CXL at the Slit Lamp: No Clinically Relevant Changes in Corneal Riboflavin Distribution During Upright UV Irradiation

To the Editor:

Photo-activated chromophore for keratitis cross-linking (PACK-CXL)\(^1\)-\(^4\) may become an attractive treatment for developing and emerging countries where access to ophthalmic care and medical equipment is limited.\(^3\) PACK-CXL treatment has the potential to be performed at the slit-lamp within 3 to 5 minutes.\(^3\) We have addressed a remaining concern: is the stromal riboflavin distribution affected by gravity if the ultraviolet irradiation takes place in the upright position?

Freshly enucleated porcine eyes were incubated in 0.1% hyposmolar riboflavin solution without dextran for 30 minutes and then divided into three groups: corneas fixed in a vertical position for 30 minutes (\(n = 4\)), corneas fixed in a vertical position for 60 minutes (\(n = 8\)), and corneas fixed in a horizontal position for 60 minutes (\(n = 8\)). Four corneas were immersed in 0.9% sodium chloride for 60 minutes and served as fluorescence controls. The fluorescence signal of each cornea was measured with a spectrophotometer. Statistical significance was determined with Student’s \(t\) tests and a confidence interval of 95%.

After 30 minutes, there was no difference (\(P = .22\)) between superior and inferior riboflavin saturation, whereas a statistically significant (\(P = .002\)) gradient of 3.36% was found after 60 minutes (Figure 1).

Gravitational influence on the riboflavin distribution was observed only after 60 minutes of vertical positioning. Given that a PACK-CXL treatment typically lasts for 3 to 30 minutes,\(^2\)-\(^4\) this difference can be considered not clinically relevant. Limitations of this study include a small sample size and the use of porcine instead of human corneas.

REFERENCES


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Drs. Richoz and Hafezi are co-inventors of the PCT/CH2012/000090 application (UV irradiation device), and Dr. Hafezi is Chief Scientific Officer and shareholder of EMAGine. The remaining authors have no financial or proprietary interest in the materials presented herein.

doi:10.3928/1081597X-20161219-03