Retinal Thinning in Well-Controlled HIV-infected Patients

#418

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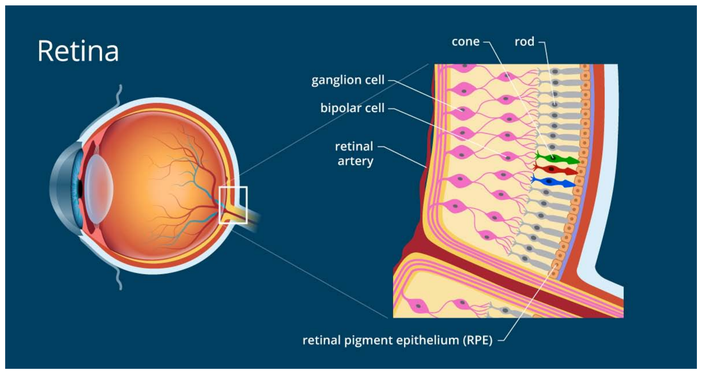
NIH National Institute of Neurological Disorders and Stroke

NIH National Eye Institute

NIH National Institute of Mental Health

BACKGROUND

The thickness of the retina can be reliably measured by spectral domain Optical Coherence Tomography (OCT) in a matter of seconds. In other neurologic diseases, retinal thinning correlates with clinically relevant outcomes. In multiple sclerosis, for example, retinal thinning correlates with both disease progression and future disability. If retinal thinning exists in persons living with HIV (PLWH), it has potential as a biomarker of clinically significant neurologic disease.



METHODS

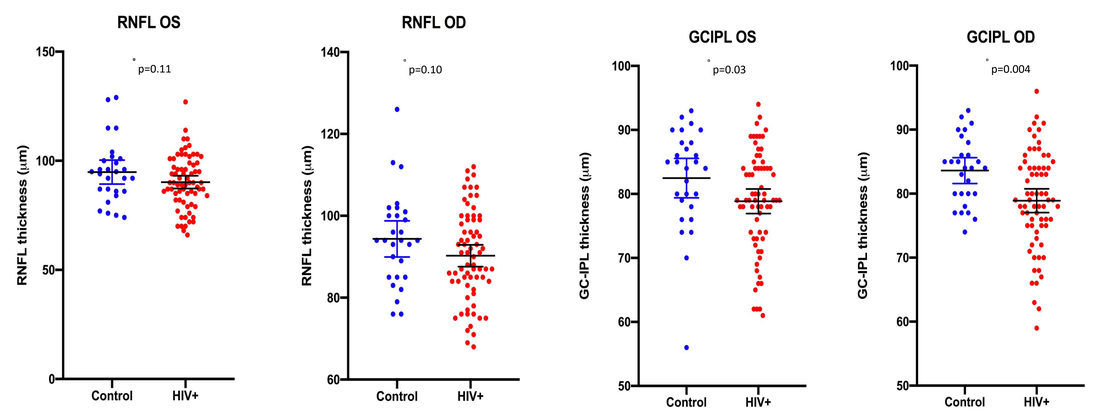
All OCTs were performed as part of a research protocol and there were no clinical indications. All participants were on antiretroviral therapy for at least one year, and all had a plasma VL<100 c/ml. A research brain MRI and comprehensive neuropsychological battery were performed as part of a larger cohort study. The control group completed the same research procedures. 10 participants (6 PLWH, 4 controls) were excluded from this analyses because of ophthalmologic confounding conditions, including ocular trauma, glaucoma, and glaucoma suspect. For all analyses, side (right vs. left eye) was included as a factor to account for the inherent correlation between a participant's two eyes.



Well-controlled HIV-infected participants had retinal thinning, correlating with brain volume loss. When controlling for differences in demographics and vascular disease risk, the retinal measures were even more significantly different.

RESULTS

	Control (n=28)	HIV+ (n=69)	p-value
Demographics			
Age, years, median (IQR)	53 (8)	54 (10)	0.64
Sex, Female, n (%)	18 (64)	22 (32)	0.01
Race, White, n (%)	11 (39)	21 (29)	0.35
Clinical Data			
Current Smoker, n (%)	6 (21)	28 (41)	0.10
Hist. of Cocaine Abuse, n (%)	4 (14)	33 (48)	<0.01
Hist. of Alcohol Abuse, n (%)	3 (11)	19 (28)	0.11
Hepatitis C Infection, n (%)	2 (7)	15 (22)	0.14
Hypertension, n(%)	7 (25)	30 (43)	0.11
Diabetes, n (%)	2 (7)	14 (20)	0.14
Dyslipidemia, n(%)	8 (29)	35 (51)	0.07
Obesity, n(%)	9 (32)	30 (43)	0.36
Lifetime risk ASCVD, %, mean (SD)	39 (3)	50 (11)	<0.01
HIV Disease Characteristics			
Years since HIV diagnosis, mean (SD)		17.2 (10.1)	
Years from diagnosis to antiretroviral therapy (median, IQR)		0 (0-10)	
Nadir CD4 cells/ul, mean (SD)		229.1 (190.1)	
Current plasma viral load, <100 c/ml, %		70 (100)	



Comparison of the unadjusted retinal measurements between the control and HIV+ groups. There are significant differences in the unadjusted GCIPL measurements between the two groups.

In a multiple regression model that included each variable significantly associated with the retinal outcomes:

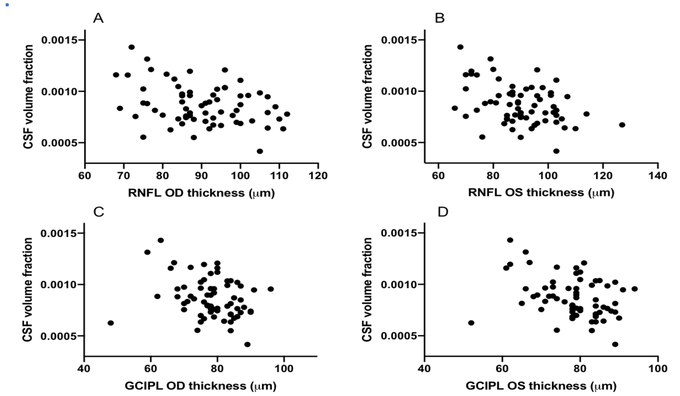
- Age
- Sex
- Lifetime ASCVD risk score,

the retinal measures were more significantly different between the two groups.

	Mean Adjusted RNFL (95% CI)
Control (n=28)	95 (90.6, 99.5)
HIV+ (n=69)	89.4 (86.7, 92.1)
	p=0.035

	Mean Adjusted GCIPL (95% CI)
Control (n=28)	83.9 (81.3, 86.5)
HIV+ (n=69)	78.1 (76.3, 79.8)
	p=0.0004

MRI: Using the same multiple regression model, MRI central brain atrophy, as measured by CSF volume, was significantly correlated with both retinal thinning (p<0.01 for both RNFL and GCIPL).



NP and CSF: There were no similar correlations with NP domain scores or with CSF NFL, IL-6, or TNF-alpha

CONCLUSIONS

Significance: OCT shows retinal thinning in a research cohort of PLWH compared to controls. Additionally, in PLWH, OCT is a biomarker of central brain volume loss.

- As a research tool, it has the potential to easily, reliably, and quantitatively serve as a surrogate for brain volume measurements without MRI.
- As a clinical tool, longitudinal follow up is needed to assess whether retinal thinning is a marker for cognitive decline.