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Title; Vitreous and retinal oxygen measurements

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- **PURPOSE:** To determine the preretinal distribution of oxygen in advanced proliferative diabetic retinopathy, and to investigate the relationship between intraocular oxygen tensions and vitreous cytokine concentrations.
- **METHODS:** Oxygen levels were measured at sites in the vitreous and at the inner retinal surface using an optical oxygen sensor in 14 control subjects and in 14 subjects with advanced proliferative diabetic retinopathy who had developed tractional retinal detachments despite previous panretinal photocoagulation. The vitreous and plasma concentrations of 42 cytokines were measured using multiplex cytokine arrays and their correlation with intraocular oxygen tension was investigated.
- **RESULTS:** The mean oxygen tension in the mid-vitreous in diabetic retinopathy was 46% lower than that in control subjects (P .017). However, the mean preretinal oxygen tension at the posterior pole in diabetic retinopathy was 37% higher than in controls (P .039). We measured significant alterations in the vitreous concentrations of 9 cytokines—eotaxin, Flt-3 ligand, growth-related oncogene (GRO), interleukin (IL)-6, IL-8, IL-9, IFN-inducible protein-10 (IP-10), macrophage-derived cytokine (MDC), and vascular endothelial growth factor (VEGF)—in advanced proliferative diabetic retinopathy, and found that oxygen tension at the posterior pole was directly correlated with vitreous VEGF concentration.
- **CONCLUSION:** We identified significant intraocular oxygen gradients in proliferative diabetic retinopathy. Our findings are consistent with the hypothesis that VEGF induces the development of neovascular complexes in the posterior retina that are richly perfused but nonetheless fail to redress hypoxia in the mid-vitreous. Upregulation of vitreous VEGF may be a consequence of retinal hypoxia at unidentified sites or of chronic inflammatory processes in advanced proliferative diabetic retinopathy.