Table S1. List of mAbs used in this study.

Antibody/Marker	Fluorochrome	Clone	Company	Catalog
Dead cells	FVS 510	-	BD	564406
CD3	APC-H7	SK7	BD	560176
CD8	FITC	SK1	BD	347313
CD8	PE-Cy7	RPA-T8	BD	557746
CD4	FITC	RPA-T4	BD	555346
CD4	PerCPCy5.5	RPA-T4	BD	560650
CD56	PE	NCAM16.2	BD	340363
CD25	PE	M-A251	BD	555432
FoxP3	AF647	259D/C7	BD	560045
CD45RO	APC	UCHL1	BD	559865
CCR7	PE	150503	BD	560765
CD95	PerCP-Cy5.5	DX2	BD	561655
IgG2b	APC	MPC-11	Biolegend	400320
PD-L1	APC	29E.2A3	Biolegend	329708
IgG1	BB515	X40	BD	564416
TIM-3	BB515	7D3	BD	565568
IgG1	BV421	X40	BD	562438
PD-1	BV421	MIH4	BD	564323
IgG1	APC	MOPC-21	BD	555751
CD69	APC	FN50	BD	555533
IgG1	PE	MOPC-21	BD	556650
ICOS	PE	DX29	BD	557802

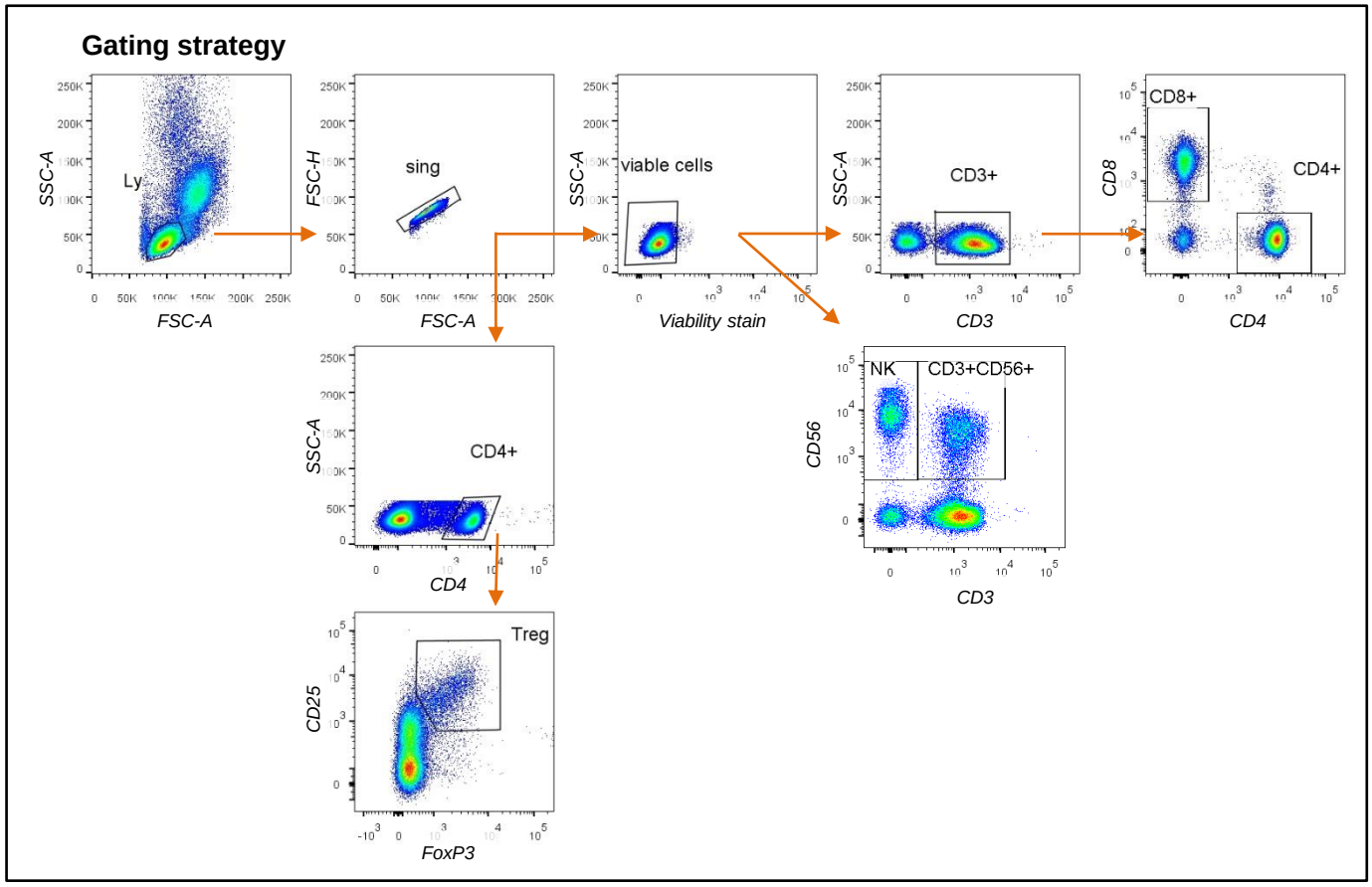

Figure S1. Representative gating strategy. Lymphocytes were gated using FSC-A vs SSC-A plot, single cells using FSC-A vs FSC-H plot and viable cells (≥50,000 events) using Fixable Viability Stain 510 staining. Lymphocytes subsets were defined as $CD3^{-}CD56^{+}$ NK cells, $CD3^{+}CD56^{+}$ cells, $CD4^{+}$ $CD3^{+}$ T cells, $CD8^{+}$ $CD3^{+}$ T cells and $CD4^{+}CD25^{+}FoxP3^{+}$ Tregs.

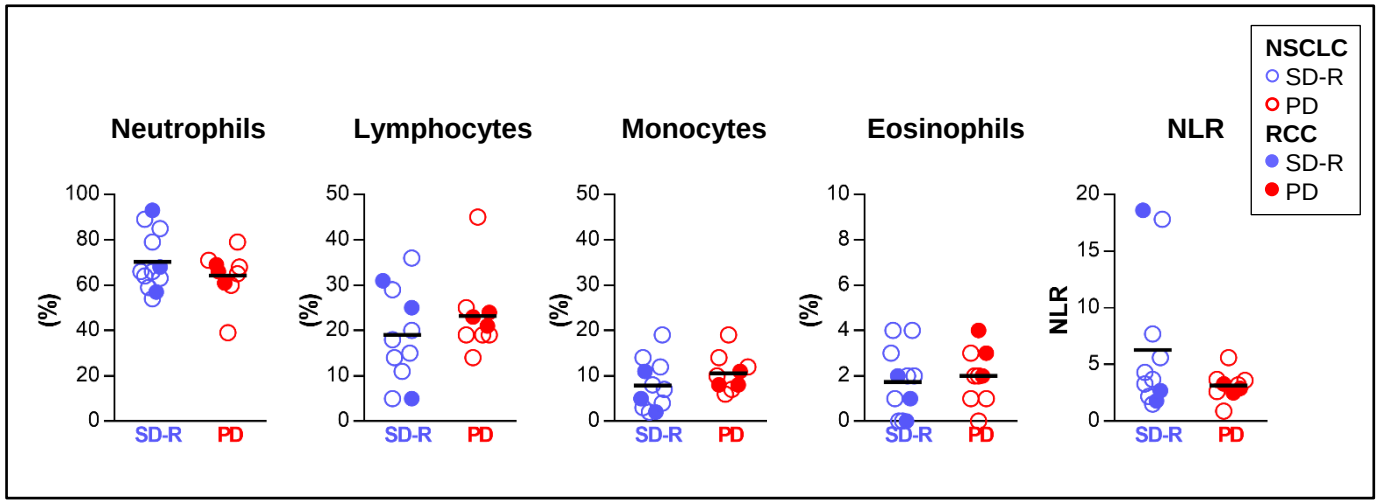

Figure S2. Leukocyte subsets in PRE-treatment samples. Frequency of neutrophils, lymphocytes, monocytes and eosinophils, and lymphocyte-to-neutrophil ratio (NLR) are shown for both stable disease-response (SD-R) and progressive disease (PD) patients.

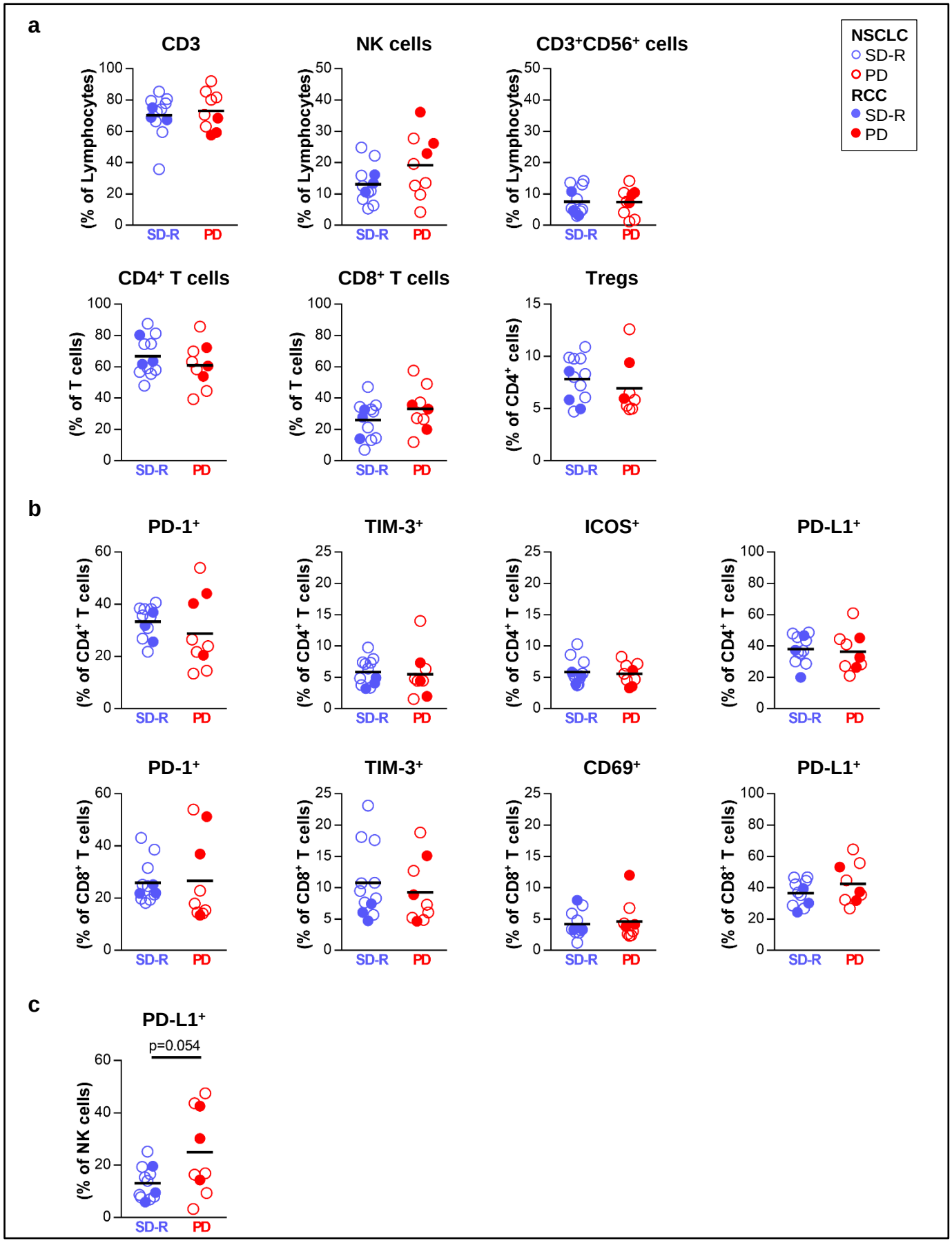

Figure S3. Lymphocyte subsets in PRE-treatment samples. a Above: Frequency of CD3$^+$ T cells, NK and CD3$^+$CD56$^+$ cells within lymphocytes. **Below:** Frequency of CD4$^+$ and CD8$^+$ cells within T cells and percentage of Tregs within CD4$^+$ cells. **b Above:** Frequency of PD-1$^+$, TIM-3$^+$, ICOS$^+$ and PD-L1$^+$ cells within CD4$^+$ T cells. **Below:** Frequency of PD-1$^+$, TIM-3$^+$, CD69$^+$ and PD-L1$^+$ cells within CD8$^+$ T cells. **c** Frequency of PD-L1$^+$ within NK cells.

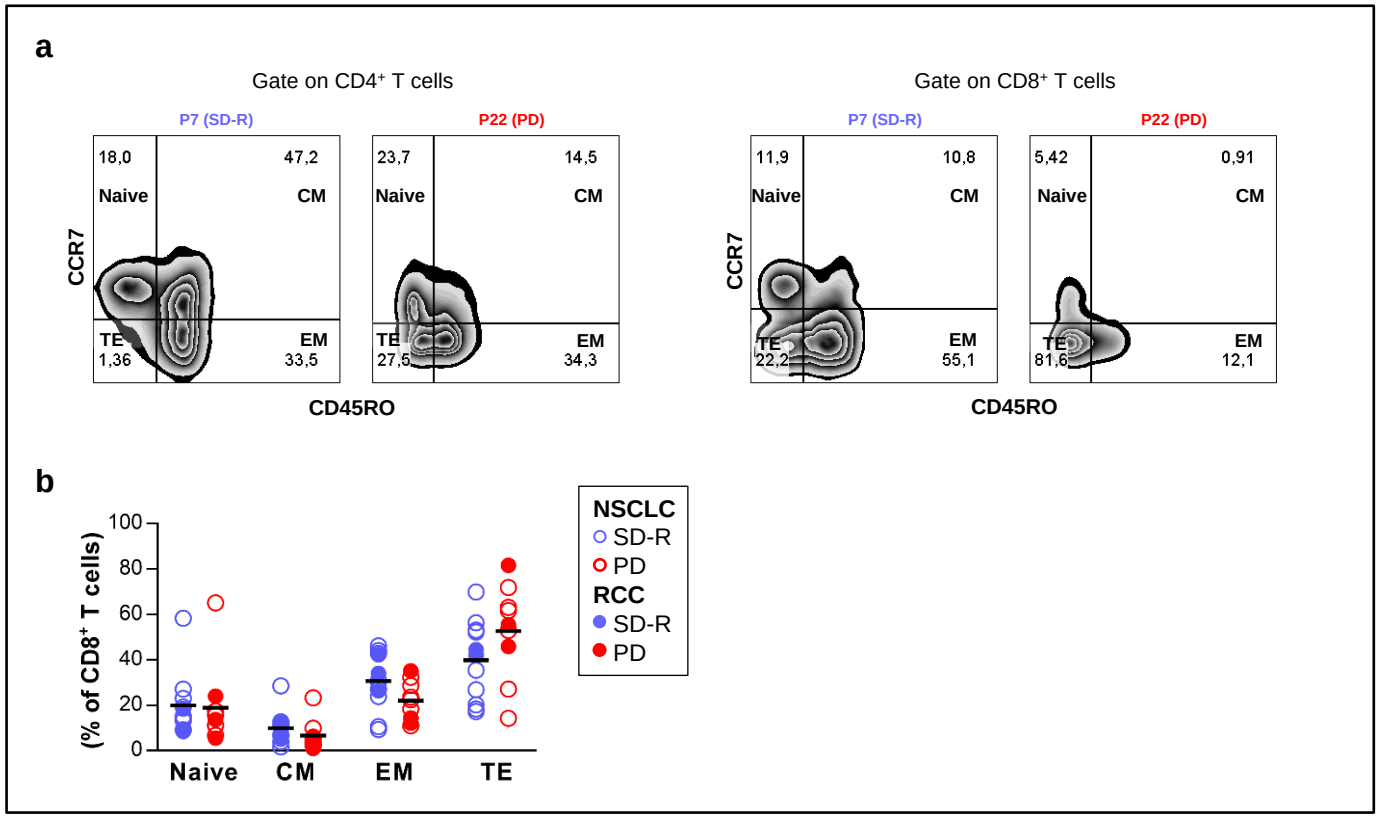

Figure S4. Memory T cell compartment in PRE-treatment samples. a Representative density plots showing memory subsets in $CD4^+$ and $CD8^+$ T cells from two patients: $CD45RO^-CCR7^+$ naïve cells, $CD45RO^+CCR7^+$ central memory (CM) cells, $CD45RO^+CCR7^-$ effector memory (EM) cells and $CD45RO^-CCR7^-$ terminal effector (TE) cells. **b** Frequency of memory $CD8^+$ T cell subsets is shown for both response groups.

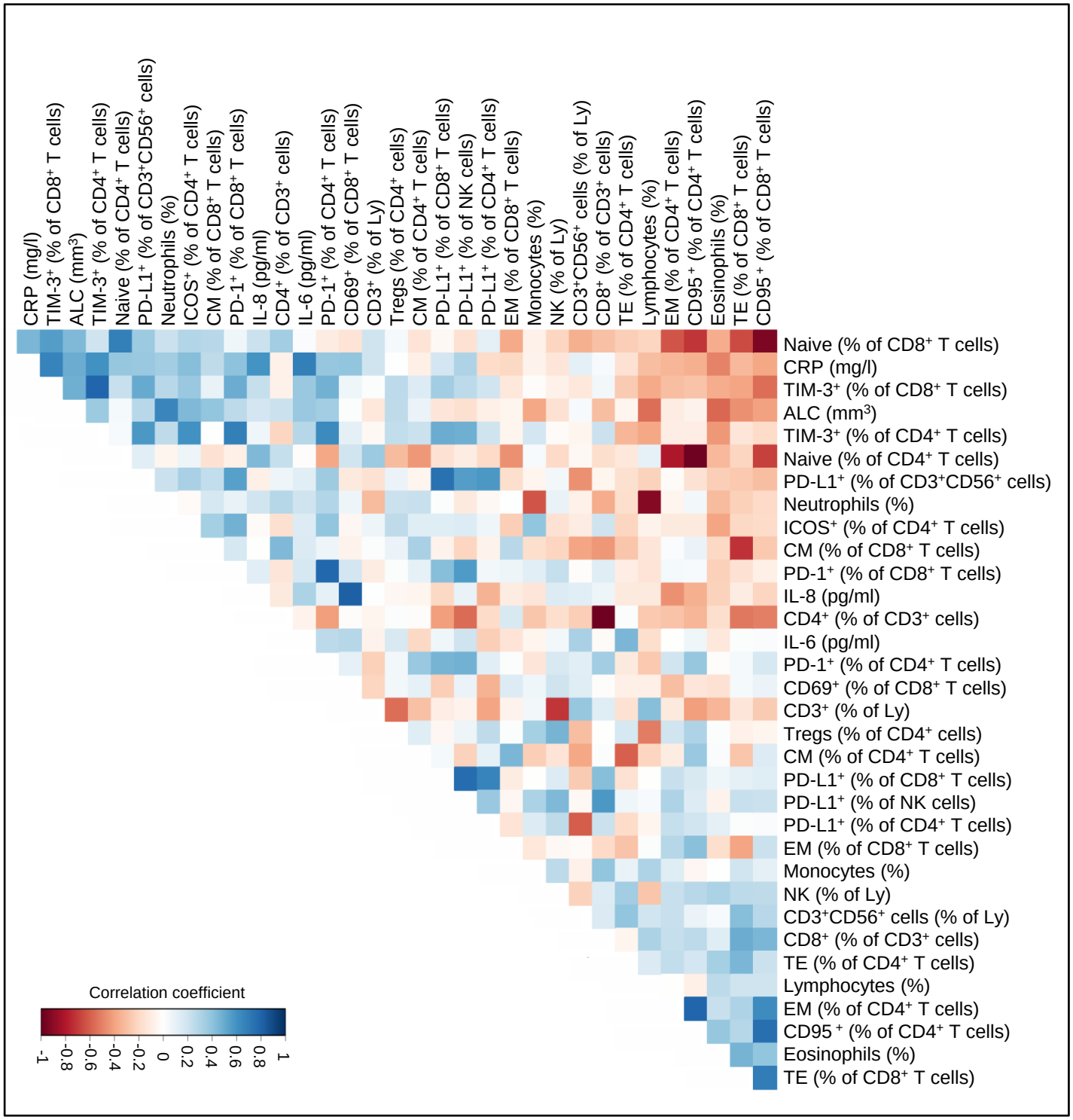

Figure S5. Correlation matrix of baseline immune cell populations and soluble mediators. Correlation between all immune cell populations and soluble mediators analyzed in peripheral blood collected before anti-PD-1 treatment. Correlation coefficients are represented using the color scale shown.

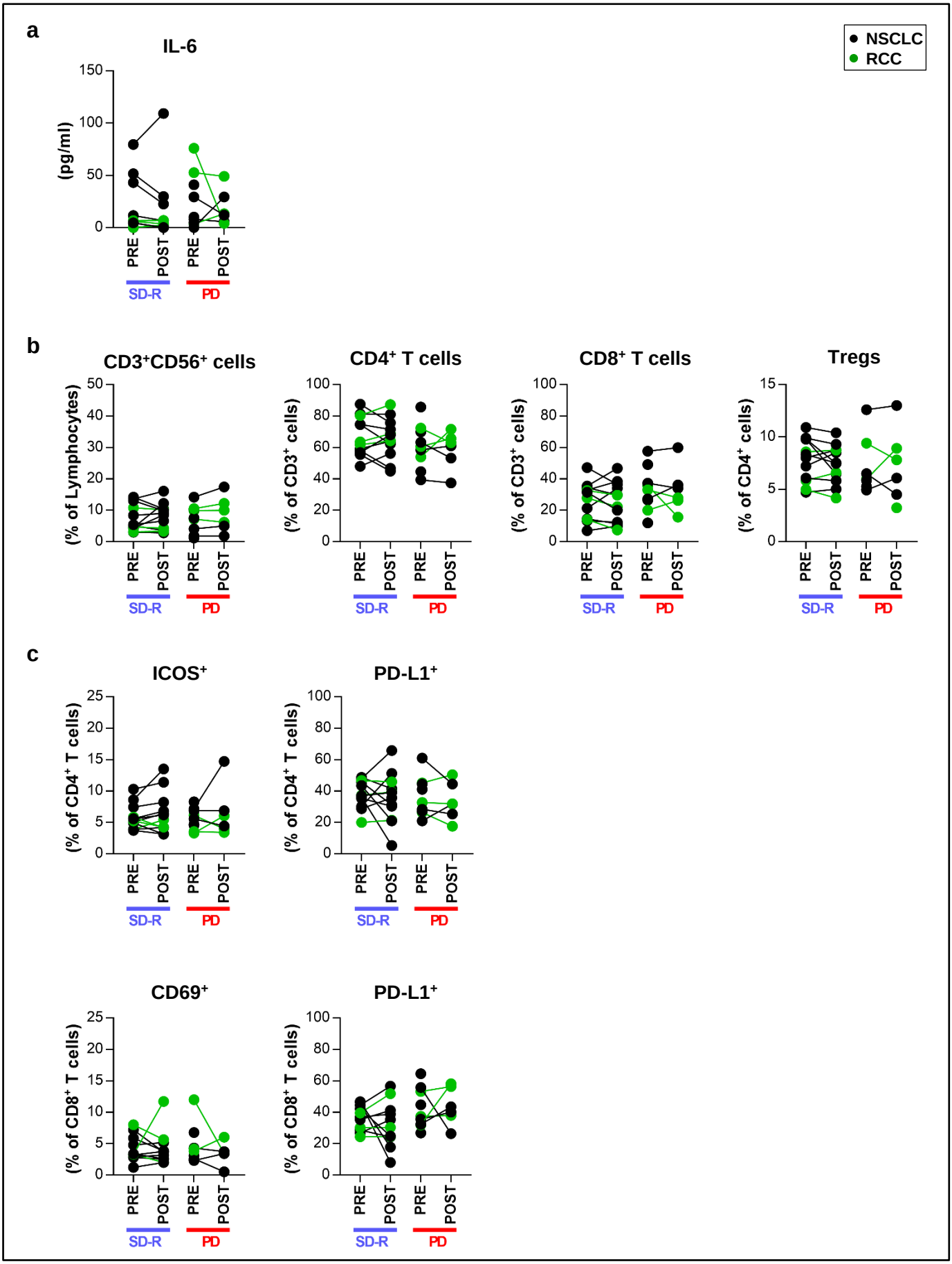

Figure S6. Immune cell subsets after anti-PD-1 therapy. Paired PRE and POST-treatment samples from SD-R and PD patients are shown for: **a** IL-6 plasma levels; **b** Frequency of $CD3^+CD56^+$ cells within lymphocytes, $CD4^+$ and $CD8^+$ T cells within T cells, and Tregs; **c** Frequency of $ICOS^+$ and $PD\text{-}L1^+$ cells within $CD4^+$ T cells (above) and frequency of $CD69^+$ and $PD\text{-}L1^+$ within $CD8^+$ T cells (below).

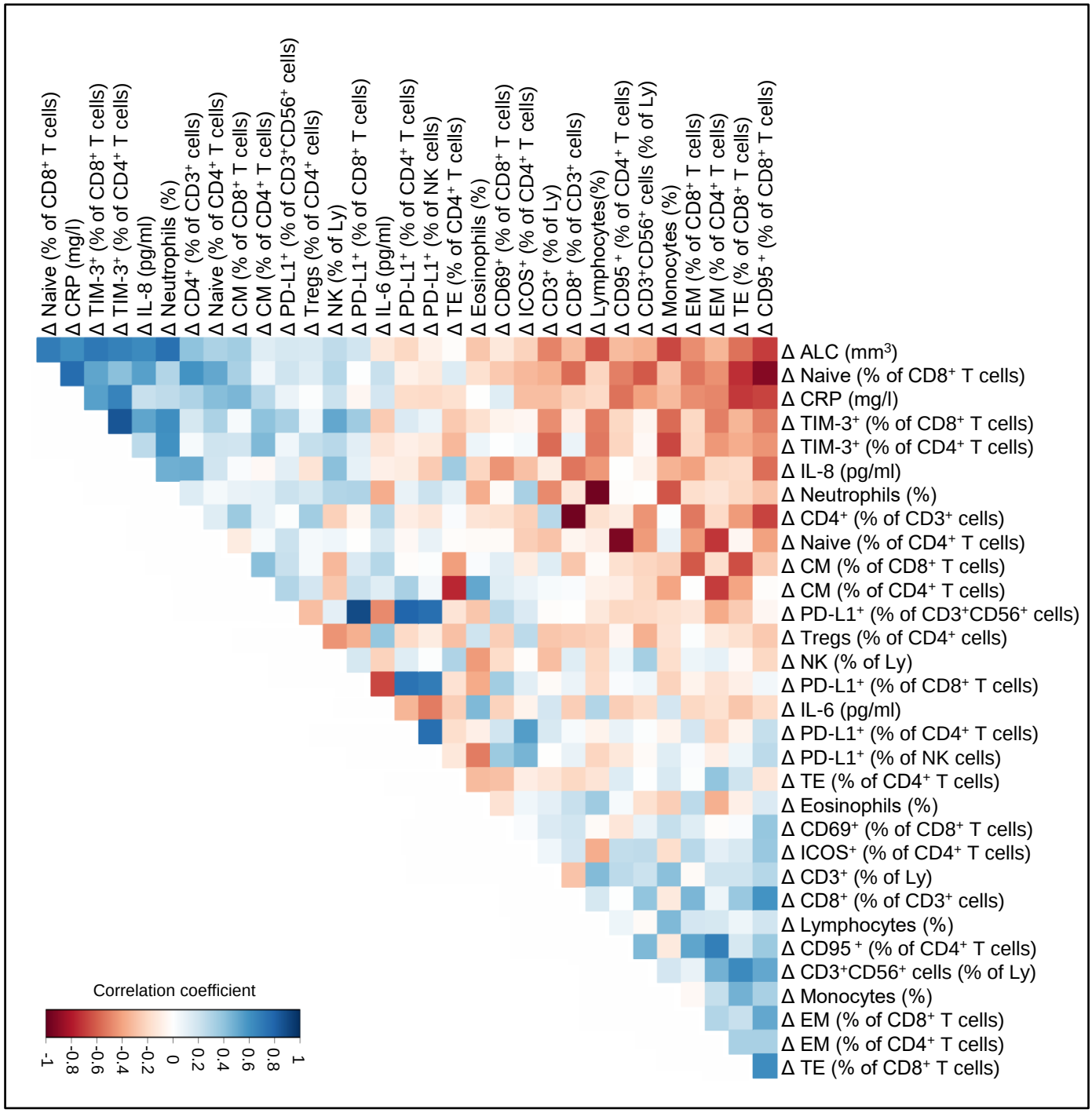

Figure S7. Correlation matrix of the variation in immune cell populations and soluble mediators. Correlation between the variation (Δ: POST minus PRE values) of all immune cell populations and soluble mediators analyzed in peripheral blood. Correlation coefficients are represented using the color scale shown.