Oximetry in glaucoma: correlation with structural and functional damage
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Purpose: To determine whether retinal vessel oxygen saturation in glaucoma patients is associated with structural optic disc and retinal nerve fiber layer (RNFL) changes and visual field defects.

Methods: Retinal oxygen saturation in glaucoma patients was measured with a non-invasive spectrophotometric retinal oximeter (Oxymap ehf, Reykjavik, Iceland). Visual fields and HRTs were performed on the same day. Oxygen tension (PO2) was calculated from oxygen saturation values. Statistical analysis was performed using Pearson’s correlation.

Results: Mean oxygen saturation in arterioles was 99% ± 2%, in venules 65% ± 6% and the arteriovenous difference was 33% ± 6%. Oxygen saturation in venules correlated with visual field mean defects (r = -0.42; p = 0.001; n = 59), with rim area (r = -0.39; p = 0.008; n = 53) and retinal nerve fiber layer (r = -0.26; p = 0.05; n = 53). AV-difference in oxygen saturation decreased significantly as the visual field worsened (r = 0.38; p = 0.003), as the rim area diminished (r = 0.29; p = 0.03) and the RNFL decreased (r = 0.27; p = 0.05). No correlation was found between saturation in retinal arterioles and visual field mean defect (r = -0.08; p = 0.56), rim area (r = -0.12; p = 0.42) and RNFL (r = 0.04; p = 0.99).

Conclusions: Severe glaucoma damage is associated with increased oxygen saturation in venules and decreased arteriovenous difference in retinal oxygen saturation. These data suggest that in eyes with severe glaucomatous damage, oxygen consumption is decreased due to tissue loss.