Effect of contact lens induced retinal defocus on the thickness of the human choroid

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AIM

To describe the amplitude and time-course of choroidal thickness changes induced by imposed hyperopic and myopic retinal defocus and to compare the responses in emmetropic and myopic subjects.

METHODS

- Twelve Asian subjects (6 Emmetropes & 6 Myopes: mean refraction: Emmetropes –0.11D ± 0.47D & Myopes: –3.71D ± 1.23D) aged between 18 and 34 years
- OCT images of choroid taken in both eyes at 5 min intervals during 60 min of viewing a video at 6m, with imposed monocular defocus.
- Two monocular defocus conditions: 2D hyperopic or 2D myopic defocus, (random right or left eye); fellow eye was kept optimally corrected (no defocus).
- Choroidal thickness changes measured as absolute change in microns.

RESULTS

- Prior to applying defocus, mean (± SD) choroidal thickness in myopic eyes (256.30µm ± 41.24µm) was significantly less ($p<0.05$) than in emmetropic eyes (mean ± SD, 423.09µm ± 60.69µm).
- In both emmetropes *(Figure 1a)* and myopes *(Figure 1b)*, 60 min of 2D myopic defocus caused an increase in choroidal thickness ($p<0.01$) whereas 2D of hyperopic defocus caused a decrease in thickness ($p<0.01$). Changes in emmetropes and myopes were not significantly different.

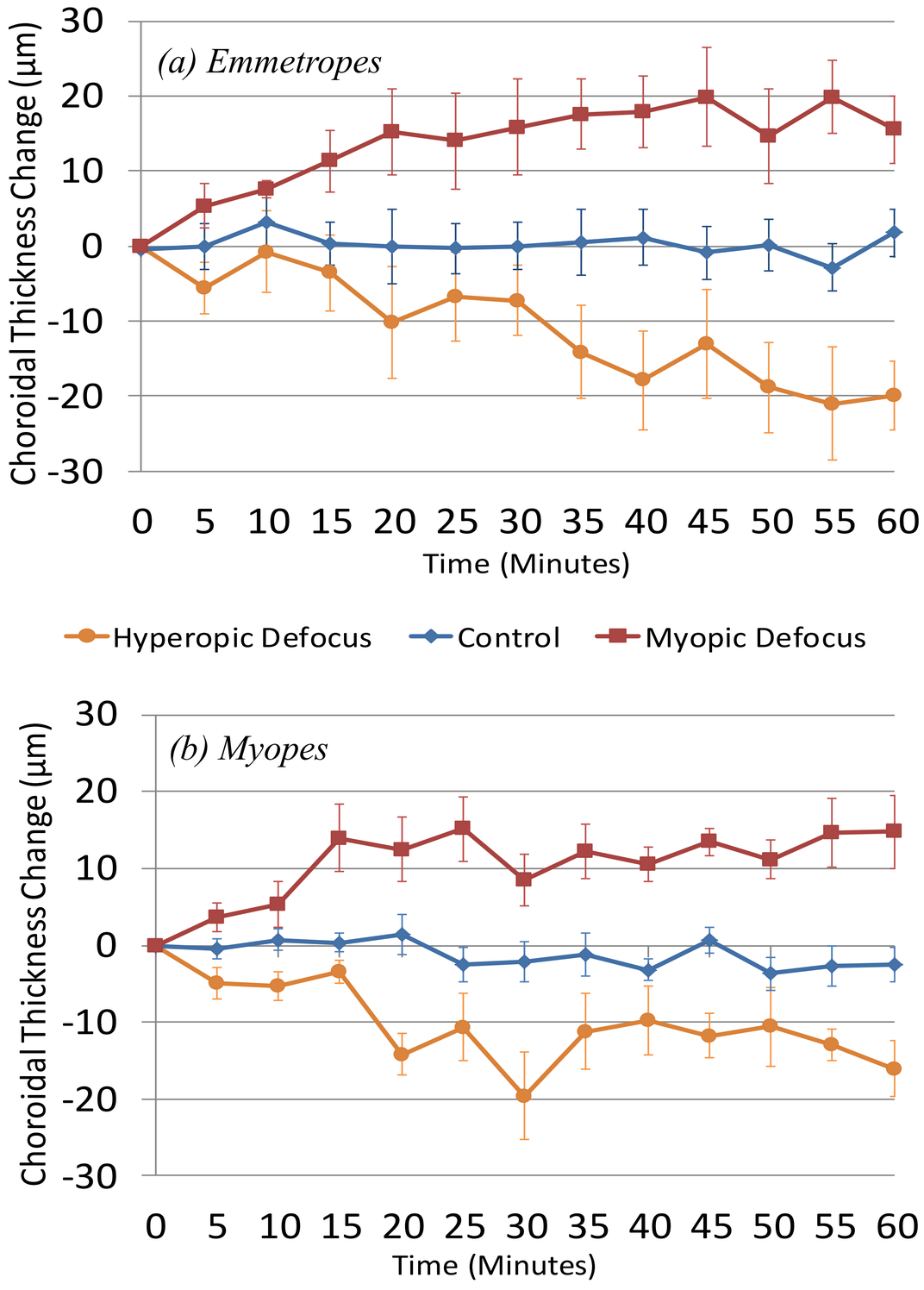
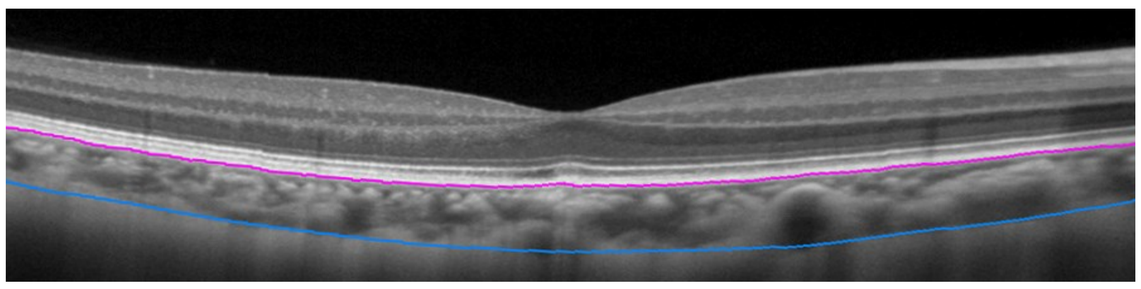


Figure 1. Absolute choroidal thickness changes in microns over Time for Hyperopic and Myopic Defocus in (a) Emmetropes and (b) Myopes. Repeated measured ANOVA (GLM) revealed significant choroidal thickness changes over time ($p<0.01$) for both hyperopic and myopic defocus condition when compared with control eye.

CONCLUSION

- Small but significant choroidal thickness changes occurred when human eyes were exposed to both myopic and hyperopic monocular defocus.
- Changes acted to move the retina towards the altered image plane, so as to reduce the degree of defocus.
- In this small sample we could detect no difference in responses of myopic eyes compared to emmetropic eyes.



Chorioretinal image of a myopic subject taken by OCT

- Interestingly, choroidal thickness increased binocularly while watching DVD at distance of 6m with no defocus. *(Figure 2)*

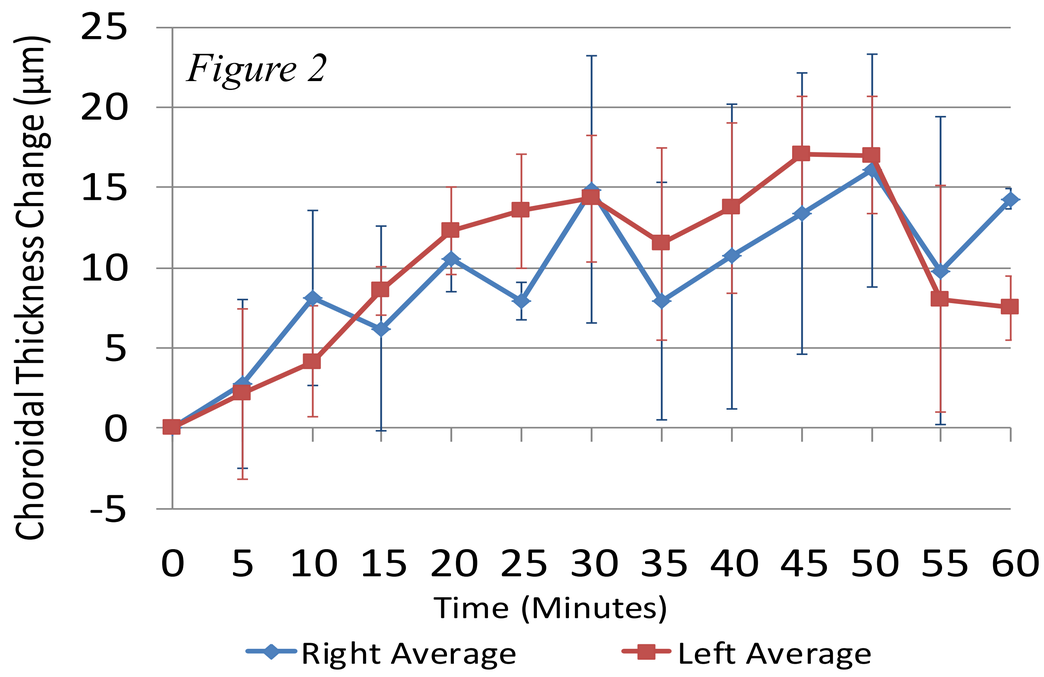


Figure 2: Absolute choroidal thickness changes in microns over Time for Emmetropes while watching DVD at distance without Defocus. Pearson Correlation Coefficient revealed a high correlation between right and left eye over time.