Sir,

Spectral and time domain OCT measure identical retinal thickness if identical boundaries are selected for analysis

We read with interest an article by Forte *et al*[1] in the December issue of *Eye*, which showed good correlation between the time-domain Stratus OCT and the spectral domain SLO/OCT, but significantly higher retinal thickness measurements with the latter. Similar findings have recently been showed when comparing the Stratus with the Topcon 3D-OCT 1000,[2] and Zeiss Cirrus OCT.[3]

One critical aspect of thickness determination that is well recognized, but not addressed by the authors of any of the above articles, is that the selection of anatomical structure as the outer boundary for thickness measurement. Several candidate hyper-reflective lines are created by (1) the inner segment (IS)/outer segment (OS) junction, which the Stratus uses by default, (2) the internal aspect of the RPE, and (3) Bruch's membrane. Here, we would like to illustrate this, by comparing the Stratus measurements with the spectral domain Topcon 3D-OCT 1000, which allows the user to choose any of the above three structures for thickness determination. Briefly, 26 normal retinas were imaged using the automatic software algorithms provided by the respective manufacturer. We found that measurements correlated well between Stratus and 3D-OCT if identical boundaries were used. Average ILM-IS/OS measurements were essentially identical on the two instruments: $250 \pm 39\,\mu$m (Stratus), and $251 \pm 39\,\mu$m (3D-OCT). Measurements using the inner aspect of the RPE or Bruch's membrane (BM) yielded results that were greater by an average of 17 ± 8 and $58 \pm 9\,\mu$m, respectively. As shown in the Figure 1, and as shown by Forte *et al*[1] for their instrument, there was a linear relationship between measurements obtained with both machines (goodness of fit $r^2 = 0.9957$), and values correlated well over the whole range of thicknesses (Pearson's coefficient $r = 0.9957$).

In summary, if the appropriate boundaries for thickness determination were used, the older generation, time-domain Stratus OCT measurements were essentially identical to those obtained with the latest generation spectral domain Topcon 3D-OCT 1000. When interpreting retinal thickness with OCT instruments of different generations and manufacturers, measurements will vary depending on the anatomical layers delineated by each instrument, and correlation between different devices should be considered in clinical and study assessment.

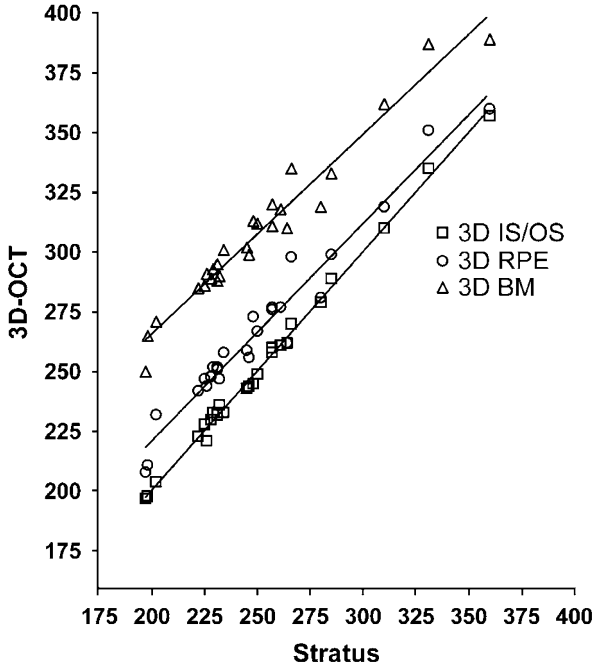

Figure 1 As shown by Forte *et al*[1] for the S-SLO/OCT, there was a linear relationship between measurements obtained with the Zeiss Stratus OCT and the Topcon 3D-OCT 1000 (goodness of fit $r^2 = 0.9957$), and values correlated well over the whole range of thicknesses (Pearson's coefficient $r = 0.9957$). Measurements on both instruments yield essentially the same results when the identical outer boundary is chosen on the 3D-OCT. ILM-IS/OS measurements were $250 \pm 39\,\mu$m with the Stratus and $251 \pm 39\,\mu$m with the 3D-OCT (3D-IS/OS). Measurements using the inner aspect of the RPE or BM yielded predictably higher results that were greater by an average of $17 \pm 8\,\mu$m (3D-RPE) and $58 \pm 9\,\mu$m (3D-BM), respectively.

References

1 Forte R, Cennamo GL, Finelli ML, de Crecchio G. Comparison of time domain Stratus OCT and spectral domain SLO/OCT for assessment of macular thickness and volume. *Eye* 2008; **12** [e-pub ahead of print].

2 Leung CK, Cheung CY, Weinreb RN, Lee G, Lin D, Pang CP *et al*. Comparison of macular thickness measurements between time domain and spectral domain optical coherence tomography. *Invest Ophthalmol Vis Sci* 2008; **49**(11): 4893–4897.

3 Kiernan DF, Hariprasad SM, Chin EK, Kiernan CL, Rago J, Mieler WF. Prospective comparison of cirrus and stratus optical coherence tomography for quantifying retinal thickness. *Am J Ophthalmol* 2009; **147**(2): 267–275.e2, (e-pub ahead of print 17 October 2008).

M Engelbert, S Zweifel, Y Imamura and Y L Fisher

Vitreous Retina Macula Consultants of New York, New York, NY, USA
E-mail: me2207@columbia.edu

Eye (2010) **24,** 193; doi:10.1038/eye.2009.58; published online 17 April 2009

Sir,

Response to Dr Engelbert *et al*

We highly appreciate the comments of Dr Engelbert *et al* on our recently published article.[1] We agree with the observations made by Dr Engelbert *et al* that the measurement of retinal thickness (RT) with optical coherence tomography (OCT) will vary depending on the outer retinal boundary delineated by each instrument. Therefore, appropriate boundaries for

thickness determination should be set, if allowed by the instrument.

The outer boundary used by Spectral SLO/OCT can be hypothesized according to the reported data about RT in normal eyes, as measured with different spectral OCT models. Mean RT, as measured with spectral domain SLO/OCT, was $281 \pm 88\,\mu$m before exclusion of the artefacts and $277.1 \pm 66\,\mu$m after their removal. In a recent report by Han *et al*,[2] Spectralis OCT (Heidelberg Engineering, Heidelberg, Germany) generated a similar RT measurement ($279 \pm 26\,\mu$m). According to previously described thickness measures of specific outer retinal layers, Spectralis OCT likely sets the outer retinal boundary for RT measurement at the junction of Bruch's membrane and the choriocapillaris; the same outer boundary could be used by Spectral SLO/OCT.

References

1 Forte R, Cennamo GL, Finelli ML, de Crecchio G. Comparison of time domain Stratus OCT and spectral domain SLO/OCT for assessment of macular thickness and volume. *Eye* 2008; 12 December 2008 [E-pub ahead of print].
2 Han IC, Jaffe GJ. Comparison of spectral spectra and time-domain optical coherence tomography for retinal thickness measurements in healthy and diseased. *Am J Ophthalmol* 2009; 4 February 2009 [E-pub ahead of print].

R Forte, G Cennamo, ML Finelli and G de Crecchio

Department of Ophthalmology, University Federico II, Naples, Italy
E-mail: raifor@hotmail.com

Eye (2010) **24,** 193–194; doi:10.1038/eye.2009.59; published online 3 April 2009

Sir,

Intravitreal bevacizumab for macular oedema secondary to branch retinal vein occlusion: more data required

We read with interest the study by Gündüz and Bakri.[1] The authors conclude that intravitreal bevacizumab (IVB) is effective in treating macular oedema associated with branch retinal vein occlusion. However, we suggest that the results ought to be interpreted cautiously for the reasons given below.

The patients involved in this study were heterogeneous with respect to factors that may influence the outcome of treatment with IVB. For example, one-third of the patients were found to have macular ischaemia, and this may account for some of the variability. The impact of the wide range of patients' ages and of relevant coexisting pathologies, such as diabetes mellitus and glaucoma, was not quantified. Some of the eyes underwent initial laser or intravitreal/posterior subtenon triamcinolone, which may have influenced the efficacy of IVB. Finally, as the authors do not state quantitative criteria for IVB retreatment, it is difficult for readers to determine a protocol that might produce similar results for their own patients.

We are encouraged by the outcomes reported, but suggest that detailed analysis of the subjects being treated and comparison with matched controls should be undertaken before IVB can be recommended for this indication. Future studies could also distinguish between the potential for IVB as a primary treatment, perhaps before structural or ischaemic changes at the macula have become established, and its role as a second- or third-line therapy.

Reference

1 Gündüz K, Bakri SJ. Intravitreal bevacizumab for macular oedema secondary to branch retinal vein occlusion. *Eye* 2008; **22**(9): 1168–1171.

K Hu, SE Horgan, RR Sivaraj and K Avgikos

Department of Ophthalmology, Moorfields Eye Hospital NHS Foundation Trust at St George's Hospital, London, UK
E-mail: kuanghu@kuanghu.com

Eye (2010) **24,** 194; doi:10.1038/eye.2009.27; published online 13 February 2009

Sir,

Reply to Dr Hu *et al*

We thank Dr Hu *et al*[1] for their valuable comments. In dealing with patients with BRVO, we are inevitably faced with different coexisting pathologies, including diabetes mellitus, systemic hypertension, and ocular problems such as glaucoma. A detailed subgroup analysis of the efficacy of IVB in each group of systemic and ocular pathologies would require a substantial number of patients to enable this study to have predictive power. As for prior ocular treatments used in IVB-treated eyes, IVB was used in eyes with recurrent ME after laser photocoagulation and intravitreal triamcinolone acetonide and not as an adjunct to these treatments. A sufficient time period had elapsed after these treatments to conclude that prior treatment had not been successful. Finally, the decision to retreat was made based on the presence of macular oedema on OCT. Eyes that had persistent macular oedema were retreated, whereas those with no macular oedema skipped retreatment.

A retrospective study is valuable in that a positive outcome encourages pursuing randomized, controlled clinical trials, whereas, randomized trials are generally not pursued following negative outcomes in a retrospective study. We are encouraged that these preliminary, retrospective data on the prn usage of the anti-VEGF agent bevacizumab support the basis for conducting the prospective, randomized, controlled trial of ranibizumab, another anti-VEGF agent, for macular oedema for branch retinal vein occlusion. It is our sincere hope that this large,