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| **Supplementary Table 1. Autoantibodies related with human NPSLE** | | | | |
| **Specific target** | **Tested in** | **Mechanism/Function** | **Association** | **Reference** |
| ***Neuronal cells and constituents*** | | | | |
| Neurons (anti-neuronal Ab) | Serum/CSF | Reaction to neuronal components | Lupus psychosis and diffuse NP-SLE. May correlate with CNS activity | (1-10) |
| Brain reactive autoantibodies (anti-BRAAs) | Serum | Antibodies binding integral membrane proteins of the brain | Psychosis and/or seizures | (11, 12) |
| Gangliosides (AGA) | Serum/CSF | Leakage of the BBB and bind to neuronal gangliosides to create a neuromuscular block | Cognitive dysfunction, depression, peripheral neuropathy and headache | (13-18) |
| Neurofilament (anti-alpha internexin) | Serum/CSF | Cortical and hippocampal neuron apoptosis | NPSLE | (19, 20) |
| Microtubule-associated protein 2 (anti-MAP2) | Serum/CSF | MAP2 is important in the control of cytoskeletal integrity and neuronal functions | Diffuse manifestations | (21-23) |
| Glial fibrillary acid protein (anti-GFAP) | Serum | Antibodies directed against glial cell-related antigens | Organic/major type | (24-26) |
| N-Methyl-D-Aspartate receptor (Anti-NMDA, Anti-NR2A/B) | Serum/CSF | Autoantibody against receptor/Hippocampus and amygdala atrophy. Apoptosis | Diffuse NPSLE. No association with NP syndromes. | (27-31) |
| Gamma-aminobutyric acid type B receptors (Anti-GABA) | Serum/CSF | Autoantibodies have a disruptive effect on GABA-mediated immune response | NPSLE | (32) |
| Serum lymphocytotoxic antibodies (Anti-LCA) | Serum | Activity against neurons in the cortex, cerebellum, and caudate nucleus | NPSLE. Cognitive impairment. | (33-35) |
| Triosephosphate isomerase (Anti-TPI) | Serum/CSF | Microtubule stabilization | NPSLE. Higher frequency aseptic meningitis | (23, 36) |
| Brain synaptosomal (anti-BS) | Serum | Antibodies binding components of synaptosoma (not well defined) | NPSLE | (37) |
| CNS tissue (Anti-CNS) | Serum | Organ-specific Abs against epitopes of CNS tissue | Cerebral involvement in connective tissue diseases | (18) |
| Hsp70 (Anti-Hsp70-71) | Serum | Protect brain against ischemia | NPSLE | (23) |
| Alpha-tubulin | Serum | The main component of microtubules | NPSLE | (38) |
| Peroxiredoxin (Anti-PRDX4) | Serum | Protect living cells from oxidative damages. Involved in cell proliferation and differentiation | NPSLE | (39) |
| Ubiquitin carboxyl-terminal Hydrolase isozyme L1 (Anti UCH-L1) | Serum | Involved in neuronal differentiation, synaptic functions, and contextual memory | NPSLE | (39) |
| Splicing factor  arginine/serine-rich 3 (Anti-SFRS3) | Serum | Involved in regulation of alternative splicing of precursor mRNA including its own mRNA | NPSLE | (39) |
| Brain-derived neurotrophic factor (BDNF) | Serum | Support the survival of neurons | Psychiatric symptoms SLE | (40, 41) |
| Aquoporine 4 (AQP-4) | Serum | Complement- and cell-mediated astrocyte cytotoxicity, leads to inflammatory response with oligodendrocyte injury and demyelination | Neuromyelitis optica spectrum disorder (NMOSD)/SLE overlap | (42) |
| Myelin oligodendrocyte glycoprotein (MOG) | Serum | Inflammation and myelin destruction without astrocyte injury | NPSLE | (43) |
| ***Ubiquitous cellular components*** | | | | |
| SSA/Ro | Serum/CSF | Unknown | Psychosis, chorea, cognitive dysfunction. NP damage. | (44, 45) |
| Cardiolipin | Serum/CSF | Thrombotic occlusion, atherosclerosis, endothelial activation, mild inflammation, inhibitory effect on brain cells | Focal NP-SLE. Stroke, seizure and cognitive impairment. | (10) |
| Lupus anticoagulant (LAC) | Serum | Thrombotic occlusion | Focal/Ischemic NP-SLE. Intracranial thrombosis | (10, 46) |
| Ribosomal proteins | Serum/CSF | Cross-react with a neuronal surface protein to initiate calcium influx and apoptosis | NPSLE. Predictor of lupus psychosis. | (10, 46, 47) |
| Sm | CSF | Neural toxicity | NPSLE. Acute confusional state. Seizure, psychiatric disorders, peripheral neuropathy | (48) |
| U1-RNP | CSF | May act as an inducer of pro-inflammatory cytokines. | NPSLE. Psychiatric disorders, peripheral neuropathy | (48, 49) |
| Endothelial cells, Nedd5 | Serum | Nedd5 relocated from cytoplasm to the plasma membrane of EAhy926 endothelial cells after apoptotic stimuli. Endothelial dysfunction | Psychiatric manifestations (Psychosis, mood disorders). Ischemic stroke | (50-52) |
| Histone H1, H2B and H3 | Serum | Immune complexes | NPSLE | (53, 54) |
| S 100 calcium-binding protein B (S100B) | Serum | Marker for brain damage and blood-brain barrier disruption | NPSLE (ACS, seizures, CVA and psychosis). Cognitive impairment in children with SLE | (55-58) |
| Neutrophil gelatinase associated lipocalin (NGAL) | Serum | Neuroinflammatory mediator | NPSLE. Cognitive dysfunction in children with SLE | (59) |
| Nitrate nucleosomes | Serum |  | NPSLE | (60) |
| Anti-Heparan sulfate | Serum |  | NPSLE | (54) |
| Fractalkine (CX3CL1) | Serum/CSF | Chemokine, type 1 transmembrane protein synthesized by endothelial cells, observed in CNS | NPSLE | (61) |
| C1q | Serum |  | Diffuse NPSLE | (62) |
| ***Interleukines*** | | | | |
| IL-1 | CSF/serum |  | NPSLE. Inflammatory NPSLE, demyelination. | (63, 64) |
| IL-6 | CSF/serum |  | NPSLE. Lupus psychosis. Inflammatory NPSLE, demyelination. Multiple ischemic foci. | (63-73) |
| IL-8 | CSF |  | NPSLE | (63, 65-67, 70) |
| IL-10 | CSF and serum |  | No association | (67, 71) |
| IL-17 | CSF |  | NPSLE | (66) |
| Tumor necrosis factor-alpha (TNF-a) | Serum/CSF |  | NPSLE | (63, 65) |
| Interferon-alpha (IFN-a) | CSF |  | NPSLE. Lupus psychosis | (71, 74, 75) |
| Interferon-gamma (IFN-γ) | CSF/Serum |  | NPSLE, multiple ischemic foci | (64) |
| A proliferation-inducing ligand (APRIL) | CSF |  | NPSLE. Relation with fatigue. | (68, 76) |
| B-cell activating factor of TNF family (BAFF) | Serum/CSF |  | NPSLE | (68, 76) |
| ***Chemokines*** | | | | |
| Monocyte chemotactic protein 1 (MCP-1) | CSF |  | NPSLE | (65-67, 77) |
| RANTES | CSF |  | NPSLE | (65, 66) |
| Monokine induced by IFN-γ (MIG) | CSF |  | NPSLE | (65) |
| Interferon-gamma-inducible 10-kd protein (IP-10) | CSF |  | NPSLE | (65, 67) |
| VCAM-1 | CSF |  | NPSLE | (66) |
| P-selectin | CSF |  | NPSLE | (66) |
| G-CSF | CSF |  | NPSLE | (67) |
| α-Klotho | CSF | Single-pass transmembrane protein | NPSLE | (78) |
| Kinin system components (Kininogen fractions, kallikreins, and kininase II) | Serum/CSF |  | NPSLE | (63) |
| Matrix metalloprotease-9 (MMP-9) | Serum/CSF |  | NPSLE. Association with small-vessel cerebral vasculopathy en increased rist of cerebral ischemic events | (79, 80) |
| ***Fibrinolytic factors*** | | | | |
| Plasminogen activator inhibitor 1(PAI-1) | CSF |  | NPSLE | (81) |
| ***Hormones*** | | | | |
| Prolactin (PRL) | CSF |  | NPSLE | (69) |
| ***Complement components*** | | | | |
| Soluble terminal complement complex (TCC) | Serum/CSF |  | No association | (71) |
| C3 and C4 | Serum/CSF |  | C3 low in serum and high in CSF related to inflammatory NPSLE. Low C4 and ischemic NPSLE. | (62, 72, 82, 83) |
| Fluid phase terminal complement complexes (SC5b-9) | Serum/CSF |  | NP-SLE | (84) |
| ***Quotient*** | | | | |
| Quotient of alpha2 macroglobulin (Qα2MG) | CSF | Evaluation blood-brain barrier integrity | BBB integrity (NPSLE) | (72) |
| CNS: central nervous system;CSF: cerebrospinal fluid; NPSLE: Neuropsychiatric systemic lupus erythematosus; | | | | |

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