Online Table 1: Qualitive scoring criteria used for head-to-head comparison between Standard and Wave-FLAIR

Parameter	Favors image A*			Favors image B*	
	-1	**-2**	**0**	**+1**	**+2**
Conspicuity/visualization of lesions	Lesions are less well visualized/conspicuous on image B and some lesions are missed	Lesions are less well visualized/conspicuous on image B but all lesions are still visualized	Equivalent	Lesions are less well visualized/conspicuous on image A but all lesions are still visualized	Lesions are less well visualized/conspicuous on image A and some lesions are missed
Motion: perceptible motion artifact when the images are optimally windowed	The B image has more motion artifacts that obscure small lesions.	The B image has more motion artifacts but it does not obscure small lesions.	Equivalent	The A image has more motion artifacts but it does not obscure small lesions.	The A image has more motion artifacts that obscures small lesions.
Pulsation artifact	Image B has more artifact and the artifact obscures underlying lesion(s).	Image B has more artifact but no lesions are obscured.	Equivalent	Image A has more artifact but no lesions are obscured.	Image A has more artifact and the artifact obscures underlying lesion(s).
Noise: perceptible noise level when the images are optimally windowed	Background noise of the B image perceptibly greater than the A image and affects the visualization of underlying structures.	Background noise of the B image perceptibly greater than the A image and does not affect the visualization of underlying structures.	Equivalent	Background noise of the A image is perceptibly greater than the B image and does not affect the visualization of underlying structures.	Background noise of the A image is perceptibly greater than the B image and affects the visualization of underlying structures.
Overall diagnostic quality	The B image has poorer image quality and the difference in quality affects the final clinical diagnosis.	The B image has poorer image quality but it does not affect the final clinical diagnosis.	Equivalent	The A image has poorer image quality but it does not affect the final clinical diagnosis.	The A image has poorer image quality and the difference in quality affects the final clinical diagnosis.

*The Standard and Wave-FLAIR sequences were randomly positioned on either the right or left side of the screen, labeled image A and image B.

Online Table 2. Clinical characteristics of the patients

Characteristics	Whole cohort (n=42)	Included in Quantitative Analysis (N=36)*
Female (%)	33 (78.6%)	28 (77.8%)
Age (year) (mean and range)	44.5 (23-78)	44.8 (23-78)
20-ch Coil (%)	36 (85.7%)	30 (83.3%)
Study indication		
Rule out demyelinating disease	18 (42.9%)	14 (38.9%)
Follow up of demyelinating disease	23 (54.8%)	21 (58.3%)
Other	1 (2.4%)	1 (2.8%)
Order of the sequences		
Standard before Wave-FLAIR (%)	22 (52.4%)	17 (47.2%)

*Six patients were excluded from the LST quantitative analysis due to absence of detectable lesions and/or severe motion artifact resulting in failure of the automated LST processing stream.

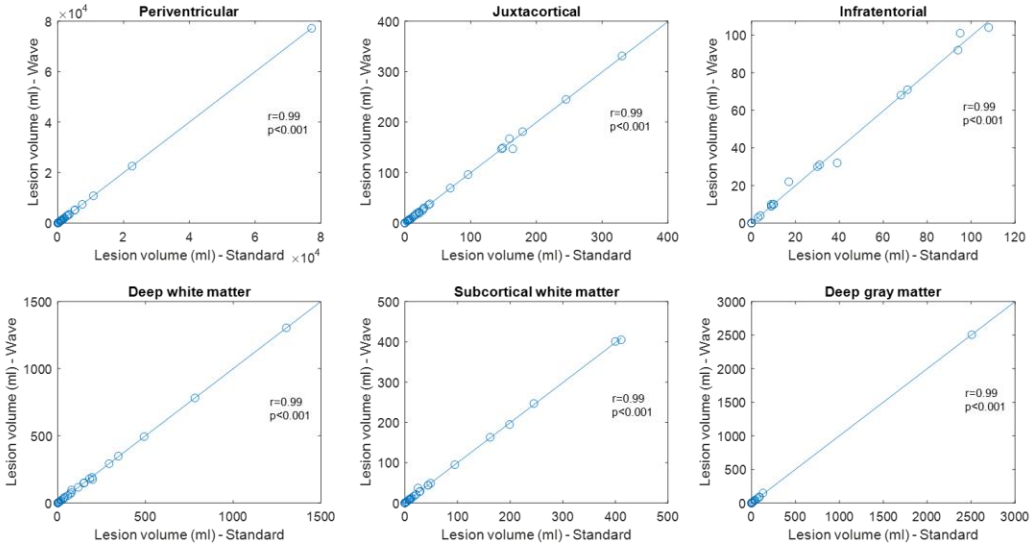
Online Table 3: Comparison of lesion volume in different brain regions as assessed on Standard and Wave-FLAIR images.

	Standard		WAVE		t-test	ICC	LVD	DSC
Brain regions	Lesions in all patients (mm^3)	Mean (SD)	Lesions in all patients (mm^3)	Mean (SD)	p-value	ICC	Mean (SD)	Mean (SD)
Whole brain	167800	4661.1 (13185)	168130	4670.4 (13180)	0.99	0.99	0.01 (0.05)	0.97 (0.05)
Periventricular	155789	4327.47 (13180.40)	156121	4336.69 (13175.96)	0.99	0.99	0.014 (0.06)	0.99 (0.03)
Juxtacortical	1892	52.56 (79.20)	1881	52.25 (79.14)	0.98	0.99	-0.012 (0.05)	0.91 (0.25)
Infratentorial	617	17.14 (30.64)	616	17.11 (30.50)	0.99	0.99	0.014 (0.09)	0.84 (0.32)
Deep white matter	4654	129.28 (259)	4650	129.17 (259.18)	0.99	0.99	0.005 (0.06)	0.98 (0.05)
Subcortical white matter	1852	51.44 (104)	1857	51.58 (103.42)	0.99	0.99	0.014 (0.1)	0.95 (0.19)
Deep gray matter	2995	83.19 (416.66'	3017	83.81 (416.73)	0.99	0.99	0.02 (0.05)	0.98(0.05)

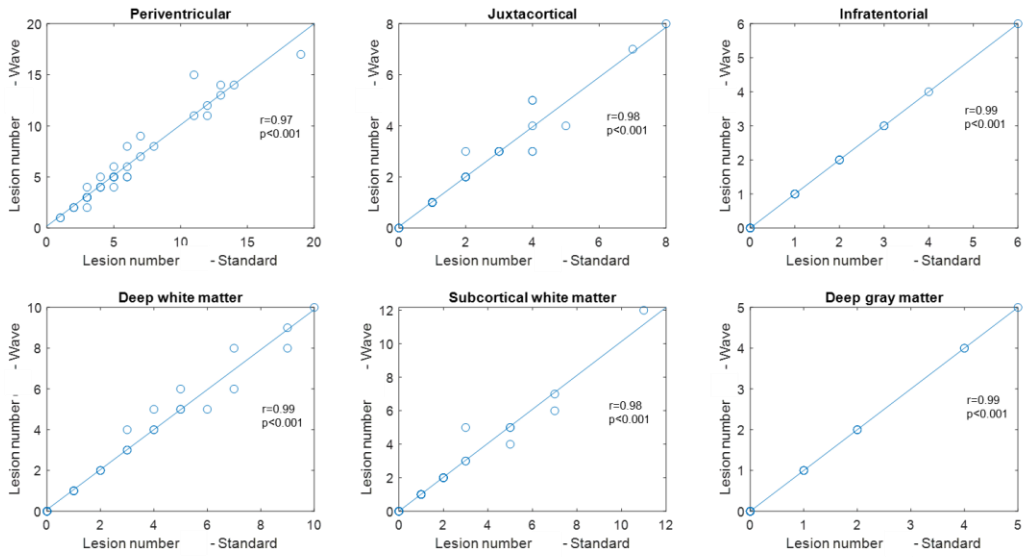
* ICC = intra-class correlation coefficient; LVD = relative lesion volume difference; DSC = Dice similarity coefficient.

Online Table 4: Comparison of number of lesions in brain regions between Standard and Wave-FLAIR

	Standard		**WAVE**		**Student's t-test**
Brain regions	Lesions in all patients (number)	Mean (±SD)	Lesions in all patients (number)	Mean (±SD)	p-value
Whole brain	520	14.4 (9.8)	529	14.7 (9.7)	0.91
Periventricular	223	6.19 (4.25)	228	6.33 (4.33)	0.89
Juxtacortical	79	2.19 (1.89)	79	2.19 (1.89)	0.99
Infra-tentorial	35	0.97 (1.4)	35	0.97 (1.4)	0.99
Deep white matter	99	2.75 (2.9)	100	2.78 (2.9)	0.97
Subcortical white matter	71	1.97 (2.47)	72	2 (2.54)	0.96
Deep gray matter	24	0.67 (1.29)	24	0.67 (1.29)	0.99



Online Figure 1. Scatter plots of lesion volume of Standard versus Wave-FLAIR in each brain region. (r=Pearson's correlation coefficient, p=p value)



Online Figure 2. Scatter plots of lesion number of Standard versus Wave-FLAIR in each brain region. (r=Pearson's correlation coefficient, p=p value)