



## City Research Online

### City, University of London Institutional Repository

---

**Citation:** Huntjens, B. & O'Donnell, C. (2006). Diabetes mellitus and the eye: axial length. Paper presented at the 42nd EASD Meeting, 14-09-2006 - 17-09-2006, Copenhagen (Denmark).

This is the accepted version of the paper.

This version of the publication may differ from the final published version.

---

**Permanent repository link:** <http://openaccess.city.ac.uk/5601/>

**Link to published version:**

**Copyright and reuse:** City Research Online aims to make research outputs of City, University of London available to a wider audience. Copyright and Moral Rights remain with the author(s) and/or copyright holders. URLs from City Research Online may be freely distributed and linked to.

---

City Research Online:

<http://openaccess.city.ac.uk/>

[publications@city.ac.uk](mailto:publications@city.ac.uk)

---

## ABSTRACT EASD (poster)

### AUTHORS

Byki Huntjens  
Clare O'Donnell

### TITLE

Diabetes Mellitus and the Eye: the Axial Length.

**Background and aims:** The refractive error of the eye is dependent on its axial length. Refractive error is known to fluctuate significantly in poorly-controlled diabetic patients. Recently it has been reported that human eyes fluctuate in axial length during the day. However, this change is not detectable in all subjects, suggesting physiological influences such as diet. The purpose of this study was to investigate fluctuations in axial length and blood glucose levels (BGLs) in diabetic patients and control subjects, using partial coherence interferometry.

**Material and methods:** Periodic axial length measurements were taken with an IOLMaster (Zeiss, Oberkochen, Germany) in 21 type 2 diabetic subjects (age  $56 \pm 11$  years), 19 type 1 diabetic subjects (age  $38 \pm 15$  years) and 18 non-diabetic controls (age  $46 \pm 22$  years). Additionally, BGLs were measured using a HemoCue Beta glucose analyser (HemoCue, Ängelholm, Sweden). Measurements were taken between 8AM and 8PM at approximately two hourly intervals. The ocular length variability was mapped against time of day and related to BGLs, age, and the degree of diabetic retinopathy.

**Results:** Axial length variations were found to be significant with time (ANOVA,  $P=.003$ ) and there was a significant effect for the interaction between group and time of day (ANOVA,  $P<.0005$ ). DM type 1 and control subjects showed a significantly increased axial length in the afternoon compared to in the morning (t-test,  $P<.0005$ ). No significant change was observed among DM type 2 subjects. Axial length fluctuated sinusoidally with time of day. A three-parameter sinusoidal curve was used to fit each set of axial length measurements, which resulted in a correlation coefficient  $R^2 \geq 0.7$  in 62% of type 2 diabetic subjects, 78% of type 1 diabetic subjects and 72% of control subjects. Multiple regression analysis established that neither BGLs, age, nor the degree of diabetic retinopathy had a significant effect on the fluctuations of the axial length ( $P>.05$ )

**Conclusion:** Axial length varies throughout the day in diabetic and control subjects; however, this change does not appear to be significant in every individual. The data suggest a maximum axial length value in the afternoon. Changes in axial length from baseline did not correlate with BGLs, age, or the degree of diabetic retinopathy. Therefore, blood glucose levels may not be the main physiological influence in axial length fluctuations.

**Acknowledgements:** Supported by a grant awarded by Lein Applied Diagnostics.