

## **Spinal cord and infratentorial lesions in radiologically isolated syndrome are associated with decreased retinal ganglion cell/inner plexiform layer thickness**

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### **Objective:**

To assess retinal layer thicknesses in radiologically isolated syndrome (RIS) and examine their associations with clinical features suggestive of increased risk for conversion to multiple sclerosis (MS).

### **Background:**

The anterior visual pathway is a frequent site of subclinical involvement in MS, however the role of retinal imaging with optical coherence tomography (OCT) in assessing individuals with RIS remains largely unexplored.

**Design/Methods:** Thirty RIS subjects, fulfilling 2009 Okuda diagnostic criteria, and 60 age- and sex-matched healthy controls (HC) underwent retinal imaging with spectral-domain OCT. Retinal layer thicknesses were derived utilizing a validated automated segmentation algorithm.

### **Results:**

Overall, retinal layer thicknesses did not differ between RIS and HC. However, RIS subjects with spinal cord (SC) lesions had lower ganglion cell + inner plexiform layer (GCIP) thickness compared to HC ( $-4.41\mu\text{m}$ ; 95% CI  $-7.61$  to  $-1.20\mu\text{m}$ ;  $p=0.007$ ) and RIS without SC lesions ( $-3.53\mu\text{m}$ ; 95% CI  $-6.93$  to  $-0.14\mu\text{m}$ ;  $p=0.041$ ). Similarly, RIS subjects with infratentorial (IT) brain lesions had lower GCIP thickness compared to HC ( $-4.07\mu\text{m}$ ; 95% CI  $-6.33$  to  $-1.82\mu\text{m}$ ;  $p<0.001$ ) and RIS without IT lesions ( $-3.49\mu\text{m}$ ; 95% CI  $-6.62$  to  $-0.35\mu\text{m}$ ;  $p=0.029$ ). Multivariate analyses revealed that the presence of SC and IT lesions were independently associated with lower GCIP thickness in RIS ( $p=0.04$  and  $p=0.03$  respectively). Other patient characteristics, including sex, abnormal cerebrospinal fluid and presence of gadolinium-enhancing or juxtacortical lesions, were not associated with retinal layer thicknesses.

### **Conclusions:**

The presence of SC or IT lesions in RIS, proposed risk factors for conversion to MS, may be associated with retinal neuro-axonal loss, potentially supporting the presence of more disseminated disease in those RIS subjects. Longitudinal studies of larger cohorts of RIS subjects are necessary to confirm these findings and to evaluate the potential prognostic value of decreased GCIP thickness for conversion to MS.