

Non-invasive retinal oximetry

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Much of our knowledge on retinal oxygenation in health and disease comes from invasive measurements of animal eyes. Non-invasive measurements are, however, increasingly being used to further our understanding of human retinal oxygenation.

Non-invasive oximetry utilises the fact the oxygenated and de-oxygenated haemoglobin have different colours. Measurements of light absorbance at different wavelengths can therefore be used to estimate oxygen saturation in retinal vessels. Measurements of the larger retinal arterioles and venules have been more successful than the more challenging measurements of retinal capillaries.

Recent studies have shown increased oxygen saturation in the larger retinal vessels in diabetic retinopathy, which may at least partly be explained by shunting of blood flow. In open-angle glaucoma, oxygen saturation in retinal venules is increased with increased visual field defect, which may be a consequence of atrophy and decreased oxygen consumption. Oxygen saturation in occluded retinal venules can be low, normal or high and further studies are needed to reveal how this relates to atrophy, re-canalisation or collateral circulation.

Non-invasive retinal oximetry has recently become a practical method to study the human retina. Intriguing first results in various ocular diseases have to be followed up in the coming years.