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Retinal layer thinning after optic neuritis as a predictor of future relapse remission in relapsing multiple sclerosis

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Background

Remission of relapses is an important contributor to both short- and long-term prognosis in relapsing multiple sclerosis (RMS) and dependent of the degree of irreversible neuroaxonal damage.
In MS-associated acute optic neuritis (ON), retinal layer thinning measured by optical coherence tomography (OCT) is a reliable biomarker of both functional recovery and the degree of neuroaxonal damage. However, prediction of non-ON relapse remission is challenging.

Objective

We aimed to investigate **whether retinal thinning after ON could predict relapse remission after subsequent non-ON relapses.**

Patients and Methods

For this longitudinal observational study from the Vienna MS database (VMSD), we included MS patients with
1) an **episode of acute ON**
2) available spectral-domain **OCT** scans within **1 week** after ON onset **and 3-6 months after ON**
3) at least **one non-ON relapse after the ON episode**.
Subsequent non-ON relapses were classified as displaying either **complete or incomplete remission** based on change in expanded disability status scale (EDSS) assessed 6 months post-relapse.
Impact of retinal thinning in peripapillary retinal nerve fiber layer (pRNFL) and macular ganglion-cell-and-inner-plexiform-layer (GCIPL) for prediction of incomplete remission was tested by multivariate logistic regression models adjusting for age, sex, disease duration, baseline EDSS, time to steroid treatment, and DMT status with internal bootstrap cross-validation.

Results

We analyzed 167 MS patients (mean age 36.5 years [SD 12.3], 71.2% female, mean disease duration 5.4 years [SD 6.2]) during a mean observation period of 3.4 years (SD 2.8) after the ON episode.
Mean retinal thinning after ON was 43.1µm (SD 45.2) in pRNFL and 12.1µm (SD 8.2) in GCIPL. In 61 patients (36.5%) at least one relapse showed incomplete remission.
In the multivariable models, **incomplete remission was predicted by GCIPL thinning** after ON independently explaining 29% of variance with a **2-fold increase of risk per each 5µm loss in GCIPL**.
pRNFL was also associated, although with both less effect size and explaining less variance.

Table 1. Probability of incomplete relapse remission depending on the degree of retinal thinning after previous optic neuritis.

	Probability of incomplete relapse remission			
	Odds ratio (OR)	95% CI	p-value	Explanation of variance ($R^{2)}$
GCIPL thinning after previous ON (per 5µm)	2.4	1.4 – 4.1	<0.001	29% (0.29)
	Adjusted for sex, age, disease duration, EDSS at baseline, time to steroid treatment and DMT status. Overall model: R^2 0.682; p<0.001			
pRNFL thinning after previous ON (per 10µm)	1.9	1.1 – 3.2	0.041	12% (0.12)
	Adjusted for sex, age, disease duration, EDSS at baseline, time to steroid treatment and DMT status. Overall model: R^2 0.513; p<0.001			

Conclusion

Retinal layer thinning after optic neuritis may be useful as a predictor of future relapse remission in relapsing multiple sclerosis, potentially informing treatment strategy.

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Disclosures

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