

Author Response: Predictors of Visual Acuity in Macular Edema

We thank Jay Chhablani and William Freeman¹ for their interest and comments regarding our study.²

The study validated axonal integrity as a measure of visual potential. In macular edema, abnormal fluid accumulation between the two plexiform layers produces mechanical stress on the bipolar axons. Considering that bipolar axons represent the sole communication between photoreceptors and ganglion cells, any loss of transmission between these neurons significantly compromises visual function.

In their letter, Chhablani and Freeman suggest a lack of analysis of other predictors of visual acuity such as macular volume, outer retinal integrity, and IS/OS junction integrity. First, they refer to the integrity of transduction elements rather than transmission elements, the object of our study. These are two completely different entities and therefore are not suitable for a head-to-head comparison. Second, the integrity of transduction elements—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, the bipolar axons, have already been permanently damaged. Figure 3B² is an example of multiple anatomic abnormalities contributing to visual impairment in macular edema.

As far as macular volume is concerned, it is a nonspecific parameter that does not add information as to the role of any anatomic components. The main purpose of this study was to identify and quantify an anatomic predictor of visual potential. By contrast, we compared axonal integrity to OCT-measured central macular thickness,³ as these two parameters involve the same anatomic elements and are both measurable along the z-axis of the retina.

Furthermore, Chhablani and 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 architecture.⁴ Clinically this is confirmed by the observation that isolated outer retinal structural damage will 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 process-

ing. Unfortunately, the literature on IS/OS junction and external limiting membrane (ELM) integrity is mostly based on retrospective studies describing qualitative parameters on OCT B scans graded by trained observers.^{5,6}

Finally, we agree that multifactorial analysis represents the future strategy for the assessment of functional potential in macular diseases and that improved photoreceptor cell function subsequent to drainage of fluid may well increase transduction and therefore have some effect on vision.

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