2199 Scanning Laser Oximetry: A New Approach To Metabolic Imaging of the Retina

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Purpose

To develop and test a system for retinal oximetry based on scanning laser ophthalmoscopy (SLO).

Methods

Images from an Optomap 200Tx (Optos Ltd, UK) were analyzed using two wavelength oximetry algorithm (Oxymap ehf, Iceland). The green channel (532 nm) was used as an oxygen insensitive image and the red channel (633 nm) was used as an oxygen sensitive image.

Figure 1. *Optomap 200Tx. Scanning laser ophthalmoscope.*

The software identifies retinal blood vessels, chooses measurements points automatically, calculates optical density ratios and estimates oxygen saturation in arterioles and venules.

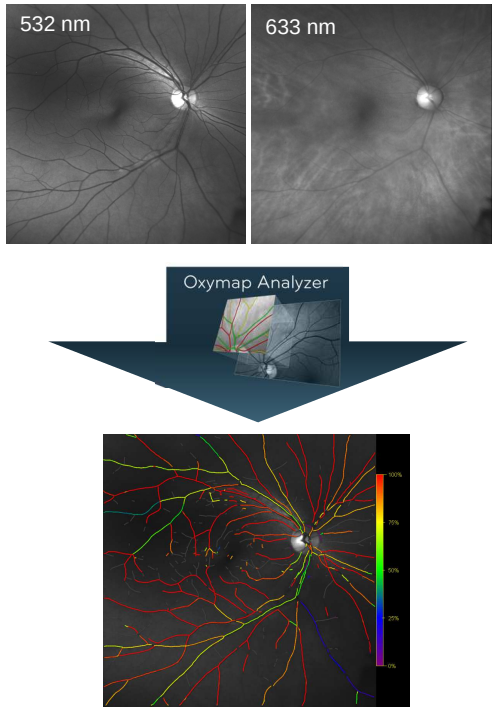

Figure 2. *A color-coded map of hemoglobin oxygen saturation is generated automatically from images, produced with lasers at 532 nm and 633 nm.*

Oxygen saturation was measured in the largest superotemporal arteriole and venule of 11 healthy individuals. Repeated measurements of the same vessel segments were compared.

Results

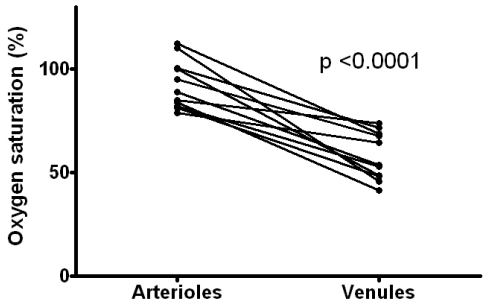

Figure 3*.Average of two measurements of oxygen saturation in 11 healthy individuals.*

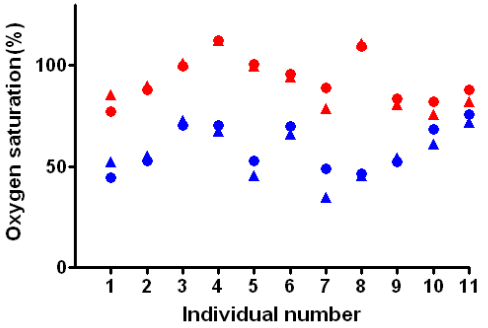

Figure 4*.Two measurements of oxygen saturation in 11 healthy individuals. Arterioles are colored red, venules blue, first measurement is labeled with▲ and second measurement is labeled with●.*

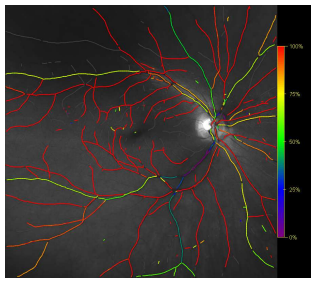

Figure 4*. Topographical variability of vessel oxygenation within the same eye.*

Oxygen saturation in arterioles was 92.6 ± 11.8% (Mean ± SD) and 58.0 ± 11.5% for venules. Standard deviation of repeated measurements of the same vessel for arterioles was 5.1% and 6,0% for venules.

Conclusions

- Clear difference in oxygen saturation between arterioles and venules.
- Good repeatability in the superotemporal vessels.
- Variability between individuals and between vessels in the same eye.
- Preliminary results are promising and suggest that scanning laser ophthalmoscopy may be used for retinal oximetry.

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