

Huntjens, B., Workman, H., Hosking, S. L. & O'Donnell, C. Daily fluctuations in axial length in Diabetes Mellitus. Paper presented at the American Academy of Optometry, 8 Dec 2005, San Diego (USA).



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Original citation: Huntjens, B., Workman, H., Hosking, S. L. & O'Donnell, C. Daily fluctuations in axial length in Diabetes Mellitus. Paper presented at the American Academy of Optometry, 8 Dec 2005, San Diego (USA).

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Paper presentation AAO

AUTHORS

Byki Huntjens * presenter
Helena Workman
Sarah Hosking
Clare O'Donnell

TITLE

Daily fluctuations in axial length in Diabetes Mellitus.

PURPOSE

It is known that axial length varies during the day in chick and rabbit eyes. Recently it has been reported that a similar variation occurs in human eyes. However, this change is not detectable in all the subjects, suggesting physiological influences such as diet. The purpose of this study was to investigate axial length fluctuations and blood glucose levels (BGLs) in diabetic patients and control subjects, using partial coherence interferometry.

METHODS

Periodic axial length measurements were taken with an IOLMaster (Zeiss, Oberkochen, Germany) in 21 type 2 diabetic subjects (aged 37 to 72 years, median 55 years), 11 type 1 diabetic subjects (aged 20 to 66 years, median 46 years), and 10 non-diabetic controls (aged 23 to 60 years, median 26 years). Additionally, BGLs were measured using a Hemocue (Hemocue, Ängelholm, Sweden) finger stick test. 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.

RESULTS

Axial length variations were found to be sinusoidal 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, 82% of type 1 diabetic subjects, and 80% of control subjects. The intraday axial length fluctuation was significant in 21% of all the participants (ANOVA, $P < 0.05$). No statistically significant differences were found in intraday axial length fluctuations between the 3 groups assessed. However, the profile of the sinusoidal curve fit to each individual's set of BGL readings did not match that of the axial length.

CONCLUSION

Axial length of the human eye varies throughout the day in diabetic and control subjects; however, this change does not appear to be significant in every individual. The data suggests a maximum axial length value in the afternoon (12.30PM-3PM), which did not always relate to an extreme BGL value. Therefore, blood glucose levels may not be the main physiological influence in axial length fluctuations.