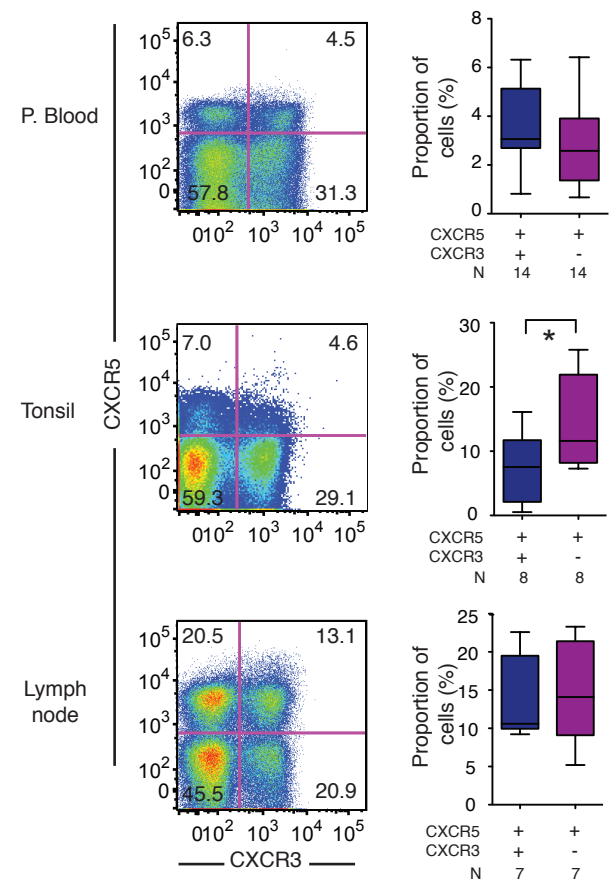
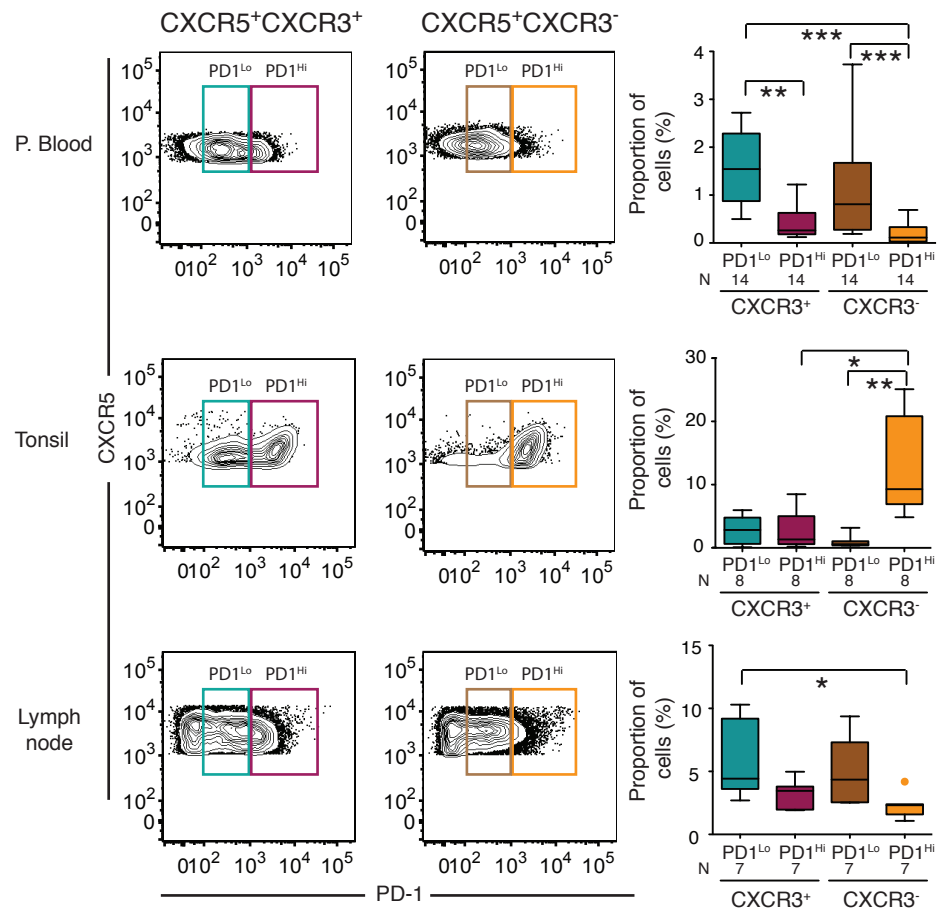


Supplemental Figure 1.

A

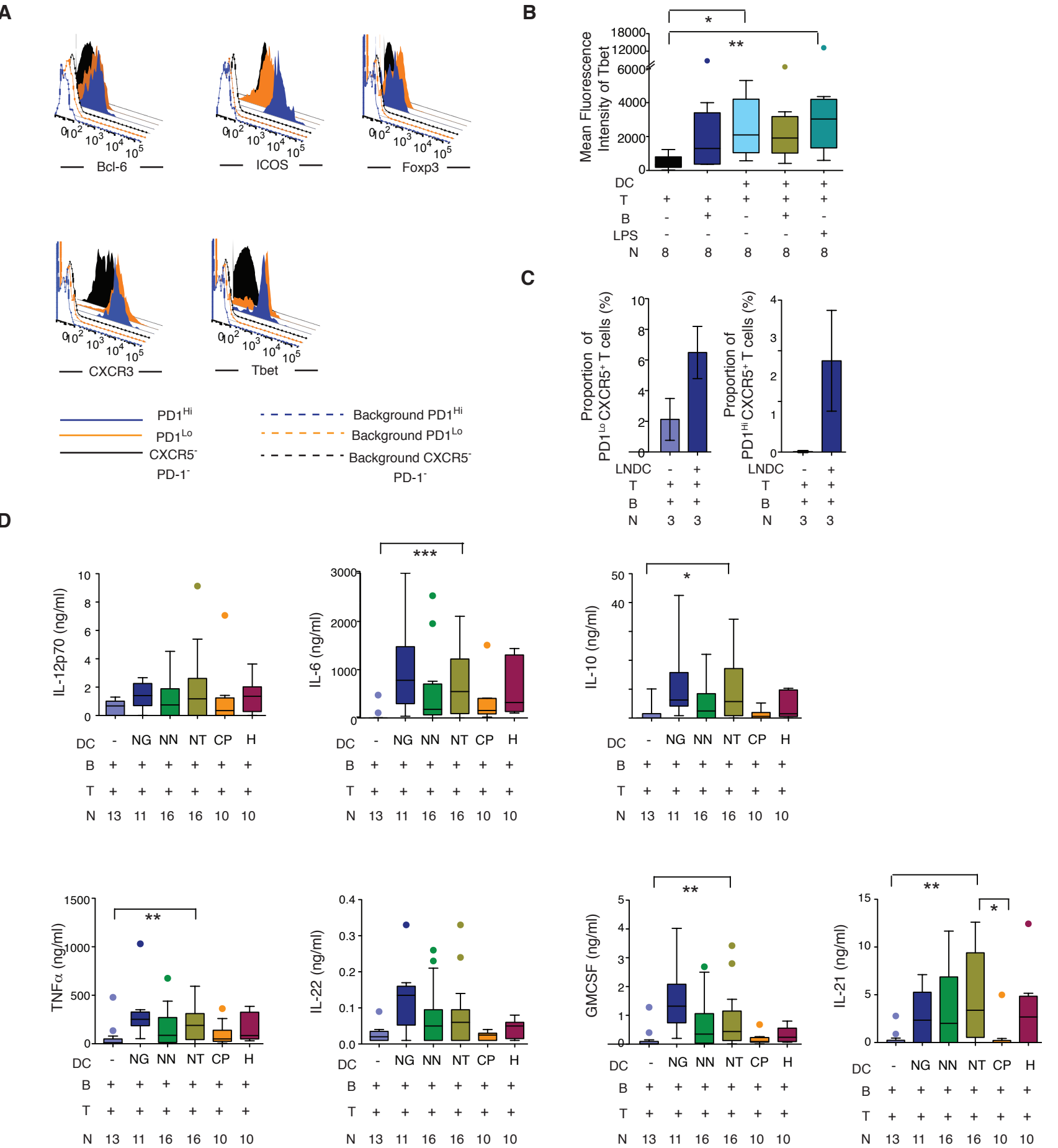


B



**Supplemental Figure 1. CXCR3 and PD-1 expression defines Tfh-like subsets present in human blood and lymphoid tissue.** (A): Flow cytometry analysis of CXCR5<sup>+</sup> CXCR3<sup>-</sup> and CXCR5<sup>+</sup> CXCR3<sup>+</sup> CD4 T cells from blood (n=14), tonsil (n=8) and lymph node (n=7) compartments from HIV-1 negative donors. Representative dot plots are shown on the left with numbers in quadrants representing percentages of different cell subsets. Right panel shows cumulative data from peripheral blood (P. Blood, n=14), tonsil (n=8) and lymph node (n=7). Statistical significance was calculated using a two-tailed Wilcoxon matched-pairs signed rank test (\*p<0.05). (B): Flow cytometric gating of CXCR3<sup>+</sup> PD-1<sup>Lo</sup> (green), CXCR3<sup>+</sup> PD-1<sup>Hi</sup> (garnet), CXCR3<sup>-</sup> PD-1<sup>Lo</sup> (brown) and CXCR3<sup>-</sup> PD-1<sup>Hi</sup> (orange) CD4 T cells consistently from indicated tissue compartments (left panel). Right panel summarizes the proportions of these cell subsets within CD4 T cells from each compartment; P. Blood, tonsil and lymph node. Statistical significance was calculated using a Friedman test followed by a Dunn's test (\*p<0.05; \*\*p<0.01; \*\*\*p<0.001).

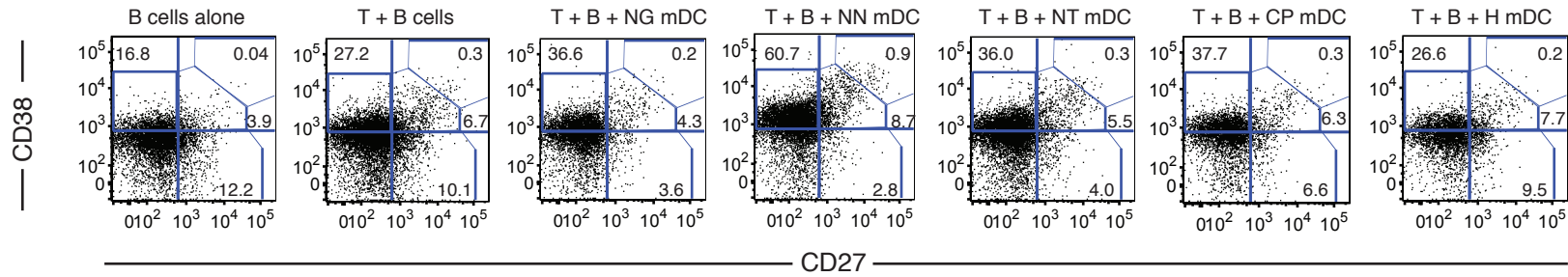
Supplemental Figure 2.



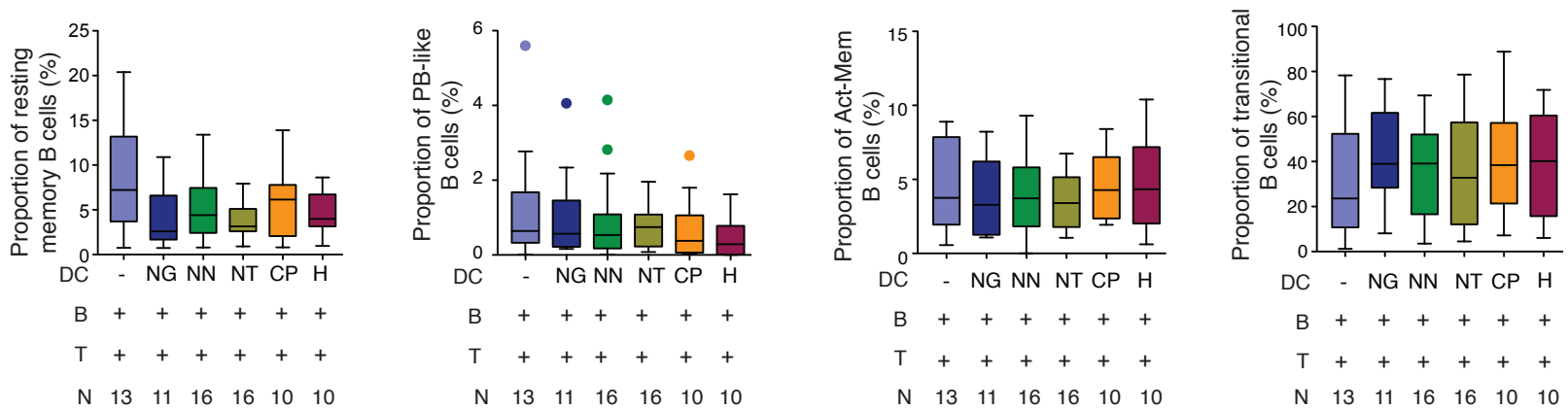
**Supplemental Figure 2. Phenotypal and functional analysis of mDC-primed Tfh-like cells.** (A): Overlay histograms reflecting Bcl-6, ICOS, Foxp3, CXCR3 and Tbet expression in gated PD-1<sup>Lo</sup> (orange) and PD-1<sup>Hi</sup> (blue) CXCR5<sup>+</sup> CD4 T cells defined as in panel A. CXCR5<sup>-</sup> PD-1<sup>-</sup> CD4 T cells (black) as internal controls and unstained background for each gated population are shown in open histograms. (B): Tbet expression levels in CD4 T cells cultured with B cells in the presence or absence of mDCs, or with LPS-activated mDCs alone (n=8). Statistical significance among different conditions was calculated using a Friedman test followed by a Dunn's test (\*p<0.05; \*\*p<0.01). (C) Proportions of PD-1<sup>Lo</sup> (left) and PD-1<sup>Hi</sup> (right) Tfh-like cells generated in the presence of autologous naïve B cells and allogeneic mDCs isolated from HIV-1 negative lymph nodes (n=3). (D): Concentrations of indicated cytokines in supernatants from naïve B cells co-cultured for 7 days with autologous naïve T cells from HIV-1 negative donors in the absence (violet) or presence of allogeneic mDCs from HIV-1 negative (NG; n=11), controller non-neutralizers (NN; n=16) and neutralizers (NT; n=16), untreated (CP; n=10) and HAART-treated (H; n=10) chronic progressors. Statistical significance between NT and all other conditions was calculated using a Kruskal-Wallis test followed by a Dunn's test (\*p<0.05; \*\*p<0.01; \*\*\*p<0.001).

Supplemental Figure 3.

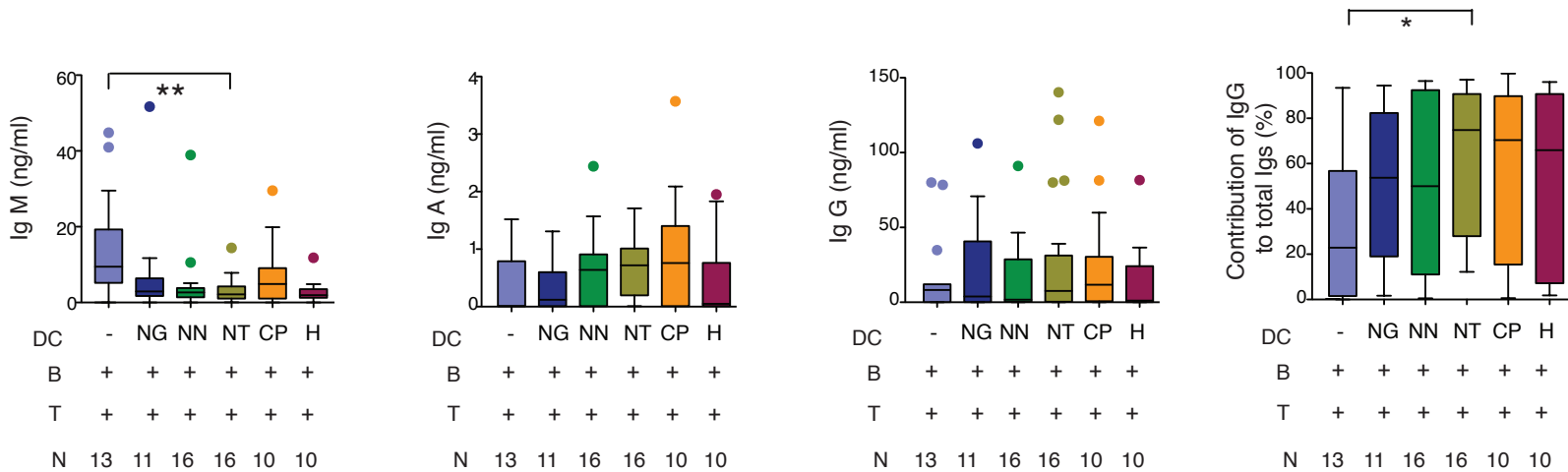
A



B



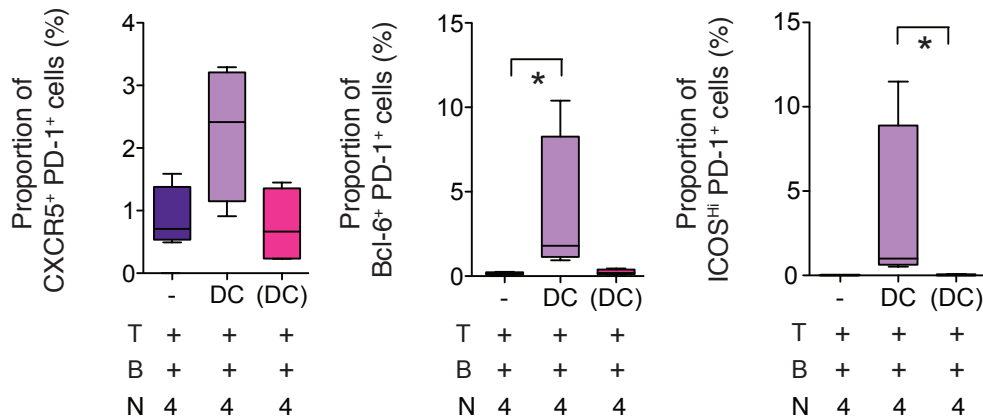
C



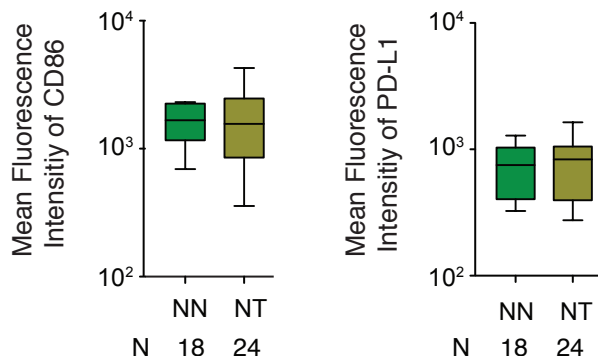
**Supplemental Figure 3. B cell phenotypal and functional analysis on Tfh priming assays.** (A): Representative flow cytometric analysis of CD38 vs CD27 expression on gated CD19<sup>+</sup> B cells co-cultured with autologous T cells alone (violet; n=13) or allogeneic mDCs from either HIV-1 negative (NG; n=11), controller non-neutralizers (NN; n=16) and neutralizers (NT; n=16), untreated (CP; n=10) and HAART-treated (H; n=10) chronic progressors. Numbers represent proportions of cells within each gate. (B): Proportions of CD38<sup>Lo</sup> CD27<sup>+</sup> resting memory, CD38<sup>Hi</sup> CD27<sup>Hi</sup> Plasmablast-like, CD38<sup>Int</sup> CD27<sup>Int</sup> activated memory and CD38<sup>+</sup>CD27<sup>+</sup> transitional-like B cells defined as in (A) and generated in the absence or presence of autologous T cells and allogeneic mDCs from the different study cohorts. Statistical significance of differences between mDCs from NT and mDCs from all other cohorts or control T and B cells alone was calculated using a Kruskal-Wallis test followed by a Dunn's test (\*p<0.05). (C): Luminex analysis of concentrations of IgM, IgA and IgGs in supernatants used in (B) from the indicated co-culture conditions. Contributions of IgG to total Igs are shown on the far right panel. Statistical significance of differences between NT and all others for each plot in B and C was calculated and corrected for multiple comparisons using a Kruskal-Wallis test followed by a Dunn's test (\*p<0.05; \*\*p<0.01).

# Supplemental Figure 4.

**A**

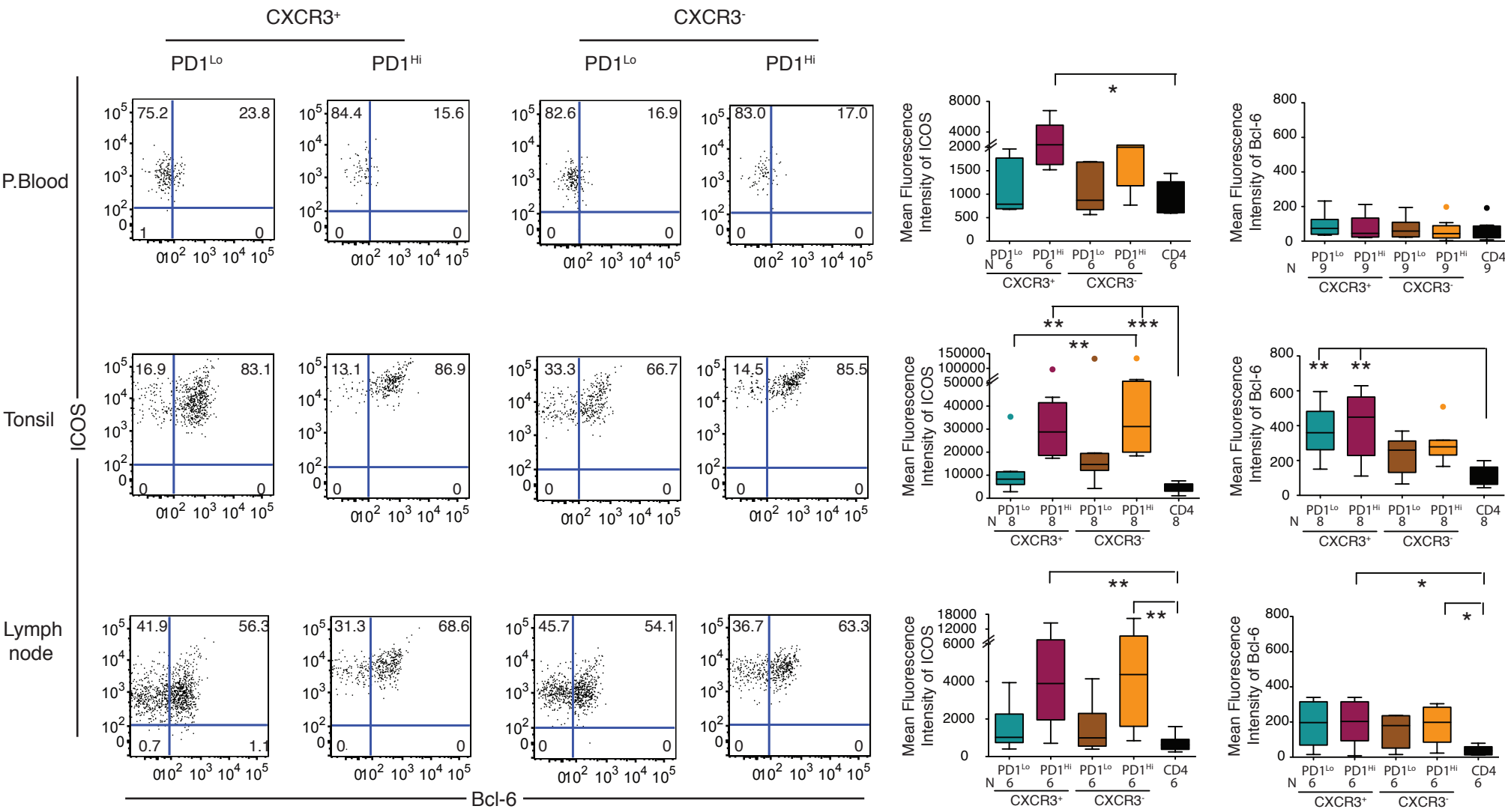


**B**



**Supplemental Figure 4. Molecular mechanisms underlying in vitro mDC-mediated priming of Tfh-like cells.** (A): Proportions of CXCR5<sup>+</sup> PD-1<sup>+</sup> (left), Bcl-6<sup>+</sup> PD-1<sup>+</sup> (middle) and ICOS<sup>+</sup> PD-1<sup>+</sup> (right) CD4 T cells cultured in the absence or the presence of autologous B cells and allogeneic mDCs in the same (no parenthesis) or in a different (between parenthesis) transwell compartments (n=4). Statistical significance was calculated using a Friedman test followed by a Dunn's test (\*p<0.05). (B): Mean Fluorescence Intensity of CD86 and PD-L1 in gated mDCs from HIV<sup>+</sup> controller non-neutralizers (NN; n=18) and neutralizers (NT; n=24).

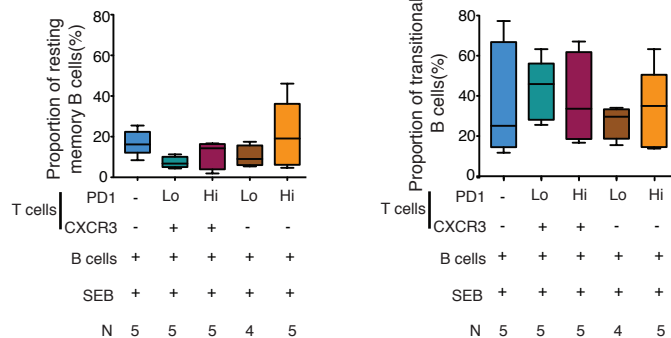
Supplemental Figure 5.



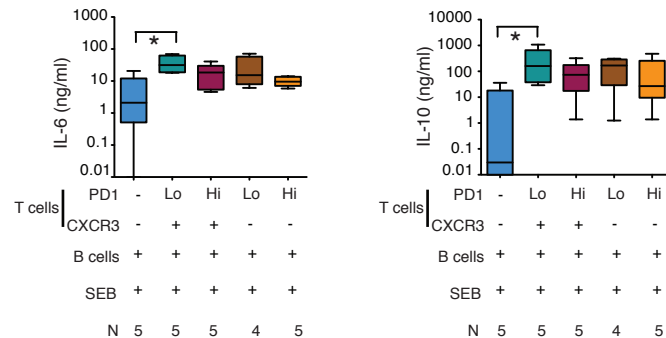
**Supplemental Figure 5. Phenotypical characterization of peripheral blood and lymphoid tissue Tfh-like subsets.** Flow cytometric analysis of surface expression of ICOS and intracellular Bcl-6 expression on gated CD4 T cells expressing either low (PD-1<sup>Lo</sup>) or high (PD-1<sup>Hi</sup>) levels of PD-1 in CXCR3<sup>+</sup> and CXCR3<sup>-</sup> CXCR5<sup>+</sup> Tfh-like subpopulations from peripheral blood (P.Blood; ICOS n=6 and Bcl=6 n=9; upper panel), tonsils (middle panel; n=8) and lymph nodes (lower panels; n=6). Numbers in quadrants represent the percentages of cells within quadrants. Summary of mean fluorescence intensities of ICOS and Bcl-6 in different experiments are shown on the right. Statistical significance of differences among populations was calculated using a Friedman test followed by a Dunn's test (\*p<0.05, \*\*p<0.01, \*\*\*p<0.001).

Supplemental Figure 6.

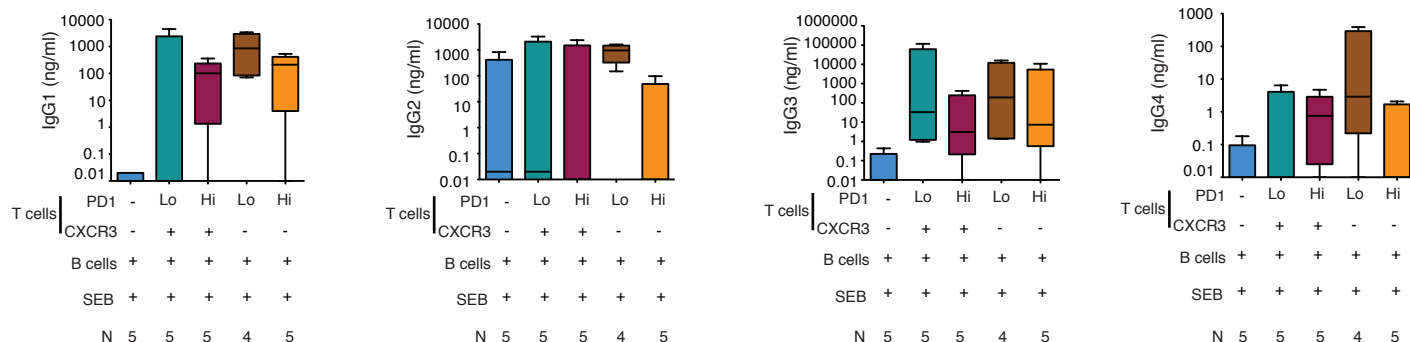
**A**



**B**

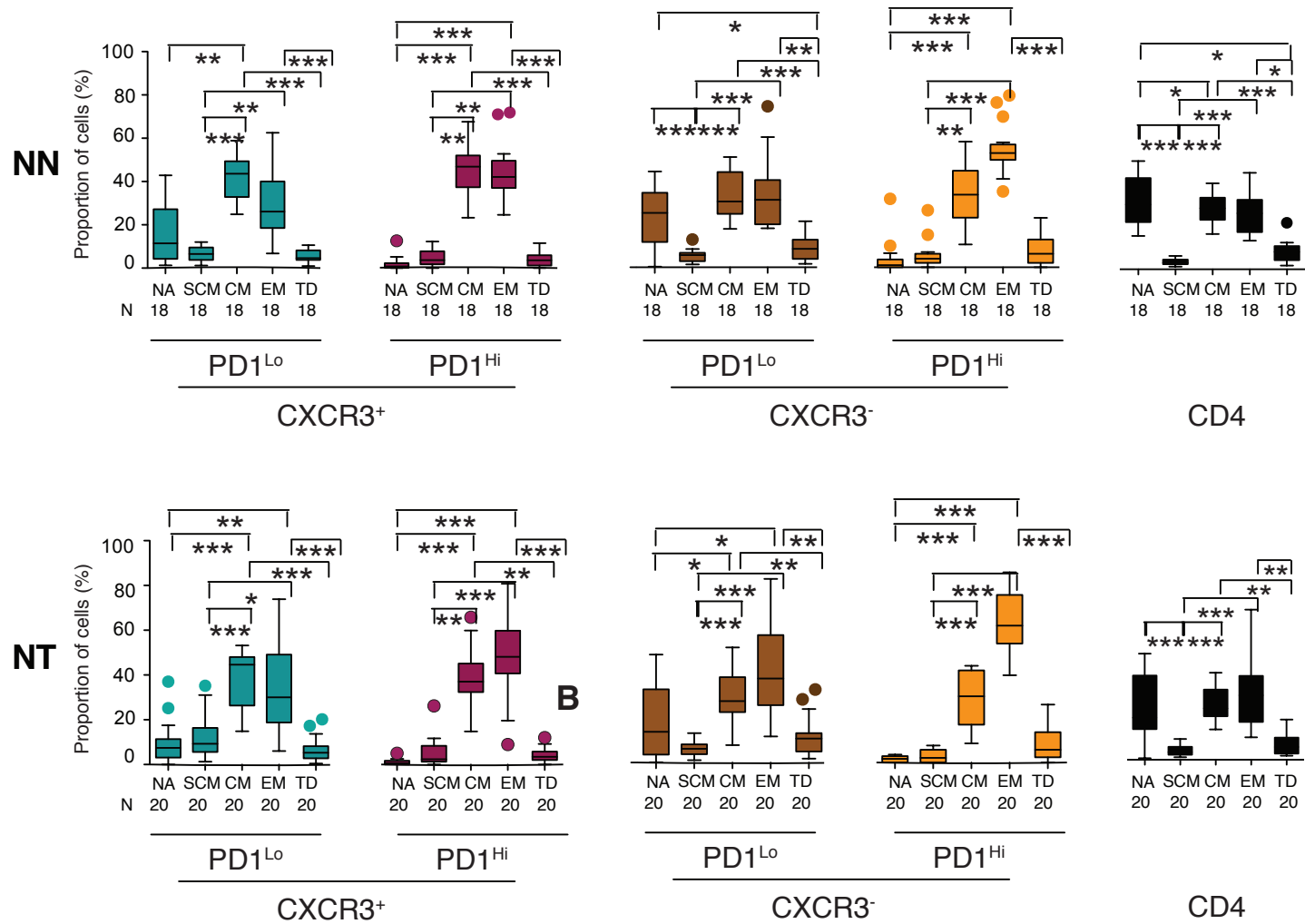


**C**

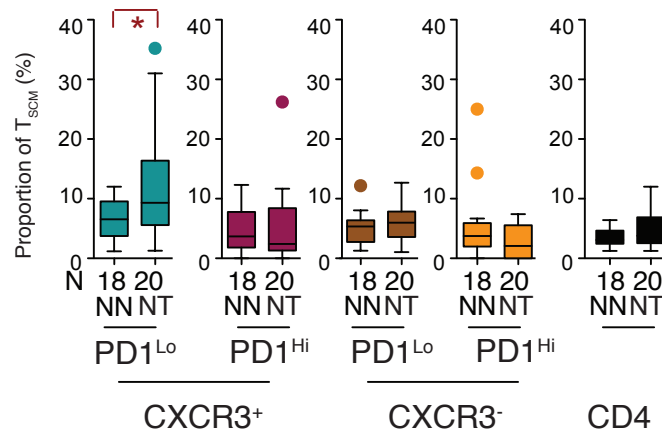


**Supplemental Figure 6. Functional analysis of pTfh cells inducing B cell activation, cytokine secretion and production of Immunoglobulins.** (A): Proportions of CD38<sup>+</sup> CD27<sup>+</sup> resting memory and CD38<sup>+</sup> CD27<sup>+</sup> transitional B cells on day 6 of co-culture with indicated pTfh populations. CXCR3<sup>+</sup> PD-1<sup>Lo</sup> (n=5), CXCR3<sup>+</sup> PD-1<sup>Hi</sup> (n=5), CXCR3<sup>+</sup> PD-1<sup>Lo</sup> (n=4) and CXCR3<sup>+</sup> PD-1<sup>Hi</sup> (n=5). (B-C): Luminex analysis of indicated cytokine (B) and IgG subclass (C) concentrations present in supernatants on day 6 in the indicated co-cultures of B cells alone or with CXCR3<sup>+</sup> PD-1<sup>Lo</sup> (n=5), CXCR3<sup>+</sup> PD-1<sup>Hi</sup> (n=5), CXCR3<sup>+</sup> PD-1<sup>Lo</sup> (n=4) and CXCR3<sup>+</sup> PD-1<sup>Hi</sup> (n=5) pTfh. Statistical significance among the 5 conditions was calculated using a Kruskal-Wallis test followed by Dunn's test (\*p< 0.05).

A



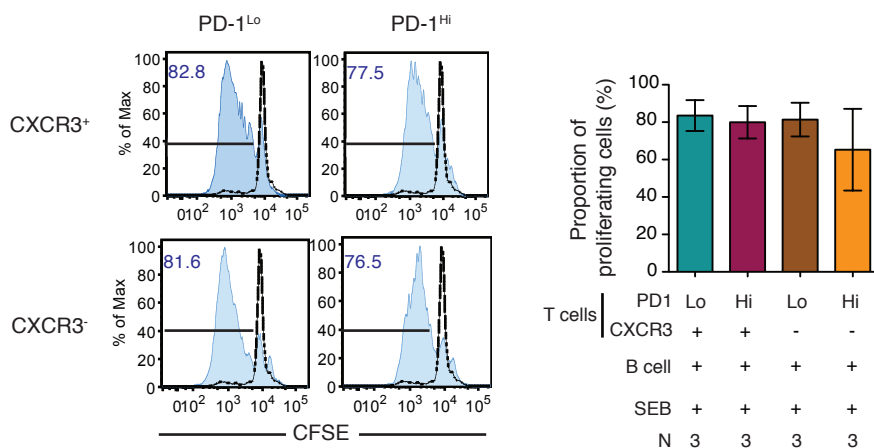
B



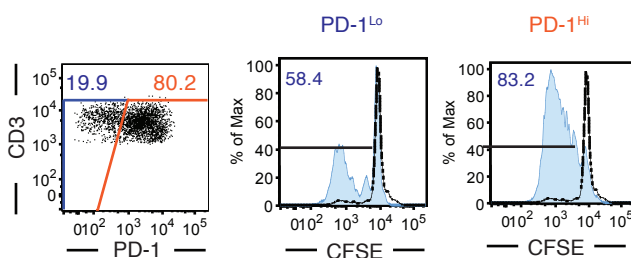
**Supplemental Figure 7. Analysis of T cell memory subsets in circulating Tfh-like cell subpopulations from the blood of HIV-1 controller neutralizers and non neutralizers.** (A): Proportions of naïve (NA), stem cell memory (SCM), central memory (CM), effector memory (EM), terminally differentiated (TD) cells defined by CCR7 vs CD45RO expression as shown in Figure 5A within CXCR3<sup>+</sup> PD-1<sup>Lo</sup> (green) and PD-1<sup>Hi</sup> (garnet), CXCR3<sup>-</sup> PD-1<sup>Lo</sup> (brown) and PD-1<sup>Hi</sup> (orange) and total CD4 T cells (CD4, black) from peripheral blood from HIV controller neutralizers (NT, n=18, lower row) and non-neutralizers (NN, n=20, upper row). Statistical differences in memory subset composition within each pTfh subpopulation were calculated using a Friedman test followed by a Dunn's test (\*p<0.05; \*\*p<0.01, \*\*\*p<0.001). (B): Distributions of SCM are also represented individually within each pTfh population comparing NN (n=18) and NT (n=20). Statistical differences in T<sub>SCM</sub> proportions between HIV controller neutralizers and non neutralizers within each PD-1<sup>Lo</sup> and PD-1<sup>Hi</sup> pTfh subset was calculated using a one-tailed Mann Whitney test (\*p<0.05,

# Supplemental Figure 8.

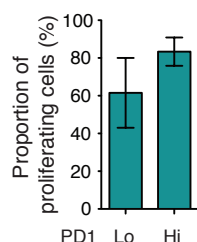
**A**



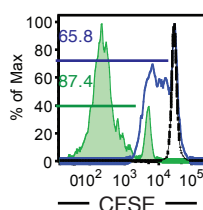
**B**



**C**



**D**



**Supplemental Figure 8. Viability and proliferative capacity of different Tfh-like cell subpopulations from human blood.** (A): Histograms (left panel) show representative flow cytometric analysis of CFSE dilution on sorted pTfh subpopulations on day 6 of culture with autologous B cells and SEB. Black dash lines reflect CFSE levels of control cells cultured with media alone. Numbers within histograms correspond to proportions of proliferating cells. Right panel summarizes proportions of proliferating CFSE<sup>Lo</sup> cells in sorted pTfh subsets on day 6 (n=3). (B): Representative flow cytometric analysis showing CFSE dilution on gated PD-1<sup>Lo</sup> and PD-1<sup>Hi</sup> cells on day 6 of culture of sorted CXCR5<sup>+</sup> CXCR3<sup>+</sup> PD-1<sup>Lo</sup> T cells with B cells and SEB. (C): summary the proportions of proliferating PD-1<sup>Lo</sup> and PD-1<sup>Hi</sup> cells in n=3 experiments. (D): Proliferative activity of CXCR5<sup>+</sup> CXCR3<sup>+</sup> PD-1<sup>Lo</sup> cells assessed in serial culture experiments. PD-1<sup>Lo</sup> cells isolated on day 6 are highlighted in blue; PD-1<sup>Lo</sup> cells resorted on day 6 and cultured for six additional days are highlighted in green. Numbers in the histogram represent proportion of proliferating cells from corresponding populations. Unstimulated cells are shown in black dash line.



## Supplemental Figure Legends

**Supplemental Figure 1. CXCR3 and PD-1 expression defines Tfh-like subsets present in human blood and lymphoid tissue.** (A): Flow cytometry analysis of CXCR5<sup>+</sup> CXCR3<sup>-</sup> and CXCR5<sup>+</sup> CXCR3<sup>+</sup> CD4 T cells from blood (n=14), tonsil (n=8) and lymph node (n=7) compartments from HIV-1 negative donors. Representative dot plots are shown on the left with numbers in quadrants representing percentages of different cell subsets. Right panel shows cumulative data from peripheral blood (P. Blood, n=14), tonsil (n=8) and lymph node (n=7). Statistical significance was calculated using a two-tailed Wilcoxon matched-pairs signed rank test (\*p<0.05). (B): Flow cytometric gating of CXCR3<sup>+</sup> PD-1<sup>Lo</sup> (green), CXCR3<sup>+</sup> PD-1<sup>Hi</sup> (garnet), CXCR3<sup>-</sup> PD-1<sup>Lo</sup> (brown) and CXCR3<sup>-</sup> PD-1<sup>Hi</sup> (orange) CD4 T cells from indicated tissue compartments (left panel). Right panel summarizes the proportions of these cell subsets within CD4 T cells from each compartment; P. Blood, tonsil and lymph node. Statistical significance was calculated using a Friedman test followed by a Dunn's test (\*p<0.05; \*\*p<0.01; \*\*\*p<0.001).

**Supplemental Figure 2. Phenotypical and functional analysis of mDC-primed Tfh-like cells.** (A): Overlay histograms reflecting Bcl-6, ICOS, Foxp3, CXCR3 and Tbet expression in gated PD-1<sup>Lo</sup> (orange) and PD-1<sup>Hi</sup> (blue) CXCR5<sup>+</sup> CD4 T cells defined as in panel A. CXCR5<sup>-</sup> PD-1<sup>-</sup> CD4 T cells (black) as internal controls and unstained background for each gated population are shown in open histograms. (B): Tbet expression levels in CD4 T cells cultured with B cells in the presence or absence of mDCs, or with LPS-activated mDCs alone (n=8). Statistical significance among different conditions was calculated using a Friedman test followed by a Dunn's test (\*p<0.05; \*\*p<0.01). (C) Proportions of PD-1<sup>Lo</sup> (left) and PD-1<sup>Hi</sup> (right) Tfh-like cells generated in the presence of autologous naïve B cells and allogeneic mDCs isolated from HIV-1 negative lymph nodes (n=3). (D): Concentrations of indicated cytokines in supernatants from naïve B cells co-cultured for 7 days with autologous naïve T cells from HIV-1 negative donors in the absence (violet) or presence of allogeneic mDCs from HIV-1 negative (NG, n=11), controller non-neutralizers (NN, n=16) and neutralizers (NT, n=16), untreated (CP, n=10) and HAART-treated (H) chronic progressors. Statistical significance between DC from NT and other conditions was calculated using a Kruskal-Wallis test followed by a Dunn's test (\*p<0.05; \*\*p<0.01; \*\*\*p<0.01).

**Supplemental Figure 3. B cell phenotypical and functional analysis on Tfh priming assays.** (A): Representative flow cytometric analysis of CD38 vs CD27 expression on gated CD19<sup>+</sup> B cells co-cultured with autologous T cells alone or with allogeneic cDCs from either HIV-1 negative persons (NG, n=11), controller non-neutralizers (NN, n=16), neutralizers (NT, n=16), untreated HIV patients (CP, n=10) or HAART-treated (H, n=10) chronic progressors. Numbers represent proportions of cells within each gate. (B): Proportions of CD38<sup>Lo/-</sup> CD27<sup>+</sup> resting memory, CD38<sup>Hi</sup> CD27<sup>Hi</sup> Plasmablast-like, CD38<sup>Int</sup> CD27<sup>Int</sup> activated memory and CD38<sup>+</sup>CD27<sup>-</sup> transitional-like B cells defined as in (A) and generated in the absence or presence of autologous T cells and allogeneic mDCs from the different study cohorts.

Statistical significance of differences between mDCs from NT and mDCs from all other cohorts or control T and B cells alone was calculated using a Kruskal-Wallis test followed by a Dunn's test (\* $p < 0.05$ ). (C): Luminex analysis of concentrations of IgM, IgA and IgGs in supernatants used in (B) from the indicated co-culture conditions. Contributions of IgG to total Igs are shown on the far right panel. Statistical significance of differences between DC from NT and all others was calculated and corrected for multiple comparisons using a Kruskal-Wallis test followed by a Dunn's test (\* $p < 0.05$ ; \*\* $p < 0.01$ ).

**Supplemental Figure 4. Molecular mechanisms underlying in vitro mDC-mediated priming of Tfh-like cells.** (A): Proportions of CXCR5<sup>+</sup> PD-1<sup>+</sup> (left), Bcl-6<sup>+</sup> PD-1<sup>+</sup> (middle) and ICOS<sup>Hi</sup> PD-1<sup>+</sup> (right) CD4 T cells cultured in the absence or the presence of autologous B cells and allogeneic mDCs in the same (no parenthesis) or in a different (between parenthesis) transwell compartment (n=4). Statistical significance was calculated using a Friedman test followed by a Dunn's test (\* $p < 0.05$ ). (B): Mean Fluorescence Intensity of CD86 and PD-L1 in gated mDCs from HIV+ controller non-neutralizers (NN; n=18) and neutralizers (NT; n=24).

**Supplemental Figure 5. Phenotypical characterization of peripheral blood and lymphoid tissue Tfh-like.** Flow cytometric analysis of surface expression of ICOS and intracellular Bcl-6 expression on gated CD4 T cells expressing either low (PD-1<sup>Lo</sup>) or high (PD-1<sup>Hi</sup>) levels of PD-1 in CXCR3<sup>-</sup> and CXCR3<sup>+</sup> CXCR5<sup>+</sup> Tfh-like subpopulations from peripheral blood (P.Blood; (P.Blood; ICOS n=6 and Bcl=6 n=9; upper panel), tonsils (middle panel; n=8) and lymph nodes (lower panels; n=6). Numbers represent the percentages of cells within each quadrants. Summary of mean fluorescence intensities of ICOS and Bcl-6 in different experiments are shown on the right. Statistical significance of differences among populations was calculated using a Friedman test followed by a Dunn's test (\* $p < 0.05$ ; \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ).

**Supplemental Figure 6. Functional analysis of pTfh cells inducing B cell activation, cytokine secretion and production of Immunoglobulins.** (A): Proportions of CD38<sup>-</sup> CD27<sup>+</sup> resting memory and CD38<sup>+</sup> CD27<sup>-</sup> transitional B cells on day 6 of co-culture with indicated pTfh populations. CXCR3<sup>+</sup> PD-1<sup>Lo</sup> (n=5), CXCR3<sup>+</sup> PD-1<sup>Hi</sup> (n=5), CXCR3<sup>-</sup> PD-1<sup>Lo</sup> (n=4) and CXCR3<sup>-</sup> PD-1<sup>Hi</sup> (n=5). (B-C): Luminex analysis of indicated cytokine (B) and IgG subclass (C) concentrations present in supernatants on day 6 in the indicated co-cultures of B cells alone or with CXCR3<sup>+</sup> PD-1<sup>Lo</sup> (n=5), CXCR3<sup>+</sup> PD-1<sup>Hi</sup> (n=5), CXCR3<sup>-</sup> PD-1<sup>Lo</sup> (n=4) and CXCR3<sup>-</sup> PD-1<sup>Hi</sup> (n=5) pTfh. Statistical significance among the 5 conditions was calculated using a Kruskal-Wallis test followed by a Dunn's test (\* $p < 0.05$ ; \*\* $p < 0.01$ ).

**Supplemental Figure 7. Analysis of T cell memory subsets in circulating Tfh-like cell subpopulations from the blood of HIV-1 controller neutralizers and non neutralizers.** (A): Proportions of naïve (NA), stem cell memory (SCM), central memory (CM), effector memory (EM), terminally differentiated (TD) cells defined by CCR7 vs CD45RO expression as shown in Figure 5A within CXCR3<sup>+</sup> PD-1<sup>Lo</sup> (green)

and PD-1<sup>Hi</sup> (garnet), CXCR3<sup>-</sup> PD-1<sup>Lo</sup> (brown) and PD-1<sup>Hi</sup> (orange) and total CD4 T cells (CD4, black) from peripheral blood from HIV controller neutralizers (NT, n=20, lower row) and non-neutralizers (NN, n=18, upper row). Statistical differences in memory subset composition within each pTfh subpopulation were calculated using a Friedman test followed by a Dunn's test (\*p<0.05; \*\*p<0.01, \*\*\*p<0.001). (B): Distributions of SCM are also represented individually within each pTfh subpopulation comparing NN (n=18) and NT (n=20). Statistical differences in T<sub>SCM</sub> proportions between HIV controller neutralizers and non-neutralizers within each PD-1<sup>Lo</sup> and PD-1<sup>Hi</sup> pTfh subset was calculated using a one-tailed Mann Whitney test (\*p<0.05, red).

**Supplemental Figure 8. Viability and proliferative capacity of different Tfh-like cell subpopulations from human blood.** (A): Histograms (left panel) show representative flow cytometric analysis of CFSE dilution on sorted pTfh subpopulations on day 6 of culture with autologous B cells and SEB. Black dash lines reflect CFSE levels of control cells cultured with media alone. Numbers within histograms correspond to proportions of proliferating cells. Right panel summarizes proportions of proliferating cells in sorted pTfh subpopulations on day 6 (n=3). (B): Representative flow cytometric analysis showing CFSE dilution on gated PD-1<sup>Lo</sup> and PD-1<sup>Hi</sup> cells on day 6 of culture of sorted CXCR5<sup>+</sup> CXCR3<sup>+</sup> PD-1<sup>Lo</sup> T cells with B cells and SEB. (C): summary the proportions of proliferating PD-1<sup>Lo</sup> and PD-1<sup>Hi</sup> cells in n=3 experiments. (D): Proliferative activity of CXCR5<sup>+</sup> CXCR3<sup>+</sup> PD-1<sup>Lo</sup> cells assessed in serial culture experiments. PD-1<sup>Lo</sup> cells isolated on day 6 are highlighted in blue; PD-1<sup>Lo</sup> cells resorted on day 6 and cultured for six additional days are highlighted in green. Numbers in the histogram represent proportion of proliferating cells from corresponding populations. Unstimulated cells are shown in black dash line.

**Supplemental Table 1.** Summary of HIV-1 infected cohorts used in the study.

HIV patient groups	n	Median VL (copies/ml)	Median CD4 T cell counts (cells/ml)	Ab Breadth (% of Tier-2 viruses neutralized)
Controller neutralizers	25	123 (20-1400)	769.5 (418-1545)	72 (8-100)
Controller non-neutralizers	20	75 (48-1470)	844.5 (407-2117)	0
Untreated progressors	14	28352.5 (2368-90500)	313 (88-955)	n.d.
ART-treated progressors	14	<49 (20-48)	490 (183-964)	n.d.

**Supplemental Table 2. Summary of HLA class II and class I distribution in HIV-1 controller cohort used for the study.** Statistical significance in the frequency of individual alleles between both patient populations was calculated using a Chi-square test and corrected for multiple comparisons using the Bonferroni method.

HLA-II alleles	Frequency in Neutralizers	Frequency in Non Neutralizers
DPB*01	20	2.8
DPB*02	10	22.2
DPB*03	10	16.7
DPB*04	34	38.9
DPB*05	4	2.8
DPB*06	2	2.8
DPB*10	0	2.8
DPB*11	6	0
DPB*13	2	5.6
DPB*17	6	2.8
DPB*18	2	2.8
DPB*19	2	0
DPB*20	2	0
DQB*02	14	11.8
DQB*03	38	44.1
DQB*04	8	2.9
DQB*05	26	17.6
DQB*06	14	23.5
DRB1*01	16	10.5
DRB1*03	12	2.6
DRB1*04	14	13.2
DRB1*07	14	26.3
DRB1*08	2	5.3
DRB1*09	4	0
DRB1*10	2	0
DRB1*11	10	15.8
DRB1*12	0	2.6
DRB1*13	14	15.8
DRB1*14	2	2.6
DRB1*15	10	5.3

HLA-I alleles	Frequency in Neutralizers	Frequency in Non Neutralizers
A*01	8	15
A*02	22	32.5
A*03	14	10
A*11	6	0
A*23	4	0
A*24	4	10
A*25	4	2.5
A*26	2	2.5
A*29	8	7.5
A*30	10	7.5
A*31	2	5
A*32	2	5
A*33	4	2.5
A*68	10	0
B*07	8	2.5
B*08	4	0
B*13	4	7.5
B*14	18	5
B*15	8	7.5
B*18	4	0
B*27	6	10
B*35	4	0
B*37	0	2.5
B*38	0	7.5
B*39	0	2.5
B*40	6	7.5
B*41	0	2.5
B*42	4	0
B*44	8	12.5
B*45	2	2.5
B*49	0	5
B*51	4	2.5
B*53	8	0
B*52	2	0

B*57	8	22.5
B*58	2	0
Cw01	6	7.5
Cw02	6	5
Cw03	10	12.5
Cw04	12	5
Cw05	4	5
Cw06	8	27.5
Cw07	14	10
Cw08	18	5
Cw12	4	12.5
Cw15	4	2.5
Cw16	8	5
Cw17	4	0
Cw18	2	2.5

**Supplemental Table 3.** List of 930 significant Differentially expressed genes by DESeq2 from dendritic cells between neutralizer controllers (NT; n=4 patients) and non neutralizer controllers (NN; n=4 patients). Log2 Fold change and FDR (p<p0.05) adjusted p-values are shown for each individual gene.

	<b>Log2FoldChange NT vs NN</b>	<b>Adjusted p-value</b>
ENSG00000211897 IGHG3	7.507785475	4.18E-28
ENSG00000211666 IGLV2-14	6.975076148	3.21E-23
ENSG00000211675 IGLC1	6.540342253	5.47E-23
ENSG00000271503 CCL5	5.362703881	6.76E-23
ENSG00000011590 ZBTB32	6.514695712	4.24E-21
ENSG00000275302 CCL4	6.136968189	4.24E-21
ENSG00000163492 CCDC141	5.742820451	5.42E-21
ENSG00000105374 NKG7	4.398281985	9.32E-21
ENSG00000160856 FCRL3	5.218020372	1.47E-20
ENSG00000211899 IGHM	5.969431764	1.47E-20
ENSG00000111537 IFNG	6.838748163	5.49E-20
ENSG00000183508 FAM46C	3.886725275	1.27E-19
ENSG00000115085 ZAP70	4.861751331	1.73E-19
ENSG00000101082 SLA2	5.167331817	4.31E-19
ENSG00000180644 PRF1	4.923533921	6.23E-19
ENSG00000183918 SH2D1A	5.611341777	6.23E-19
ENSG00000162894 FCMR	3.693964481	4.16E-18
ENSG00000161405 IKZF3	4.811870303	3.26E-17
ENSG00000240403 KIR3DL2	5.905562541	3.26E-17
ENSG00000213413 PVRIG	5.067924246	1.29E-16
ENSG00000143297 FCRL5	5.367656307	1.33E-16
ENSG00000120738 EGR1	3.886653541	1.67E-16
ENSG00000150687 PRSS23	5.348253706	2.54E-16
ENSG00000205809 KLRC2	6.020127832	4.92E-16
ENSG00000213402 PTPRCAP	4.058577329	8.34E-16
ENSG00000196586 MYO6	5.479869394	1.36E-15
ENSG00000145649 GZMA	5.337384109	1.85E-15
ENSG00000197540 GZMM	5.055765456	1.96E-15
ENSG00000177455 CD19	5.064680445	5.40E-15
ENSG00000182866 LCK	4.577792124	5.56E-15
ENSG00000155657 TTN	3.915537338	5.98E-15
ENSG00000124772 CPNE5	4.675423256	6.11E-15
ENSG00000013725 CD6	3.684298208	6.17E-15



ENSG00000136573 BLK	5.088079503	6.17E-15
ENSG00000243772 KIR2DL3	5.721491694	6.17E-15
ENSG00000203896 LIME1	4.31025245	7.19E-15
ENSG00000100453 GZMB	5.248113788	2.40E-14
ENSG00000156738 MS4A1	5.063907731	4.40E-14
ENSG00000181847 TIGIT	5.299522484	6.50E-14
ENSG00000213809 KLRK1	4.974464514	8.07E-14
ENSG00000137441 FGFBP2	4.942992451	9.70E-14
ENSG00000122188 LAX1	5.602360009	1.20E-13
ENSG00000069667 RORA	4.224360918	1.31E-13
ENSG00000117281 CD160	4.970346278	1.68E-13
ENSG00000243466 IGKV1-5	5.81349499	3.79E-13
ENSG00000185436 IFNLR1	5.458898124	5.51E-13
ENSG00000167984 NLRC3	4.869216701	5.94E-13
ENSG00000205336 ADGRG1	4.882087141	6.58E-13
ENSG00000105369 CD79A	4.934934324	7.07E-13
ENSG00000110848 CD69	3.961201484	8.22E-13
ENSG00000132704 FCRL2	5.184684874	8.72E-13
ENSG00000152689 RASGRP3	3.93650606	1.12E-12
ENSG00000243290 IGKV1-12	5.549583384	1.55E-12
ENSG00000138378 STAT4	4.123906906	1.71E-12
ENSG00000159958 TNFRSF13C	4.812959573	1.71E-12
ENSG00000276085 CCL3L3	4.730883725	3.42E-12
ENSG00000027075 PRKCH	3.492775254	7.26E-12
ENSG00000172543 CTSW	3.664961239	7.73E-12
ENSG00000254709 IGLL5	4.341502442	8.11E-12
ENSG00000213658 LAT	3.891361685	9.75E-12
ENSG00000100385 IL2RB	4.682920942	1.16E-11
ENSG00000239951 IGKV3-20	4.955143321	1.65E-11
ENSG00000081041 CXCL2	4.22118269	1.89E-11
ENSG00000198821 CD247	4.306790676	2.12E-11
ENSG00000130787 HIP1R	4.79352615	2.62E-11
ENSG00000132185 FCRLA	5.036224873	3.09E-11
ENSG00000240505 TNFRSF13B	4.956611482	3.40E-11
ENSG00000163508 EOMES	5.465643909	3.45E-11
ENSG00000241351 IGKV3-11	5.385257047	4.12E-11
ENSG00000167633 KIR3DL1	5.094346904	5.50E-11
ENSG00000150045 KLRF1	4.211813442	5.51E-11
ENSG00000255641	5.39820292	7.84E-11
ENSG00000073861 TBX21	5.275220237	8.50E-11
ENSG00000244437 IGKV3-15	5.183996166	9.74E-11
ENSG00000139116 KIF21A	4.255476133	1.15E-10
ENSG00000198851 CD3E	4.070827525	1.62E-10
ENSG00000122224 LY9	3.116804671	1.91E-10

ENSG00000008517	IL32	4.01643931	2.83E-10
ENSG00000181036	FCRL6	3.420033198	3.10E-10
ENSG00000170476	MZB1	4.583071148	3.29E-10
ENSG00000012124	CD22	2.494942741	3.86E-10
ENSG00000204475	NCR3	4.573064004	3.87E-10
ENSG00000107742	SPOCK2	3.627241024	4.05E-10
ENSG00000113088	GZMK	4.627717253	4.18E-10
ENSG00000169429	CXCL8	3.425745268	4.18E-10
ENSG00000163564	PYHIN1	4.307152364	7.31E-10
ENSG00000205810	KLRC3	4.780854056	1.05E-09
ENSG00000123240	OPTN	4.108179018	1.05E-09
ENSG00000168229	PTGDR	4.518508972	1.24E-09
ENSG00000211829	TRDC	4.461168637	1.29E-09
ENSG00000153064	BANK1	2.691643024	1.34E-09
ENSG00000164483	SAMD3	4.512257088	1.41E-09
ENSG00000211668	IGLV2-11	4.827937153	1.54E-09
ENSG00000255819	KLRC4-KLRK1	4.673480567	1.59E-09
ENSG00000211934	IGHV1-2	4.93868436	1.63E-09
ENSG00000172575	RASGRP1	4.015645332	1.64E-09
ENSG00000082438	COBLL1	4.960107127	2.18E-09
ENSG00000196092	PAX5	4.660228697	3.08E-09
ENSG00000172183	ISG20	2.014844383	3.19E-09
ENSG00000109943	CRTAM	3.737837522	3.69E-09
ENSG00000197992	CLEC9A	-4.607079775	3.76E-09
ENSG00000171476	HOPX	4.235824833	4.12E-09
ENSG00000211892	IGHG4	4.999889865	4.26E-09
ENSG00000251546	IGKV1D-39	4.739680295	4.78E-09
ENSG00000211592	IGKC	4.94350218	5.37E-09
ENSG00000184205	TSPYL2	3.123021124	5.87E-09
ENSG00000153283	CD96	3.989663082	7.14E-09
ENSG00000100351	GRAP2	3.399742787	8.64E-09
ENSG00000151612	ZNF827	4.925694369	8.64E-09
ENSG00000211949	IGHV3-23	4.809000147	8.74E-09
ENSG00000141293	SKAP1	4.093908944	1.34E-08
ENSG00000211772	TRBC2	3.480185014	1.34E-08
ENSG00000125245	GPR18	2.86019838	1.44E-08
ENSG00000178860	MSC	4.619992844	1.44E-08
ENSG00000211751	TRBC1	3.791037692	2.13E-08
ENSG00000111796	KLRB1	3.949554334	2.34E-08
ENSG00000164330	EBF1	4.509080924	2.53E-08
ENSG00000125498	KIR2DL1	4.732315638	2.73E-08
ENSG00000198780	FAM169A	4.248784183	2.76E-08
ENSG00000116106	EPHA4	4.827984898	2.82E-08

ENSG00000256039		4.399328423	2.83E-08
ENSG00000124181	PLCG1	4.610468243	2.90E-08
ENSG00000170962	PDGFD	4.338208037	3.16E-08
ENSG00000154640	BTG3	3.079897335	3.19E-08
ENSG00000272398	CD24	4.802352854	3.26E-08
ENSG00000173482	PTPRM	4.10382226	3.69E-08
ENSG00000171848	RRM2	3.869695137	5.15E-08
ENSG00000120278	PLEKHG1	4.08070599	5.24E-08
ENSG00000166289	PLEKHF1	3.572108219	5.27E-08
ENSG00000168421	RHOH	4.077954012	6.14E-08
ENSG00000169583	CLIC3	3.432665007	6.14E-08
ENSG00000198589	LRBA	2.286674667	6.14E-08
ENSG00000171681	ATF7IP	1.664816238	6.88E-08
ENSG00000153563	CD8A	3.81880604	7.75E-08
ENSG00000253755	IGHGP	4.720235109	9.02E-08
ENSG00000159674	SPON2	3.537199833	1.06E-07
ENSG00000160408	ST6GALNAC6	2.477723866	1.19E-07
ENSG00000100473	COCH	4.322213392	1.23E-07
ENSG00000069493	CLEC2D	2.688889224	1.25E-07
ENSG00000113263	ITK	4.029763803	1.53E-07
ENSG00000134285	FKBP11	3.148528922	1.54E-07
ENSG00000183542	KLRC4	4.572115859	1.58E-07
ENSG00000160683	CXCR5	3.695975351	2.18E-07
ENSG00000078596	ITM2A	3.449292965	2.21E-07
ENSG00000124243	BCAS4	2.652044317	2.35E-07
ENSG00000242371	IGKV1-39	4.571101971	2.35E-07
ENSG00000181104	F2R	3.915867059	2.46E-07
ENSG00000118503	TNFAIP3	2.792881206	2.70E-07
ENSG00000211679	IGLC3	4.495098994	2.71E-07
ENSG00000226777	KIAA0125	4.223869545	2.96E-07
ENSG00000159618	ADGRG5	2.761821984	2.97E-07
ENSG00000188822	CNR2	3.79118959	3.06E-07
ENSG00000130827	PLXNA3	3.501416828	3.28E-07
ENSG00000247774	PCED1B-AS1	2.050127467	3.28E-07
ENSG00000211964	IGHV3-48	4.284512428	3.98E-07
ENSG00000211651	IGLV1-44	4.520732471	5.11E-07
ENSG00000115523	GNLY	3.636641404	5.13E-07
ENSG00000211694	TRGV10	4.455044281	5.21E-07
ENSG00000162692	VCAM1	4.181150387	5.36E-07
ENSG00000104921	FCER2	3.880398155	5.42E-07
ENSG00000139187	KLRG1	3.323049112	5.73E-07
ENSG00000145911	N4BP3	4.120857158	7.47E-07
ENSG00000139193	CD27	3.564288171	9.47E-07
ENSG00000103187	COTL1	-2.420014159	1.01E-06

ENSG00000167483 FAM129C	3.854763519	1.02E-06
ENSG00000168811 IL12A	4.07788735	1.42E-06
ENSG00000035720 STAP1	3.870862338	1.43E-06
ENSG00000211653 IGLV1-40	4.149671682	1.43E-06
ENSG00000205045 SLFN12L	4.106626041	1.51E-06
ENSG00000184226 PCDH9	3.786850835	1.54E-06
ENSG00000092871 RFFL	1.893350284	1.59E-06
ENSG00000109956 B3GAT1	4.293196936	1.68E-06
ENSG00000244575 IGKV1-27	4.314533119	1.78E-06
ENSG00000154760 SLFN13	2.822672914	1.85E-06
ENSG00000137501 SYTL2	3.528325428	1.86E-06
ENSG00000027869 SH2D2A	3.791826603	1.93E-06
ENSG00000167094 TTC16	3.86996038	2.15E-06
ENSG00000167106 FAM102A	3.294851519	2.15E-06
ENSG00000211895 IGHA1	4.299130751	2.26E-06
ENSG00000010810 FYN	1.804108662	2.27E-06
ENSG00000124203 ZNF831	4.304063639	2.32E-06
ENSG00000211660 IGLV2-23	4.273474332	2.41E-06
ENSG00000163734 CXCL3	4.078691725	2.41E-06
ENSG00000211955 IGHV3-33	4.054593718	2.45E-06
ENSG00000147912 FBXO10	3.21348057	2.53E-06
ENSG00000221957 KIR2DS4	4.237602732	2.53E-06
ENSG00000261796 ISY1-RAB43	-4.232241466	2.53E-06
ENSG00000134954 ETS1	3.205227371	2.53E-06
ENSG00000211677 IGLC2	4.143890098	2.56E-06
ENSG00000171992 SYNPO	4.212273652	2.61E-06
ENSG00000123689 GOS2	3.248833739	2.63E-06
ENSG00000077984 CST7	2.663333912	2.63E-06
ENSG00000172116 CD8B	3.484985217	2.63E-06
ENSG00000152969 JAKMIP1	3.972150499	2.87E-06
ENSG00000096433 ITPR3	3.232122011	2.88E-06
ENSG00000105426 PTPRS	3.638058558	2.97E-06
ENSG00000132849 INADL	3.934894867	2.99E-06
ENSG00000162777 DENND2D	2.459876493	3.02E-06
ENSG00000240382 IGKV1-17	4.241106248	3.43E-06
ENSG00000054654 SYNE2	3.378310965	3.51E-06
ENSG00000072858 SIDT1	2.02982719	3.63E-06
ENSG00000134744 ZCCHC11	2.275178749	4.14E-06
ENSG00000110203 FOLR3	3.9641495	4.20E-06
ENSG00000132465 JCHAIN	4.031411401	4.37E-06
ENSG00000067082 KLF6	1.448511092	4.50E-06
ENSG00000164691 TAGAP	2.163846077	5.27E-06
ENSG00000247982 LINC00926	3.616424349	5.76E-06
ENSG00000156475 PPP2R2B	3.922677182	5.77E-06

ENSG00000124788 ATXN1	1.802982556	6.36E-06
ENSG00000211648 IGLV1-47	4.035581361	6.73E-06
ENSG00000173208 ABCD2	3.844323625	7.09E-06
ENSG00000227191 TRGC2	3.564213607	7.12E-06
ENSG00000009694 TENM1	3.717553062	7.37E-06
ENSG00000074370 ATP2A3	2.272959862	8.33E-06
ENSG00000211966 IGHV5-51	4.082498264	8.93E-06
ENSG00000148773 MKI67	2.721781943	9.27E-06
ENSG00000187118 CMC1	2.281549435	1.03E-05
ENSG00000185920 PTCH1	3.992750474	1.05E-05
ENSG00000158006 PAFAH2	2.289926558	1.12E-05
ENSG00000173200 PARP15	2.26267855	1.15E-05
ENSG00000088179 PTPN4	2.929441589	1.18E-05
ENSG00000162739 SLAMF6	3.319419751	1.18E-05
ENSG00000179388 EGR3	3.916993834	1.19E-05
ENSG00000139289 PHLDA1	3.291214348	1.23E-05
ENSG00000133067 LGR6	3.867637822	1.32E-05
ENSG00000147548 WHSC1L1	1.380560046	1.40E-05
ENSG00000165929 TC2N	3.588534658	1.46E-05
ENSG00000110777 POU2AF1	3.709773024	1.54E-05
ENSG00000275023 MLLT6	1.983074988	1.63E-05
ENSG00000245164 LINC00861	3.588043969	1.67E-05
ENSG00000135929 CYP27A1	3.542992814	1.70E-05
ENSG00000131018 SYNE1	2.059099608	1.75E-05
ENSG00000229474 PATL2	2.263716301	1.75E-05
ENSG00000136238 RAC1	-1.892491929	1.98E-05
ENSG00000211644 IGLV1-51	3.982837009	2.23E-05
ENSG00000140853 NLRC5	1.567282402	2.26E-05
ENSG00000146285 SCML4	2.945443894	2.52E-05
ENSG00000198286 CARD11	2.802275193	2.72E-05
ENSG00000148200 NR6A1	-3.502036345	2.90E-05
ENSG00000157557 ETS2	-1.561297251	2.95E-05
ENSG00000085117 CD82	2.703398303	3.02E-05
ENSG00000197989 SNHG12	1.991713938	3.03E-05
ENSG00000170989 S1PR1	3.036405077	3.04E-05
ENSG00000135976 ANKRD36	2.199950243	3.05E-05
ENSG00000106992 AK1	3.727948749	3.06E-05
ENSG00000105926 MPP6	3.281028923	3.12E-05
ENSG00000121104 FAM117A	2.840659335	3.35E-05
ENSG00000164327 RICTOR	1.792075996	3.77E-05
ENSG00000269404 SPIB	1.867059227	3.88E-05
ENSG00000064886 CHI3L2	3.821954215	4.21E-05
ENSG00000186810 CXCR3	2.841012667	4.21E-05
ENSG00000112511 PHF1	2.361478127	4.23E-05

ENSG00000169962 TAS1R3	3.502581729	4.24E-05
ENSG00000081059 TCF7	2.615468638	4.52E-05
ENSG00000101057 MYBL2	3.699798204	4.79E-05
ENSG00000277734 TRAC	3.085476481	5.22E-05
ENSG00000173762 CD7	3.429836709	5.25E-05
ENSG00000242076 IGKV1-33	3.833192407	5.45E-05
ENSG00000100095 SEZ6L	-1.914634163	5.56E-05
ENSG00000102445 KIAA0226L	2.54362072	5.77E-05
ENSG00000253364	3.825589793	5.80E-05
ENSG00000163519 TRAT1	3.005381304	5.98E-05
ENSG00000180096 SEPT1	2.671514656	5.98E-05
ENSG00000213626 LBH	3.078169493	6.03E-05
ENSG00000114423 CBLB	2.556030697	6.11E-05
ENSG00000168081 PNOC	3.243468949	6.82E-05
ENSG00000163534 FCRL1	3.398222376	7.33E-05
ENSG00000115977 AAK1	1.727971382	7.44E-05
ENSG00000243238 IGKV2-30	3.785230389	7.44E-05
ENSG00000211956 IGHV4-34	3.638616803	7.46E-05
ENSG00000171617 ENC1	3.335322146	7.57E-05
ENSG00000176105 YES1	3.52269665	7.75E-05
ENSG00000264522 OTUD7B	3.346591854	8.03E-05
ENSG00000211938 IGHV3-7	3.769920697	8.67E-05
ENSG00000151729 SLC25A4	3.32288351	8.87E-05
ENSG00000211689 TRGC1	3.540640231	8.87E-05
ENSG00000078687 TNRC6C	2.282272121	8.97E-05
ENSG00000102096 PIM2	1.585657037	9.00E-05
ENSG00000184545 DUSP8	3.750627244	9.45E-05
ENSG00000127824 TUBA4A	1.864808385	9.82E-05
ENSG00000170458 CD14	2.296830858	9.82E-05
ENSG00000085563 ABCB1	3.627174708	0.000102187
ENSG00000145675 PIK3R1	2.05398153	0.000109009
ENSG00000134532 SOX5	3.67596185	0.000113071
ENSG00000178295 GEN1	2.637707889	0.000129479
ENSG00000167286 CD3D	3.289826768	0.000133913
ENSG00000074266 EED	1.701081895	0.000134809
ENSG00000151208 DLG5	3.698847058	0.000137029
ENSG00000189430 NCR1	3.697490169	0.000149026
ENSG00000130940 CASZ1	2.775309028	0.000155905
ENSG00000205133 TRIQQ	-2.013208628	0.000158537
ENSG00000213443	2.543264082	0.000158537
ENSG00000211898 IGHD	3.697234817	0.000174301
ENSG00000101445 PPP1R16B	2.604606961	0.000194899
ENSG00000177272 KCNA3	2.911834959	0.000197129
ENSG00000017483 SLC38A5	2.840117627	0.000198975

ENSG00000174501	ANKRD36C	2.265925067	0.000212671
ENSG00000276070	CCL4L2	3.642639951	0.000215523
ENSG00000122417	ODF2L	1.985109865	0.000217405
ENSG00000211959	IGHV4-39	3.499962634	0.000217405
ENSG00000157827	FMNL2	-2.922813141	0.000218974
ENSG00000107331	ABCA2	2.606012073	0.000227241
ENSG00000232810	TNF	2.450385205	0.000229229
ENSG00000156711	MAPK13	2.919580135	0.000239882
ENSG00000155903	RASA2	1.652174363	0.000242955
ENSG00000196782	MAML3	-1.638286668	0.00024609
ENSG00000103365	GGA2	1.324456159	0.000247795
ENSG00000138182	KIF20B	1.719636683	0.000252617
ENSG00000240891	PLCXD2	3.482782472	0.000264823
ENSG00000183023	SLC8A1	-1.471604297	0.000283204
ENSG00000114374	USP9Y	1.892682094	0.000311049
ENSG00000130844	ZNF331	2.482525143	0.000311049
ENSG00000151883	PARP8	1.690493727	0.00031116
ENSG00000140451	PIF1	3.478478382	0.000338283
ENSG00000188820	FAM26F	-2.180303566	0.000343702
ENSG00000159388	BTG2	1.577524152	0.000362899
ENSG00000248101		3.525397057	0.000377694
ENSG00000179859		-3.402547456	0.000394857
ENSG00000278196	IGLV2-8	3.459248128	0.000403237
ENSG00000048028	USP28	1.554063364	0.000409527
ENSG00000121594	CD80	3.283362566	0.00042964
ENSG00000069329	VPS35	-1.373256227	0.000436036
ENSG00000137193	PIM1	2.109297287	0.000436036
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ENSG00000174197	MGA	0.933493514	0.020116454
ENSG00000185950	IRS2	-1.67559093	0.020233863
ENSG00000067057	PFKP	1.351960467	0.020264524
ENSG00000137364	TPMT	-1.283184613	0.020326395
ENSG00000145569	FAM105A	-1.32764763	0.020326395
ENSG00000100077	ADRBK2	-1.144401539	0.020342275
ENSG00000124120	TTPAL	1.557528377	0.020403093
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ENSG00000141404 GNAL	2.582603395	0.02459579
ENSG00000164111 ANXA5	-1.108418266	0.024645966
ENSG00000169230 PRELID1	-1.011140326	0.024766002
ENSG00000127507 ADGRE2	-1.572970883	0.024901332
ENSG00000134070 IRAK2	2.485857738	0.02492688
ENSG00000179152 TCAIM	-1.221551307	0.02507485
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ENSG00000112312 GMNN	1.506540433	0.025592394
ENSG00000151150 ANK3	2.451030769	0.025801948
ENSG00000116731 PRDM2	1.449506032	0.025840359
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ENSG00000068784 SRBD1	-1.184223761	0.025893168
ENSG00000176049 JAKMIP2	1.997352262	0.025997372
ENSG00000119812 FAM98A	1.948181515	0.026028684
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ENSG00000198408 MGEA5	1.051443585	0.026340909
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ENSG00000067048 DDX3Y	1.25983228	0.02959843
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