

**Supplementary table 1.** Attrition analysis on the SLE patients performing the brain MRI analysis vs. SLE patients excluded from the brain MRI analysis showed no major differences between groups.

	Whole SLE cohort (N=33)	Brain MRI SLE cohort (N=20)	p
Age, years mean (DS)	43.5 (14.0)	41.9 (12.2)	0.577
Gender, male	3 (9%)	3 (15%)	0.406
Disease duration, months median (IQR)	124.4 (34.7-305)	176.3 (77.4-417.3)	0.886
SLEDAI-2k, median (IQR)	4 (0-14)	6 (2-10.8)	0.107
SLICC-DI, median (IQR)	0 (0-1)	0 (0-1)	0.078
Anti-P	6 (18.2%)	4 (21.1%)	0.504
Anti-NR2	14 (42.4%)	8 (42.1%)	0.782
C3, mg/dl mean (DS)	89.9 (20.8)	86.6 (24.1)	0.714
C4, mg/dl mean (DS)	13.7 (6.6)	13.4 (5.2)	0.974
Antiphospholipid <sup>#</sup>	11 (33.3%)	10 (52.6%)	0.126
anti-dsDNA	18 (54.5%)	10 (50%)	0.502
Anti-Ro/SSA	16 (48.5%)	6 (31.6%)	0.021
Anti-La/SSB	4 (12.1%)	2 (10.5%)	0.813
Anti-RNP	11 (33.3%)	4 (21.1%)	0.024
anti-Sm	10 (30.3%)	5 (26.3%)	0.635
SF-12 questionnaire, median (IQR)	35.0 (31.0-37.0)	32 (21.0-36.0)	0.835
SF-12 MCS, median (IQR)	19.0 (21.0-16.5)	18 (13.8-20.0)	0.014
SF-12 PCS, median (IQR)	14.5 (13.0-17.0)	14.5 (11.8-17.3)	0.059
Dose PDN mg/daily, median (IQR)	6.4 (3.8-13.5)	8.1 (3.9-14.5)	0.566

Unless otherwise specified, values are absolute numbers, and values in brackets are percentages.

# Lupus anticoagulant and/or anticardiolipin IgM/IgG and/or anti-B2glycoprotein1 IgM/IgG. MCS : mental component summary PCS : physical component summary.

**Supplementary table 2.** Table reporting the results of the resting-state functional connectivity (rs-fc) MRI analysis of the effects of Anti-P serum levels on cerebral networks, according to brain theory, using the CONN's default atlas for mapping the regions. The significant results ( $p$ -FDR < 0.05) of the correlation between two region of interest to region of interest are reported for each property of the brain (as represented in figure 2).

Average path length						
ROI (according to the Conn's default atlas)	beta	T	dof	p-unc	p-FDR	

Network	<0.01	2.99	8	0.017219	-
atlas.pTFusC l (Temporal Fusiform Cortex, posterior division Left) x,y,z = (-36,-30,-25) mm	0.01	9.13	8	0.000017	0.00111
<b>atlas.pPaHC l (Parahippocampal Gyrus, posterior division Left) x,y,z = (-22,-32,-17) mm</b>	<0.01	9.12	8	0.000017	0.00111
atlas.Accumbens r (Accumbens Right) x,y,z = (9,12,-7) mm	0.01	8.58	8	0.000026	0.001158
atlas.toITG l (Inferior Temporal Gyrus, temporooccipital part Left) x,y,z = (-52,-53,-17) mm	<0.01	7.64	8	0.000061	0.002013
atlas.SubCalC (Subcallosal Cortex) x,y,z = (-0,21,-15) mm	<0.01	7.32	8	0.000083	0.002179
atlas.Ver6 (Vermis 6) x,y,z = (1,-66,-16) mm	<0.01	6.44	8	0.0002	0.004308
atlas.MedFC (Frontal Medial Cortex) x,y,z = (0,43,-19) mm	<0.01	6.21	8	0.000257	0.004308
atlas.Cereb1 l (Cerebelum Crus1 Left) x,y,z = (-36,-66,-30) mm	<0.01	6.19	8	0.000261	0.004308
atlas.Ver3 (Vermis 3) x,y,z = (1,-40,-11) mm	<0.01	5.91	8	0.000356	0.005225
atlas.Ver12 (Vermis 1 2) x,y,z = (1,-39,-20) mm	0.01	5.09	8	0.000936	0.012361
atlas.Cereb2 l (Cerebelum Crus2 Left) x,y,z = (-29,-73,-38) mm	<0.01	4.64	8	0.001675	0.018863
atlas.Cereb6 r (Cerebelum 6 Right) x,y,z = (24,-58,-25) mm	<0.01	4.62	8	0.001715	0.018863
atlas.Ver45 (Vermis 4 5) x,y,z = (1,-52,-7) mm	<0.01	4.19	8	0.003027	0.030732
atlas.Cereb10 l (Cerebelum 10 Left) x,y,z = (-23,-34,-42) mm	0.01	4.29	7	0.003602	0.033959
atlas.Cereb1 r (Cerebelum Crus1 Right) x,y,z = (38,-67,-30) mm	<0.01	3.93	8	0.004362	0.036503
atlas.Ver9 (Vermis 9) x,y,z = (1,-55,-35) mm	<0.01	3.92	8	0.004431	0.036503
atlas.sLOC l (Lateral Occipital Cortex, superior division Left) x,y,z = (-32,-73,38) mm	<0.01	3.86	8	0.004779	0.036503
atlas.Ver8 (Vermis 8) x,y,z = (1,-64,-34) mm	<0.01	3.84	8	0.004978	0.036503
atlas.sLOC r (Lateral Occipital Cortex, superior division Right) x,y,z = (33,-71,39) mm	<0.01	3.79	8	0.005344	0.037124
atlas.Hippocampus l x,y,z = (-25,-23,-14) mm	<0.01	3.62	8	0.006794	0.044841
atlas.OFusG l (Occipital Fusiform Gyrus Left) x,y,z = (-27,-77,-14) mm	<0.01	3.58	8	0.007158	0.044993
atlas.Cereb10 r (Cerebelum 10 Right) x,y,z = (26,-34,-41) mm	<0.01	3.71	7	0.007572	0.045433

Global efficiency					
ROI (according to the Conn's default atlas)	beta	T	dof	p-unc	p-FDR
Network	<0.01	-2.2	8	0.05756	-
atlas.pPaHC l (Parahippocampal Gyrus, posterior division Left) x,y,z = (-22,-32,-17) mm	<0.01	-6	8	0.000338	0.034656
atlas.Ver45 (Vermis 4 5) x,y,z = (1,-52,-7) mm	<0.01	-5.5	8	0.000602	0.034656
atlas.Ver6 (Vermis 6) x,y,z = (1,-66,-16) mm	<0.01	-5	8	0.001013	0.034656
atlas.Accumbens r (Accumbens Right) x,y,z = (9,12,-7) mm	<0.01	-4.8	8	0.001361	0.034656
atlas.SubCalC (Subcallosal Cortex) x,y,z = (-0,21,-15) mm	<0.01	-4.7	8	0.001559	0.034656
atlas.toITG l (Inferior Temporal Gyrus, temporooccipital part Left) x,y,z = (-52,-53,-17) mm	<0.01	-4.7	8	0.001575	0.034656
atlas.pTFusC l (Temporal Fusiform Cortex, posterior division Left) x,y,z = (-36,-30,-25) mm	<0.01	-4.4	8	0.002266	0.042735
atlas.Cereb1 l (Cerebelum Crus1 Left) x,y,z = (-36,-66,-30) mm	<0.01	-4.2	8	0.003186	0.047967
<b>atlas.MedFC (Frontal Medial Cortex) x,y,z = (0,43,-19) mm</b>	<0.01	-4.1	8	0.00327	0.047967

Local efficiency					
ROI (according to the Conn's default atlas)	beta	T	dof	p-unc	p-FDR
Network	<0.01	1.05	8	0.326157	-
atlas.Ver3 (Vermis 3) x,y,z = (1,-40,-11) mm	<0.01	-6.7	8	0.000153	0.018014
atlas.MedFC (Frontal Medial Cortex) x,y,z = (0,43,-19) mm	<0.01	-6.2	8	0.000273	0.018014

Betweenness centrality					
ROI (according to the Conn's default atlas)	beta	T	dof	p-unc	p-FDR
Network	<0.01	3.06	8	0.015592	-
atlas.LG r (Lingual Gyrus Right) x,y,z = (14,-63,-5) mm	<0.01	10.2	8	0.000007	0.000957
atlas.Ver10 (Vermis 10) x,y,z = (0,-46,-32) mm	<0.01	6.06	8	0.000304	0.015764
atlas.Putamen r (Putamen right) x,y,z = (25,2,0) mm	<0.01	5.91	8	0.000358	0.015764
atlas.OFusG r (Occipital Fusiform Gyrus Right) x,y,z = (27,-75,-12) mm	<0.01	5.18	8	0.000838	0.02766
atlas.Pallidum l (Pallidum Left) x,y,z = (-19,-5,-1) mm	<0.01	4.79	8	0.001381	0.03212
atlas.IFG tri r (Inferior Frontal Gyrus, pars triangularis Right) x,y,z = (52,28,8) mm	<0.01	4.74	8	0.00146	0.03212
atlas.aSMG l (Supramarginal Gyrus, anterior division Left) x,y,z = (-57,-33,37) mm	<0.01	4.36	8	0.002403	0.045322

Degree					
ROI (according to the Conn's default atlas)	beta	T	dof	p-unc	p-FDR
Network	<0.01	-0.3	8	0.774631	-
atlas.IFG tri l (Inferior Frontal Gyrus, pars triangularis Left) x,y,z = (-50,28,9) mm	0.14	5.86	8	0.000377	0.044299
atlas.IC l (Insular Cortex Left) x,y,z = (-36,1,0) mm	<0.01	4.87	8	0.001243	0.044299
atlas.Ver45 (Vermis 4 5) x,y,z = (1,-52,-7) mm	-0.11	-4.7	8	0.001548	0.044299
atlas.FO l (Frontal Operculum Cortex Left) x,y,z = (-40,18,5) mm	0.14	4.68	8	0.001576	0.044299
atlas.IFG oper l (Inferior Frontal Gyrus, pars opercularis Left) x,y,z = (-51,15,15) mm	0.16	4.63	8	0.001678	0.044299

Cost					
ROI (according to the Conn's default atlas)	beta	T	dof	p-unc	p-FDR
Network	<0.01	0	8	NaN	-
atlas.IFG tri l (Inferior Frontal Gyrus, pars triangularis Left) x,y,z = (-50,28,9) mm	<0.01	5.86	8	0.000377	0.044299
atlas.IC l (Insular Cortex Left) x,y,z = (-36,1,0) mm	<0.01	4.87	8	0.001243	0.044299
atlas.Ver45 (Vermis 4 5) x,y,z = (1,-52,-7) mm	<0.01	-4.7	8	0.001548	0.044299
atlas.FO l (Frontal Operculum Cortex Left) x,y,z = (-40,18,5) mm	<0.01	4.68	8	0.001576	0.044299
atlas.IFG oper l (Inferior Frontal Gyrus, pars opercularis Left) x,y,z = (-51,15,15) mm	<0.01	4.63	8	0.001678	0.044299

Clustering coefficient					
ROI (according to the Conn's default atlas)	beta	T	dof	p-unc	p-FDR
Network	<0.01	1.19	8	0.267329	-