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We would like to thank Dr JK Chhablani and Dr W Freeman for their interest and comments regarding our study¹.

This study validated axonal integrity as a measure of visual potential. In macular oedema, abnormal fluid accumulation produces mechanical stress on the bipolar axons. Considering that the bipolar represents the sole communication between photoreceptors and ganglion cells, any loss of transmission between these neurones will compromise visual function.

In their letter, Dr Chhablani and Dr Freeman suggest a lack of analysis of other predictors of visual acuity such as macular volume, outer retinal integrity and IS/OS junction integrity. Firstly, they refer to the integrity of transduction elements rather than transmission elements, which was the object of our study. These are two completely different entities and therefore not suitable for a head-to-head comparison. Secondly, the integrity of transduction elements, i.e. photoreceptors and inner segment/outer segment junction (IS/OS junction), may give a falsely reassuring result as the photoreceptors may still be intact when the transmission elements, i.e. bipolar axons, have already been permanently damaged. Figure 3B¹ is an example of multiple anatomical abnormalities contributing to visual impairment in macular oedema.

As far as macular volume is concerned, this is a non-specific parameter that does not add information on the role of any anatomical components. The main aim of this study was to identify an anatomical predictor of visual potential. By contrast, we compared axonal integrity to OCT measured central macular thickness² as these two parameters involve the same anatomical elements and are both measurable along the Z axis of the retina.

Furthermore, Dr Chhablani and Dr Freeman expressed their concern about the high predictive value generated by retinal axonal integrity versus visual acuity. In fact, anatomically, this is explained by the concepts of convergence and redundancy in retinal architecture³. Clinically this is confirmed by the observation that isolated outer retinal structure damage may not produce a directly proportional functional impairment, whereas the loss of axonal integrity may have a more direct impact on visual function.

The major strengths of our study are its prospective, objective, quantitative approach and the evaluation of the whole fovea using coronal OCT scans with automated image processing. Unfortunately, the literature on IS/OS junction and ELM integrity is mostly based on retrospective studies describing qualitative parameters on OCT B scans graded by trained observers.^{4, 5}

Finally, we agree that multifactorial analysis represents the future strategy for the assessment of functional potential in macular diseases.

References

1. Pelosini L, Hull CC, Boyce JF, McHugh D, Stanford MR, Marshall J. Optical coherence tomography may be used to predict visual acuity in patients with macular edema. *Invest Ophthalmol Vis Sci*. 2011;52:2741-2748.
2. Diabetic Retinopathy Clinical Research Network. Relationship between optical coherence tomography measured central retinal thickness and visual acuity in diabetic macular oedema. *Ophthalmology*. 2007;114:525-536.
3. Balasubramanian V, Sterling P. Receptive fields and functional architecture in the retina. *J Physiol*. 2009;15:2753-2767.
4. Maheshwary AS, Oster SF, Yuson RM, Cheng L, Mojana F, Freeman WR. The association between percent disruption of the photoreceptor inner segment-outer segment junction and visual acuity in diabetic macular edema. *Am J Ophthalmol*. 2010;150:63-67.
5. Otani T, Yamaguchi Y, Kishi S. Correlation between visual acuity and foveal microstructural changes in diabetic macular edema. *Retina*. 2010;30:774-780.