

Retinal tissue oxygenation differs between eye fundus regions, but not with age, sex, and intraocular pressure in non-human primates

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Purpose: Oxygen plays a central role in multiple physiological and pathophysiological processes, and retinal oxygen supply has been found to be an important factor in many ocular diseases. Animal models are often used to study the pathophysiological mechanisms of diseases, especially non-human primates (NHP) due to their great similarities with humans. Few data are available on the quantification of oxygen in the retina of NHP. The objectives of the study were to establish NHP tissue oxygen saturation (StO₂) normative values in different eye fundus regions, compare StO₂ in these regions and analyze how StO₂ correlates to age, sex and intraocular pressure (IOP).

Methods: 44 vervet monkeys (28 males/16 females, 5 to 28 years old) were included in the study. IOP was measured in both eyes with an ocular tonometer. StO₂ was measured in both eyes using the Zilia Ocular oximeter in the temporal (tONH) and nasal (nONH) optic nerve head, the peripapillary region (pPL) and the perifovea (pFV). T-tests were used to compare between regions (paired), between both eyes (paired) and between sexes (independent). Kendall's tau was used to assess the correlation between StO₂ and age, as well as that between StO₂ and IOP.

Results: Mean StO₂ was 55.7%±4.3% in the tONH, 55.0%±3.9% in the nONH, 63.9%±7.3% in the pPL and 74.2%±3.4% in the pFV. No significant difference in StO₂ was observed between the left and the right eyes, just as no significant difference was observed between tONH and nONH. The StO₂ was lower in tONH and nONH than in pPL (p=0.0226 and 0.0060, respectively). No correlation was found between StO₂ and age, StO₂ and sex, or StO₂ and IOP.

Conclusions: StO₂ in the retinal tissue of NHP has been assessed for the first time. Regional variations similar to previous human studies were observed. The results of this study show the applicability of the Zilia Ocular on NHP and provide normative values that can serve as a basis for future studies.