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**ELISA measurements**

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Histones H1, H2B, and H2A & H4  
Complement C1q\*  
Collagens IV and X  
Aggrecan  
dsDNA\*

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**Clinical**

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Gender  
Age at diagnosis and at sample  
Modified SELENA-SLEDAI  
Physician's global assessment (PGA)#  
White blood cell count (WBC)\*  
Hemoglobin\*  
Platelets  
Absolute lymphocyte count (ALC)\*  
Creatinine  
Complement C3 and C4\*  
Erythrocyte sedimentation rate (ESR)\*

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**Urinalysis**

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Protein:creatinine ratio  
Red blood cells (RBC)\*  
White blood cells (WBC)  
Granular/cellular casts

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**Autoantibodies**

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DNA  
Smith#  
Ribonucleoprotein (RNP)#  
Ro & La#  
Antiphospholipid (APL)#

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**Lupus Criteria#**

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Malar rash  
Discoid rash  
Photosensitivity  
Oral ulcers  
Arthritis  
Serositis  
Renal  
Central nervous system (CNS)  
Hematological  
Autoantibodies  
Antinuclear antibodies (ANA)

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**Supplemental Table S1. Autoantibody and clinical variables.**

\* Variables included in the training set model

# Variables removed prior to LASSO analysis

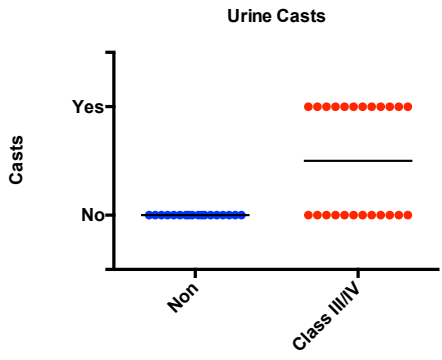
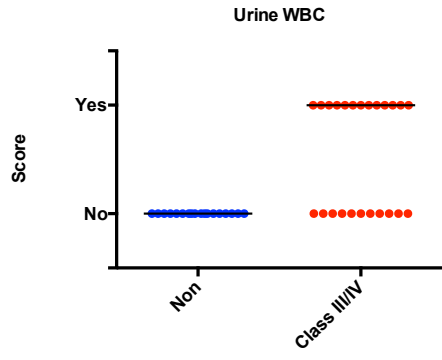
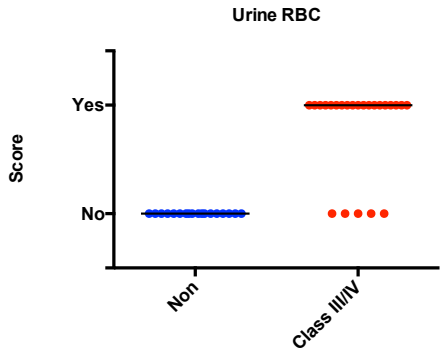
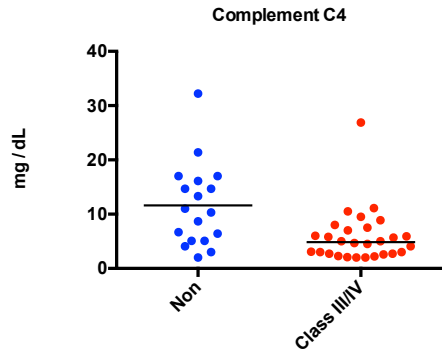
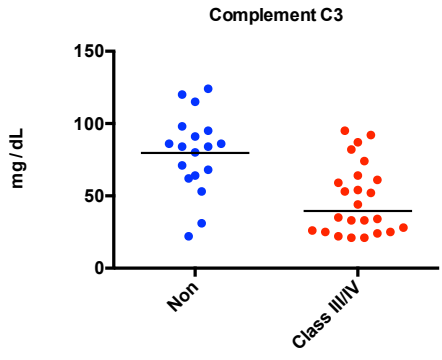
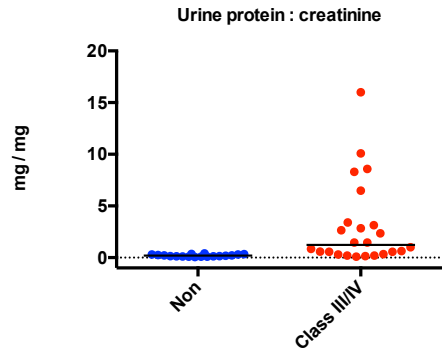
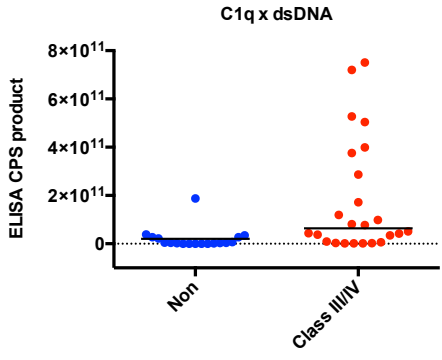
| <b>Antigen</b>  | <b>Vendor</b>    | <b>Catalog number</b> | <b>Description</b>                    |
|---|------------------|-----------------------|---------------------------------------|
| a-actinin   | Sigma            | A9776                 | Chicken gizzard                       |
| Actin   | Molecular Probes | A12375                | Rabbit muscle                         |
| Aggrecan  | Sigma            | A1960                 | Bovine articular cartilage            |
| aKGDH   | Sigma            | K1502                 | Porcine heart                         |
| Aldolase  | Sigma            | A2714                 | Rabbit muscle                         |
| Annexin V-d   | Diarect          | 19101                 | Recombinant human, His-tagged         |
| Annexin V-s   | Sigma            | A9460                 | Human placenta                        |
| Azurocidin  | The Binding Site | BH236.X               | Human neutrophils                     |
| b2GP1   | Diarect          | A14901                | Recombinant human, His-tagged         |
| BAFF  | R&D              | 2149-BF-010           | BLyS/TNFSF13B                         |
| BAFF  | Stem Cell        | 02517                 | Recombinant human                     |
| BB'   | Diarect          | 13300                 | Recombinant human, His-tagged         |
| BCOADC-E2   | Diarect          | Test lot 1201/2       | Recombinant human, His-tagged         |
| BPI   | Diarect          | Test lot 1352         | From purified human neutrophils       |
| BPI   | Arotec           | ATB01-02              | From purified human neutrophils       |
| Ro 60/SS-A (bovine)   | Diarect          | A15501                | Bovine                                |
| C1q   | Biodesign        | A90150H               | Human serum                           |
| Cardiolipin 0   | Sigma            | C0563                 | Bovine heart                          |
| Cardiolipin 1   | Sigma            | C1649                 | Bovine heart                          |
| Catalase  | Sigma            | C3556                 | Human erythrocytes                    |
| Cathespin G   | Arotec           | ATC01-02              | Human neutrophils                     |
| CENP-A  | Diarect          | A16901                | Recombinant human, His-tagged         |
| CENP-B  | Diarect          | A12501                | Recombinant human, His-tagged         |
| Collagen II   | Sigma            | C1188                 | Human placenta                        |
| Collagen IV   | Sigma            | C5533                 | Human placenta                        |
| Collagen IX   | Sigma            | C3657                 | Human placenta                        |
| Collagen VI   | Sigma            | C7521                 | Human placenta                        |
| Collagen VIII   | Sigma            | C7774                 | Human placenta                        |
| Collagen X  | Sigma            | C4407                 | Human placenta                        |
| Artemis (DCLRE1C)   | Abnova           | H00064421-P01         | Recombinant human                     |
| Diphtheria Toxin  | Sigma            | D0564                 | Corynebacterium diphtheriae           |
| dsDNA genomic   | Sigma            | D1626                 | From salmon testes                    |
| dsDNA plasmid   | Diarect          | 12301                 | E.Coli                                |
| Desmoglein 1 (DSG1)   | Abnova           | H00001828-P01         | Recombinant human                     |
| Desmoglein 4 (DSG4)   | Abnova           | H00147409-Q01         | Recombinant human                     |
| EA-D  | Biodesign        | R18740                | Recombinant                           |
| EA  | ProspecBio       | EBV-272               | Recombinant                           |
| EBNA-1 35 D isomer  | Sigma            | aa 35-58              | Sequence:<br>GGDNHGRGRGRGRGRGGRRPGAPG |
| EBNA-1 35 L isomer  | Sigma            | aa 35-58              | Sequence:<br>GGDNHGRGRGRGRGRGGRRPGAPG |
| EBNA-1 398 D isomer   | Sigma            | aa 398-412            | Sequence: PPPGRRPFHPVGEA              |
| EBNA-1 398 L isomer   | Sigma            | aa 398-412            | Sequence: PPPGRRPFHPVGEA              |
| EBNA-1 58 D isomer  | Sigma            | aa 58-72              | Sequence: GGSGSGPRHRDGVRR             |
| EBNA-1 58 L isomer  | Sigma            | aa 58-72              | Sequence: GGSGSGPRHRDGVRR             |
| EBNA-1  | Biodesign        | R57523                | Recombinant                           |
| EBNA-1  | ProspecBio       | EBV-276               | Recombinant, his-tagged               |
| Entactin-Collagen IV-<br>Laminin Cell<br>Attachment Matrix<br>(ECL-CAM) | USBiological     | E0275                 | Engelbreth-Holm-Swarm mouse<br>tumor  |
| Elastase  | Arotec           | ATE01                 | Human neutrophils                     |
| Enolase   | Sigma            | E0379                 | Rabbit muscle                         |

| <b>Antigen</b>                      | <b>Vendor</b>          | <b>Catalog number</b> | <b>Description</b>                   |
|-------------------------------------|------------------------|-----------------------|--------------------------------------|
| Fib I                               | Sigma                  | F3879                 | Human plasma                         |
| Fib I-S                             | Sigma                  | F8630                 | Bovine plasma                        |
| Fib IV                              | Sigma                  | F4753                 | Bovine plasma                        |
| GBM dissociated                     | Diarect                | A16801                | Recombinant human, His-tagged        |
| GBM undissociated                   | Diarect                | A15901                | Recombinant human, His-tagged        |
| gp210                               | Diarect                | A19001                | Recombinant human, His-tagged        |
| GRP78                               | Stressgen              | SPP-765               | Recombinant hamster                  |
| Hepatitis B Surface Antigen (HBSAg) | Meridian Life Sciences | R36100                | Human plasma                         |
| heparan sulfate                     | Sigma                  | H7640                 | Bovine kidney                        |
| hHDL                                | Biomedical             | 80P-HD101             | Human plasma                         |
| Human IgG                           | Jackson                | 009-000-003           | Human                                |
| Human IgM                           | Jackson                | 009-000-012           | Human                                |
| Histones, whole                     | Immunovision           | HIS-1000              | Bovine Tissue                        |
| Histone H1                          | Immunovision           | HIS-1001              | Bovine Tissue                        |
| Histone H2a & H4                    | Immunovision           | HIS-1002              | Bovine thymus                        |
| Histone H2b                         | Immunovision           | HIS-1003              | Bovine Tissue                        |
| Histones H3                         | Immunovision           | HIS-1004              | Bovine Tissue                        |
| HSP25                               | Stressgen              | NSP-510               | Recombinant murine                   |
| HSP47                               | Stressgen              | NSP-535               | Recombinant human                    |
| HSP60                               | Stressgen              | NSP-540               | Recombinant human                    |
| HSP70                               | Stressgen              | NSP-555               | Recombinant human                    |
| HSP90                               | Stressgen              | SPP-770               | Human, from HeLa cells               |
| Insulin                             | Sigma                  | I0908                 | Recombinant human                    |
| Intrinsic factor                    | Diarect                | A12901                | Recombinant human, His-tagged        |
| Jo-1 (Histidyl-tRNA synthetase)     | Diarect                | A12901                | Recombinant human, His-tagged        |
| Ku (p70/p80)                        | Diarect                | A17301                | Recombinant human, His-tagged        |
| La/SSB                              | Diarect                | A12801                | Recombinant human, His-tagged        |
| Lactotransferrin                    | Abcam                  | ab78526               | Human breast milk                    |
| Laminin                             | Sigma                  | L2020                 | EHS murine sarcoma basement membrane |
| Liver Cytosol Type-1 Antigen (LC1)  | Diarect                | 13700                 | Recombinant human, His-tagged        |
| DNA ligase 4 (LIG4)                 | Abnova                 | H00003981-Q01         | Recombinant human                    |
| Lipoprotein lipase                  | Sigma                  | L9656                 | Pseudomonas species                  |
| Cytochrome P450 2D6 (LKM1)          | Diarect                | A13501                | Recombinant human                    |
| Lysozyme                            | Calbiochem             | 440345                | Human neutrophils                    |
| M2                                  | Diarect                | A18001                | Recombinant human, His-tagged        |
| MAGE-B2                             | N/A                    | N/A                   | Provided by Deborah McCurdy, MD      |
| MDA-hLDL                            | Academy BioMedical     | 20P-MD-L110           | From human plasma                    |
| Rubeola (Measles)                   | Biodesign              | R14120                | Edmonston strain                     |
| Mi2                                 | Diarect                | A18101                | Recombinant human, His-tagged        |
| MMP-9                               | Arotec                 | ATM03-02              | Human neutrophils                    |
| MPO                                 | Diarect                | 18501                 | Native human                         |
| MPO                                 | Immunovision           | MPO-3000              | Human promyelocytic cell line        |
| Mumps                               | Biodesign              | R02602                | BSC-1, strain Enders                 |
| Myosin                              | Sigma                  | M1636                 | Rabbit muscle                        |
| NGAL                                | Arotec                 | ATN01-02              | Human neutrophils                    |
| XLF (NHEJ1)                         | Abnova                 | H00079840-P01         | Recombinant human                    |

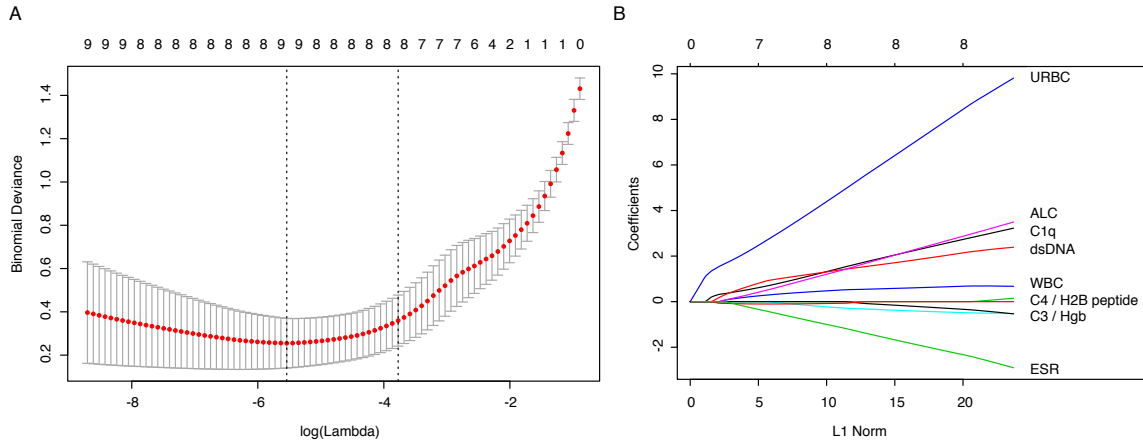
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|---|---------------|-----------------------|-------------------------------------|
| NR2A D isomer                               | Sigma Genosys | Custom                | Sequence: SVSYDDWDYSLEARV           |
| NR2A L isomer                               | Sigma Genosys | Custom                | Sequence: SVSYDDWDYSLEARV           |
| Nucleoporin p62<br>(Nup62)                  | Diarect       | 19401                 | Recombinant human, His-tagged       |
| OGDC-E2                                     | Diarect       | Test lot 1196/2       | Recombinant human, His-tagged       |
| Ox-hLDL                                     | Academy       |                       |                                     |
| EBV P18                                     | Biomedical    | Ox-L110               | From human plasma                   |
| Parietal cell Ag                            | ProspecBio    | EBV-273               | Recombinant                         |
| PCNA  | Arotec        | ATP01-04              | Porcine gastric mucosa              |
| PDC-E2                                      | Diarect       | 15401                 | baculovirus/insect cell expression  |
| Pyruvate<br>dehydrogenase (PDH)             | Diarect       | Test lot 359/1        | Recombinant human, His-tagged       |
| Pertussis Toxin                             | Sigma         | P7032                 | Porcine heart                       |
| PL-12                                       | Sigma         | P7208                 | Bordetella pertussis                |
| PL-7  | Diarect       | A15701                | Recombinant human, His-tagged       |
| PM/Scl 100                                  | Diarect       | A15601                | Recombinant human, His-tagged       |
| PM/Scl75                                    | Diarect       | A16001                | Recombinant human, His-tagged       |
| PR3   | Diarect       | Test lot 1137/2       | Test lot, data not provided         |
| PR3   | Diarect       | 18601                 | Native human                        |
| DNA PKcs (PRKDC)                            | Immunovision  | PR3-3100              | Human promyelocytic cell line       |
| Proteoglycans                               | Abnova        | H00005591-Q01         | Recombinant human                   |
| Ribosomal<br>phosphoprotein P0<br>(Ribo P0) | Sigma         | P5864                 | Bovine nasal septum                 |
| Ribosomal<br>phosphoprotein P1<br>(Ribo P1) | Diarect       | A14101                | Recombinant human, His-tagged       |
| Ribosomal<br>phosphoprotein P2<br>(Ribo P2) | Diarect       | Test lot 1193         | Recombinant human, His-tagged       |
| Ro 52                                       | Diarect       | Test lot 1179         | Recombinant human, His-tagged       |
| Ro 60/SS-A<br>(recombinant)                 | Diarect       | A12701                | Recombinant human, His-tagged       |
| Rubella                                     | Diarect       | A17401                | Recombinant human, His-tagged       |
| Scl70 (full length)                         | Biodesign     | R9A123                | Vero Cells, strain HPV-77           |
| Scl70 (truncated)                           | Diarect       | A12401                | Recombinant human, His-tagged       |
| Sm/RNP                                      | Diarect       | A14501                | Recombinant human, His-tagged       |
| Sm/RNP                                      | Immunovision  | SRC-3000              | Rabbit and calf thymus              |
| SmD D isomer                                | Immunovision  | SRC-3000              | Rabbit and calf thymus              |
| SmD L isomer                                | Sigma Genosys | Custom                | Sequence:<br>AGRGRGRGRGRGRGRGRGGPRR |
| Smith                                       | Sigma Genosys | Custom                | Sequence:<br>AGRGRGRGRGRGRGRGRGGPRR |
| Sp100                                       | Immunovision  | SMA-3000              | Bovine spleen and/or thymus         |
| Signal recognition<br>particle 54 (SRP54)   | Diarect       | A18901                | Recombinant human, His-tagged       |
| ssDNA                                       | Diarect       | A18401                | Recombinant human, His-tagged       |
| Tetanus Toxin                               | Sigma         | D8661                 | Calf thymus                         |
| Thyroglobulin                               | Sigma         | T3194                 | Clostridium tetani                  |
| TPO (Thyropoxidase)                         | Diarect       | A12201                | Native human                        |
| Tissue                                      | Diarect       | A12101                | Recombinant human, His-tagged       |
| Transglutaminase                            | Diarect       | A15200                | Recombinant human, His-tagged       |

| <b>Antigen</b>                          | <b>Vendor</b> | <b>Catalog number</b> | <b>Description</b>                                 |
|---|---------------|-----------------------|--|
| U1-snRNP 68 protein                     | Diarect       | A13001                | Recombinant human, His-tagged                      |
| U1-snRNP A protein                      | Diarect       | A13101                | Recombinant human, His-tagged                      |
| U1-snRNP C protein                      | Diarect       | A13201                | Recombinant human, His-tagged                      |
| EBV VCA                                 | Biodesign     | R02150                | VCA gp125, Burkitt's lymphoma<br>(not recombinant) |
| Vimentin                                | Sigma         | V4383                 | Bovine lens  |
| XRCC4                                   | Abnova        | H00007518-P01         | Recombinant human                                  |
| Ku80 (XRCC5)                            | Abnova        | H00007520-P01         | Recombinant human                                  |
| XRCC6 (Ku70)                            | Abnova        | H00002547-P01         | Recombinant human                                  |
| Goat Anti-Human IgG,<br>Fcγ specific    | Jackson       | 109-005-098           | min X Bov, Hrs, Ms Sr Prot                         |
| Rabbit Anti-Human IgG<br>+ IgM (H+L)    | Jackson       | 309-005-107           | min X Ms Sr Prot                                   |
| Rabbit Anti-Human<br>IgM, Fc5μ Specific | Jackson       | 309-005-095           | min X Ms Sr Prot                                   |

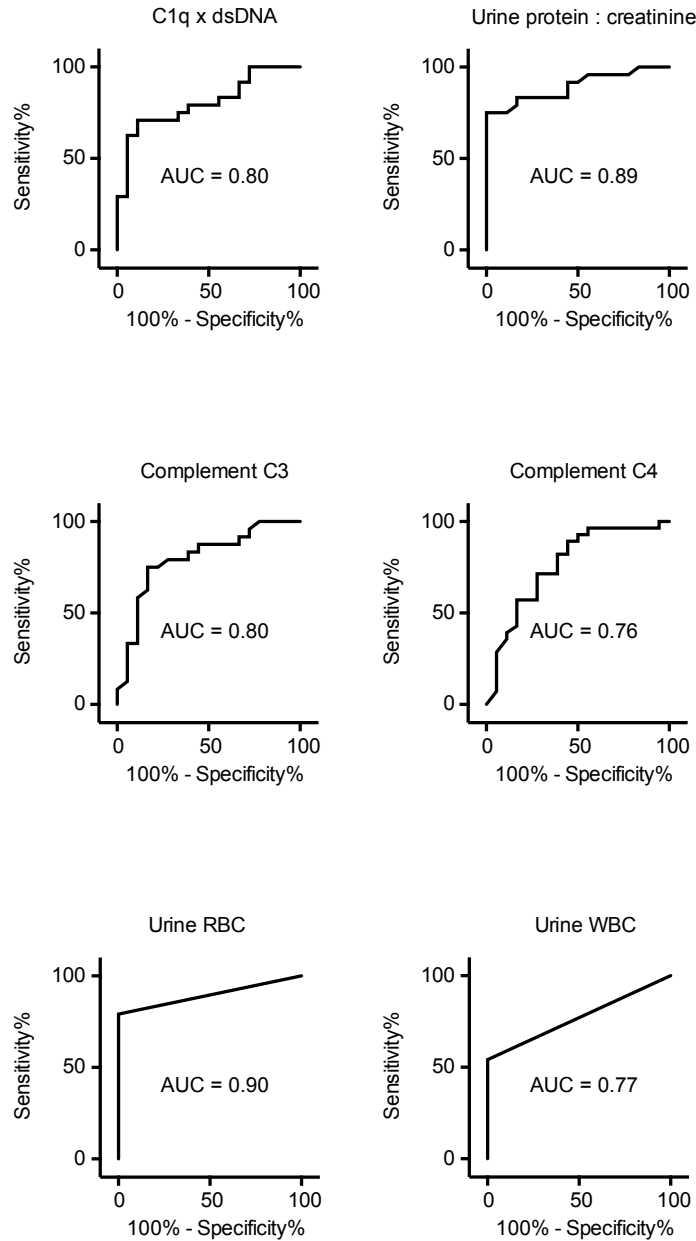
**Supplemental Table S2. Microarray antigens.**



**Supplemental Figure S1. Association of anti-C1q and anti-dsDNA, as well as other clinical measures with proliferative nephritis.** Sera from new-onset pSLE patients (n=42) were divided into two groups based on whether they had biopsy-confirmed proliferative nephritis (n=24), or no significant evidence of nephritis (n=18). Bars represent the medians of each group. C1q and dsDNA counts (minus BSA counts) were multiplied to give the ELISA CPS product. Urine RBC or WBC > 5 per high power field (HPF) were considered abnormal.



**Supplemental Figure S2. Cross-validated deviance of LASSO.** (A) Plot of cross-validation deviance along the Lamda sequence. The tuning parameter Lambda controls the overall strength of the penalty for model complexity. The top y-axis indicates the number of nonzero coefficients. The left dashed line indicates the point with minimum cross-validation deviance, and the right dashed line indicates the point one standard deviation above the minimum. The coefficients at the minimum plus one standard deviation were used to create the model. The error bars represent standard deviation. (B) Plot showing nonzero coefficients as a function of the L1 Norm of the entire coefficient vector. The L1 Norm represents the magnitude of the combined coefficient vector. Variables with the greatest magnitude at low L1 Norm have the greatest impact on the nephritis score. Variable names are shown to the right of each line. Similar to A, the top y-axis indicates the number of nonzero coefficients.



**Supplemental Figure S3. Receiver Operating Characteristic (ROC) analysis of clinical measures.** New-onset pSLE patients (n=42) were divided into groups based on whether they had biopsy-confirmed proliferative nephritis (n=24), or no significant evidence of nephritis (n=18). ROC curves are shown for combined anti-C1q and anti-dsDNA as well as other clinical measures. Area Under the Curve (AUC) values are shown for each variable. For comparison, the LASSO model had AUC of 1.00.