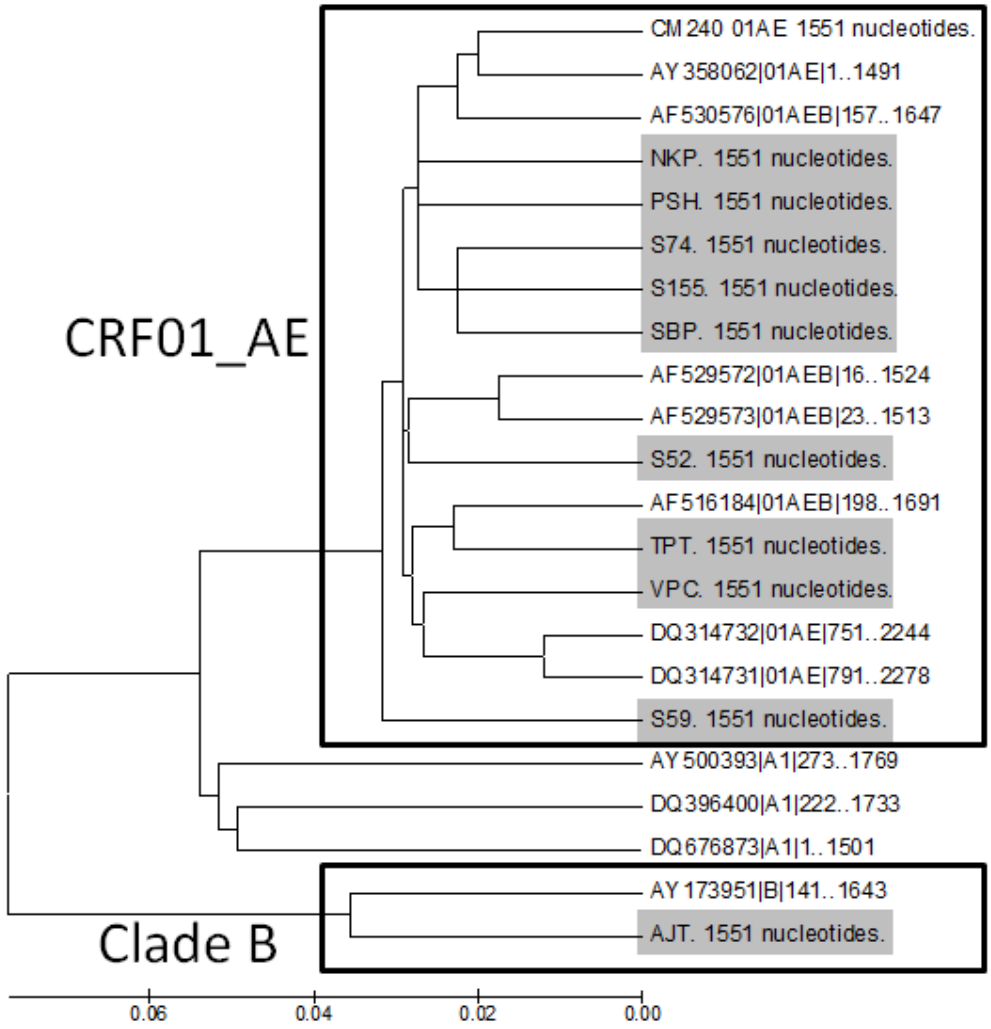
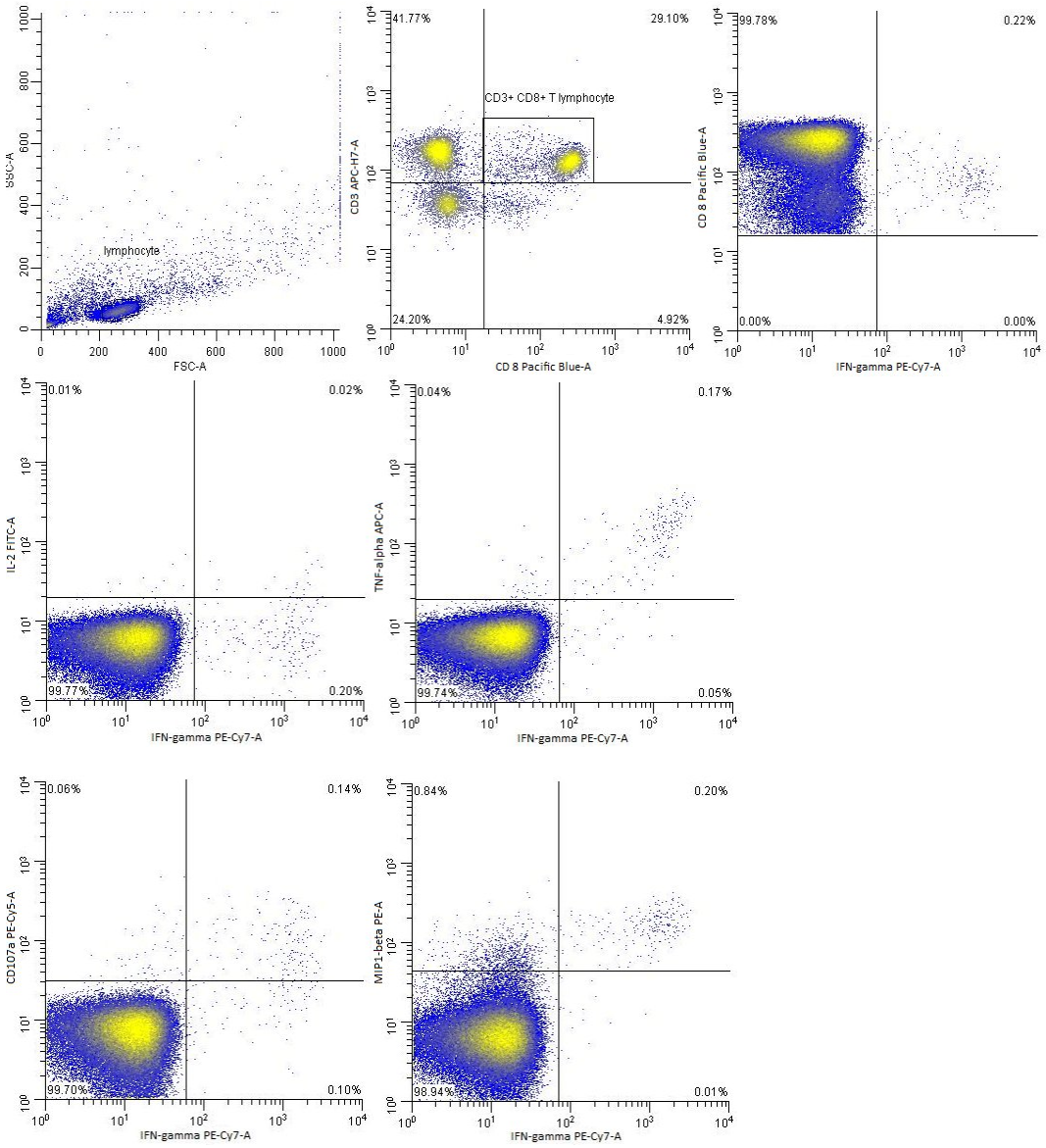
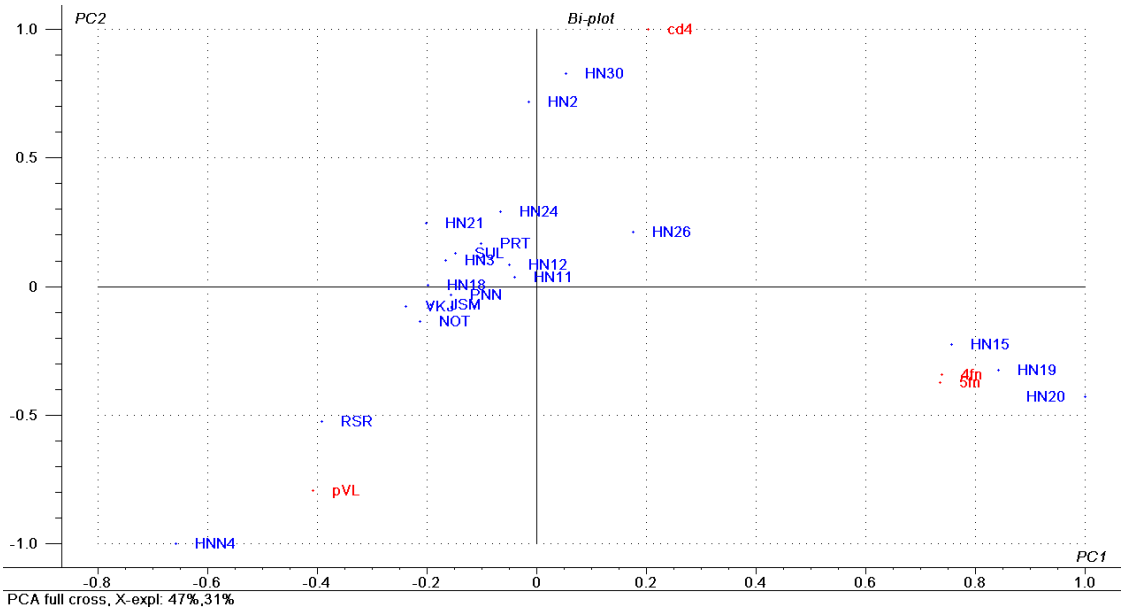


Supplement Figure 1. Neighbor-joining phylogenetic tree of 10 HIV gag gene from Thai donors with reference Thailand HIV sequence: Sequences derived from 10 chronically HIV infected Thai donors were indicated with grey shading. Sequences which were genotypically related were group together within black box. Nine sequences (NKP, PSH, S74, S155, SBP, S52, TPT, VPC and S59) were genetically related to CRF_01AE subtype, while one sequence (AJT) was related to Clade B.

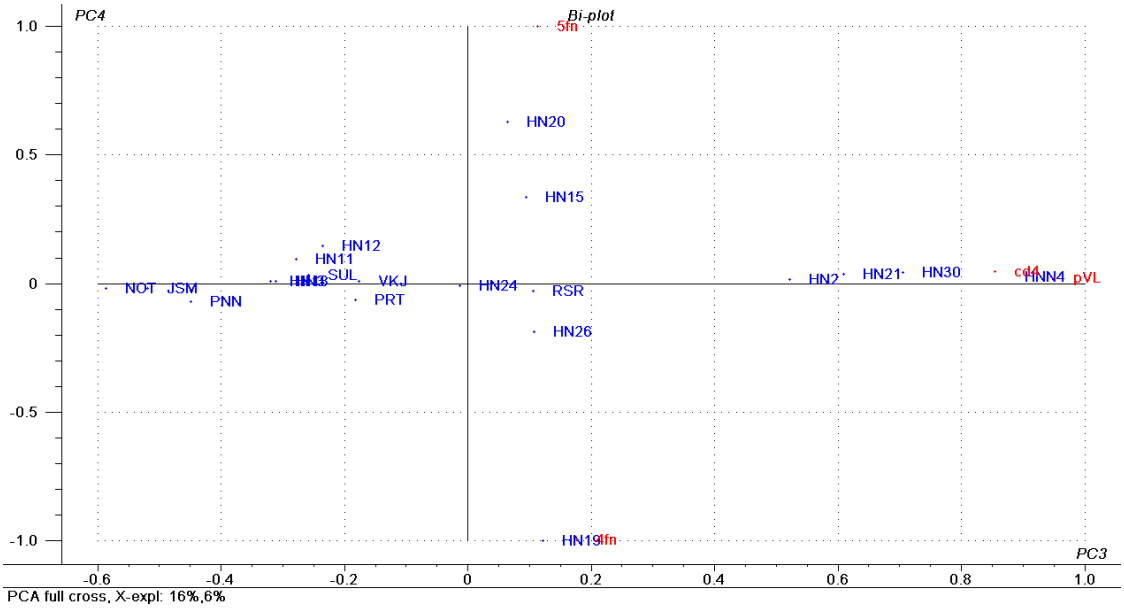


Supplement Figure 2. Gating strategy for identification of high functional quality responding CD8$^+$ T cells Plots shown were a representative data from OLP18-specific CD8$^+$ T cell response from subject HN30, a viraemic controller. Upper column showed a gating scheme for CD3$^+$CD8$^+$ T cell population. The upper rightmost plot and 4 lower plots showed a gating scheme for CD3$^+$CD8$^+$ T cells responded with IFN-γ, IL-2, TNF-α, CD107a and MIP-1β, respectively.

3.1



3.2



Supplement Figure 3. Principal Component Analysis (PCA) These figures showed PCA bi-plot (score vs loading) of the first four principal components (PC). Four loadings (p24-specific-CD8+ T cells with 4 (4fn)and 5 functions (5fn), plasma viral load (pVL) and $CD4^{+}$ count (CD4)) were shown in red while 20 scores were shown in blue. In figure 3.1 (PC1 vs PC2), which explained 78% of variants, loadings 4fn and 5fn were located together on the right, CD4 on the near-right while pVL on the left side suggesting that those 4fn and 5fn were co-varying and in a mild positive and negative correlation with CD4 and pVL, respectively. In figure 3.2, PC3 also showed the co-varying behavior of

4fn and 5fn and explained other 16%. Interestingly, it showed a positive correlation between CD4 and pVL which dominates 4 donors (HN2, HN21, HN30, and HNN4).

Supplement Table 1. HIV-1 Gag p24 overlapping peptides (OLPs) and HLA-B*27, -B*57 and –B*58 restricted epitopes

Peptide names	Amino acid sequences
OLP1	PIVQNAQGQMIHQSLSPRTL
OLP2	IHQSLSPRTLNAWVKVVEEK
OLP3	NAWVKVVEEKGFSPEVIPMF
OLP4	GFSPEVIPMFSALSEGAVPQ
OLP5	SALSEGAVPQDLNMMLNIVG
OLP6	DLNMMLNIVGGHQAAMQMLK
OLP7	GHQAAMQMLKETINEEAAEW
OLP8	ETINEEAAEWDRLHPVHAGP
OLP9	DRLHPVHAGPIPPGQMREPR
OLP10	IPPGQMREPRGSDIAGTTST
OLP11	GSDIAGTTSTLQEQIGWMTS
OLP12	LQEQIGWMTSNPPIPVGDIY
OLP13	NPPIPVGDIYKRWIILGLNK
OLP14	KRWIILGLNKIVRMYSPVSI
OLP15	IVRMYSPVSILDIRQGPKEP
OLP16	LDIRQGPKEPFRDYVDRFYK
OLP17	FRDYVDRFYKTLRAEQATQE
OLP18	TLRAEQATQEVKNWMTETLL
OLP19	VKNWMTETLLIQNANPDCKS
OLP20	IQNANPDCKSILKALGTGAT
OLP21	ILKALGTGATLEEMMTACQG
OLP22	LEEMMTACQGVGGPSHKARV
OLP23	VGGPSHKARVLAEAMSHAQQ
KK10	KRWIILGLNK
LW9	LSPRTLNAW
KF11	KGFNPEVIPMF
EW10	ETINEEAAEW
QW9	QATQEVKNW
GM9	GTGATLEEM
TW10	TSTLQEQIGW

Supplement Table 2. HLA-B alleles subtypes of HLA-B*27 positive donors

Viraemic Controllers (VC)			Non-Controllers (NC)		
HN1	B*2705	B*1301	HN21	B*2704	B*3901
HN2*	B*2706	B*0801	JSM	B*2704	B*1802
HN15	B*2704	B*4006	NOT	B*2704	B*3701
HN20	B*2704	B*5201	PNN*	B*2706	B*5801

*HN2 and PNN were observed with p24 OLP specific response in both IFN-γ ELISpot and ICS assay but did not respond to the KK10 epitope.

Supplement Table 3. HLA-B alleles subtypes of HLA-B*57/58 positive donors

Viraemic Controllers (VC)			Non-Controllers (NC)		
HN12	B*5701	B*1801	PNN	B*2706	B*5801
HN24	B*5701	B*4002	VKJ	B*1301	B*5801
HN30	B*5701	B*5701	SUL	B*1502	B*5801
			RSR	B*5102	B*5801
			KRR	B*3802	B*5801
			SYY*	B*5801	B*5801
			HN16*	B*4001	B*5801
			HN22*	B*5201	B*5701
			HNN4	B*1802	B*5801

*SYY, HN16 and HN22, though they were observed with IFN-γ ELISpot, were not included in functional quality assay due to limited PBMC.

Supplement table 4. HLA-B*57/58^{+} individual's IFN-γ responses and their HIV sequence*

		LSPRTLNAW	KGFNPEVIPMF	ETINEEAEW	QATQEVKNW	TSTLQEQIGW
VC	HN12	-	-	-	-	TSNLQEQIGW
	HN24	-		-	-	-
	HN30	ISPRTLNAW	-	-	-	-
NC	PNN	-	-	-	QASQEVKNW	TSNLQEQIGW
	VKJ	ISPRTLNAW	-	ETINEEADW	QASQEVKNW	TSNLQEQIAW
	SUL	MSPRTLNAW	KAFSPEVIPMF	DTINEEAEW	-	TSNLQEQIGW
	RSR	-	-	-	QATQEVKHW	TSNLQEQIGW
	KRR	-	-	-	-	-
	SYY	ISPRTLNAW	-	-	QATQEVKRW	TSNLAEQIGW
	HN16	-	-	-	-	TSNLQEQIGW
	HN22	-	-	-	-	TSNLQEQIGW
	HNN4	-	-	-	-	TSNLQEQIGW

*Grey shaded cell indicated positive IFN-γ ELISpot response against that epitope. Donor's HIV sequences with mutations in tested epitopes were shown while "-" indicated matched sequence.