1 **Table S1 Summary in sequencing data of TCR V-J pairs (Median, range)**

α/β	Subset	Group	raw reads pairs ($\times 10^5$)	V-J reads ($\times 10^5$)	types count of V-J pairs
α	naïve	HC	1.30(0.71-7.56)	1.26(0.66-7.66)	2899(2372-3253)
		HN	1.83(0.68-8.06)	1.79(0.66-8.02)	2562(1568-3210)
		HE	1.10(0.55-1.57)	1.18(0.53-10.48）	2891(2290-3231)
	memory	HC	1.16(0.54-7.94)	1.10(0.51-7.93)	2960(2189-2960)
		HN	1.80(0.70-5.11)	1.81(0.65-5.10)	2891(1703-3229)
		HE	1.29(0.38-2.16)	1.36(0.36-8.13)	2855(2234-3195)
β	naïve	HC	0.75(0.65-4.94)	0.75(0.71-4.91)	1032(860-1045)
		HN	1.14(0.47-2.07)	1.12(0.47-7.20)	976(881-1037)
		HE	0.71(0.21-1.68)	0.76(0.21-1.58)	1008(949-1044)
	memory	HC	0.70(0.37-5.06)	0.65(0.21-5.03)	1028(882-1044)
		HN	1.25(0.36-3.15)	1.24(0.26-3.53)	998(849-1050)
		HE	0.72(0.23-1.88)	0.62(0.22-1.75)	1008(959-1047)

2 Abbreviations: HC: healthy control; HN: HIV-infected HAART-naïve; HE: HIV-infected

3 ART-experienced.

4 The P values are calculated upon Mann-Whitney test compared with ART-naïve patients.

Table S2 The consistency of Top 10 V-J pairs between Naïve and Memory CD4^{+} T cell in Healthy Control

Chain (α/β)	V-J	Naïve CD4^{+}		Memory CD4^{+}	
		Rank	%	Rank	%
α	TRAV23/DV6-TRAJ3	1	3.12	1	4.45
	TRAV23/DV6-TRAJ46	2	2.96	2	2.84
	TRAV23/DV6-TRAJ39	3	2.75	4	2.00
	TRAV23/DV6-TRAJ42	4	2.57	3	2.50
	TRAV23/DV6-TRAJ10	5	1.46	5	1.46
	TRAV23/DV6-TRAJ6	6	1.05	7	0.58
	TRAV30-TRAJ46	7	0.57	6	0.69
	TRAV30-TRAJ32	8	0.50	9	0.40
	TRAV23/DV6-TRAJ57	9	0.48	13	0.34
	TRAV23/DV6-TRAJ23	10	0.46	11	0.38
β	TRBV11.3-TRBJ2.7	1	4.77	2	4.12
	TRBV11.3-TRBJ2.1	2	4.70	1	6.34
	TRBV2-TRBJ2.7	3	2.50	4	2.56
	TRBV11.3-TRBJ1.4	4	2.38	3	3.58
	TRBV16-TRBJ2.1	5	2.05	5	2.44
	TRBV2-TRBJ2.1	6	2.04	7	1.86
	TRBVB-TRBJ1.4	7	1.89	6	2.02
	TRBV29/OR9.2-TRBJ2.1	8	1.73	13	0.96
	TRBV29.1-TRBJ2.1	9	1.70	10	1.28
	TRBV16-TRBJ2.7	10	1.38	8	1.39

The percentages are provided as medians.

Table S3 Characteristics of Vα segment of V-J pairs (ART-experienced HIV-infected patients *vs.* healthy controls, *p*<0.01)

	Naïve CD4^{+}				Memory CD4^{+}			
Vα	Rank (HC)	% (HC)	#	%[a]	Vα	Rank (HC)	% (HC)	#	%[a]
TRAV23/DV6	1	34.5	10	18.5	TRAV23/DV6	1	28.8	1	1.9
TRAV8.2	**2**	**7.5**	**31**	**57.4**	**TRAV8.2**	**2**	**9.9**	**18**	**33.3**
TRAV30	3	7.2	-	-	TRAV30	3	7.0	-	-
TRAV8.4	**4**	**5.3**	**26**	**48.1**	TRAV8.4	4	6.2	6	11.1
TRAV29/DV5	5	3.8	2	3.7	TRAV13.1	5	4.6	-	-
TRAV2	6	3.5	1	1.9	TRAV29/DV5	6	3.8	3	5.6
TRAV6	7	3.2	2	3.7	TRAV6	7	2.8	-	-
TRAV24	8	3.1	9	16.7	TRAV25	8	2.7	-	-
TRAV13.1	9	2.8	-	-	TRAV24	9	2.7	2	3.7
TRAV25	10	2.8	-	-	TRAV39	10	2.5	-	-
TRAV38.1	**11**	**2.3**	**19**	**35.2**	TRAV38.2/DV8	11	2.2	1	1.9
TRAV39	12	2.1	1	1.9	TRAV26.1	12	2.2	-	-
TRAV38.2/DV8	**13**	**2.0**	**43**	**79.6**	TRAV17	13	2.2	1	1.9
TRAV17	14	2.0	8	14.8	TRAV2	14	2.2	-	-
TRAV9.1	15	1.8	1	1.9	TRAV38.1	15	2.1	-	-
TRAV26.1	16	1.7	-	-	TRAV9.1	16	2.0	-	-
TRAV20	17	1.2	3	5.6	TRAV18	17	1.4	-	-
TRAV8.1	18	1.2	2	3.7	TRAV10	18	1.4	-	-
TRAV18	19	1.2	-	-	TRAV20	19	1.4	1	1.9
TRAV40	20	0.9	12	22.2	TRAV27	20	1.2	-	-
TRAV26.2	21	0.9	2	3.7	TRAV26.2	21	1.0	-	-
TRAV27	22	0.9	3	5.6	TRAV40	22	0.8	1	1.9
TRAV10	23	0.8	6	11.1	TRAV8.1	23	0.7	1	1.9
TRAV35	24	0.7	5	9.3	TRAV11	24	0.6	-	-
TRAV3	25	0.6	2	3.7	TRAV35	25	0.6	1	1.9
TRAV11	26	0.5	-	-	TRAV3	26	0.6	-	-
TRAV14/DV4	27	0.5	3	5.6	TRAV1.1	27	0.5	-	-
TRAV1.1	28	0.5	3	5.6	TRAV13.2	28	0.4	-	-
TRAV22	29	0.3	10	18.5	TRAV15	29	0.4	-	-
TRAV15	30	0.3	-	-	TRAV41	30	0.4	-	-
TRAV13.2	31	0.3	1	1.9	TRAV33	31	0.4	-	-
TRAV33	32	0.3	-	-	TRAV8.5	32	0.4	-	-
TRAV41	33	0.3	9	16.7	TRAV5	33	0.4	-	-
TRAV5	34	0.3	1	1.9	TRAV14/DV4	34	0.4	-	-
TRAV12.1	**35**	**0.3**	**16**	**29.6**	TRAV22	35	0.3	1	1.9
TRAV8.5	36	0.3	-	-	TRAV19	36	0.3	-	-
TRAV19	37	0.3	4	7.4	TRAV12.1	37	0.3	1	1.9

TRAV	Rank	%	#	%ᵃ	TRAV	Rank	%	#	%ᵃ
TRAV12.3	38	0.2	2	3.7	TRAV12.2	38	0.3	1	1.9
TRAV34	39	0.2	1	1.9	TRAV12.3	39	0.3	-	-
TRAV12.2	40	0.2	-	-	TRAV8.3	40	0.2	-	-
TRAV4	41	0.2	-	-	TRAV34	41	0.2	-	-
TRAV37	42	0.2	-	-	TRAV37	42	0.2	1	1.9
TRAV8.3	43	0.2	-	-	TRAV4	43	0.2	-	-
TRAV8.7	44	0.1	-	-	TRAV28	44	0.2	-	-
TRAV28	45	0.1	-	-	TRAV8.7	45	0.2	-	-
TRAV7	46	0.1	-	-	TRAV16	46	0.1	-	-
TRAV8.6	47	0.1	1	1.9	TRAV7	47	0.1	-	-
TRAV16	48	0.1	-	-	TRAV8.6	48	0.1	-	-
TRAV36/DV7	49	0.1	1	1.9	TRAV36/DV7	49	0.1	-	-
TRAV31	50	0.1	-	-	TRAV21	50	0.1	-	-
TRAV21	51	0.0	-	-	TRAV31	51	0.1	-	-
TRAV9.2	52	0.0	-	-	TRAV9.2	52	0.0	-	-
TRAV1.2	53	0.0	-	-	TRAV1.2	53	0.0	-	-
TRAV32	54	0.0	-	-	TRAV32	54	0.0	-	-

10 Rank represent the percentage order of TCR Vα segments from the highest to lowest in naïve CD4$^+$ T

11 cells of Healthy controls.

12 Abbreviations: HC: healthy control; #: count of V-J pairs with significantly different percentage paired

13 with single type Vα; %ᵃ: the coverage of V-J pair which paired with corresponding Vα segment.