Differences in peripapillary and macular vessel density in glaucoma patients of African and European descent using optical coherence tomography angiography

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BACKGROUND

Individuals of African descent (AD) have been reported to have a near threefold increase of developing glaucoma and have faster progression with worse clinical outcomes compared to individuals of European descent (ED).[1] It has been proposed that vascular disfunction is a contributing factor in the progression of glaucoma.[2] Optical coherence tomography-angiography (OCTA) is a new method of imaging the blood vessels of the retina and providing information on the effects of glaucoma. The purpose of this study is to investigate the differences in peripapillary retinal nerve fiber layer (RNFL) microcirculation in open angle glaucoma (OAG) patients of African descent and European descent using optical coherence tomography-angiography.

METHODS

- Prospective, observational study
- Two groups: African descent and European descent
- OCTA using a 6 x 6 mm area centered at the optic nerve head
- Poor-quality imaging were excluded from analyses
- Variables of interest: Vessel area density, blood flux
- Other demographic and clinical factors evaluated: age, gender, blood pressure, mean ocular perfusion pressure, intraocular pressure

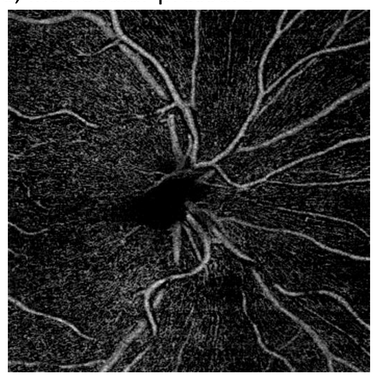

Figure 1. Representative en face image showing blood vessels in the RNFL

RESULTS

	African Descendent (N=23)	European Descendent (N=27)	P-value
Age (y)	70.1± 8.4	74.5 ± 8.5	0.062*
Male / Female	23 / 0	25 / 2	0.493‡
Intraocular Pressure (mmHg)	14.7 ± 2.5	14.6 ± 2.4	0.932*
Systolic Blood Pressure (mmHg)	139.9 ± 23.8	142.3 ± 21.6	0.752*
Diastolic Blood Pressure (mmHg)	83.8 ± 12.6	80.2 ± 12.6	0.228*
MOPP (mmHg)	53.9 ± 10.4	52.6 ± 8.6	0.669*
VF MD (dB)	-8.55 ± 8.35	-6.00 ± 5.85	0.201*
VF PSD (dB)	6.50 ± 3.89	6.25 ± 3.61	0.819*
RNFL Thickness (µm)	64.5 ± 23.3	66.6 ± 19.4	0.692*
Global RNFL Blood Flux	8.607 ± 2.883	8.562 ± 2.768	0.950*
Global RNFL VAD	0.138 ± 0.038	0.129 ± 0.035	0.380*

Table 1. Table 1. Baseline information and optical coherence tomography angiography findings in the nerve fiber layer among African and European Descendent subjects. * 2-tail independent sample t-test, ‡ Fisher's exact test; MOPP= Mean Ocular Perfusion Pressure, RNFL= retinal nerve fiver layer; VF = visual field; MD = mean deviation, PSD = pattern standard deviation; VAD= Vessel Area Density

Variable	AA Global RNFL Blood Flux		ED Global RNFL Blood Flux		AA Global RNFL Vessel Area Density		ED Global RNFL Vessel Area Density	
	Correlation (r)	P-value	Correlation (r)	P-value	Correlation (r)	P-value	Correlation (r)	P-value
RNFL Thickness (µm)	0.772	<0.001	0.567	0.004	0.772	<0.001	0.449	0.02
VF MD (dB)	0.666	<0.001	0.51	0.01	0.666	<0.001	0.432	0.026
VF PSD (dB)	-0.607	0.002	-0.541	0.003	-0.597	0.002	-0.551	0.003

Table 2. Summary of correlation and univariate regression analyses results between blood flux and vessel area density, and other functional and structural clinical measurements

DISCUSSION

- Similar age, gender and clinical variables between groups
- Similar visual field characteristics representing disease severity between groups
- Similar RNFL blood flux and vessel area density between groups
- Correlation between disease severity and RNFL blood flux and vessel area density
- Future directions
  - Analysis of RNFL blood flux and vessel area density in the macula between individuals of AD and ED
  - Analysis of RNFL blood flux and vessel area density by disease severity (e.g. separate moderate from severe glaucoma) within AD and ED groups

CONCLUSIONS

No significant differences were found in peripapillary RNFL microcirculation detected by OCTA between AD and ED eyes. Peripapillary RNFL microcirculation metrics are significantly correlated with disease severity in AD and ED glaucomatous eyes.

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