow-up ranged from 1 to 38 months. Examinations included visual acuity testing, corneal topography, pachymetry and measurement of endothelial cell density.

**Results:** The k-readings showed a statistically significant progression from the first documented to the preoperative measurements (paired student t test; p = 0.003; 95% confidence interval, -2.375 to -0.511). None of the patients with a follow-up longer than 3 months showed progression of the k-readings in the treated eye (paired Student t test, p = 0.15; 95% confidence interval -0.138 to 0.896). In 31 eyes (51.7%) a postoperative regression of the maximal k-readings with an average reduction of  $2.87 \pm 2.56$  D (range 0.18 to 9.97 D) was observed. **Before regression or stabilization of the keratoconus 24 eyes (40%) showed a transient mild to moderate increase of the maximal k-readings.** Best corrected visual acuity improved postoperative slightly by  $1.4 \pm 2.04$  lines.

**Conclusions:** Collagen crosslinking by Riboflavin/Ultraviolet-A seems to be a useful and sufficient treatment in patients with advanced keratoconus to prevent further progression. This treatment might be helpful to reduce the need for penetrating keratoplasty in these patients. In a 38 month follow-up no negative side effects of the treatment were seen in our patients.

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