

2. Syed ZA, Tran JA, Jurkunas UV. Peripheral endothelial cell count is a predictor of disease severity in advanced fuchs endothelial corneal dystrophy. *Cornea* 2017;36(10):1166–1171.

## Advanced Optical Coherence Tomography Angiography Analysis of Age-related Macular Degeneration Complicated by Onset of Unilateral Choroidal Neovascularization



EDITOR:

I READ THE ARTICLE BY ARRIGO AND ASSOCIATES<sup>1</sup> ON OPTICAL coherence tomography angiography (OCTA) analysis of retinal vasculature in cases of unilateral choroidal neovascularization (CNV) using quantitative analytical techniques with great interest. However, I have few concerns.

The image processing using OCTA is affected once the anatomy of the retina is altered, as the machine is unable to segment the images correctly through the desired depth in many cases. The decorrelation analysis may also give an incorrect flow image if the segmentation lines do not properly pass through the network of vessels being studied. Thus in cases of CNV the images of the overlying superficial and deep retinal network may not represent the true anatomy but rather only what the machine is able to display based on the decorrelation analysis. Therefore, quantitative differences may not truly reflect actual changes. This would need histologic confirmation, as already suggested by the authors. The basic unanswered question is this: Why should there be changes in overlying retinal vascular morphology in a disease arising from the choroidal circulation or primarily affecting the subretinal/sub-retinal pigment epithelial space? An assessment of the retinal vasculature post anti-vascular endothelial growth factor (anti-VEGF) injection and its comparison with the preinjection values might have provided more insight into the actual retinal vascular changes, if any. Postinjection, as the subretinal and intraretinal fluid absorb, the imaging may not suffer from image acquisition errors owing to altered anatomy.

The authors have used the ImageJ “Adjust Threshold” function for reducing noise. They have not used any standard thresholding method such as Huang or Otsu, provided in ImageJ. Manual thresholding would define different cut-off values for each image and would make image analysis a bit subjective. If the threshold setting is altered by another observer, the entire quantitative analysis that follows would change. This induces a large observer bias.

The authors provide OCTA images of a normal eye; however, images of cases of CNV are not provided. At least

a few sample images of retinal plexus in cases of a pathology can help the readers assess any qualitative difference between the normal and abnormal.

Though OCTA is a promising technology, at the present juncture I feel that there is too much variation in the techniques used for quantitative analysis by various authors. There is a need for an international consensus on the thresholding techniques and the algorithms used to analyze OCTA images before we can draw meaningful conclusions regarding vessel density or perfusion status of the retina, choroid, or optic nerve.

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### REFERENCE

1. Arrigo A, Aragona E, Capone L, et al. Advanced optical coherence tomography angiography analysis of age-related macular degeneration complicated by onset of unilateral choroidal neovascularization. *Am J Ophthalmol* 2018;195:233–242.

### REPLY



WE ARE GRATEFUL TO DR CHAWLA FOR THE OPPORTUNITY to provide further clarifications regarding our recently published paper.<sup>1</sup>

We totally agree with Dr Chawla regarding the difficulties of accurately isolating each retinal plexus; poor-quality images are usually expected in the analyses of advanced stages of choroidal neovascularization (CNV) growth owing to the limitations of the optical coherence tomography angiography (OCTA) technique. However, in our paper we have analyzed occult (type 1) and classic (type 2) CNV, in 70% and 30% of cases, respectively; our patients showed relatively high best-corrected visual acuity at onset (mean BCVA: 20/32 Snellen equivalent). Then, we can assume that our cohort was actually composed of early CNV cases, excluding more advanced stages that are characterized by a global upheaval of the retinal architecture. As already declared, this choice was essential in order to test the feasibility of the proposed “new” quantitative approaches (namely, dispersion, tortuosity, and rarefaction). Furthermore, as stated in the Methods section, we initially examined the output provided by automated segmentation, but data were then inspected by an expert ophthalmologist and manually corrected in case of segmentation errors.