An Assessment of Dynamic Retinal Microvascular Changes in Healthy Subjects

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The retina is a highly metabolic tissue equipped with an exquisite autoregulatory mechanism. Extending the assessment of retinal function to feasibly measure autoregulatory responses in this vital tissue would advance knowledge regarding the diagnosis, pathophysiology, and treatment of many ophthalmic diseases. Pechauer et al.1 derived retinal angiograms without the need for intravenous dye by applying a novel algorithm called split-spectrum amplitude-decorrelation angiography (SSADA) to a commercial Fourier-domain ocular coherence tomography (OCT) unit. Previously, Feke and Pasquale2 described a bioassay to measure segmental retinal blood flow response to posture change in units of microliters per minute; however, the protocol measured flow only in vessels greater than 90 μm in diameter and required Doppler technology that is not readily available. Split-spectrum amplitude-decorrelation angiography improves the signal-to-noise ratio in the measurement of movement within peripapillary capillaries where oxygen exchange takes place. Pechauer et al.1 measured retinal blood flow index and vessel density in response to hyperoxia in six healthy subjects. Retinal blood flow index and vessel density, which capture information on velocity and vessel caliber in peripapillary capillaries, respectively, were decreased by 8.9% and 2.6% in response to breathing supplemental oxygen at a rate of 15 L/min for 10 minutes.

Pechauer et al.1 repeated measures of retinal response to hyperoxia on two separate days. They found that the response to hyperoxia was larger than the between-day variability in baseline measures of flow index and vessel density. Interestingly, the healthy subjects studied had a highly variable response to hyperoxia (37% for flow index and 57.5% for vessel density). Overall, the retinal hemodynamic responses to hyperoxia were low, and it would be interesting to assess alternative perturbations to assess retinal autoregulation that might produce larger hemodynamic responses such as posture change or pharmacologic reduction in intraocular pressure.

References
