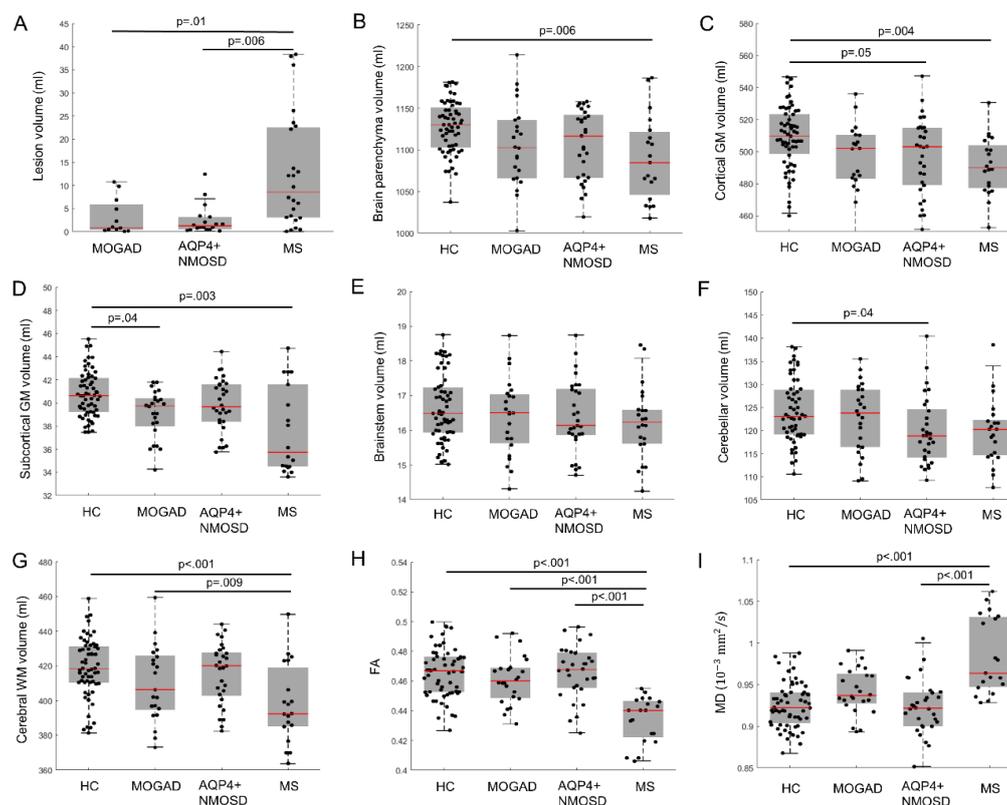


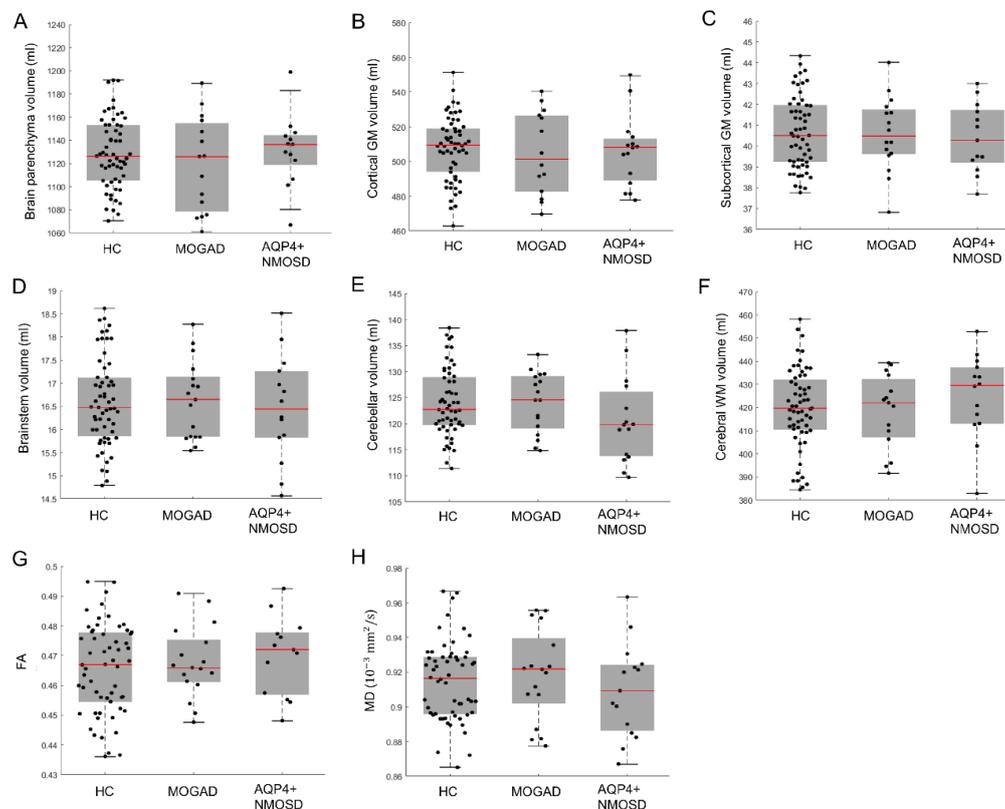
eFigure 1. Structural MRI measures of female subsamples in MOGAD, AQP4+ NMOSD, MS and HC.

Structural MRI measures including (A) lesion volume, (B) brain parenchyma volume, (C) cortical GM volume, (D) subcortical GM volume, (E) brainstem volume, (F) cerebellar volume, (G) cerebral WM volume, (H) FA and (I) MD between HC, MOGAD, AQP4+ NMOSD and MS. Statistical analyses were performed using one-way ANOVA or Kruskal-Wallis tests followed by post-hoc comparison with Bonferroni correction. Significance with two-sided $p < 0.05$ were considered. MRI=magnetic resonance imaging; MOGAD=myelin oligodendrocyte glycoprotein antibody disease; AQP4+ NMOSD=aquaporin 4 antibody positive neuromyelitis optica spectrum diseases; MS=multiple sclerosis; HC, healthy controls; GM=grey matter; WM=white matter; FA=fractional anisotropy; MD=mean diffusivity.



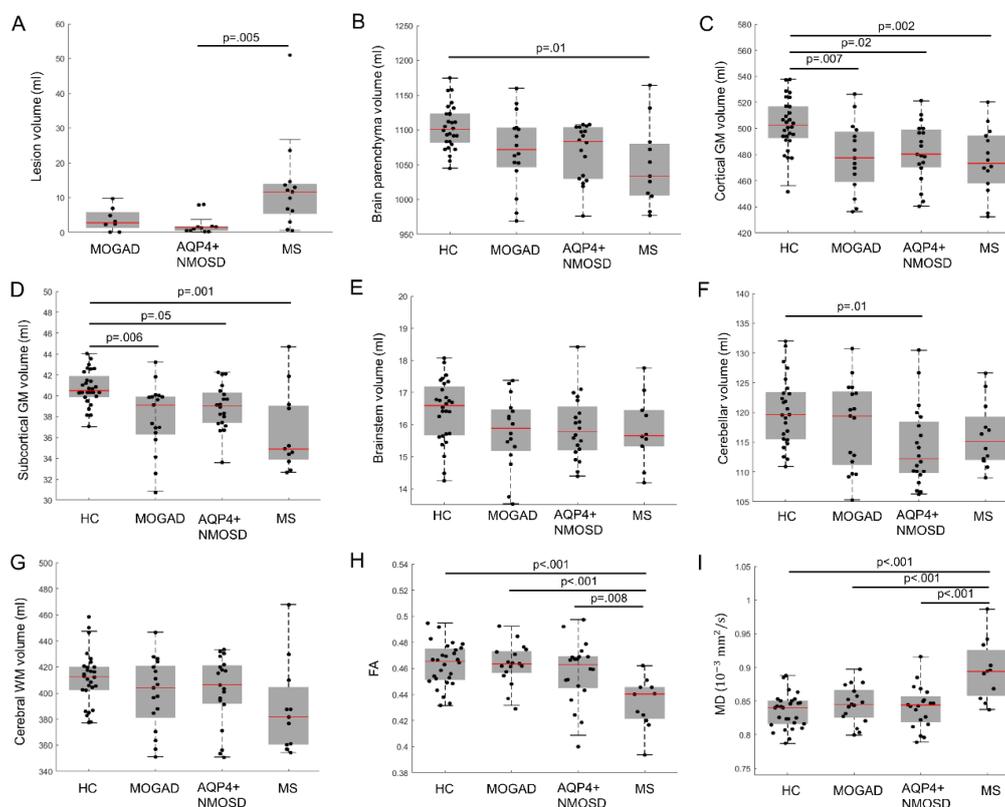
eFigure 2. Structural MRI measures of subsamples in early phase (disease duration less than 3 years) in MOGAD, AQP4+ NMOSD, MS and HC.

Structural MRI measures including (A) lesion volume, (B) brain parenchyma volume, (C) cortical GM volume, (D) subcortical GM volume, (E) brainstem volume, (F) cerebellar volume, (G) cerebral WM volume, (H) FA and (I) MD between HC, MOGAD, AQP4+ NMOSD and MS. Statistical analyses were performed using one-way ANOVA or Kruskal-Wallis tests followed by post-hoc comparison with Bonferroni correction. Significance with two-sided $p < 0.05$ were considered. MRI=magnetic resonance imaging; MOGAD=myelin oligodendrocyte glycoprotein antibody disease; AQP4+ NMOSD=aquaporin 4 antibody positive neuromyelitis optica spectrum diseases; MS=multiple sclerosis; HC, healthy controls; GM=grey matter; WM=white matter; FA=fractional anisotropy; MD=mean diffusivity.



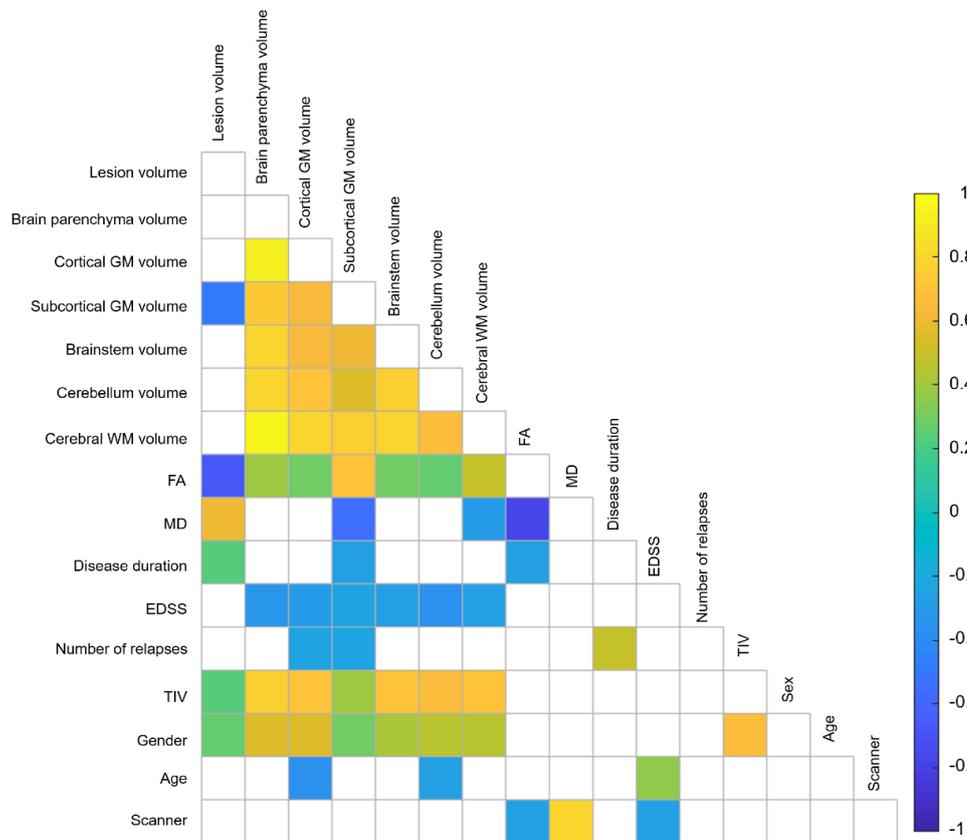
eFigure 3. Structural MRI measures of subsamples without brain lesions in MOGAD, AQP4+ NMOSD and HC.

Structural MRI measures including (A) brain parenchyma volume, (B) cortical GM volume, (C) subcortical GM volume, (D) brainstem volume, (E) cerebellar volume, (F) cerebral WM volume, (G) FA and (H) MD between HC, MOGAD, AQP4+ NMOSD. Statistical analyses were performed using one-way ANOVA or Kruskal-Wallis tests followed by post-hoc comparison with Bonferroni correction. MRI=magnetic resonance imaging; MOGAD=myelin oligodendrocyte glycoprotein antibody disease; AQP4+ NMOSD=aquaporin 4 antibody positive neuromyelitis optica spectrum diseases; MS=multiple sclerosis; HC, healthy controls; GM=grey matter; WM=white matter; FA=fractional anisotropy; MD=mean diffusivity.



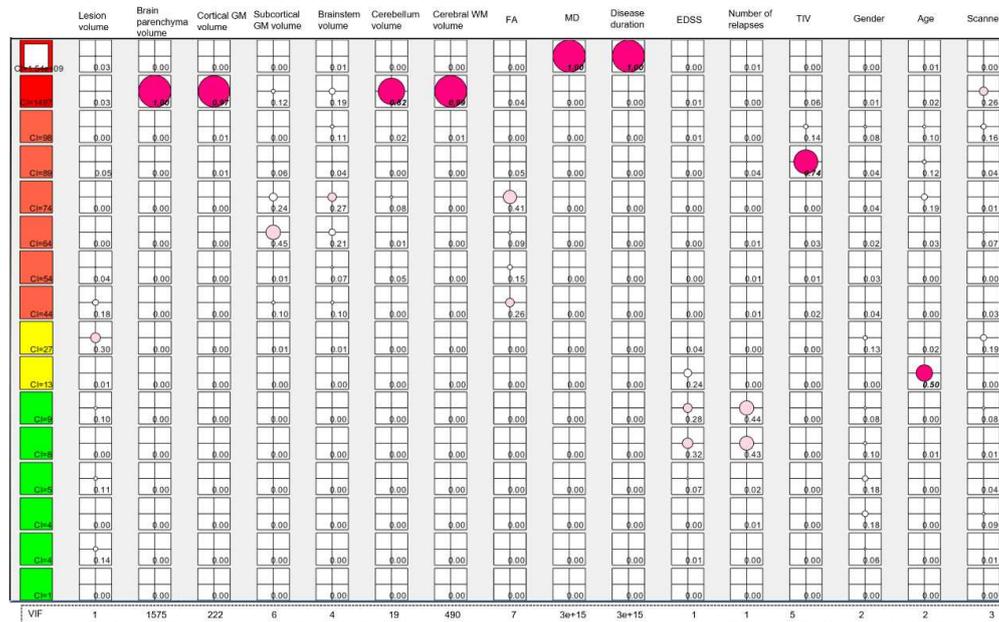
eFigure 4. Structural MRI measures of single centre subsamples (centre 1) in MOGAD, AQP4+ NMOSD, MS and HC.

Structural MRI measures including (A) lesion volume, (B) brain parenchyma volume, (C) cortical GM volume, (D) subcortical GM volume, (E) brainstem volume, (F) cerebellar volume, (G) cerebral WM volume, (H) FA and (I) MD between HC, MOGAD, AQP4+ NMOSD and MS. Statistical analyses were performed using one-way ANOVA or Kruskal-Wallis tests followed by post-hoc comparison with Bonferroni correction. Significance with two-sided $p < 0.05$ were considered. MRI=magnetic resonance imaging; MOGAD=myelin oligodendrocyte glycoprotein antibody disease; AQP4+ NMOSD=aquaporin 4 antibody positive neuromyelitis optica spectrum diseases; MS=multiple sclerosis; HC, healthy controls; GM=grey matter; WM=white matter; FA=fractional anisotropy; MD=mean diffusivity.



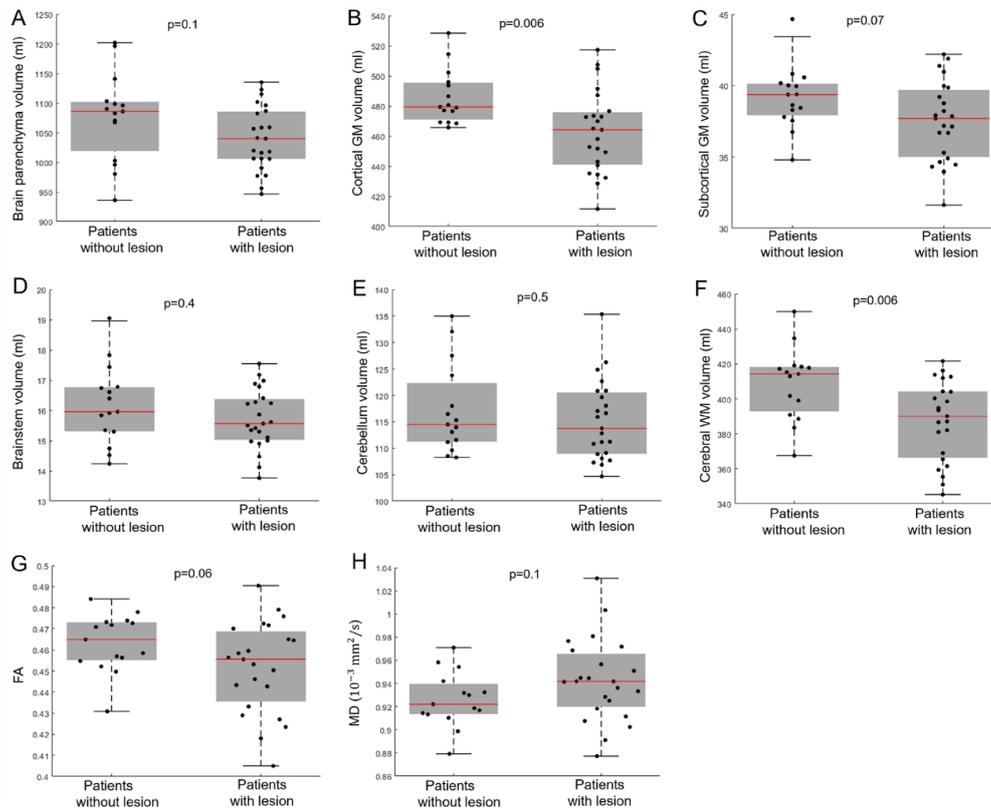
eFigure 5. Covariance matrix of the MRI and clinical variables in MOGAD, AQP4+ NMOSD and MS.

These variables were considered in the univariate logistic and forward step-wise logistic regression models. Pair-wise Pearson's correlation was used for the inter-variables correlation matrix. GM=grey matter; WM=white matter; FA=fractional anisotropy; MD=mean diffusivity, EDSS, expanded disability status scale, TIV, total intracranial volume.



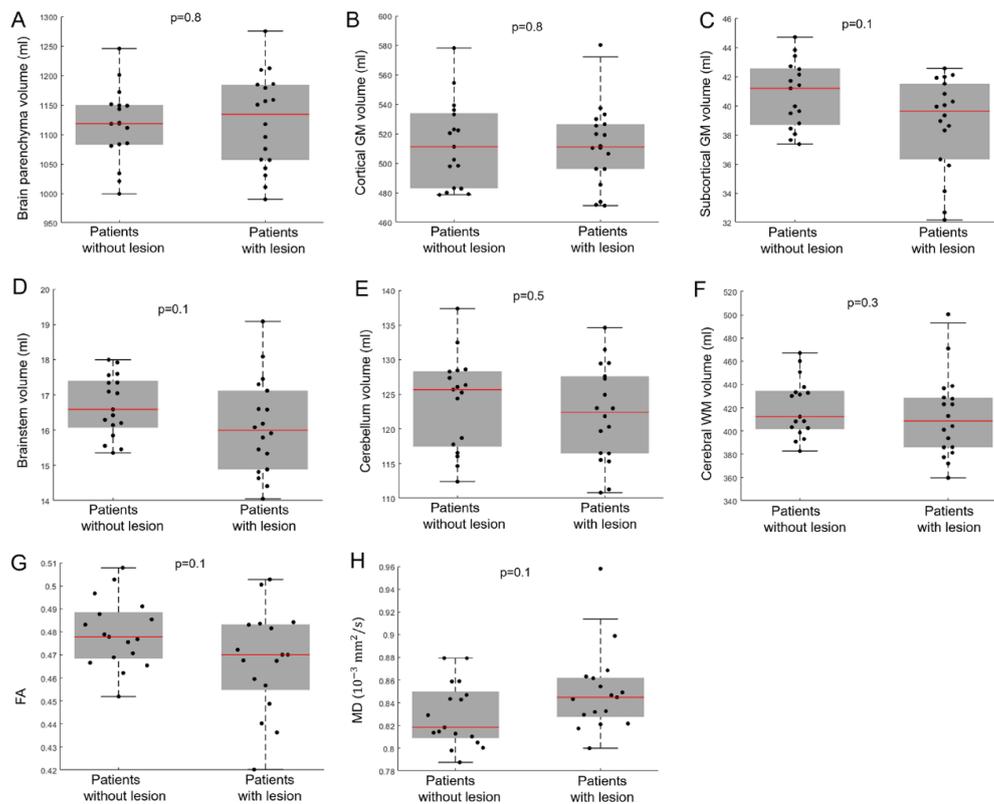
eFigure 6. Tableplot of condition indices (CI), variance proportions and variance inflation factor (VIF) for the MRI and clinical variables.

In column 1, the square symbols are scaled relative to a maximum condition index of $2e+09$ and color indicated the CI range (red, $CI > 100$; orange, $30 < CI \leq 100$; yellow, $10 < CI \leq 30$; green, $CI \leq 10$). In the remaining columns, variance proportions are shown as circles scaled relative to 1 and color indicated the ranges (red, variance proportion ≥ 0.5 ; pink, $0.2 \leq$ variance proportion < 0.5 ; white, variance proportion < 0.2). A $VIF \geq 10$ indicated a high collinearity of the variable in the regression model.



eFigure 7. The structural MRI measures between AQP4+ NMOSD patients with and without brain lesions.

Statistical analyses were performed using Student's t-test. MRI measurements were adjusted for total intracranial volume (only for volume measurements), gender, age and scanner type. Significance with two-sided $p < 0.05$ were considered. AQP4+ NMOSD=aquaporin 4 antibody positive neuromyelitis optica spectrum diseases; GM=grey matter; WM=white matter; FA=fractional anisotropy; MD=mean diffusivity.



eFigure 8. The structural MRI measures between MOGAD patients with and without brain lesions.

Statistical analyses were performed using Student's t-test. MRI measurements were adjusted for total intracranial volume (only for volume measurements), gender, age and scanner type. Significance with two-sided $p < 0.05$ were considered. MOGAD=myelin oligodendrocyte glycoprotein antibody disease; GM=grey matter; WM=white matter; FA=fractional anisotropy; MD=mean diffusivity.

eTable 1 Univariate logistic regression using unadjusted MRI and clinical variables.

	Odds ratio	95% CI		p value	Accuracy (%)	Sensitivity (%)	Specificity (%)	AUC
		Lower Bound	Upper Bound					
MOGAD vs AQP4+								
NMOSD								
Lesion_volume (ml)	1.049	1.033	1.071	0.26	56	29	82	0.48
Brain parenchyma volume (ml)	1.0062	1.0049	1.0081	0.018	67	63	71	0.67
Cortical GM volume (ml)	1.017	1.015	1.021	0.0033	67	57	76	0.70
Subcortical GM volume (ml)	1.12	1.082	1.18	0.082	64	77	53	0.64
Brainstem volume (ml)	1.16	1.078	1.27	0.26	60	63	58	0.58
Cerebellum volume (ml)	1.05	1.038	1.066	0.022	67	69	66	0.66
Cerebral WM volume (ml)	1.011	1.0078	1.015	0.063	66	91	42	0.64
FA	1.1e+12	3.19e+9	1.33e+16	0.014	66	71	61	0.69
MD (10 ⁻³ mm ² /s)	1.10e-06	5.49e-08	5.19e-06	<0.001	73	91	55	0.74
Disease duration (year)	1.028	0.98	1.075	0.70	58	26	87	0.42
EDSS	0.8	0.74	0.87	0.12	60	46	74	0.59
Number of relapse	1.099	1.012	1.18	0.47	58	17	95	0.48
TIV (ml)	1.0038	1.0029	1.0051	0.035	68	54	82	0.63
Gender	3.56	2.57	5.16	0.024	63	40	84	0.59
Age (year)	0.99	0.98	1.0031	0.66	58	31	82	0.54
Scanner	1.63e-45	1.39e-45	1.91e-45	1	73	10	47	0.47
MOGAD vs AQP4+ without brain lesion								
Brain parenchyma volume (ml)	1.00045	1	1.0029	0.9	56	65	47	0.50
Cortical GM volume (ml)	1.0068	1.0017	1.013	0.41	60	65	60	0.57
Subcortical GM volume (ml)	1.089	1.011	1.19	0.46	69	88	47	0.60
Brainstem volume (ml)	0.97	0.84	1.11	0.88	63	94	27	0.49
Cerebellum volume (ml)	1.036	1.012	1.065	0.35	63	76	47	0.57
Cerebral WM	1	0.991	1.0027	0.74	63	59	67	0.55

volume (ml)								
FA	5.80e+18	1.48e+14	1.36e+25	0.055	69	100	33	0.68
MD (10 ⁻³ mm ² /s)	4.27e-09	1.85e-11	9.11e-08	0.029	75	100	47	0.72
Disease duration (year)	1.017	0.95	1.098	0.85	53	18	93	0.42
EDSS	0.74	0.63	0.83	0.14	72	100	40	0.63
Number of relapse	0.87	0.66	1.039	0.57	59	88	27	0.52
TIV (ml)	1	0.99	1.0017	0.99	69	53	87	0.55
Gender	1.15	0.68	2.037	0.86	50	29	73	0.47
Age (year)	0.96	0.93	0.98	0.24	63	35	93	0.64
Scanner	1.51e-45	1.07e-45	1.98e-45	1	72	100	40	0.40
MOGAD vs MS								
Lesion_volume (ml)	0.93	0.89	0.95	0.0084	82	80	84	0.84
Brain_parechyma volume (ml)	1.0033	1.0023	1.0046	0.089	63	97	30	0.63
Cortical GM volume (ml)	1.0076	1.0053	1.01	0.084	61	94	30	0.6
Subcortical GM volume (ml)	1.18	1.152	1.23	0.0013	75	80	70	0.74
Brainstem volume (ml)	1.11	1.041	1.2	0.35	61	83	41	0.56
Cerebellum volume (ml)	1.025	1.015	1.038	0.16	64	74	54	0.61
Cerebral WM volume (ml)	1.0085	1.0061	1.012	0.059	69	91	49	0.65
MOGAD vs MS (continued)								
FA	2.74e+33	1.74e+30	4.15e+42	<0.001	89	86	92	0.92
MD (10 ⁻³ mm ² /s)	1.94e-10	2.38e-13	1.20e-09	<0.001	90	91	89	0.94
Disease duration (year)	0.94	0.89	0.97	0.34	65	51	78	0.62
EDSS	1.33	1.22	1.49	0.072	61	54	68	0.64
Number of relapse	1.06	0.97	1.14	0.63	58	17	97	0.46
TIV (ml)	1	0.998	1.00054	0.81	56	77	35	0.51
Gender	1.095	0.83	1.44	0.85	51	40	62	0.44
Age (year)	1.017	1.0057	1.03	0.38	57	54	59	0.56
Scanner	1.14e-45	9.39e-46	1.33e-45	1	81	100	62	0.62

Note: MOGAD=myelin oligodendrocyte glycoprotein antibody disease; AQP4+

NMOSD=aquaporin 4 antibody positive neuromyelitis optica spectrum diseases;

MS=multiple sclerosis; GM=grey matter; WM=white matter; FA=fractional anisotropy;

MD=mean diffusivity; TIV, total intracranial volume; EDSS, Expanded Disability Status

Scale; CI=confidence interval; AUC= area under the curve.