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SLEEP BREATHING PHYSIOLOGY AND DISORDERS • LETTER TO THE EDITORS (INVITED)

Reply to comment on "Choroidal vascularity index in obstructive sleep apnea syndrome"

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Dear Editor,

We thank Marino et al. for their kind interest in our study [1]. In their letter to the editor, the authors pointed out that measurement of choroidal vascularity index (CVI) did not reveal any significant change and proposed that it can be due to the so-called blooming effect in the OCT imaging.

In the study, the choroidal structural parameters and CVI were decreased in the obstructive sleep apnea syndrome (OSAS) group, and the difference was not statistically significant. The choroidal thinning can depend on changes in the vascular and stromal tissues, or both. Therefore, the choroidal thinning may be related to the decrease of both the luminal (LA) and stromal (SA) areas in the patient group. The CVI is expressed as the proportion of LA to the total choroidal area. In patients with OSAS, as the LA and SA decreased simultaneously, the CVI did not reveal a significant difference when compared with the controls [2].

We used Niblack's autolocal threshold technique as the binarization method. This is because it takes into consideration the mean and standard deviation of all the pixels in the region of interest. In addition, given that binarization could be also affected by the direction of light and focussing issues, these were taken into account by using a distinct binarization threshold for individual subject [2].

The blooming effect appears when the illumination is strong enough to saturate pixels which is proportional to the intensity of the illumination. Limiting overexposure is especially important because blooming effect can change the image details. This requires a careful balancing of the device settings, combined with evaluation of image quality during capture (https://cdn.ymaws.com/www.opsweb.org/resource/resmgr/boc_resourses_pdf/31-1-05.pdf).

Optical coherence tomography (OCT) is probably the most common technique used in clinical practice, and even if it is considered to be a highly sensitive tool in the diagnosis and evaluation of patients, it has some limitations such as image quality, motion artifact, and segmentation error [3].

One of the commonly used measures related to the quality of OCT image is the signal strength. Although different OCT devices can use different values, signal strength commonly falls between 0 and 10, and a value of 10 shows the highest value for the healthy eyes. All OCT devices including the SPECTRALIS® OCT (Heidelberg Engineering, Germany) have different recommended thresholds according to the manufacturer signal index, and unless it is set to proper values, the automatic algorithms cannot work reliably. In the study, we captured and analyzed all OCT images according to the manufacturer's recommended settings [2].

To conclude, we totally agree with the authors that signal amplification or blooming effect can have an impact on the measurement of binarized OCT images. However, it is not well-known to what extent a change in signal strength can affect the measurements of binarized areas like luminal or stromal areas. In order to clear this issue, further attention and future investigations are needed.

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