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Confocal microscopy evaluation of stromal fluorescence intensity after standard and accelerated iontophoresis-assisted corneal cross-linking.

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Abstract

The aim of this study is to determine modifications in **stromal fluorescence intensity after** different **corneal cross-linking** (CXL) procedures and to correlate **stromal fluorescence** to **corneal** biomechanical resistance. For **confocal microscopy** study, 15 human cadaver corneas were examined. Three served as control (group 1), three were just soaked with iontophoresis procedure (group 2), three were treated with **standard** epi-off technique (group 3), and six underwent iontophoresis imbibition. Three of later six were irradiated for 30 min with 3 mW/cm^2 UVA (group 4) and three for 9 min at 10 mW/cm^2 UVA (group 5). **Confocal microscopy** was performed to quantify the **fluorescence intensity** in the cornea at different **stromal** depths. For biomechanical study, 30 human cadaver corneas were randomly divided into five groups and treated as previously described. Static stress-strain measurements of the corneas were performed. Iontophoresis imbibition followed by 10mW/cm^2 irradiation proved to increase **stromal fluorescence** into the **corneal** stroma and significant differences were revealed between group 3 and 5 both at 100 ($p = 0.0171$) and 250 μm ($p = 0.0024$), respectively. Biomechanical analysis showed an improvement of **corneal** resistance in group 5. Iontophoresis imbibition followed by **accelerated** irradiation increased the **stromal fluorescence** and is related to an improvement of biomechanical resistance. This approach may represent a new strategy to achieve greater concentrations of riboflavin without removing **corneal** epithelium and improve clinical results while reducing the side effects of CXL.

KEYWORDS: Cross-linking; Iontophoresis; Riboflavin

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