

**Table S1: Animal group distribution**

<b>Group</b>	<b>Animal Number</b>	<b>Age (Years)</b>	<b>Body Weight (Kg)</b>
Vaccine	LK45	5.5	4.6
	LK50	5.3	5.9
	LK54	5.0	5.7
	LK56	4.6	5.5
	LK57	4.5	5.3
	LK58	4.4	5.2
	LK59	4.4	6.0
	LK60	4.4	5.1
Control	LK42	6.4	5.2
	LK46	5.5	5.3
	LK51	5.2	5.9
	LK53	5.1	5.2
	LK55	4.6	6.0
	LP32	4.6	5.0
	LP33	5.5	5.0

All macaques were MHC typed and negative for Mamu-A\*01, B\*08 and B\*17 alleles.

**Table S2: List of monoclonal antibodies used for T-cell phenotyping and antigen specific cytokine flow cytometry assays**

<b>Antibody</b>	<b>Clone</b>	<b>Amount used (μL)</b>	<b>Source</b>
Anti-human CD3	SP34-2	5	BD Biosciences, CA
Anti-human CD4	L200	3	BD Biosciences, CA
Anti-human CD8	SK1	3	BD Biosciences, CA
Anti-human CD25	M-A251	5	Biolegend, CA
Anti-human CD28	CD28.2	5	BD Biosciences, CA
Anti-human CD38	OKT10	5	NHP Reagent Resource Program, NIH
Anti-NHP CD45	D058-1283	10	BD Biosciences, CA
Anti-human CD69	FN50	5	Biolegend, CA
Anti-human CD95	DX2	5	BD Biosciences, CA
Anti-human CD107a	H4A3	20	BD Biosciences, CA
Anti-human CD107b	H4B4	5	BD Biosciences, CA
Anti-human HLA-DR	G46-6	5	BD Biosciences, CA
Anti-human IFN $\gamma$	B27	3	Biolegend, CA
Anti-human IL-2	JES3-9D7	5	Biolegend, CA
Anti-human IL-4	8D4-8	5	BD Biosciences, CA
Anti-human IL-5	JES1-39D10	5	Sony Biotech, CA
Anti-human IL-21	3A3-N2	5	Sony Biotech, CA
Anti-mouse Ki67	B56	20	BD Biosciences, CA
Anti-human TNF $\alpha$	Mab11	5	Biolegend, CA

**Table S3: Statistical Analysis of different cell types and tissues in vaccine Group**

Cell Types/Tissue	Vaccine timepoint Comparison	Adjusted p value	Mean values $\pm$ Standard Errors (%)
CM CD4+/ PBMC	pV#2 vs. pV#3	0.0007	40.9 $\pm$ 2.2 vs. 56.8 $\pm$ 3.8
Naïve CD4+/ LN	pV#2 vs. pV#5	0.025	71.0 $\pm$ 3.9 vs. 53.6 $\pm$ 5.4
CM CD4+/ LN	Pre vs. pV#5	0.045	29.1 $\pm$ 3.7 vs. 46.0 $\pm$ 6.0
	pV#2 vs. pV#5	0.003	22.8 $\pm$ 3.3 vs. 46.0 $\pm$ 6.0
EM CD4+/ LN	Pre vs. pV#2	0.009	6.3 $\pm$ 0.8 vs. 3.0 $\pm$ 0.4
	Pre vs. pV#3	0.017	6.3 $\pm$ 0.8 vs. 3.2 $\pm$ 0.7
	Pre vs. pV#5	<0.0001	6.3 $\pm$ 0.8 vs. 1.2 $\pm$ 0.5
	pV#2 vs. pV#4	0.009	3.0 $\pm$ 0.4 vs. 6.3 $\pm$ 0.9
	pV#3 vs. pV#4	0.017	3.2 $\pm$ 0.7 vs. 6.3 $\pm$ 0.9
	pV#4 vs. pV#5	<0.0001	6.3 $\pm$ 0.9 vs. 1.2 $\pm$ 0.5
CD4+/Jej LPL	Pre vs. SIV+	0.020	47.3 $\pm$ 4.5 vs. 25.4 $\pm$ 4.1
	pV#2 vs. SIV+	0.012	53.7 $\pm$ 7.9 vs. 25.4 $\pm$ 4.1
	pV#3 vs. SIV+	<0.0001	72.4 $\pm$ 2.8 vs. 25.4 $\pm$ 4.1
	pV#5 vs. SIV+	0.0004	56.3 $\pm$ 6.1 vs. 25.4 $\pm$ 4.1
CD4+/Rectal LPL	Pre vs. SIV+	<0.0001	62.9 $\pm$ 3.6 vs. 23.7 $\pm$ 4.5
	pV#2 vs. SIV+	0.0004	53.7 $\pm$ 7.9 vs. 23.7 $\pm$ 4.5
	pV#3 vs. SIV+	<0.0001	69.9 $\pm$ 2.5 vs. 23.7 $\pm$ 4.5
	pV#4 vs. SIV+	<0.0001	54.3 $\pm$ 2.8 vs. 23.7 $\pm$ 4.5
	pV#5 vs. SIV+	<0.0001	57.7 $\pm$ 3.6 vs. 23.7 $\pm$ 4.5
CM CD4+/Jej LPL	Pre vs. pV#2	0.002	61.4 $\pm$ 6.7 vs. 94.3 $\pm$ 0.9
	Pre vs. pV#3	0.029	61.4 $\pm$ 6.7 vs. 81.6 $\pm$ 3.5
	pV#2 vs. pV#5	0.010	94.3 $\pm$ 0.9 vs. 66.1 $\pm$ 3.9
EM CD4+/Jej LPL	Pre vs. pV#2	0.001	35.8 $\pm$ 6.9 vs. 1.5 $\pm$ 0.5
	Pre vs. pV#3	0.026	35.8 $\pm$ 6.9 vs. 15.5 $\pm$ 3.0
	pV#2 vs. pV#5	0.015	1.5 $\pm$ 0.5 vs. 28.3 $\pm$ 3.9
CM CD4+/Rectal LPL	Pre vs. pV#2	0.0003	76.1 $\pm$ 1.5 vs. 94.3 $\pm$ 0.9
	Pre vs. pV#3	0.011	76.1 $\pm$ 1.5 vs. 86.9 $\pm$ 3.8
	Pre vs. pV#5	0.020	76.1 $\pm$ 1.5 vs. 86.2 $\pm$ 1.9
CM CD8+/Jej LPL	Pre vs. pV#2	<0.0001	61.3 $\pm$ 2.3 vs. 94.3 $\pm$ 0.6
	Pre vs. pV#3	<0.0001	61.3 $\pm$ 2.3 vs. 89.4 $\pm$ 3.3
	Pre vs. pV#5	<0.0001	61.3 $\pm$ 2.3 vs. 30.6 $\pm$ 5.5

	pV#3 vs. pV#4	<0.0001	89.4 ± 3.3 vs. 54.1 ± 2.4
	pV#3 vs. pV#5	<0.0001	89.4 ± 3.3 vs. 30.6 ± 5.5
	pV#4 vs. pV#5	0.0003	54.1 ± 2.4 vs. 30.6 ± 5.5
EM CD8+/Jej LPL	Pre vs. pV#2	<0.0001	36.2 ± 2.8 vs. 3.5 ± 0.5
	Pre vs. pV#3	0.0001	36.2 ± 2.8 vs. 9.6 ± 3.2
	Pre vs. pV#5	<0.0001	36.2 ± 2.8 vs. 67.7 ± 5.9
	pV#3 vs. pV#4	<0.0001	9.6 ± 3.2 vs. 43.5 ± 2.2
	pV#3 vs. pV#5	<0.0001	9.6 ± 3.2 vs. 67.7 ± 5.9
	pV#4 vs. pV#5	0.0004	43.5 ± 2.2 vs. 67.7 ± 5.9
CM CD8+/Rectal LPL	Pre vs. pV#2	0.0001	57.9 ± 3.5 vs. 94.7 ± 0.5
	Pre vs. pV#3	0.003	57.9 ± 3.5 vs. 81.4 ± 5.2
	pV#3 vs. pV#4	0.010	81.4 ± 5.2 vs. 60.6 ± 5.1
	pV#3 vs. pV#5	<0.0001	81.4 ± 5.2 vs. 42.6 ± 3.2
	pV#4 vs. pV#5	0.034	60.6 ± 5.1 vs. 42.6 ± 3.2
EM CD8+/Rectal LPL	Pre vs. pV#2	0.0002	39.0 ± 3.6 vs. 2.8 ± 0.6
	Pre vs. pV#3	0.007	39.0 ± 3.6 vs. 17.1 ± 5.2
	pV#3 vs. pV#4	0.018	17.1 ± 5.2 vs. 36.8 ± 5.1
	pV#3 vs. pV#5	<0.0001	17.1 ± 5.2 vs. 55.3 ± 3.4
	pV#4 vs. pV#5	0.029	36.8 ± 5.1 vs. 55.3 ± 3.4
CD4+CD38+/Jej LPL	Pre vs. pV#2	0.005	32.6 ± 4.1 vs. 11.9 ± 1.9
	Pre vs. pV#3	<0.0001	32.6 ± 4.1 vs. 2.3 ± 0.9
	Pre vs. pV#5	0.015	32.6 ± 4.1 vs. 17.4 ± 2.9
	pV#3 vs. pV#4	0.007	2.3 ± 0.9 vs. 19.5 ± 5.1
	pV#4 vs. pV#5	0.012	19.5 ± 5.1 vs. 17.4 ± 2.9
CD4+CD38+/Rectal LPL	pV#3 vs. pV#4	0.019	1.1 ± 0.5 vs. 13.1 ± 3.9
	pV#3 vs. pV#5	0.019	1.1 ± 0.5 vs. 12.7 ± 2.4
CD8+CD38+/Jej LPL	Pre vs. pV#3	<0.0001	19.6 ± 2.4 vs. 1.4 ± 0.5
	pV#2 vs. pV#3	0.035	13.3 ± 3.4 vs. 1.4 ± 0.5
	pV#3 vs. pV#4	<0.0001	1.4 ± 0.5 vs. 21.4 ± 3.6
	pV#3 vs. pV#5	0.003	1.4 ± 0.5 vs. 14.2 ± 2.4
CD8+CD38+/Rectal LPL	Pre vs. pV#3	0.009	16.4 ± 3.8 vs. 1.4 ± 0.7
CD4+HLADR+/Jej LPL	Pre vs. pV#3	0.003	9.1 ± 0.6 vs. 3.6 ± 0.5
CD8+HLADR+/Rectal LPL	Pre vs. pV#4	0.024	5.2 ± 2.4 vs. 12.8 ± 1.3
CD4+CD69+/Jej LPL	Pre vs. pV#2	<0.0001	64.8 ± 4.3 vs. 2.7 ± 0.9
	Pre vs. pV#3	<0.0001	64.8 ± 4.3 vs. 30.6 ± 4.1

	Pre vs. pV#5	<0.0001	64.8 ± 4.3 vs. 31.8 ± 1.8
CD4+CD69+/Rectal LPL	Pre vs. pV#2	<0.0001	43.8 ± 7.2 vs. 3.0 ± 2.0
	Pre vs. pV#3	0.0007	43.8 ± 7.2 vs. 16.6 ± 2.9
	Pre vs. pV#5	0.006	43.8 ± 7.2 vs. 22.4 ± 1.1
CD8+CD69+/Jej LPL	Pre vs. pV#2	<0.0001	64.2 ± 4.2 vs. 7.8 ± 1.6
	Pre vs. pV#3	<0.0001	64.2 ± 4.2 vs. 36.7 ± 4.7
	Pre vs. pV#5	0.013	64.2 ± 4.2 vs. 46.4 ± 2.8

**Table S4: SIV-antigen specific cytokine responses in lymph node tissue during pV#3 and pV#4 vaccination phase**

Macaque	Antigen#	T cells	pV#3							pV#4						
			CD107a/b	IFN $\gamma$	IL2	IL4	IL5	IL21	TNF $\alpha$	CD107a/b	IFN $\gamma$	IL2	IL4	IL5	IL21	TNF $\alpha$
LK50	Gag	CD4			0.10	0.22										
LK57	Gag	CD4		0.26									3.66			0.11
LK58	Gag	CD4							0.24							
LK50	Gag	CD8	0.34				0.24									
LK57	Gag	CD8								0.74	0.24		4.11	0.10	0.09	
LK58	Gag	CD8			0.26	0.52							0.61			0.24
LK45	Gag	CD4											1.23			
LK54	Gag	CD4									0.24		0.63	0.24		
LK56	Gag	CD4	0.24	0.54	0.32		0.38	0.34					1.25			
LK59	Gag	CD4														0.20
LK60	Gag	CD4				0.13										
LK45	Gag	CD8									0.10		2.46			
LK54	Gag	CD8								0.15	0.36			0.34	0.43	0.33
LK56	Gag	CD8	0.22	0.22	0.22			2.04					1.86			
LK59	Gag	CD8									0.09		1.58	0.14		
LK60	Gag	CD8			0.31	0.10										
LK50	Env	CD4			0.13	0.45								0.24		
LK57	Env	CD4		0.84	0.58								1.85			
LK58	Env	CD4	1.83	0.21												0.31
LK50	Env	CD8				0.45		0.65						0.21		
LK57	Env	CD8		1.01	0.33					0.71				0.14	0.08	
LK58	Env	CD8	2.48	0.39	0.46	1.58		1.17				0.28	0.93	0.82	1.03	1.36
LK45	Env	CD4						3.36								
LK54	Env	CD4		1.79	0.23	0.64					0.19			0.26		
LK56	Env	CD4	0.31	0.10	0.77	0.46	0.77	5.43	1.82				0.13			
LK59	Env	CD4														0.11
LK60	Env	CD4				0.39		0.61								
LK45	Env	CD8											3.12			
LK54	Env	CD8	0.64	0.64	0.21		0.37				0.29		0.71	0.22	0.29	0.16
LK56	Env	CD8	1.48	1.21	1.21	0.93	1.15	8.00	2.29	0.54	0.22		1.69		0.07	
LK59	Env	CD8					1.49				0.14	0.09	1.34		0.14	
LK60	Env	CD8			0.18	0.17										

#Peptide specific responses are shown as percentage for CD3+CD4+ and CD3+CD8+ T cell subsets. Although both Gag and Env peptides pools were tested, only positive responses are shown.

**Table S5: SIV-antigen specific cytokine responses in PBMC during pV#3 and pV#4 vaccination phase**

Macaque	Antigen#	T cells	pV#3							pV#4						
			CD107a/b	IFN $\gamma$	IL2	IL4	IL5	IL21	TNF $\alpha$	CD107a/b	IFN $\gamma$	IL2	IL4	IL5	IL21	TNF $\alpha$
LK50	Gag	CD4								0.34					0.23	
LK57	Gag	CD4								0.54			3.73			
LK58	Gag	CD4	0.34	0.16		2.63		0.96	0.21	0.58						
LK50	Gag	CD8														
LK57	Gag	CD8				0.24							4.74			
LK58	Gag	CD8	2.57	0.23		0.15	0.15	0.89	1.21	0.90						
LK45	Gag	CD4		0.08					0.05				1.72			
LK54	Gag	CD4				2.69		1.16	0.08	0.61						
LK56	Gag	CD4				0.12				0.10						
LK59	Gag	CD4									0.08	0.06	1.43			0.05
LK60	Gag	CD4								0.35					0.14	0.23
LK45	Gag	CD8						1.62					3.62			
LK54	Gag	CD8				0.19		0.98	0.37	0.39				0.05		
LK56	Gag	CD8														
LK59	Gag	CD8					0.25						3.78	0.36		
LK60	Gag	CD8								0.14						
LK50	Env	CD4								0.33						
LK57	Env	CD4								0.23			1.98			
LK58	Env	CD4	0.64					2.44	0.20	1.46						
LK50	Env	CD8														
LK57	Env	CD8											4.39			
LK58	Env	CD8				0.17	0.09	1.58	0.84	1.28						
LK45	Env	CD4		0.27	0.08	0.13				0.16			0.95		0.08	
LK54	Env	CD4								1.82				0.13	0.27	
LK56	Env	CD4		0.24	0.07	0.26	0.33	1.97								
LK59	Env	CD4											1.3			
LK60	Env	CD4								2.34					0.96	0.81
LK45	Env	CD8			0.21		0.66						2.93		0.26	
LK54	Env	CD8		0.07	0.13	0.16		1.50	0.24	3.00				0.11	0.81	
LK56	Env	CD8		0.11			0.34	2.08	1.27						0.05	
LK59	Env	CD8											4.35		0.08	
LK60	Env	CD8								1.04						

#Peptide specific responses are shown as percentage for CD3+CD4+ and CD3+CD8+ T cell subsets. Although both Gag and Env peptides pools were tested, only positive responses are shown.