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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our [Editorial Policies](#) and the [Editorial Policy Checklist](#).

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a Confirmed

- ☐ ☒ The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement
- ☐ ☒ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
- ☐ ☒ The statistical test(s) used AND whether they are one- or two-sided
Only common tests should be described solely by name; describe more complex techniques in the Methods section.
- ☐ ☒ A description of all covariates tested
- ☐ ☒ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
- ☐ ☒ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
- ☐ ☒ For null hypothesis testing, the test statistic (e.g. F , t , r) with confidence intervals, effect sizes, degrees of freedom and P value noted
Give P values as exact values whenever suitable.
- ☒ ☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
- ☒ ☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
- ☒ ☐ Estimates of effect sizes (e.g. Cohen's d , Pearson's r), indicating how they were calculated

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection

Flow cytometric data: Beckman Coulter CytoFLEX
mRNA expression data: StepOne Plus (Life Sciences)
Immunoblot images: ChemiDoc Touch (Bio-Rad).
Immunofluorescence data: Keyence fluorescence microscope (BZ-X710).
Mass spectrometry data: nanoflow UPLC system (Thermo Fisher Scientific), Q Exactive Hybrid Quadrupole-Orbitrap mass spectrometer (Thermo Fisher Scientific)

Data analysis

Flow cytometric data: FlowJo vX;
Statistical data: Prism v8
Immunoblot quantification: ImageJ (Fiji Version: 2.1.0/1.53c)
Mass spectrometry data were analyzed using Byonic (Version 4.3).

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our [policy](#)

No novel datasets or reagents are generated in this study.

The RNA-seq datasets that support the findings of this study are publicly available from The Immunological Genome Project (http://rstats.immgen.org/Skyline_microarray/skyline.html), and these data were reanalyzed in the study.

Research involving human participants, their data, or biological material

Policy information about studies with [human participants or human data](#). See also policy information about [sex, gender \(identity/presentation\), and sexual orientation](#) and [race, ethnicity and racism](#).

Reporting on sex and gender	There is no sex and gender potential bias in this study.
Reporting on race, ethnicity, or other socially relevant groupings	There is no race, ethnicity, or other socially relevant groupings were used in this study.
Population characteristics	No covariate-relevant population characteristics were used.
Recruitment	Informed consent was obtained from all subjects. All patients met the American College of Rheumatology classification criteria for systemic lupus erythematosus. Patients with concurrent infection, malignancy or other autoimmune diseases were excluded from the study. There was no exclusion criterion for healthy volunteers. Peripheral blood samples were collected from patients or healthy donors. There is no potential bias in this study as there is no different treatments or groups, all samples are used in the analysis.
Ethics oversight	Approved by the Ethics Committee of The First Affiliated Hospital, Sun Yat-sen University (Approval No. 2022-436)

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☒ Life sciences ☐ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

Sample size	No statistical methods were used to predetermine sample size. Sample size were chosen based on the maximum number of mice available at the moment of experiments. Since the mice are on identical genetic backgrounds, a minimum of 3 individual mice were commonly recognized in the field to sufficiently detect differences between genotypes or conditions. Sample size was determined based on standards for experimental cell lines, attempting to have a minimum of n=3 biological replicates with sufficient reproducibility.
Data exclusions	No data exclusions in all experiments.
Replication	Experiments were replicated successfully for least twice as described throughout the paper and in the Methods.
Randomization	Mice of similar ages and sex were used for all the experiments reported. Samples were randomly assigned.
Blinding	For mice kidney H&E analysis and immunofluorescence analysis, glomerular size, immunofluorescence intensity of IgG and C3 were performed blinded, without knowledge of mice genotype. For other experiments, the investigators were not blinded to the identities of the samples because treatments and data collection were performed by the same people. During data analysis, investigators were not blinded to group allocation, as this is performed by the same people. The reason for these unblindings is due to a lack of personnel and resources, as investigators have to collect and analyze data by themselves. For human studies, there was no blinding in this study as we did not have different treatment/experimental groups and therefore was not relevant.

Reporting for specific materials, systems and methods

Materials & experimental systems

n/a	Involved in the study
☐	☒ Antibodies
☐	☒ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☐	☒ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☐	☒ Flow cytometry
☒	☐ MRI-based neuroimaging

Antibodies

Antibodies used

For magnetic activated cell enrichment,
 Company: Invitrogen IgG Catalog #: 13-4013-85
 Company: Invitrogen IgD clone: 11-26 Catalog #: 13-5993-82
 Company: Invitrogen CD93 clone: AA4.1 Catalog #: 13-5892-82
 Company: Invitrogen CD5 clone: 53-7.3 Catalog #: 13-0051-82
 Company: Invitrogen CD49b clone: DX5 Catalog #: 13-5971-85
 Company: Invitrogen TCR β clone: H57-597 Catalog #: 13-5961-85
 Company: Invitrogen CD11b clone: M1170 Catalog #: 13-0112-82
 Company: Invitrogen CD24 clone: M1/69 Catalog #: 13-0242-82
 Company: Invitrogen F4/80 clone: BM8 Catalog #: 13-4801-81
 Company: BioLegend Ly6G/Ly6C (Gr-1) clone: R86-8C5 Catalog #: 108404
 Company: BioLegend CD41 clone: MWReg30 Catalog #: 133930
 Company: TONBO CD19 clone: 1D3 Catalog #: 30-0193-U500
 Company: TONBO TER-119 clone: TER-119 Catalog #: 30-5921-U500
 Company: TONBO CD3 clone: 145-2C11 Catalog #: 30-0031-U500

For flow cytometry ,
 Company: Invitrogen CD19 eFluor 450 Clone: 1D3 Catalog #: 48-0193-82
 Company: Invitrogen CD3e APC clone: 17A2 Catalog #: 17-0032-82
 Company: Invitrogen CD11b PerCP-Cyanine5.5 clone: M1/70 Catalog #: 45-0112-82
 Company: Invitrogen IgD APC-Cyanine7 clone: 11-26c Catalog #: 47-5993-82
 Company: Invitrogen IgM PE clone: II/41 Catalog #: 12-5790-82
 Company: Invitrogen B220 FITC clone: RA3-6B2 Catalog #: 11-0452-82
 Company: Invitrogen CD38 PE-Cyanine7 clone: 90 Catalog #: 25-0381-82
 Company: Invitrogen GL7 eFluor 45 clone: GL-7 Catalog #: 48-5092-82
 Company: Invitrogen CD1d PE clone: 1B1 Catalog #: 12-0011-82
 Company: Invitrogen CD21/CD35 PE-Cyanine 7 clone: 8D9 Catalog #: 47-0211-82
 Company: Invitrogen TCR β PE clone: H57-597 Catalog #: 12-5961-82
 Company: Invitrogen CD69 eFluor 45 clone: H1.2F3 Catalog #: 48-0691-82
 Company: Invitrogen CD62L PE-Cyanine7 clone: MEL-14 Catalog #: 25-0621-82
 Company: Invitrogen BST2 FITC clone: eBio927 Catalog #: 11-3172-82
 Company: Invitrogen SIGLEC-H APC clone: eBio440c Catalog #: 17-0333-82
 Company: Invitrogen TNF PE-Cyanine7 clone: MP6-XT22 Catalog #: 25-7321-82
 Company: BioLegend CD44 APC-Cyanine7 clone: IM7 Catalog #: 103028
 Company: BioLegend CD44 APC clone: IM7 Catalog #: 103012
 Company: BioLegend B220 PE clone: RA3-6B2 Catalog #: 103208
 Company: BioLegend PD-1 PE-Cyanine7 clone: 29F.1A12 Catalog #: 135216
 Company: BioLegend PD-1 APC-Cyanine7 clone: 29F.1A12 Catalog #: 1352224
 Company: BioLegend CD138 PE-Cyanine7 clone: 281-2 Catalog #: 142514
 Company: BioLegend CD23 PerCP-Cyanine5.5 clone: B3B4 Catalog #: 101618
 Company: BioLegend IA/IE APC-Cyanine7 clone: M5/114.15.2 Catalog #: 107628
 Company: BioLegend IA/IE APC clone: M5/114.15.2 Catalog #: 107614
 Company: BioLegend CXCR3 eFluor 45 clone: CXCR3-173 Catalog #: 126529
 Company: BioLegend CD4 PerCP-Cyanine5.5 clone: GK1.5 Catalog #: 100434
 Company: BioLegend CD8 BV605 clone: 53-6.7 Catalog #: 100743
 Company: BioLegend Ly6G BV605 clone: 1A8 Catalog #: 127612
 Company: BioLegend Ly6C FITC clone: HK1.4 Catalog #: 128006
 Company: BioLegend F4/80 PE clone: BM8 Catalog #: 123110
 Company: BioLegend CD11c APC-Cyanine7 clone: N418 Catalog #: 117352
 Company: BioLegend CD45 APC clone: 30-F11 Catalog #: 103112

Company: Pbl assay IFNa FITC clone: RMMA-1 Catalog #: 22100-3

For ELISA,

Company: Invitrogen Goat AP-conjugated anti-mouse IgG Catalog #: G-21060

For kidney immunofluorescence,

Company: Thermo Fisher Scientific rabbit anti-mouse IgG Catalog #: A27022

Company: Abcam rat anti-mouse C3 Catalog #: ab11862

For western blotting,

Company: Sigma Anti-Flag (host: Mouse) Catalog #: F1840

Company: Roche Anti-HA (host: Rat) Catalog #: 11867423001

Company: Abcam Calnexin (host: Rabbit) Catalog #: ab213243

Company: Abcam Rab7 (host: Rabbit) Catalog #: ab137029

Company: Abcam Tubulin (host: Mouse) Catalog #: ab78078

Company: Novus PPT1 (host: Rabbit) Catalog #: NBP2-93840

Company: Novus TLR9 (host: Mouse) Catalog #: NBP2-24729

Company: CST anti-biotin, HRP-linked Catalog #: 7075S

Company: Abcam goat anti-mouse IgG H&L (HRP) Catalog #: ab6789

Company: Abcam goat anti-rabbit IgG H&L (HRP) Catalog #: ab6721

Company: Abcam goat anti-rat IgG H&L (HRP) Catalog #: ab97057

Company: Abmart GM130 (host: Rabbit) Catalog #: T55142

Company: CST EEA1 (host: Rabbit) Catalog #: 2411

For Immunoprecipitation,

Company: Sigma anti-Flag matrix Catalog #: A2220

Company: Roche anti-HA matrix Catalog #: 11815016001

Validation

All antibodies used were commercially available and validated by corresponding manufacturers. The following companies have general validation/reproducibility statements. Biolegend (<https://www.biolegend.com/en-us/reproducibility>). Roche applied science (https://lifescience.roche.com/en_cn/tools-and-resources/documents.html). Sigma aldrich (<https://www.sigmaaldrich.com/technical-documents/articles/biology/antibody-standard-validation.html>). Thermo Fisher Scientific (<https://www.thermofisher.cn/cn/zh/home/life-science/antibodies/invitrogen-antibody-validation.html>). Abcam (<https://www.abcam.com/primary-antibodies/how-we-validate-our-antibodies>).

Company: Invitrogen IgG Catalog #: 13-4013-85 <https://www.thermofisher.cn/cn/zh/antibody/product/Rat-anti-Mouse-IgG-H-L-Secondary-Antibody-Monoclonal/13-4013-85>

Company: Invitrogen IgD clone: 11-26 Catalog #: 13-5993-82 <https://www.thermofisher.cn/cn/zh/antibody/product/IgD-Antibody-clone-11-26c-11-26-Monoclonal/13-5993-82>

Company: Invitrogen CD93 clone: AA4.1 Catalog #: 13-5892-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD93-AA4-1-Antibody-clone-AA4-1-Monoclonal/13-5892-82>

Company: Invitrogen CD5 clone: 53-7.3 Catalog #: 13-0051-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD5-Antibody-clone-53-7-3-Monoclonal/13-0051-82>

Company: Invitrogen CD49b clone: DX5 Catalog #: 13-5971-85 <https://www.thermofisher.cn/cn/zh/antibody/product/CD49b-Integrin-alpha-2-Antibody-clone-DX5-Monoclonal/13-5971-82>

Company: Invitrogen TCR β clone: H57-597 Catalog #: 13-5961-85 <https://www.thermofisher.cn/cn/zh/antibody/product/TCR-beta-Antibody-clone-H57-597-Monoclonal/13-5961-82>

Company: Invitrogen CD11b clone: M1170 Catalog #: 13-0112-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD11b-Antibody-clone-M1-70-Monoclonal/13-0112-82>

Company: Invitrogen CD24 clone: M1/69 Catalog #: 13-0242-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD24-Antibody-clone-M1-69-Monoclonal/13-0242-82>

Company: Invitrogen F4/80 clone: BM8 Catalog #: 13-4801-81 <https://www.thermofisher.cn/cn/zh/antibody/product/F4-80-Antibody-clone-BM8-Monoclonal/13-4801-82>

Company: BioLegend Ly6G/Ly6C (Gr-1) clone: R86-8C5 Catalog #: 108404 <https://www.biolegend.com/ja-jp/products/purified-anti-mouse-ly-6g-ly-6c-gr-1-antibody-462?GroupID=BLG4876>

Company: BioLegend CD41 clone: MWReg30 Catalog #: 133930 <https://www.biolegend.com/en-us/products/biotin-anti-mouse-cd41-antibody-13059>

Company: TONBO CD19 clone: 1D3 Catalog #: 30-0193-U500 no longer available

Company: TONBO TER-119 clone: TER-119 Catalog #: 30-5921-U500 <https://cytekbio.com/products/biotin-anti-mouse-ter-119-ter-119?variant=40581229346852>

Company: TONBO CD3 clone: 145-2C11 Catalog #: 30-0031-U500 <https://cytekbio.com/products/biotin-anti-mouse-cd3e-145-2c11?variant=40581230428196>

For flow cytometry ,

Company: Invitrogen CD19 eFluor 450 Clone: 1D3 Catalog #: 48-0193-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD19-Antibody-clone-eBio1D3-1D3-Monoclonal/48-0193-82>

Company: Invitrogen CD3e APC clone: 17A2 Catalog #: 17-0032-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD3-Antibody-clone-17A2-Monoclonal/17-0032-82>

Company: Invitrogen CD11b PerCP-Cyanine5.5 clone: M1/70 Catalog #: 45-0112-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD11b-Antibody-clone-M1-70-Monoclonal/45-0112-82>

Company: Invitrogen IgD APC-Cyanine7 clone: 11-26c Catalog #: 47-5993-82 <https://www.thermofisher.cn/cn/zh/antibody/product/>

IgD-Antibody-clone-11-26c-11-26-Monoclonal/25-5993-82

Company: Invitrogen IgM PE clone: II/41 Catalog #: 12-5790-82 <https://www.thermofisher.cn/cn/zh/antibody/product/IgM-Antibody-clone-II-41-Monoclonal/12-5790-82>

Company: Invitrogen B220 FITC clone: RA3-6B2 Catalog #: 11-0452-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD45R-B220-Antibody-clone-RA3-6B2-Monoclonal/11-0452-82>

Company: Invitrogen CD38 PE-Cyanine7 clone: 90 Catalog #: 25-0381-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD38-Antibody-clone-90-Monoclonal/25-0381-82>

Company: Invitrogen GL7 eFluor 45 clone: GL-7 Catalog #: 48-5092-82 <https://www.thermofisher.cn/cn/zh/antibody/product/GL7-Antibody-clone-GL-7-GL7-Monoclonal/48-5092-82>

Company: Invitrogen CD1d PE clone: 1B1 Catalog #: 12-0011-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD1d-Antibody-clone-1B1-Monoclonal/12-0011-82>

Company: Invitrogen CD21/CD35 PE-Cyanine 7 clone: 8D9 Catalog #: 47-0211-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD21-CD35-Antibody-clone-eBio8D9-8D9-Monoclonal/25-0211-82>

Company: Invitrogen TCR β PE clone: H57-597 Catalog #: 12-5961-82 <https://www.thermofisher.cn/cn/zh/antibody/product/TCR-beta-Antibody-clone-H57-597-Monoclonal/12-5961-82>

Company: Invitrogen CD69 eFluor 45 clone: H1.2F3 Catalog #: 48-0691-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD69-Antibody-clone-H1-2F3-Monoclonal/48-0691-82>

Company: Invitrogen CD62L PE-Cyanine7 clone: MEL-14 Catalog #: 25-0621-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD62L-L-Selectin-Antibody-clone-MEL-14-Monoclonal/25-0621-82>

Company: Invitrogen BST2 FITC clone: eBio927 Catalog #: 11-3172-82 <https://www.thermofisher.cn/cn/zh/antibody/product/CD317-BST2-PDCA-1-Antibody-clone-eBio927-Monoclonal/11-3172-82>

Company: Invitrogen SIGLEC-H APC clone: eBio440c Catalog #: 17-0333-82 <https://www.thermofisher.cn/cn/zh/antibody/product/SIGLEC-H-Antibody-clone-eBio440c-Monoclonal/17-0333-82>

Company: Invitrogen TNF PE-Cyanine7 clone: MP6-XT22 Catalog #: 25-7321-82 <https://www.thermofisher.cn/cn/zh/antibody/product/TNF-alpha-Antibody-clone-MP6-XT22-Monoclonal/25-7321-82>

Company: BioLegend CD44 APC-Cyanine7 clone: IM7 Catalog #: 103028 <https://www.biolegend.com/en-us/products/apc-cyanine7-anti-mouse-human-cd44-antibody-3933?GroupID=BLG10248>

Company: BioLegend CD44 APC clone: IM7 Catalog #: 103012 <https://www.biolegend.com/ja-jp/products/apc-anti-mouse-human-cd44-antibody-312>

Company: BioLegend B220 PE clone: RA3-6B2 Catalog #: 103208 <https://www.biolegend.com/de-de/products/pe-anti-mouse-human-cd45r-b220-antibody-447>

Company: BioLegend PD-1 PE-Cyanine7 clone: 29F.1A12 Catalog #: 135216 <https://www.biolegend.com/en-us/products/pe-cyanine7-anti-mouse-cd279-pd-1-antibody-7005?GroupID=BLG7928>

Company: BioLegend PD-1 APC-Cyanine7 clone: 29F.1A12 Catalog #: 1352224 <https://www.biolegend.com/en-us/products/apc-cyanine7-anti-mouse-cd279-pd-1-antibody-9742>

Company: BioLegend CD138 PE-Cyanine7 clone: 281-2 Catalog #: 142514 <https://www.biolegend.com/nl-nl/products/pe-cyanine7-anti-mouse-cd138-syndecan-1-antibody-8601>

Company: BioLegend CD23 PerCP-Cyanine5.5 clone: B3B4 Catalog #: 101618 <https://www.biolegend.com/en-us/products/percp-cyanine5-5-anti-mouse-cd23-antibody-9118?GroupID=BLG1926>

Company: BioLegend IA/IE APC-Cyanine7 clone: M5/114.15.2 Catalog #: 107628 <https://www.biolegend.com/en-us/products/apc-cyanine7-anti-mouse-i-a-i-e-antibody-5966?GroupID=BLG11931>

Company: BioLegend IA/IE APC clone: M5/114.15.2 Catalog #: 107614 <https://www.biolegend.com/nl-be/products/apc-anti-mouse-i-a-i-e-antibody-2488>

Company: BioLegend CXCR3 eFluor 45 clone: CXCR3-173 Catalog #: 126529 <https://www.biolegend.com/en-us/products/brilliant-violet-421-anti-mouse-cd183-cxcr3-antibody-7159?GroupID=BLG10642>

Company: BioLegend CD4 PerCP-Cyanine5.5 clone: GK1.5 Catalog #: 100434 <https://www.biolegend.com/en-gb/products/percp-cyanine5-5-anti-mouse-cd4-antibody-4220?GroupID=BLG4745>

Company: BioLegend CD8 BV605 clone: 53-6.7 Catalog #: 100743 <https://www.biolegend.com/nl-nl/products/brilliant-violet-605-anti-mouse-cd8a-antibody-7636>

Company: BioLegend Ly6G BV605 clone: 1A8 Catalog #: 127612 <https://www.biolegend.com/fr-fr/products/brilliant-violet-605-anti-mouse-ly-6g-antibody-12244>

Company: BioLegend Ly6C FITC clone: HK1.4 Catalog #: 128006 <https://www.biolegend.com/de-at/products/fits-anti-mouse-ly-6c-antibody-4896>

Company: BioLegend F4/80 PE clone: BM8 Catalog #: 123110 <https://www.biolegend.com/en-us/products/pe-anti-mouse-f4-80-antibody-4068?GroupID=BLG5319>

Company: BioLegend CD11c APC-Cyanine7 clone: N418 Catalog #: 117352 <https://www.biolegend.com/fr-ch/products/apc-cyanine7-anti-mouse-cd11c-antibody-3931>

Company: BioLegend CD45 APC clone: 30-F11 Catalog #: 103112 <https://www.biolegend.com/de-at/products/apc-anti-mouse-cd45-antibody-97>

Company: Pbl assay IFNa FITC clone: RMMA-1 Catalog #: 22100-3 <https://www.pbl assaysci.com/antibodies/fits-conjugated-anti-mouse-ifn-alpha-antibody-clone-rmma-1-mab-221003>

For ELISA,

Company: Invitrogen Goat AP-conjugated anti-mouse IgG Catalog #: G-21060 <https://www.thermofisher.cn/cn/zh/antibody/product/Goat-anti-Mouse-IgG-H-L-Cross-Adsorbed-Secondary-Antibody-Polyclonal/G-21060>

For kidney immunofluorescence,

Company: Thermo Fisher Scientific rabbit anti-mouse IgG Catalog #: A27022 <https://www.thermofisher.cn/cn/zh/antibody/product/Rabbit-anti-Mouse-IgG-H-L-Secondary-Antibody-Recombinant-Polyclonal/A27022>

Company: Abcam rat anti-mouse C3 Catalog #: ab11862 <https://www.abcam.com/products/primary-antibodies/c3c3b-antibody-11h9-ab11862.html>

For western blotting,

Company: Sigma Anti-Flag (host: Mouse) Catalog #: F1840 <https://www.sigmaaldrich.com/HK/zh/product/sigma/f1804>

Company: Roche Anti-HA (host: Rat) Catalog #: 11867423001 <https://www.sigmaaldrich.com/HK/zh/product/roche/roahaha>

Company: Abcam Calnexin (host: Rabbit) Catalog #: ab213243 <https://www.abcam.com/products/primary-antibodies/calnexin-antibody-epr21205-ab213243.html>

Company: Abcam Rab7 (host: Rabbit) Catalog #: ab137029 <https://www.abcam.com/products/primary-antibodies/rab7-antibody-epr7589-ab137029.html>

Company: Abcam Tubulin (host: Mouse) Catalog #: ab78078 <https://www.abcam.com/products/primary-antibodies/beta-iii-tubulin-antibody-2g10-neuronal-marker-ab78078.html>

Company: Novus PPT1 (host: Rabbit) Catalog #: NBP2-93840 https://www.novusbio.com/products/ppt1-antibody-oti1f10_nbp2-45388

Company: Novus TLR9 (host: Mouse) Catalog #: NBP2-24729 https://www.novusbio.com/products/tlr9-antibody-26c5932_nbp2-24729

Company: CST anti-biotin, HRP-linked Catalog #: 7075S <https://www.cellsignal.com/products/secondary-antibodies/anti-biotin-hrp-linked-antibody/7075>

Company: Abcam goat anti-mouse IgG H&L (HRP) Catalog #: ab6789 <https://www.abcam.com/products/secondary-antibodies/goat-mouse-igg-hl-hrp-ab6789.html>

Company: Abcam goat anti-rabbit IgG H&L (HRP) Catalog #: ab6721 <https://www.abcam.com/products/secondary-antibodies/goat-rabbit-igg-hl-hrp-ab6721.html>

Company: Abcam goat anti-rat IgG H&L (HRP) Catalog #: ab97057 <https://www.abcam.com/products/secondary-antibodies/goat-rat-igg-hl-hrp-ab97057.html>

Company: Abmart GM130 (host: Rabbit) Catalog #: T55142 <http://www.ab-mart.com.cn/page.aspx?node=%2077%20&id=%201436>

Company: CST EEA1 (host: Rabbit) Catalog #: 2411 <https://www.cellsignal.com/products/primary-antibodies/eea1-c45b10-rabbit-mab/3288?requestid=4824795>

For Immunoprecipitation,

Company: Sigma anti-Flag matrix Catalog #: A2220 <https://www.sigmaaldrich.com/HK/zh/product/sigma/a2220>

Company: Roche anti-HA matrix Catalog #: 11815016001 <https://www.sigmaaldrich.cn/CN/zh/product/roche/11815016001>

Eukaryotic cell lines

Policy information about [cell lines and Sex and Gender in Research](#)

Cell line source(s)	293T were purchased from ATCC (CRL-3216), Flt3L-B16 cell line is generated from ATCC-purchased B16 (ATCC, CRL-6475).L929 is purchase from ATCC (CRL-6364), RAW264.7 macrophage cell lines is purchase from ATCC (TIB-71), Human monocytic THP-1 cells is purchase from ATCC (TIB-202)
Authentication	Authentication of 293T ,B16, L929 is provided by ATCC with STR profiling. The complete authentication information is provided at: 293T: https://www.atcc.org/products/all/CRL-3216.aspx ; B16: https://www.atcc.org/products/all/CRL-6475.aspx ; L929: https://www.atcc.org/products/all/CRL-6364.aspx ; RAW264.7: https://www.atcc.org/products/tib-71.aspx ; THP-1: https://www.atcc.org/products/tib-202.aspx . Cell lines were authenticated via morphology, functional assays.
Mycoplasma contamination	The cell line was confirmed to be negative for mycoplasma contamination by PCR.
Commonly misidentified lines (See ICLAC register)	No commonly misidentified cell lines were used.

Animals and other research organisms

Policy information about [studies involving animals](#); [ARRIVE guidelines](#) recommended for reporting animal research, and [Sex and Gender in Research](#)

Laboratory animals	C57BL/6J (WT), B6.SJL-PtprcaPepcb/BoyJ (Strain #: 002014, CD45.1+), B6.129S6-Ppt1tm1Hof/SopJ, (Strain #: 006566, Ppt1-/-), B6.Cg-Sle1NZM2410/AegYaa/DcrJ (Strain #: 021569, B6.Sle1yaa) and C57BL/6-Tg (CLEC4C-HBEGF)956Cln/J (Strain #: 014176, BDCA2-DTR) mice were purchased from the Jackson Laboratory. B6.129S6-Ppt1tm1Hof/SopJ (Ppt1-/-) mice were back-crossed for ≥10 generations with C57BL/6J. Ppt1-/- B6.Sle1yaa, and Ppt1+/+ B6.Sle1yaa mice were generated by crossing B6.Cg-Sle1NZM2410/AegYaa/DcrJ (B6.Sle1yaa) males with backcrossed B6.129S6-Ppt1tm1Hof/SopJ (Ppt1-/-) females for two generations. All mice used are sex matched with no bias for female or male, except B6.Sle1yaa related strains, at the age -matched range of 8-16 weeks. The mice are housed in 12 hours/12 hours light-dark cycle, ambient temperature of 18-22 degrees, and 50-60% humidity.
Wild animals	This study did not involve the use of wild animals.
Reporting on sex	B6.Sle1yaa related strains (B6.Sle1yaa, Ppt1-/- B6.Sle1yaa, and Ppt1+/+ B6.Sle1yaa) are all male mice presented on Fig1; Fig2; Supplementary Fig1; Supplementary Fig2. Because B6.Sle1yaa mice only can be developed into lupus-like phenotype with Yaa-containing Y chromosome.
Field-collected samples	The study did not involve samples collected from the field.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Flow Cytometry

Plots

Confirm that:

- ☐ The axis labels state the marker and fluorochrome used (e.g. CD4-FITC).
- ☒ The axis scales are clearly visible. Include numbers along axes only for bottom left plot of group (a 'group' is an analysis of identical markers).
- ☒ All plots are contour plots with outliers or pseudocolor plots.
- ☒ A numerical value for number of cells or percentage (with statistics) is provided.

Methodology

Sample preparation

Cells were blocked with Fc blocker (CD16/32), and stained for specific surface markers. For intracellular staining, cells were fixed and permeabilized and stained for intracellular cytokines by fixation/permeabilization kit (eBiosciences).

Instrument

Flow cytometry data were collected by CytoFLEX (Beckman Coulter) and FACS Aria III (BD Biosciences) for cell sorting.

Software

CytoFLEX (Beckman Coulter) software for data acquisition and analyzed using FlowJo software version X (Tree Star). Data was graphed using Prism 8 (Graphpad).

Cell population abundance

After sorting the purity was determined to be >95%.

Gating strategy

All antibodies were titrated on murine splenic cells to determine optimal concentrations for the separation of positive or negative populations. All population markers were on bifurcated markers and clearly defined positive from negative.

All immune cells are gated with FSC-A/SSC-A for a live gate. Then a viability dye (FVD506) is used to exclude dead cells. Next, FSC-A/FSC-H is used to exclude doublets. After these gating, cells are specifically gated accordingly below:

- a. Gating strategy (CD11b+) to identify myeloid cells presented on Fig. 1F; Fig2G.
- b. Gating strategies (TCR β + CD4+ CD44+ CD62L-) to activated CD4+ T cells presented on Fig. 1G; Fig. 2H.
- c. Gating strategies (TCR β + CD8+ CD44+ CD62L-) to activated CD8+ T cells presented on Fig. 1H; Fig. 2I.
- d. Gating strategies (CD3- CD19+ MHCII+ CXCR3+) to antibody-forming B cells presented on Fig. 1I; Fig. 2J.
- e. Gating strategies (CD3+) to CD3+ T cells and (CD19+) to B cells presented on Supplementary Fig. 1A; Supplementary Fig. 2A.
- f. Gating strategies (B220+ IgD- CD38- GL-7+) to germinal center B cells presented on Supplementary Fig. 1B; Supplementary Fig. 2B.
- g. Gating strategies (B220- CD19- CD138+) to plasma B cells presented on Supplementary Fig. 1C; Supplementary Fig. 2C.
- h. Gating strategies (CD3- CD19+ IgM+ IgD-) to immature B cells and (CD3- CD19+ IgM- IgD+) to mature B cells presented on Supplementary Fig. 1D; Supplementary Fig. 2D.
- i. Gating strategies (B220+ CD11c+ SiglecH+) to identify pDCs or sort BM pDCs presented on Fig. 3C, 3F; Supplementary Fig. 3D-F, 3I, 3K.
- j. Gating strategies (B220+ CD11c+ SiglecH+) to Flt3l-pDCs presented on Fig. 3B.
- k. Gating strategies (CD11b+ F4/80+) to identify or sort peritoneal cavity macrophages or BMDMs presented on Fig 3E-F.
- l. Gating strategies (CD19+) to identify splenic B cells presented on Fig. 3E, 3F; Supplementary Fig. 3H, 3J, 7D-E.

- ☒ Tick this box to confirm that a figure exemplifying the gating strategy is provided in the Supplementary Information.