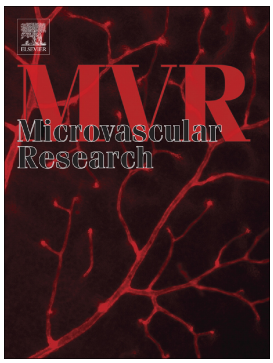

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PII: S0026-2862(18)30205-X
DOI: doi:10.1016/j.mvr.2018.09.003
Reference: YMVRE 3821

To appear in: *Microvascular Research*

Received date: 12 September 2018
Revised date: 23 September 2018
Accepted date: 25 September 2018

Please cite this article as: Jingjiang Xu, Yuandong Li, Shaozhen Song, William Cepurna, John Morrison, Ruikang K. Wang , Evaluating changes of blood flow in retina, choroid, and outer choroid in rats in response to elevated intraocular pressure by 1300 nm swept-source OCT. Ymvre (2018), doi:10.1016/j.mvr.2018.09.003

Evaluating changes of blood flow in retina, choroid, and outer choroid in rats in response to elevated intraocular pressure by 1300nm swept-source OCT

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Abstract: We report the development of a 1300nm swept-source optical coherence tomography (SS-OCT) system specifically designed to perform OCT imaging and optical microangiography (OMAG) in rat eyes *in vivo* and its use in evaluating the effects of intraocular pressure (IOP) elevation on ocular circulation. The swept laser is operated in single longitude mode with a 90 nm bandwidth centered at 1300 nm and 200 kHz A-line rate, providing remarkable sensitivity fall-off performance along the imaging depth, a larger field of view of 2.5×2.5 mm^2 (approximately 35°), and more time-efficient imaging acquisition. The advantage of the SS-OCT/OMAG is highlighted by an increased imaging depth of the entire posterior thickness of optic nerve head (ONH) and its surrounding vascular anatomy, to include, for the first time *in vivo*, the vasculature at the scleral opening, allowing visualization of the circle of Zinn-Haller and posterior ciliary arteries (PCAs). Furthermore, the capillary-level resolution angiograms achieved at the retinal and choroidal layers over a larger field of view enable a significantly improved quantification of the response of vascular area density (VAD) to elevated IOP. The results indicate that reduction in perfusion of the choroid in response to elevated IOP is delayed compared to that seen in the retina; while choroidal VAD doesn't reach 50% of baseline until ~70 mmHg, the same effect is seen for the retinal VAD at ~60 mmHg. The superior image quality offered by SS-OCT may allow more comprehensive investigation of IOP-related ocular perfusion changes and their pathological roles in glaucomatous optic nerve damage.

Keywords: Optical coherence tomography; optical microangiography; swept source OCT; glaucoma; intraocular pressure; ocular perfusion; circle of Zinn-Haller; optic nerve head.