The optic nerve as a 5th location for dissemination in space for multiple sclerosis criteria: a role for optical coherence tomography

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Background

- The diagnosis of MS is based on a combination of clinical and para-clinical tests
- The potential contribution of OCT has been recognised
- We tested the feasibility of OCT measures of retinal asymmetry as a diagnostic test for MS at the community level

Methods

- n=502,656 UK participants aged 40–69 years
- Retinal spectral domain OCT in n=78,505
- Calculate inter-eye difference from n=72,120
  - Percentage (IEPD) as %
  - Absolute (IEAD) as µm
- Calculate diagnostic value of IEPD/IEAD for MS
  for a range of scenarios using the Receiver Operator Characteristics (ROC) Area under the Curve (AUC)

Cohort

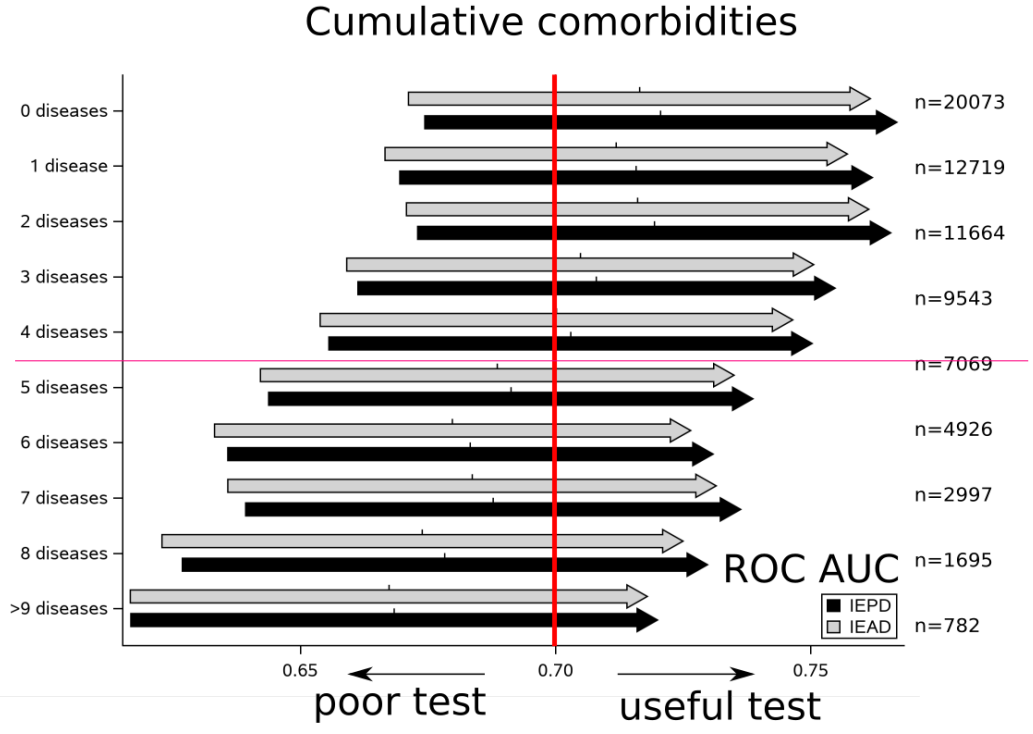
	All controls	MS
N	71,939	144
Age (years)	56.67 ±8.05	55.20±7.82
Female sex	38633 (54%)	110 (74%)
Optic Neuritis	0 (0%)	0 (0%)
mGCIPL OD [µm]	72.36±6.28	67.21±7.04
mGCIPL OS [µm]	72.45±6.23	67.65±7.05
IEPD mGCIPL [%]	2.76±3.56	6.51±6.23
IEAD mGCIPL [µm]	2.03±2.63	4.62±4.62

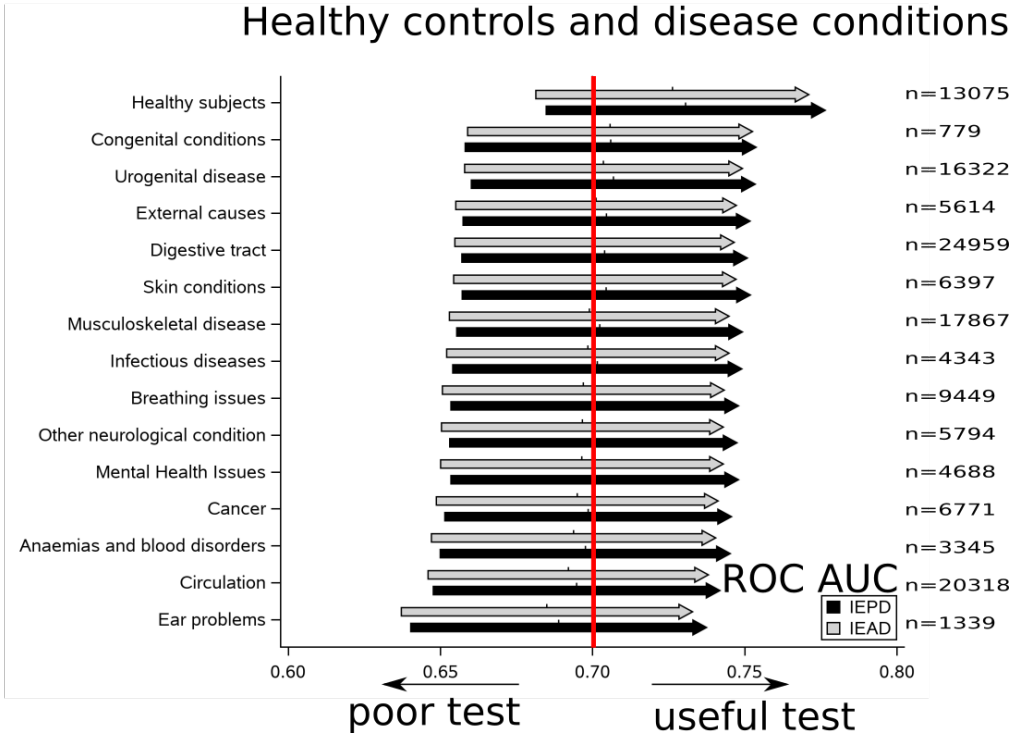
Data also calculated for RNFL and GCC, but of lesser statistical relevance because of lower AUC. See next slide.

The mGCIPL is best

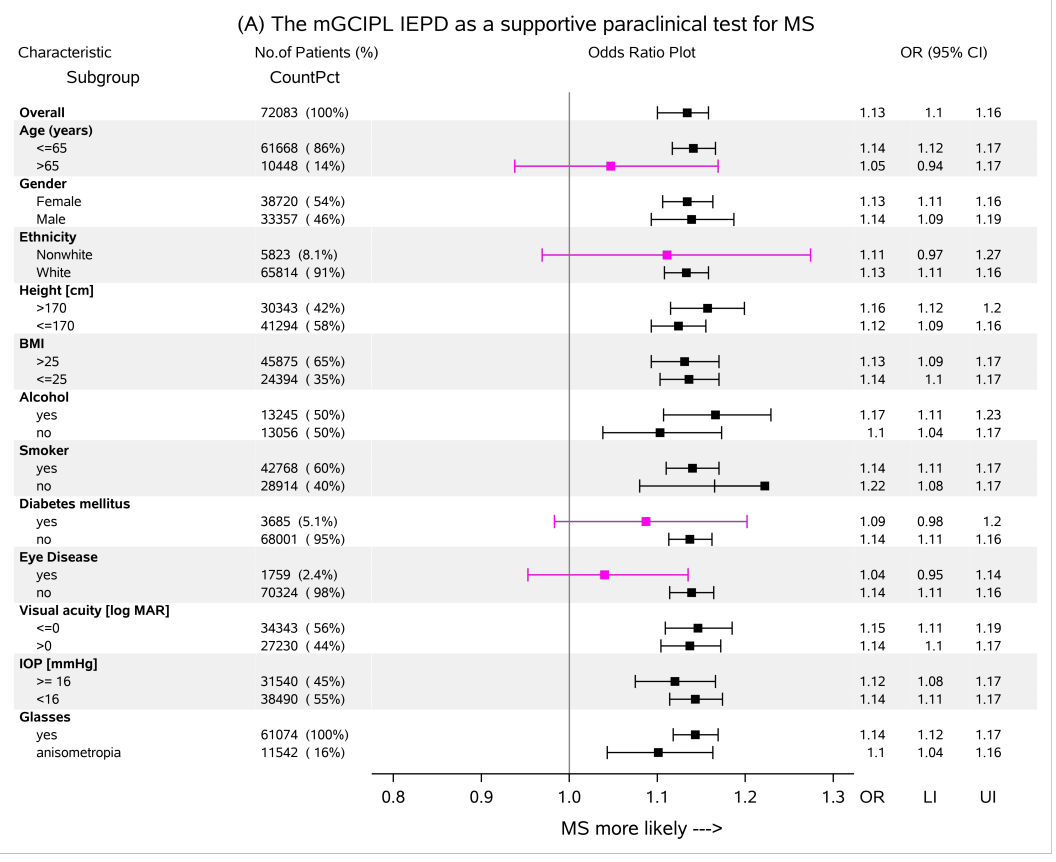
Inter-eye Difference	AUC	95% CI		P-value	P-value
IEPD mGCIPL	0.7110	0.6646	0.7575	reference	0.318
IEAD mGCIPL	0.7075	0.6621	0.7529	0.318	reference
IEPD mGCC	0.6483	0.5979	0.6987	0.0073	0.011
IEAD mGCC	0.6419	0.5925	0.6912	0.003	0.0043
IEPD mRNFL	0.5948	0.5451	0.6445	<.0001	<.0001
IEAD mRNFL	0.5859	0.5383	0.6334	<.0001	<.0001

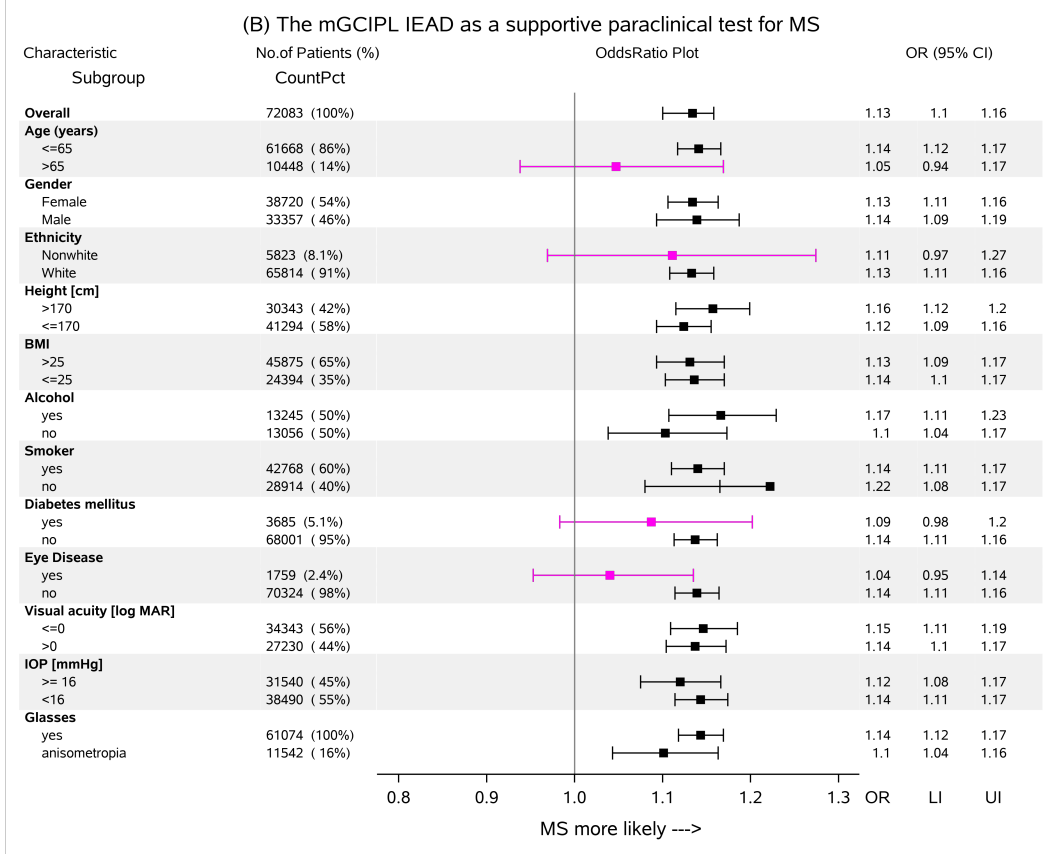
Cumulative comorbidities matter





Forest plot of relevant confounders





Diagnostic sensitivity and specificity of the IEPD/IEAD for MS

mGCIPL	Cut-off	References	Specificity	Sensitivity	PPV	NPV
IEPD	20 %	Petzold et al. 2014	99.4	2.7	0.998	0.01
IEPD	4 %	Coric et al. 2017	82.8	51.7	0.6	99.9
IEAD	4 µm	Nolan-Kenney et al. 2019	86.8	43.5	0.7	99.9

Discussion

- The mGCIPL IEPD / IEAD may be considered as 5th location for dissemination in space for MS (slide 6)
  - in less than 5 comorbidities (slide 7)
  - in absence of confounders (slide 8)
- To be viable, higher sensitivity and specificity levels are needed (slide 9)