

Supplementary Table**Supplementary Table 1. The list of all monoclonal antibodies**

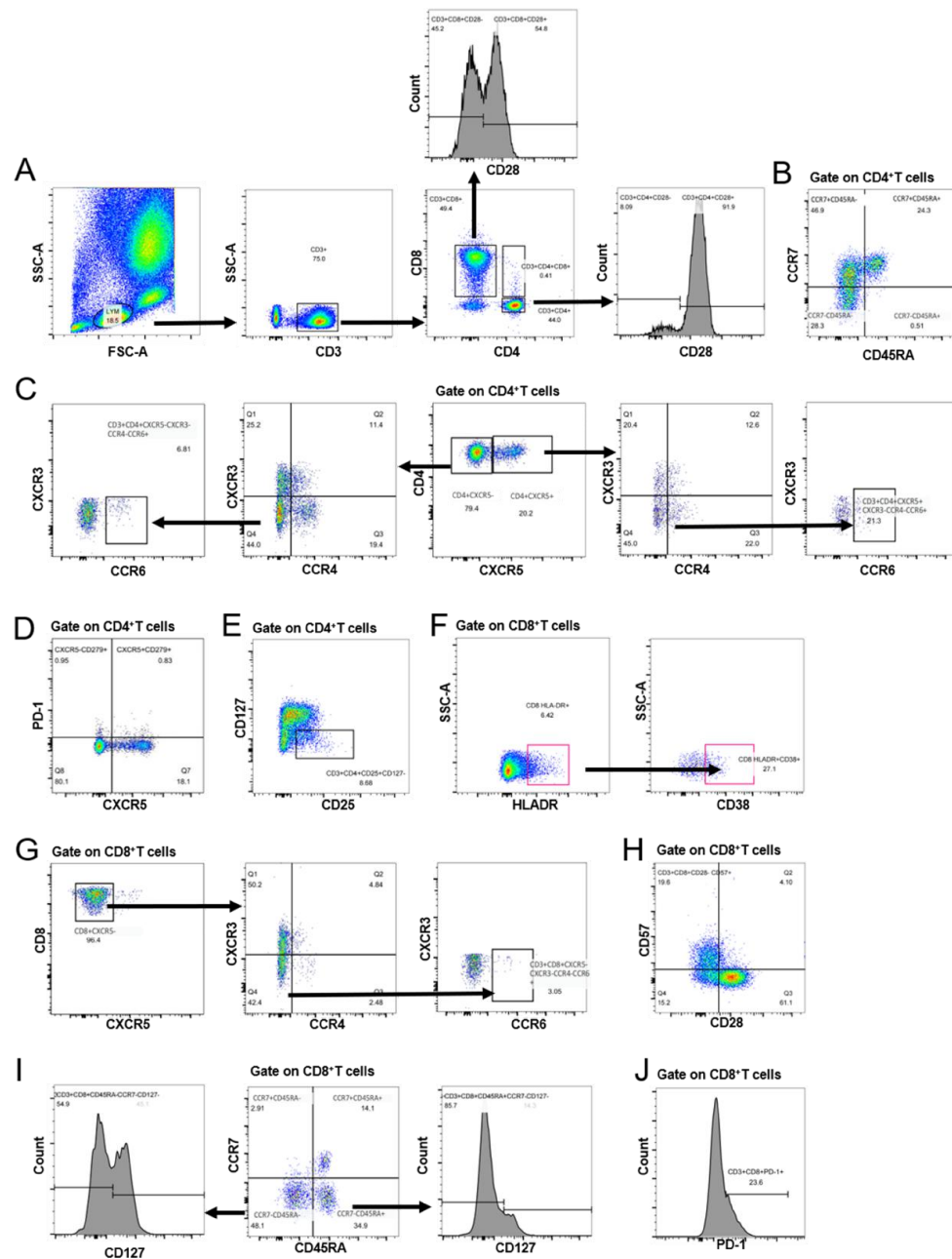
Panel	Marker	Fluorochrome	Catalogue No.	Specification
Panel 1	CD3	PerCP-Cy5.5	560835	50T
	CD4	APC-H7	560158	100T
	CD8	BV510	563919	100T
	CD127	BV421	562436	100T
	CD25	PE	555432	100T
	CD45RA	FITC	555488	100T
	CCR7	AF647	557734	100T
	CD28	PE-Cy7	560684	50T
Panel 2	CD3	PerCP-Cy5.5	560835	50T
	CD8	FITC	555634	100T
	CD28	PE-Cy7	560684	50T
	CD57	BV421	563896	50T
	CD38	BV510	563251	50T
	HLA-DR	PE	555812	100T
	CD279(PD1)	AF647	560838	100T
Panel 3	CD3	APC-H7	560176	100T
	CD4	PE-Cy7	557852	100T
	CD8	PerCP-Cy5.5	565310	100T
	CD183(CXCR3)	AF488	558047	100T
	CD196 (CCR6)	BV510	563241	50T
	CD185(CXCR5)	AF647	558113	100 T
	CD194(CCR4)	BV421	562579	50 T
	CD279(PD1)	PE	557946	100T

Supplementary Table 2. The 37 T lymphocyte subsets

T Lymphocyte subsets	Phenotype
T cell	CD3 ⁺
CD4 ⁺ T cell (Th cell)	CD3 ⁺ CD4 ⁺
CD8 ⁺ T cell (Tc cell)	CD3 ⁺ CD8 ⁺
Double-positive T cell	CD3 ⁺ CD4 ⁺ CD8 ⁺
Naïve CD4 ⁺ T cell	CD3 ⁺ CD4 ⁺ CD45RA ⁺ CCR7 ⁺
Terminally Differentiated CD4 ⁺ T cell	CD3 ⁺ CD4 ⁺ CD45RA ⁺ CCR7 ⁻
Central Memory CD4 ⁺ T cell	CD3 ⁺ CD4 ⁺ CD45RA ⁻ CCR7 ⁺
Effector Memory CD4 ⁺ T cell	CD3 ⁺ CD4 ⁺ CD45RA ⁻ CCR7 ⁻
CD4 ⁺ CD28 ⁻ T cell	CD3 ⁺ CD4 ⁺ CD28 ⁻
CD4 ⁺ CD28 ⁺ T cell	CD3 ⁺ CD4 ⁺ CD28 ⁺
Regulatory T cell	CD3 ⁺ CD4 ⁺ CD25 ⁺ CD127 ^{low/-}
Naïve CD8 ⁺ T cell	CD3 ⁺ CD8 ⁺ CCR7 ⁺ CD45RA ⁺
Terminally Differentiated CD8 ⁺ T cell	CD3 ⁺ CD8 ⁺ CCR7 ⁻ CD45RA ⁺
Central Memory CD8 ⁺ T cell	CD3 ⁺ CD8 ⁺ CCR7 ⁺ CD45RA ⁻
Effector Memory CD8 ⁺ T cell	CD3 ⁺ CD8 ⁺ CCR7 ⁻ CD45RA ⁻
CD127 ⁺ effector memory CD8 ⁺ T cell	CD3 ⁺ CD8 ⁺ CCR7 ⁻ CD45RA ⁻ CD127 ⁺
CD127 ⁻ effector memory CD8 ⁺ T cell	CD3 ⁺ CD8 ⁺ CCR7 ⁻ CD45RA ⁻ CD127 ⁻
CD127 ⁺ terminally differentiated CD8 ⁺ T cell	CD3 ⁺ CD8 ⁺ CCR7 ⁻ CD45RA ⁺ CD127 ⁺
CD127 ⁻ terminally differentiated CD8 ⁺ T cell	CD3 ⁺ CD8 ⁺ CCR7 ⁻ CD45RA ⁺ CD127 ⁻
CD8 ⁺ PD1 ⁺ T cell	CD3 ⁺ CD8 ⁺ PD1 ⁺
CD8 ⁺ CD28 ⁻ T cell	CD3 ⁺ CD8 ⁺ CD28 ⁻
CD8 ⁺ CD28 ⁺ T cell	CD3 ⁺ CD8 ⁺ CD28 ⁺
CD8 ⁺ HLADR ⁺ T cell	CD3 ⁺ CD8 ⁺ HLADR ⁺
CD8 ⁺ HLADR ⁺ CD38 ⁺ T cell	CD3 ⁺ CD8 ⁺ HLADR ⁺ CD38 ⁺
CD8 ⁺ CD28 ⁻ CD57 ⁺ T cell	CD3 ⁺ CD8 ⁺ CD28 ⁻ CD57 ⁺
Th1 cell	CD3 ⁺ CD4 ⁺ CXCR5 ⁻ CXCR3 ⁺ CCR4 ⁻
Th2 cell	CD3 ⁺ CD4 ⁺ CXCR5 ⁻ CXCR3 ⁻ CCR4 ⁺
Th17 cell	CD3 ⁺ CD4 ⁺ CXCR5 ⁻ CXCR3 ⁻ CCR4 ⁻ CCR6 ⁺
Tfh cell	CD3 ⁺ CD4 ⁺ CXCR5 ⁺
Tfh1 cell	CD3 ⁺ CD4 ⁺ CXCR5 ⁺ CXCR3 ⁺ CCR4 ⁻
Tfh2 cell	CD3 ⁺ CD4 ⁺ CXCR5 ⁺ CXCR3 ⁻ CCR4 ⁺
Tfh17 cell	CD3 ⁺ CD4 ⁺ CXCR5 ⁺ CXCR3 ⁻ CCR4 ⁻ CCR6 ⁺
Tc1 cell	CD3 ⁺ CD8 ⁺ CXCR5 ⁻ CXCR3 ⁺ CCR4 ⁻
Tc2 cell	CD3 ⁺ CD8 ⁺ CXCR5 ⁻ CXCR3 ⁻ CCR4 ⁺
Tc17 cell	CD3 ⁺ CD8 ⁺ CXCR5 ⁻ CXCR3 ⁻ CCR4 ⁻ CCR6 ⁺
CD4 ⁺ CXCR5 ⁻ PD1 ⁺ T cell	CD3 ⁺ CD4 ⁺ CXCR5 ⁻ PD1 ⁺
CD4 ⁺ CXCR5 ⁺ PD1 ⁺ T cell	CD3 ⁺ CD4 ⁺ CXCR5 ⁺ PD1 ⁺

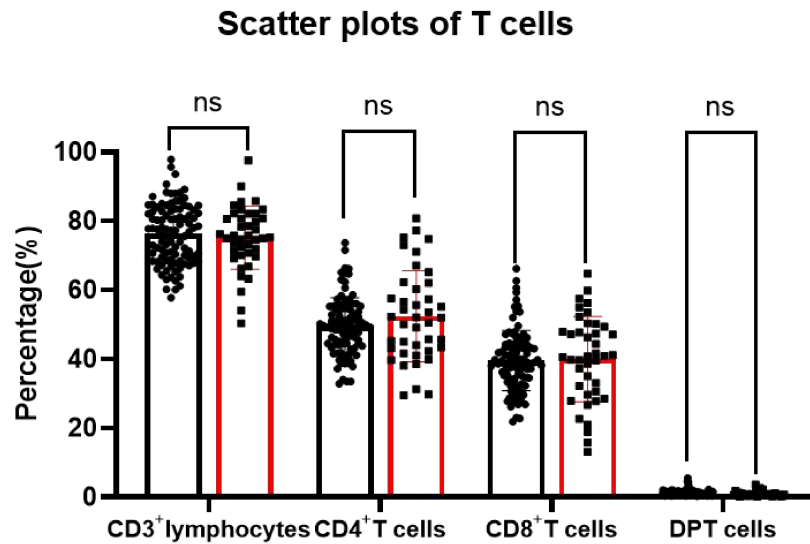
Th cell: Helper T cell, Tc cell: Cytotoxic T lymphocyte, Tfh cell: Follicular helper T cell.

Supplementary Figure

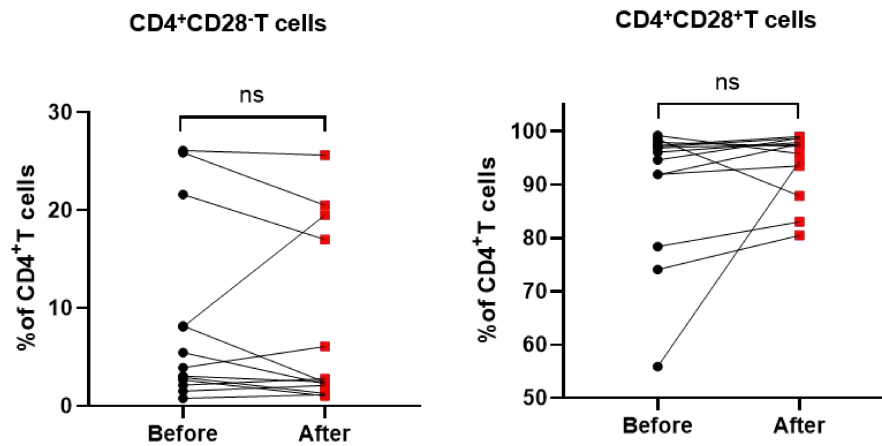


Supplementary Figure 1. Gating strategy for flow cytometric analysis: (A) Gating of CD4⁺ T cells, CD8⁺ T cells, and their subsets based on the expression of CD28. (B) CD4⁺ T cell subsets based on the expression of CCR7 and CD45RA. (C) Gating of Th and Tfh subsets. (D) Gating of Tph and activated Tfh cells. (E) Gating of CD4⁺ Treg. (F) Gating HLADR, and CD38 in CD8⁺ T cells. (G) Gating of Tc1, Tc2, and Tc17 subsets. (H) CD8⁺ T cell subsets

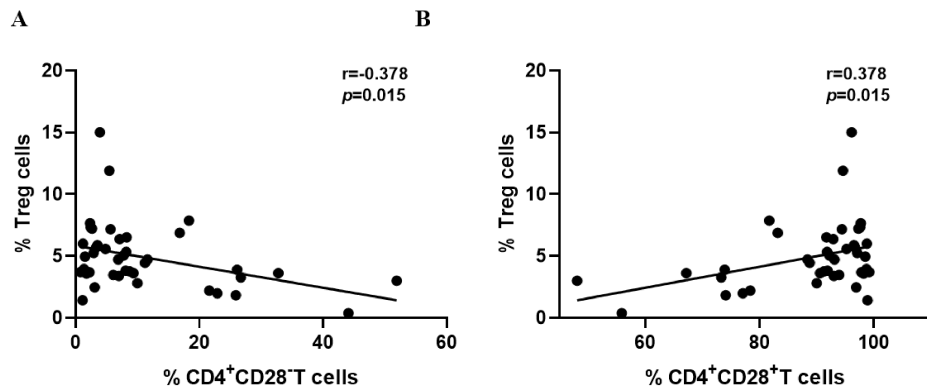
based on the expression of CD28 and CD57. (I) Gating of CD8⁺ T cell subsets based on the expression of CCR7, CD45RA, and CD127. (J) Gating of PD1 in CD8⁺ T cells.



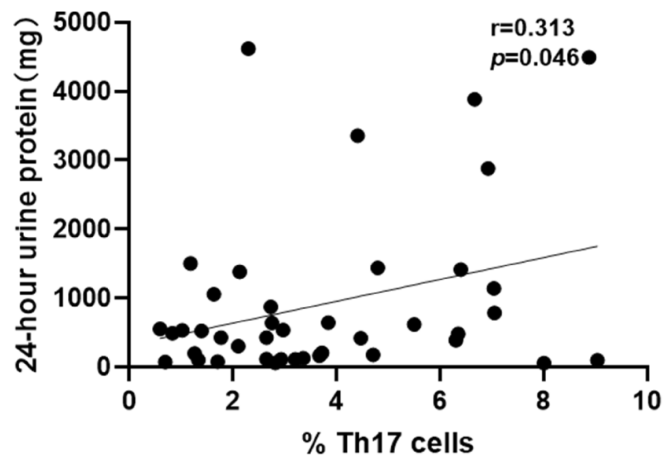
Supplementary Figure 2. Proportions of T cells, including CD4⁺ T cells, CD8⁺ T cells, and double-positive T cells, between SLE patients and HCs.



Supplementary Figure 3. Changes in the frequencies of CD4⁺CD28⁻ T cells and CD4⁺CD28⁺ T cells from 13 active SLE patients before (baseline) and after lupus treatment.



Supplementary Figure 4. (A) Correlation between the frequency of CD4⁺CD28⁻ T cells and Treg cells in SLE patients. (B) Correlation between the frequency of CD4⁺CD28⁺ T cells and Treg cells in SLE patients.



Supplementary Figure 5. Correlation between the frequency of Th17 cells and the level of 24-h urinary protein in SLE patients.