2093 Hypoxia in Human Central Retinal Vein Occlusion

S. Traustason[1A], S. H. Hardarson[1A], G. H. Halldorsson[1B], R. A. Karlsson[1B], J. M. Beach[1B], J. A. Benediktsson[1B], T. Eysteinsson[1A], E. Stefansson[1A]
[A]Department of Ophthalmology, [B]Electrical and Computer Engineering, [1]University of Iceland

UNIVERSITY OF ICELAND

LANDSPÍTALI UNIVERSITY HOSPITAL

Purpose

To measure oxygen saturation in retinal vessels in patients with central retinal vein occlusion (CRVO), using a non-invasive spectrophotometric method.

Methods

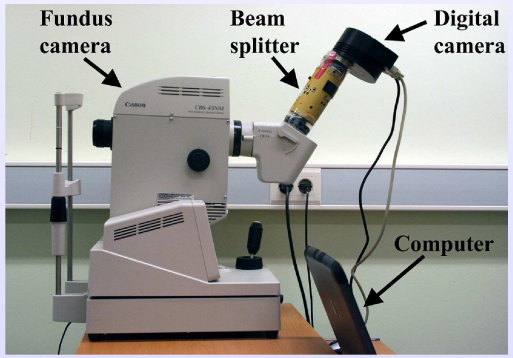

Figure 1. The retinal oximeter

Our automatic oximeter (Hardarson et al, 2006)* is based on a fundus camera and yields snap-shot fundus images with 4 wavelengths of light simultaneously. Two wavelengths, 605 nm and 586 nm, are used for calculation of oxygen saturation. Specialized software automatically selects measurement points on the images and estimates the oxygen saturation in retinal vessels, utilizing the different light absorbance spectra of oxygenated and deoxygenated haemoglobin.

Measurements were made on 7 individuals with CRVO, 5 males and 2 females. The age of the patients was 62 ± 11 years (mean ± SD). The average visual acuity logMAR was 0.58 ± 0.35 in CRVO affected eyes and 0.12 ± 0.29 in fellow eyes.

Oxygen saturation was measured in eyes with CRVO and fellow eyes in first and second degree vessels within 2 disc diameters from the optic disc. Paired t-tests were used for statistical analysis.

* Hardarson, S. H., Harris, A., Karlsson, R. A., Halldorsson, G. H., Kagemann, L., Rechtman, E., et al. (2006). Automatic retinal oximetry. Invest Ophthalmol Vis Sci, 47(11), 5011-5016

Results

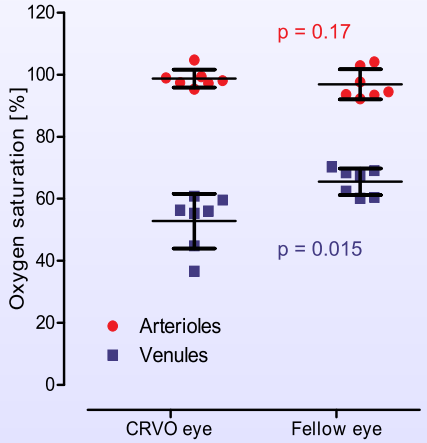

Figure 2. Oxygen saturation in eyes with CRVO and unaffected fellow eyes. Horizontal line shows mean and bars show standard deviation. Each point denotes measurements from one eye.

Table1. Oxygen saturation in CRVO affected eyes and unaffected fellow eyes (mean ± SD, n = 7)

	Oxygen saturation		Paired t-test p-value
	CRVO Eye	Fellow Eye	
Arterioles	99 ± 3 %	97 ± 5 %	0.17
Venules	53 ± 9 %	65 ± 4 %	0.015
Arterio-venous difference	46 ± 9 %	31 ± 6 %	0.011

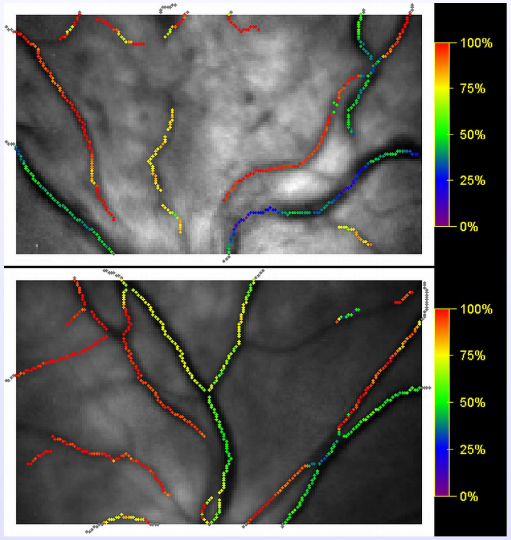

Figure 3. Pseudocolour map output from the retinal oximeter, showing an eye with CRVO (above) and healthy fellow eye (below). The pseudocolour scale on the right side shows the oxygen saturation

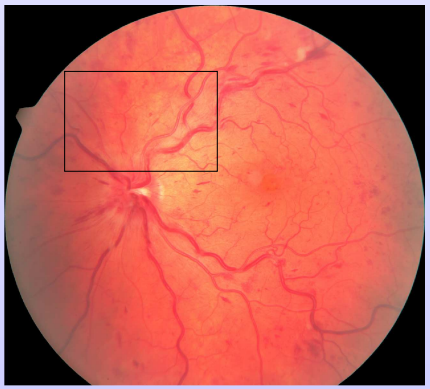

Figure 4. Fundus image of the CRVO eye, which is shown in figure 3. Frame indicates approximate area of oximetry measurement.

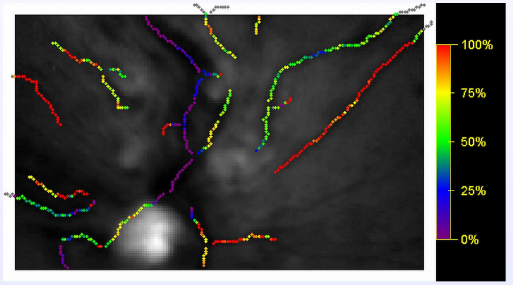

Figure 5. Oximetry image showing variability in venous oxygen saturation in CRVO.

Conclusions

Retinal venous oxygen saturation is significantly lower in CRVO affected eyes than in fellow eyes.

In some cases we observed highly variable levels of venous oxygen saturation within the same CRVO affected eye.

Commercial relationship: S. Traustason: Oxymap (E), S.H. Hardarson: Oxymap (I, E, P), G.H. Halldorsson: Oxymap (I, E, P), R.A. Karlsson: Oxymap (I, E, P), J.M. Beach: Oxymap (I, E, P), J.A. Benediktsson: Oxymap (I, P), T. Eysteinsson: Oxymap (I, P), E. Stefansson: Oxymap (I, P)

Support: Icelandic Research Council, Eimskip University Fund, Landspitali Research Fund, Helga Jonsdottir and Sigurlidi Kristjansson Memorial Fund, University of Iceland Research Fund.