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LETTER TO THE EDITOR

Changes of the extracellular matrix of the cornea in diabetes mellitus

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Dear Editor,

We are aware of the discrepancy between the results of a significantly higher corneal hysteresis (CH) in diabetic patients [1, 2] and the effect of collagen cross linking by diabetes that may be expected to lower CH as shown by other authors [3].

In our rather large group of patients, CH was higher in diabetes when corrected for age and possible other cofounders such as glaucoma, refraction, gender, side of the eye and IOP as measured by Goldmann applanation tonometry [1]. In linear mixed model analysis, we found that age, IOP and diabetes have a significant influence on CH. These effects, however, are shown to influence CH in opposite directions, so that they need to be taken into consideration when comparing CH in normal eyes and eyes of diabetic patients.

We pointed out that the effect of age as well as the effect of diabetes-induced cross linking of collagen fibrils was expected to lower CH. This effect can clearly be shown for age, and was taken into consideration in multivariate analysis. Since CH was significantly higher in diabetes after correcting for age (and this seems to be essential since diabetes Type II is a disease of the elderly) and IOP, we assume structural alterations of the matrix proteoglycans modifying corneal viscosity and therefore increasing CH.

It would be very interesting if data from Bayer et al. were evaluated comparing CH values in normal and diabetic eyes after correcting for age and IOP.

While CH is a parameter that is measured primarily using the ORA instrument, corneal resistance factor (CRF) is derived from CH measurement [4].

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According to Luce the formula is $CRF = P1 - k \times P2$ with k being an empirical constant.

So far, we have only little experience with the different pieces of information about rigidity and/or elasticity of the cornea given by CH and CRF [5]. We wanted to evaluate the impact of the CH measurement first [5].

Congdon et al. [6] described lower CH values to be a risk factor in glaucoma patients for further progression of visual field deterioration. Therefore, higher CH might suggest a protective function in glaucoma which might be an advantage for diabetic patients.

To date, cross-sectional or longitudinal studies of biomechanical properties of the cornea have been impossible. For the future, we expect quite a few new and interesting findings with regard to the biomechanical properties of the cornea in diabetes.

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