

Surface and Volume Changes in the Lens during Accommodation

I was excited by the results presented in the excellent paper by Sheppard et al.¹ showing a 2.3% increase in lens volume and a decrease of 1.82% in surface during accommodation in human volunteers. I was very gratified that they acknowledged that we had predicted similar changes in human lens volume and surface based on mathematical modeling of human lens dimensions, using the Pappus theorem as well as our experimentally induced changes in lens dimensions of isolated cow lenses under conditions mimicking accommodation.^{2,3}

Their acknowledgment of our work is especially gratifying for us because members of the “accommodation group” had received our findings and predictions with skepticism. I hope that the publication by Sheppard et al. serves to encourage a re-evaluation of the changes that occur during accommodation.

However, there is a point of ours that was dismissed by the authors, who simply indicated that the changes in lens volume may be due to compression of the lens bag contents. They did not consider the possibility that the change in volume could be fluid exiting and re-entering the lens bag. The lens capsule is very permeable to water, as shown by numerous “osmotic” experiments. We have also recently shown a relationship between the osmotic and mechanical forces of accommodation.⁴

Could the authors comment as to why they did not consider our suggested interpretation to explain the volume changes in their publication?

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References

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