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Supplemental information

SARS-CoV-2 vaccination induces immunological T cell memory able to cross-recognize variants from Alpha to Omicron

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Table S1. Related to Figures 1, 2, 3, 5 and 6. Characteristics of the donor cohorts enrolled in this study.

	Early COVID-19 (n=16)	mRNA-1273 (n=33)	BNT162b2 (n=27)	Ad26.COV2.S (n=28)	NVX-CoV2373 (n=8)
Age (years)					
Range;	27-68;	21-78;	24-66;	20-70	18-60
Median ± IQR	44±40	42±29	36±34	50±27	35±26
Gender					
Male (%)	44% 7/16)	29% (6/21)	40% (8/20)	43% (13/28)	62% (5/8)
Female (%)	56% (9/16)	71% (15/21)	60% (12/20)	57% (15/28)	38% (3/8)
Race or Ethnicity					
White	88% (14/16)	61% (20/33)	48% (13/27)	71% (20/28)	75% (6/8)
Hispanic or Latino	6% (1/16)	21% (7/33)	22% (6/27)	18% (5/28)	13% (1/8)
Asian	0% (0/16)	6% (2/33)	22% (6/27)	4% (1/28)	0% (0/8)
Black	0% (0/16)	3% (1/33)	4% (1/27)	0% (0/28)	0% (0/8)
More than one	0% (0/16)	9% (3/33)	4% (1/27)	7% (2/28)	0% (0/8)
Not reported	6% (1/16)	0% (0/33)	0% (0/27)	0% (0/28)	0% (0/8)
Days post symptoms onset	21-43; 33±29	-	-	-	-
		Timepoint 1			
# of donors	n=16	After 1st dose n=20	After 1st dose n=20	After 1st dose n=12	-
dPV[a] Range;	-	4-21;	10-52;	14-21;	
Median ± IQR	-	15±2	15±4	14±1	
RBD IgG positive(%)	100%(16/16)	95%	95%	58%	
N IgG positive(%)	-	0%	5%	0%	
		Timepoint 2			
# of donors	-	After 2nd dose n=20	After 2nd dose n=20	After 1st dose n=12	-
dPV[a] Range;		13-20;	08-19;	39-68;	
Median ± IQR		14±2	14±1	42±9	
RBD IgG positive(%)		100%	100%	67%	
N IgG positive(%)		0%	5%	8%	
		Timepoint 3			
# of donors	-	After 2nd dose n=12	After 2nd dose n=15	After 1st dose n=15	After 1st dose n=8
dPV[a] Range;		58-86	54-98	102-108	22-90
Median ± IQR		77±4	84±5	105±2	78±11
RBD IgG positive(%)		100%	94%	86%	88%
N IgG positive(%)		0%	7%	14%	0%
		Timepoint 4			
# of donors	-	After 2nd dose n=9	After 2nd dose n=4	-	-
dPV[a] Range;		151-229	169-187		
Median ± IQR		175±66	179±12		
RBD IgG positive(%)		100%	100%		
N IgG positive(%)		0%	0%		

[a] Samples corresponding to the first and second time point are longitudinal samples from the same donors, while samples from time point 3 and 4 are cross-sectional samples derived from additional independent donors.

Table S2. Related to Figures 1, 2, 3, 5 and 6. HLA typing of the cohort studied.

Donor code	Vaccine type	HLA-A		HLA-B		HLA-C		HLA-DPB1		HLA-DQA1		HLA-DQB1		HLA-DRB1		HLA-DRB3/4/5	
1203	mRNA-1273	A*02:01	A*24:02	B*27:05	B*39:06	C*02:02	C*07:02	DPB1*02:01	DPB1*03:01	DQA1*02:01	DQA1*03:01	DQB1*02:02	DQB1*03:02	DRB1*04:01	DRB1*07:01	DRB4*01:01	DRB4*01:01
1568	mRNA-1273	A*03:01	A*32:01	B*07:05	B*51:01	C*04:01	C*15:05	DPB1*02:01	DPB1*02:01			DQB1*02:02	DQB1*03:02	DRB1*04:05	DRB1*07:01	DRB4*01:01	DRB4*01:01
1584	mRNA-1273	A*25:01	A*26:01	B*38:01	B*44:02	C*05:01	C*12:03	DPB1*03:01	DPB1*04:01			DQB1*05:01	DQB1*06:02	DRB1*10:01	DRB1*15:01	DRB5*01:01	
2022	mRNA-1273	A*11:01	A*25:01	B*07:02	B*35:03	C*04:01	C*07:02	DPB1*02:01	DPB1*10:01	DQA1*01:03	DQA1*05:01	DQB1*02:01	DQB1*06:03	DRB1*03:01	DRB1*13:01	DRB3*01:01	DRB3*02:02
2033	mRNA-1273	A*02:01	A*25:01	B*18:01	B*57:01	C*12:03	C*16:01	DPB1*02:01	DPB1*04:02	DQA1*03:01	DQA1*05:01	DQB1*03:01	DQB1*03:02	DRB1*04:01	DRB1*11:04	DRB3*02:02	DRB4*01:01
2225	mRNA-1273	A*02:01	A*02:01	B*07:02	B*44:02	C*07:02	C*07:04	DPB1*02:01	DPB1*04:01	DQA1*01:02	DQA1*02:01	DQB1*03:03	DQB1*06:02	DRB1*07:01	DRB1*15:01	DRB4*01:01	DRB5*01:01
2500	mRNA-1273	A*23:01	A*24:02	B*08:01	B*39:06	C*07:01	C*07:02	DPB1*03:01	DPB1*04:02	DQA1*01:02	DQA1*05:01	DQB1*03:01	DQB1*06:02	DRB1*11:01	DRB1*14:06	DRB3*01:01	DRB3*03:01
2718	mRNA-1273	A*02:01	A*03:01	B*07:02	B*55:01	C*03:03	C*07:02			DQA1*01:01	DQA1*02:01	DQB1*03:03	DQB1*05:03	DRB1*07:01	DRB1*14:01	DRB3*02:02	DRB4*01:01
4279	mRNA-1273	A*11:01	A*24:02	B*15:01	B*40:01	C*04:01	C*04:01	DPB1*04:02	DPB1*05:01	DQA1*03:01	DQA1*03:01	DQB1*03:02	DQB1*03:03	DRB1*04:06	DRB1*09:01	DRB4*01:01	DRB4*01:01
5610	mRNA-1273			B*51:01	B*51:01	C*07:02	C*16:02	DPB1*02:01	DPB1*17:01	DQA1*05:01	DQA1*05:01			DRB1*03:01	DRB1*03:01	DRB3*02:02	DRB3*02:02
5617	mRNA-1273	A*26:01	A*32:01	B*38:01	B*40:02	C*02:02	C*12:03	DPB1*04:01	DPB1*04:02	DQA1*05:01	DQA1*05:01	DQB1*02:01	DQB1*03:01	DRB1*03:01	DRB1*11:01	DRB3*01:01	DRB3*02:02
5623	mRNA-1273	A*01:01	A*33:03	B*14:01	B*27:02	C*02:02	C*08:02	DPB1*02:01	DPB1*02:01	DQA1*02:01	DQA1*05:01	DQB1*02:02	DQB1*03:01	DRB1*07:01	DRB1*11:01	DRB3*02:02	DRB4*01:01
5624	mRNA-1273	A*01:01	A*25:01	B*18:01	B*41:02	C*12:03	C*17:01	DPB1*01:01	DPB1*23:01	DQA1*01:02	DQA1*05:01	DQB1*03:01	DQB1*06:02	DRB1*13:03	DRB1*15:01	DRB3*01:01	DRB5*01:01
5629	mRNA-1273	A*01:01	A*03:01	B*08:01	B*35:01	C*04:01	C*07:01	DPB1*04:01	DPB1*04:02	DQA1*01:01	DQA1*05:01	DQB1*02:01	DQB1*05:01	DRB1*01:01	DRB1*03:01	DRB3*01:01	
5637	mRNA-1273	A*01:01	A*02:01	B*18:01	B*51:01	C*05:01	C*07:01	DPB1*04:01	DPB1*14:01	DQA1*03:01	DQA1*05:01	DQB1*03:01	DQB1*03:02	DRB1*04:01	DRB1*11:04	DRB3*02:02	DRB4*01:01
5663	mRNA-1273	A*31:01	A*31:01	B*27:05	B*51:01	C*01:02	C*15:02	DPB1*04:01	DPB1*04:02	DQA1*01:01	DQA1*05:01	DQB1*03:01	DQB1*05:01	DRB1*01:01	DRB1*11:01	DRB3*02:02	
5669	mRNA-1273	A*29:02	A*29:02	B*44:03	B*44:03	C*07:02	C*16:01	DPB1*04:02	DPB1*13:01	DQA1*01:01	DQA1*02:01	DQB1*03:03	DQB1*05:01	DRB1*01:01	DRB1*07:01	DRB4*01:01	
5670	mRNA-1273	A*03:01	A*03:01	B*07:02	B*35:01	C*04:01	C*07:02	DPB1*04:01	DPB1*04:02	DQA1*01:01	DQA1*01:01			DRB1*01:01	DRB1*15:01	DRB5*01:01	
5671	mRNA-1273	A*02:01	A*03:01	B*07:02	B*38:01	C*07:02	C*12:03	DPB1*03:01	DPB1*04:01	DQA1*01:02	DQA1*01:03	DQB1*06:03	DQB1*06:03	DRB1*13:01	DRB1*15:01	DRB3*01:01	DRB5*01:01
5683	mRNA-1273	A*24:02	A*24:02	B*39:06	B*39:06	C*03:06	C*07:02	DPB1*04:02	DPB1*04:02	DQA1*03:01	DQA1*04:01	DQB1*03:02	DQB1*04:02	DRB1*04:11	DRB1*08:02	DRB4*01:01	
5684	mRNA-1273	A*03:01	A*23:01			C*04:01	C*08:04	DPB1*01:01	DPB1*04:02	DQA1*01:01	DQA1*01:02	DQB1*05:01	DQB1*05:02	DRB1*11:04	DRB1*12:01	DRB3*01:01	DRB3*02:02
5716	mRNA-1273	A*69:01	A*69:01	B*55:01	B*55:01	C*01:02	C*01:02	DPB1*02:01	DPB1*04:02	DQA1*03:01	DQA1*05:01	DQB1*03:01	DQB1*03:02	DRB1*04:01	DRB1*11:01	DRB3*02:02	DRB4*01:01
5763	mRNA-1273	A*68:02	A*68:02	B*13:02	B*18:01	C*05:01	C*06:02	DPB1*04:01	DPB1*17:01	DQA1*02:01	DQA1*05:01	DQB1*02:01	DQB1*02:01	DRB1*03:01	DRB1*07:01	DRB3*02:02	DRB4*01:01
5770	mRNA-1273	A*02:01	A*24:02	B*40:01	B*40:02	C*03:04	C*03:05	DPB1*04:01	DPB1*14:01	DQA1*03:01	DQA1*03:01			DRB1*04:07	DRB1*14:01	DRB3*02:02	DRB4*01:01
5776	mRNA-1273	A*23:01	A*24:02	B*35:01	B*49:01	C*04:01	C*07:01	DPB1*02:01	DPB1*02:01	DQA1*05:01	DQA1*05:01	DQB1*03:01	DQB1*04:02	DRB1*08:01	DRB1*11:01	DRB3*02:02	
6037	mRNA-1273	A*02:06	A*29:02	B*07:02	B*44:03	C*07:02	C*16:01	DPB1*02:01	DPB1*11:01	DQA1*01:02	DQA1*02:01	DQB1*02:02	DQB1*05:02	DRB1*07:01	DRB1*16:01	DRB4*01:01	DRB5*02:02
6087	mRNA-1273	A*31:01	A*66:01	B*41:02	B*51:02	C*08:01	C*17:01	DPB1*02:01	DPB1*04:01	DQA1*01:03	DQA1*05:01	DQB1*03:01	DQB1*06:03	DRB1*11:04	DRB1*13:03	DRB3*01:01	DRB3*02:02
6263	mRNA-1273	A*02:01	A*11:01	B*38:01	B*51:01	C*12:03	C*15:02	DPB1*02:01	DPB1*02:01	DQA1*02:01	DQA1*02:01	DQB1*02:02	DQB1*03:03	DRB1*07:01	DRB1*07:01	DRB4*01:01	DRB4*01:01
6264	mRNA-1273	A*02:01	A*68:01	B*51:01	B*52:01	C*03:04	C*16:02	DPB1*03:01	DPB1*14:01	DQA1*04:01	DQA1*05:01	DQB1*03:01	DQB1*04:02	DRB1*08:02	DRB1*11:02	DRB3*02:02	
6276	mRNA-1273	A*11:01	A*32:01	B*39:01	B*51:01	C*12:03	C*15:02	DPB1*02:01	DPB1*10:01	DQA1*01:02	DQA1*02:01	DQB1*02:02	DQB1*05:02	DRB1*07:01	DRB1*16:01	DRB4*01:01	DRB5*02:02
6277	mRNA-1273	A*02:01	A*68:02	B*52:01	B*57:03	C*07:01	C*12:02	DPB1*01:01	DPB1*04:01	DQA1*01:03	DQA1*04:01	DQB1*04:02	DQB1*06:01	DRB1*03:02	DRB1*15:02	DRB3*03:01	DRB5*01:02
6323	mRNA-1273	A*24:02	A*26:01	B*35:05	B*40:02	C*03:04	C*04:01	DPB1*02:02	DPB1*05:01	DQA1*01:03	DQA1*06:01	DQB1*03:01	DQB1*06:01	DRB1*08:03	DRB1*12:02	DRB3*03:01	
6473	mRNA-1273	A*01:01	A*24:02	B*38:02	B*51:01	C*07:02	C*14:02	DPB1*01:01	DPB1*04:01	DQA1*01:02	DQA1*03:01	DQB1*03:01	DQB1*05:02	DRB1*04:07	DRB1*15:02	DRB4*01:01	DRB5*01:01
1706	BNT162b2	A*01:01	A*32:01	B*08:01	B*51:01	C*04:01	C*07:01	DPB1*02:01	DPB1*03:01			DQB1*02:02	DQB1*06:03	DRB1*07:01	DRB1*13:01	DRB3*01:01	DRB4*01:01
2890	BNT162b2	A*24:02	A*24:02	B*44:02	B*44:02	C*05:01	C*05:01	DPB1*03:01	DPB1*04:01	DQA1*01:01	DQA1*01:03	DQB1*05:01	DQB1*06:02	DRB1*01:01	DRB1*13:01	DRB3*01:01	
3520	BNT162b2	A*11:01	A*68:01	B*44:02	B*44:02	C*07:04	C*07:04	DPB1*04:01	DPB1*04:02	DQA1*01:01	DQA1*01:01	DQB1*05:03	DQB1*06:04				
3946	BNT162b2	A*02:01	A*11:01	B*07:02	B*44:03	C*07:02	C*16:01	DPB1*11:01	DPB1*15:01	DQA1*02:01	DQA1*03:01	DQB1*02:02	DQB1*03:02	DRB1*04:04	DRB1*07:01	DRB4*01:01	DRB4*01:01
4633	BNT162b2	A*01:01	A*03:01	B*51:01	B*51:01	C*06:02	C*14:02	DPB1*04:01	DPB1*13:01	DQA1*01:01	DQA1*02:01	DQB1*03:03	DQB1*05:01	DRB1*01:01	DRB1*07:01	DRB4*01:01	
5600	BNT162b2	A*01:02	A*30:01	B*49:01	B*50:01	C*06:02	C*07:01	DPB1*01:01	DPB1*02:01	DQA1*01:01	DQA1*05:01	DQB1*03:01	DQB1*05:01	DRB1*01:02	DRB1*13:05	DRB3*02:02	
5601	BNT162b2	A*24:02	A*24:02	B*13:01	B*15:02	C*03:04	C*08:01	DPB1*02:02	DPB1*13:01	DQA1*03:01	DQA1*06:01	DQB1*03:01	DQB1*03:03	DRB1*09:01	DRB1*12:02	DRB3*03:01	DRB4*01:01
5639	BNT162b2	A*03:01	A*03:01	B*07:02	B*15:01	C*03:04	C*07:02	DPB1*05:01	DPB1*20:01	DQA1*01:03	DQA1*02:01	DQB1*02:02	DQB1*06:03	DRB1*07:01	DRB1*13:01	DRB3*01:01	DRB4*01:01
5673	BNT162b2	A*24:02	A*32:01	B*51:08	B*55:01	C*03:03	C*16:02	DPB1*02:01	DPB1*02:01	DQA1*01:02	DQA1*01:03	DQB1*06:04	DQB1*06:41:01	DRB1*13:01	DRB1*13:02	DRB3*01:01	DRB3*01:01
5685	BNT162b2	A*31:01	A*33:03	B*07:02	B*13:01	C*07:02	C*07:02	DPB1*05:01	DPB1*05:01	DQA1*01:01	DQA1*06:01	DQB1*03:01	DQB1*03:01	DRB1*01:01	DRB1*12:02	DRB3*03:01	
5700	BNT162b2	A*02:01	A*02:65	B*38:01	B*41:01	C*07:01	C*12:03	DPB1*04:02	DPB1*04:02	DQA1*01:10	DQA1*05:01	DQB1*03:01	DQB1*06:03	DRB1*13:01	DRB1*13:05	DRB3*01:01	DRB3*02:02
5701	BNT162b2	A*24:02	A*66:01	B*27:02	B*41:02	C*02:02	C*17:01	DPB1*02:01	DPB1*02:01	DQA1*01:03	DQA1*05:01	DQB1*02:01	DQB1*06:03	DRB1*03:01	DRB1*03:01	DRB3*02:02	DRB3*02:02
5714	BNT162b2	A*01:01	A*29:02	B*08:01	B*45:01	C*06:02	C*07:01	DPB1*04:01	DPB1*04:01	DQA1*02:01	DQA1*05:01	DQB1*02:01	DQB1*02:02	DRB1*03:01	DRB1*07:01	DRB3*01:01	DRB4*01:01
5759	BNT162b2	A*68:02	A*68:02	B*15:10	B*81:01	C*03:02	C*08:04	DPB1*01:01	DPB1*18:01	DQA1*01:01	DQA1*05:01	DQB1*02:01	DQB1*05:01	DRB1*03:01	DRB1*12:01	DRB3*01:01	DRB3*02:02
5761	BNT162b2	A*01:01	A*03:01	B*07:02	B*13:02	C*06:02	C*07:02	DPB1*04:01	DPB1*04:02	DQA1*01:02	DQA1*02:01	DQB1*02:02	DQB1*06:02	DRB1*07:01	DRB1*15:01	DRB4*01:01	DRB5*01:01
5774	BNT162b2	A*24:02	A*24:02	B*40:01	B*46:01	C*01:02	C*07:02	DPB1*05:01	DPB1*13:01	DQA1*01:01	DQA1*04:01	DQB1*04:02	DQB1*05:02	DRB1*08:09	DRB1*08:09		
5788	BNT162b2	A*01:01	A*01:01	B*08:01	B*49:01	C*07:01	C*07:01	DPB1*03:01	DPB1*04:01	DQA1*05:01	DQA1*05:01	DQB1*03:01	DQB1*03:01	DRB1*03:01	DRB1*11:02	DRB3*01:01	DRB3*02:02
5794	BNT162b2	A*01:01	A*02:01	B*14:02	B*51:01	C*08:02	C*15:02	DPB1*04:01	DPB1*04:02	DQA1*01:01	DQA1*03:01	DQB1*03:02	DQB1*05:01	DRB1*01:02	DRB1*04:02	DRB4*01:01	
5796	BNT162b2	A*24:02	A*24:02	B*39:05	B*39:05	C*07:02	C*14:02	DPB1*04:01	DPB1*04:02	DQA1*03:01	DQA1*05:01	DQB1*03:01	DQB1*03:01			DRB3*02:02	DRB3*02:02
5808	BNT162b2			B*14:02	B*51:01	C*08:02	C*15:02	DPB1*10:01	DPB1*11:01	DQA1*02:01	DQA1*03:01			DRB1*04:02	DRB1*07:01	DRB4*01:01	DRB4*01:01
5816	BNT162b2	A*01:01	A*24:02	B*40:01	B*41:03	C*03:04	C*07:01	DPB1*01:01	DPB1*04:02	DQA1*01:02	DQA1*05:01	DQB1*02:01	DQB1*06:04	DRB1*03:01	DRB1*13:02	DRB3*01:01	DRB3*03:01
5824	BNT162b2	A*01:01	A*01:01	B*08:01	B*35:02	C*04:01	C*07:01	DPB1*02:01	DPB1*15:01	DQA1*01:03	DQA1*03:01	DQB1*03:04	DQB1*06:03	DRB1*04:08	DRB1*11:04	DRB3*02:02	DRB4*01:01
5834	BNT162b2	A*24:02	A*30:01	B*13:02	B*40:01	C*06:02	C*07:02	DPB1*05:01	DPB1*15:01	DQA1*01:03	DQA1*05:01	DQB1*03:01	DQB1*06:03	DRB1*12:01	DRB1*13:01	DRB3*01:01	DRB3*02:02
5836	BNT162b2	A*02:01	A*29:02	B*44:03	B*44:03	C*16:01	C*16:02	DPB1*04:01	DPB1*04:01	DQA1*01:02	DQA1*03:01	DQB1*03:02	DQB1*06:02	DRB1*04:02	DRB1*15:01	DRB4*01:01	DRB5*01:01
6307	BNT162b2	A*02:01	A*26:01	B*35:12	B*44:02	C*04:01	C*05:01	DPB1*04:01	DPB1*04:02	DQA1*01:03	DQA1*04:01	DQB1*04:02	DQB1*06:03	DRB1*08:02	DRB1*13:01		
6319	BNT162b2	A*01:01	A*33:01	B*08:01	B*49:01	C*07:01	C*07:01	DPB1*04:01	DPB1*16:01	DQA1*03:01	DQA1*05:01	DQB1*02:01	DQB1*03:01	DRB1*03:01	DRB1*04:01		
6390	BNT162b2	A*02:01	A*02:01	B*44:02	B*44:02	C*05:01	C*05:01	DPB1*02:01	DPB1*03:01	DQA1*01:03	DQA1*01:03	DQB1*06:01	DQB1*06:03	DRB1*13:01	DRB1*15:02		
2587	Ad26.COV2.S	A*02:01	A*30:01	B*13:02	B*35:17	C* 04:0	C* 06:0	DPB1*05:01	DPB1*17:01	DQA1*02:01	DQA1*03:01	DQB1*02:02	DQB1*03:02	DRB1*04:04	DRB1*07:01	DRB4*01:01	DRB4*01:01
4062	Ad26.COV2.S	A*01:01	A*02:01	B*07:02	B*08:01	C*07:01	C*07:02	DPB1*02:01	DPB1*04:01	DQA1*01:02	DQA1*05:01	DQB1*02:01	DQB1*06:02	DRB1*03:01	DRB1*15:01	DRB3*01:01	DRB5*01:01
5720	Ad26.COV2.S	A*31:01	A*32:01	B*51:01	B*51:01	C*12:03	C*15:02	DPB1*04:02	DPB1*05:01	DQA1*01:01	DQA1*01:03	DQB1*05:01	DQB1*06:03	DRB1*01:01	DRB1*13:01	DRB3*01:01	
5829	Ad26.COV2.S	A*01:01	A*03:01	B*07:02	B*35:02	C*04:01	C*07:02	DPB1*02:01	DPB1*04:01	DQA1*01:02	DQA1*01:03	DQB1*06:02	DQB1*06:03	DRB1*11:04	DRB1*15:01	DRB3*02:02	DRB5*01:01
5841	Ad26.COV2.S	A*03:01	A*30:01	B*07:02	B*13:02	C*06:02	C*07:02	DPB1*04:01	DPB1*04:01	DQA1*01:01	DQA1*01:03	DQB1*05:01	DQB1*06:03	DRB1*01:01	DRB1*13:01	DRB3*01:01	
6077	Ad26.COV2.S	A*26:01	A*33:01	B*14:02	B*38:01	C*08:02	C*12:03	DPB1*03:01	DPB1*04:01	DQA1*01:01	DQA1*01:01	DQB1*05:01	DQB1*05:01	DRB1*01:02	DRB1*01:02		
6091	Ad26.COV2.S	A*02:06	A*24:07	B*27:04	B*38:02	C*07:02	C*12:02	DPB1*01:01	DPB1*05:01	DQA1*01:02	DQA1*03:01	DQB1*03:02	DQB1*05:02	DRB1*04:03	DRB1*15:02	DRB4*01:01	DRB5*01:01
6140	Ad26.COV2.S	A*03:01	A*68:02	B*07:02	B*14:02	C*07:02	C*08:02	DPB1*02:01	DPB1*04:01	DQA1*02:01	DQA1*05:01	DQB1*03:01	DQB1*03:03	DRB1*07:01	DRB1*13:03		
6141	Ad26.COV2.S	A*02:05	A*03:01	B*15:01	B*50:01	C*03:04	C*06:02	DPB1*04:01	DPB1*04:01	DQA1*03:01	DQA1*03:01	DQB1*03:01	DQB1*03:02	DRB1*04:01	DRB1*04:01	DRB4*01:01	DRB4*01:01
6144	Ad26.COV2.S	A*02:01	A*24:02	B*08:01	B*35:02	C*04:01	C*07:01	DPB1*04:01	DPB1*04:01	DQA1*01:03	DQA1*05:01	DQB1*03:01	DQB1*06:03	DRB1*13:01	DRB1*13:03	DRB3*01:01	DRB3*01:01
6149	Ad26.COV2.S	A*03:01	A*68:01	B*07:02	B*51:01	C*03:04	C*07:02	DPB1*02:01	DPB1*04:02	DQA1*01:02	DQA1*05:01	DQB1*03:01	DQB1*06:02			DRB5*01:01	DRB5*02:02
6151	Ad26.COV2.S	A*24:02	A*30:01	B*13:02	B*35:02	C*04:01	C*06:02	DPB1*04:01	DPB1*17:01	DQA1*02:01	DQA1*05:01	DQB1*02:02	DQB1*03:01	DRB1*07:01	DRB1*11:04		
6153	Ad26.COV2.S	A*24:02	A*68:01			C*03:04	C*07:02	DPB1*04:01	DPB1*04:02	DQA1*01:02	DQA1*03:01	DQB1*03:02	DQB1*06:02	DRB1*04:07	DRB1*15:01		
6156	Ad26.COV2.S	A*01:01	A*02:01	B*51:01	B*51:01			DPB1*02:01	DPB1*03:01	DQA1*01:01	DQA1*05:01	DQB1*02:01	DQB1*05:01	DRB1*01:01	DRB1*03:01		
6157	Ad26.COV2.S	A*02:01	A*24:02	B* 15:0	B* 35:0	C*03:03	C*04:01	DPB1*04:01	DPB1*04:01	DQA1*01:02	DQA1*01:03	DQB1*06:02	DQB1*06:03	DRB1*13:01	DRB1*15:01		
6159	Ad26.COV2.S	A*02:01	A*03:01	B*18:01	B*51:01	C*07:01	C*14:02	DPB1*04:01	DPB1*04:01	DQA1*04:01	DQA1*05:01	DQB1*03:01	DQB1*04:02	DRB1*08:01	DRB1*11:04		
6162	Ad26.COV2.S	A*02:01	A*33:03	B*44:03	B*54:01	C*01:02	C*14:03	DPB1*05:01	DPB1*05:01	DQA1*01:02	DQA1*01:03	DQB1*06:01	DQB1*06:04	DRB1*08:03	DRB1*13:02		
6224	Ad26.COV2.S	A*03:01	A*25:01	B*07:02	B*35:01	C*04:01	C*07:02	DPB1*03:01	DPB1*04:01	DQA1*03:01	DQA1*05:01	DQB1*03:01	DQB1*03:01	DRB1*04:07	DRB1*11:01		
6225	Ad26.COV2.S	A*02:01	A*03:01	B*07:02	B*40:01	C*03:04	C*07:02	DPB1*04:01	DPB1*06:01	DQA1*01:02	DQA1*03:01	DQB1*03:02	DQB1*06:02	DRB1*04:04	DRB1*15:01		
6238	Ad26.COV2.S	A*02:05	A*29:02	B*14:02	B*41:01	C*07:01	C*08:02	DPB1*02:01	DPB1*15:01	DQA1*02:01	DQA1*05:01	DQB1*02:02	DQB1*03:01	DRB1*07:01	DRB1*13:05		
6240	Ad26.COV2.S	A*01:01	A*03:01	B* 07:0	B* 08:0	C*07:01	C*07:27	DPB1*03:01	DPB1*04:01	DQA1*01:02	DQA1*05:01	DQB1*02:01	DQB1*06:04	DRB1*03:04	DRB1*03:02	DRB3*01:01	DRB3*03:01
6241	Ad26.COV2.S	A*01:01	A*02:05			C*07:01	C*07:01	DPB1*01:01	DPB1*14:01	DQA1*03:01	DQA1*05:01	DQB1*02:01	DQB1*03:02	DRB1*03:01	DRB1*04:05		
6251	Ad26.COV2.S	A*23:01	A*29:02	B*14:02	B*44:03	C*04:01	C*08:02	DPB1*03:01	DPB1*05:01	DQA1*01:02	DQA1*02:01	DQB1*02:02	DQB1*06:09	DRB1*07:01	DRB1*13:02		
6252	Ad26.COV2.S	A*02:01	A*26:01	B*38:01	B*51:01	C*12:03	C*14:02	DPB1*02:01	DPB1*04:01	DQA1*01:03	DQA1*03:01	DQB1*03:02	DQB1*06:03	DRB1*04:02	DRB1*13:01		
6256	Ad26.COV2.S	A*01:01	A*11:01	B*08:01	B*44:03	C*07:01	C*16:01	DPB1*02:01	DPB1*03:01	DQA1*02:01	DQA1*05:01	DQB1*02:01	DQB1*02:02	DRB1*03:01	DRB1*07:01		
6258	Ad26.COV2.S	A*24:02	A*29:02	B*35:01	B*44:03	C*04:01	C*16:01	DPB1*02:01	DPB1*04:01	DQA1*02:01	DQA1*05:01	DQB1*02:02	DQB1*03:01	DRB1*07:01	DRB1*11:03		
6262	Ad26.COV2.S	A*11:01	A*68:01			C*12:03	C*15:02	DPB1*02:01	DPB1*02:01	DQA1*01:03	DQA1*03:01	DQB1*03:02	DQB1*06:03	DRB1*04:03	DRB1*13:01		
6314	Ad26.COV2.S	A*01:01	A*03:01	B*07:02	B*57:01	C*06:02	C*07:02	DPB1*04:01	DPB1*13:01	DQA1*01:02	DQA1*02:01	DQB1*03:03	DQB1*06:02	DRB1*07:01	DRB1*15:01		
6090	NVX-CoV2373	A*01:01	A*26:01	B*08:01	B*13:02	C*07:01	C*07:01	DPB1*01:01	DPB1*03:01	DQA1*03:01	DQA1*05:01	DQB1*02:01	DQB1*03:01	DRB1*03:01	DRB1*04:07	DRB3*01:01	DRB4*01:01
6095	NVX-CoV2373	A*01:01	A*02:01	B*35:01	B*35:02	C*04:01	C*04:01	DPB1*02:01	DPB1*04:01	DQA1*01:01	DQA1*05:01	DQB1*03:01	DQB1*05:03	DRB1*11:04	DRB1*14:01	DRB3*02:01	DRB3*02:02
6096	NVX-CoV2373	A*01:01	A*02:01	B*35:02	B*39:06	C*04:01	C*07:02	DPB1*04:01	DPB1*04:01	DQA1*05:01	DQA1*05:01	DQB1*03:01	DQB1*03:01	DRB1*11:01	DRB1*11:04	DRB3*02:02	DRB3*02:02
6097	NVX-CoV2373	A*01:01	A*02:01	B*35:02	B*39:06	C*04:01	C*07:02	DPB1*04:01	DPB1*04:01	DQA1*05:01	DQA1*05:01	DQB1*03:01	DQB1*03:01	DRB1*11:01	DRB1*11:04	DRB3*02:02	DRB3*02:02
6099	NVX-CoV2373	A*02:01	A*02:01	B*35:01	B*39:06	C*04:01	C*07:02	DPB1*02:01	DPB1*04:01	DQA1*01:01	DQA1*05:01	DQB1*03:01	DQB1*05:03	DRB1*11:01	DRB1*14:01	DRB3*02:01	DRB3*02:02
6259	NVX-CoV2373	A*23:01	A*25:01	B*40:01	B*44:03	C*03:04	C*04:01	DPB1*02:01	DPB1*03:01	DQA1*02:01	DQA1*03:01	DQB1*02:02	DQB1*03:02	DRB1*04:04	DRB1*07:01	DRB4*01:01	DRB4*01:01
6261	NVX-CoV2373	A*01:01	A*36:01	B*53:01	B*57:01	C*04:01	C*07:01	DPB1*04:01	DPB1*18:01	DQA1*01:02	DQA1*02:01	DQB1*03:03	DQB1*06:02	DRB1*07:01	DRB1*11:01		
6310	NVX-CoV2373	A*02:06	A*26:08					DPB1*02:01	DPB1*04:01	DQA1*01:02	DQA1*05:01	DQB1*03:01	DQB1*06:04	DRB1*11:04	DRB1*13:02	DRB3*02:02	DRB3*03:01

Table S3. Related to Figures 1-6. List of amino acid mutations for each SARS-CoV-2 variant.

Protein	Position	Wuhan	B.1.1.7	B.1.351	P.1	B.1.1.519	B.1.617.1	B.1.617.2	C.37	R.1	B.1.427/429	B.1.525	B.1.526	B.1.526.1	B.1.621	B.1.529
E	21	L										F				
E	71	P		L												
M	3	D														G
M	19	Q														E
M	28	F								L						
M	63	A														T
M	162	K		N												
N	3	D	L													
N	12	A										G				
N	13	P		S					L							L
N	31	E														-
N	32	R		H												-
N	33	S														-
N	63	D						G								
N	80	P			R											
N	187	S								L						
N	203	R	K		K	K	M	M		K	K					K
N	204	G	R		R	R				R	R					R
N	205	T													I	
N	212	G		C												
N	214	G							C							
N	234	M									I		I	I		
N	235	S	F													
N	377	D					Y	Y								
N	418	Q								H						
nsp1	109	P		S												
nsp2	85	T		I							I		I	I		
nsp2	339	G		S												
nsp2	366	S		T												
nsp2	427	Q		H												
nsp2	563	E		D												
nsp3	38	K														R
nsp3	141	P				S										
nsp3	183	T	I													
nsp3	186	T			A											
nsp3	237	T													A	
nsp3	370	S			L											
nsp3	720	T													I	
nsp3	778	P									S					
nsp3	837	K		N												
nsp3	890	A	D													
nsp3	926	C		S												
nsp3	977	K			Q											
nsp3	1069	V														I
nsp3	1180	T		I												
nsp3	1189	T										I				
nsp3	1265	S														-
nsp3	1266	L														I
nsp3	1412	I	T													
nsp3	1429	T					N									
nsp3	1469	P						S	S							
nsp3	1569	F							V							
nsp3	1778	N		S												
nsp3	1892	A														T
nsp4	395	S									T					
nsp4	399	K												E		
nsp4	438	L							P				P	P		
nsp4	446	A												V		
nsp4	492	T				I			I						I	I
nsp5	90	K		R												
nsp5	132	P														H
nsp5	193	A		V												
nsp6	49	I				V										
nsp6	77	T					A									
nsp6	106	S	-	-	-							-	-	-		-
nsp6	107	G	-	-	-							-	-	-		-
nsp6	108	F	-	-	-							-	-	-		-
nsp6	125	L									F					
nsp6	135	G		S												
nsp6	149	V		F												
nsp6	160	Q													R	
nsp6	167	L									F					
nsp6	189	A														V
nsp6	278	V												I		
nsp9	35	T				I										
nsp10	105	N		K												
nsp12	314	N							L	L						
nsp12	323	P	L	L	L	L	L	L			L	F	L	L	L	I
nsp12	671	G						S								
nsp13	53	P									L					
nsp13	77	P						L								
nsp13	88	Q											H	H		
nsp13	209	V									F					
nsp13	260	D									Y					
nsp13	341	E			D											
nsp13	419	P													S	
nsp13	429	M					I									
nsp13	439	G								R						
nsp13	588	T		I												
nsp14	42	I														V
nsp14	177	L		F												
nsp14	326	F									L					
nsp14	328	V		F												
nsp14	412	P								H						
nsp15	91	D									Y					
nsp15	259	K					R									
ORF3a	26	S					L	L								
ORF3a	42	P											L	L		

ORF3a	57	Q		H							H		H	H	H	
ORF3a	131	W		L												
ORF3a	171	S		L												
ORF3a	253	S			P											
ORF3a	256	V													I	
ORF7a	82	V					A	A								
ORF7a	93	V		F												
ORF7a	120	T						I								
ORF8	11	T											I	I	K	
ORF8	27		stop													
ORF8	38	P													S	
ORF8	51	A												S		
ORF8	67	S													F	
ORF8	92	E			K											
ORF8	121	I		L												
S	5	L											F			
S	13	S									I					
S	18	L		F	F											
S	19	T						R								
S	20	T			N											
S	26	P			S											
S	52	Q										R				
S	67	A														V
S	69	H	-													-
S	70	V	-													-
S	75	G							V							
S	76	T							I							
S	80	D		A										G		
S	95	T											I		I	I
S	138	D			Y											
S	142	G														D
S	143	V														-
S	144	Y												-	S	-
S	145	Y	-												N	-
S	152	W								L	C					-
S	154	E					K									
S	157	F												S		
S	190	R			S											
S	211	N														-
S	212	L														I
S	214	ins														EPE
S	215	D		G/H												
S	241	L		-												
S	242	L		-												
S	243	A		-												
S	246	R							N							
S	247	S							-							
S	248	Y							-							
S	249	L							-							
S	250	T							-							
S	251	P							-							
S	252	G							-							
S	253	D							-				G			
S	339	G														D
S	346	R													K	
S	371	S														L
S	373	S														P
S	375	S														F
S	417	K		N	T											N
S	440	N														K
S	446	G														S
S	452	L					R	R	Q		R			R		
S	477	S														N
S	478	T				K		K								K
S	484	E		K	K		Q			K		K	K		K	A
S	490	F							S							
S	493	Q														R
S	496	G														S
S	498	Q														R
S	501	N	Y	Y	Y										Y	Y
S	505	Y														H
S	547	T														K
S	570	A	D													
S	614	D	G	G	G	G	G	G	G	G	G	G	G	G	G	G
S	655	H			Y											Y
S	677	Q										H				
S	679	N														K
S	681	P	H			H	R	R							H	H
S	701	A		V									V			
S	716	T	I													
S	732	T				A										
S	764	N														K
S	769	G								V						
S	796	D														Y
S	856	N														K
S	859	T							N					N		
S	888	F										L				
S	938	L									F					
S	950	D						N						H	N	
S	954	Q														H
S	969	N														K
S	981	L														F
S	982	S	A													
S	1027	T			I											
S	1071	Q					H									
S	1118	D	H													
S	1176	V			F											
S	1191	K									N					
# of mutations per variant			**22**	**43**	**25**	**11**	**15**	**16**	**21**	**12**	**21**	**12**	**17**	**22**	**21**	**60**

Table S5. Related to Figure 6. List of class II and class I epitopes identified in vaccinated apheresis donors. Information on the mutations within these epitopes when applicable and to which variants they belong are included.

Epitope specificity	Donor	Start	length	Epitope	% response	% of total responses	HLA type	HLA binding (%ile rank)	Mutation	Mutated Epitope	Variant	HLA binding of mutated epitope (%ile rank)	Ratio
CD4 epitope	6263-VA-1	311	15	GIYQTSNFRVQPTES	0.013	13.83%	N/A	N/A	None			N/A	N/A
CD4 epitope	6263-VA-1	686	15	SVASQSIIAYTMSLG	0.015	15.96%	N/A	N/A	None			N/A	N/A
CD4 epitope	6263-VA-1	691	15	SIIAYTMSLGAENSV	0.023	24.47%	N/A	N/A	A701V	SIIAYTMSLGVENSV	B.1.351 (Beta)	N/A	N/A
CD4 epitope	6263-VA-1	716	15	TNFTISVTTEILPVS	0.019	20.21%	N/A	N/A	T716I	INFTISVTTEILPVS	B.1.1.7 (Alpha)	N/A	N/A
CD4 epitope	6263-VA-1	896	15	IPFAMQMAYRFNGIG	0.024	25.53%	N/A	N/A	None			N/A	N/A
CD4 epitope	6264-VA-1	346	15	RFASVYAWNRKRISN	0.028	19.86%	N/A	N/A	None			N/A	N/A
CD4 epitope	6264-VA-1	356	15	KRISNCVADYSVLYN	0.041	29.08%	N/A	N/A	None			N/A	N/A
CD4 epitope	6264-VA-1	366	15	SVLYNSASFSTFKCY	0.016	11.35%	N/A	N/A	S371L; S373P; S375F	SVLYN**LAPFFT**FKCY	B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6264-VA-1	386	15	KLNDLCFTNVYADSF	0.022	15.60%	N/A	N/A	None			N/A	N/A
CD4 epitope	6264-VA-1	426	15	PDDFTGCVIAWNSNN	0.034	24.11%	N/A	N/A	N440K	PDDFTGCVIAWNSN**K**	B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6276-VA-1	26	15	PAYTNSFTRGVYYPD	0.0246	6.14%	N/A	N/A	P26S	**S**AYTNSFTRGVYYPD	P.1. (Gamma)	N/A	N/A
CD4 epitope	6276-VA-1	31	15	SFTRGVYYPDKVFRS	0.0106	2.65%	N/A	N/A	None			N/A	N/A
CD4 epitope	6276-VA-1	46	15	SVLHSTQDLFLPFFS	0.0136	3.39%	N/A	N/A	Q52R	SVLHST**R**DLFLPFFS	B.1.525 (Eta)	N/A	N/A
CD4 epitope	6276-VA-1	126	15	VVIKVCEFQFCNDPF	0.0136	3.39%	N/A	N/A	D138Y	VVIKVCEFQFCN**Y**PF	P.1. (Gamma)	N/A	N/A
CD4 epitope	6276-VA-1	711	15	SIAIPTNFTISVTTE	0.0316	7.89%	N/A	N/A	T716I	SIAIP**I**NFTISVTTE	B.1.1.7 (Alpha)	N/A	N/A
CD4 epitope	6276-VA-1	716	15	TNFTISVTTEILPVS	0.0256	6.39%	N/A	N/A	T716I	**I**NFTISVTTEILPVS	B.1.1.7 (Alpha)	N/A	N/A
CD4 epitope	6276-VA-1	726	15	ILPVSMTKTSVDCTM	0.0126	3.15%	N/A	N/A	T732A	ILPVSM**A**KTSVDCTM	B.1.1.519	N/A	N/A
CD4 epitope	6276-VA-1	816	15	SFIEDLLFNKVTLAD	0.0396	9.89%	N/A	N/A	None			N/A	N/A
CD4 epitope	6276-VA-1	831	15	AGFIKQYGDCLGDIA	0.0686	17.12%	N/A	N/A	None			N/A	N/A
CD4 epitope	6276-VA-1	1101	15	HWFVTQRNFYEPQII	0.0456	11.38%	N/A	N/A	None			N/A	N/A
CD4 epitope	6276-VA-1	1106	15	QRNFYEPQIITTDNT	0.0296	7.39%	N/A	N/A	D1118H	QRNFYEPQIITT**H**NT	B.1.1.7 (Alpha)	N/A	N/A
CD4 epitope	6276-VA-1	1111	15	EPQIITTDNTFVSGN	0.0106	2.65%	N/A	N/A	D1118H	EPQIITT**H**NTFVSGN	B.1.1.7 (Alpha)	N/A	N/A
CD4 epitope	6276-VA-1	1116	15	TTDNTFVSGNCDVVI	0.0186	4.64%	N/A	N/A	D1118H	TT**H**NTFVSGNCDVVI	B.1.1.7 (Alpha)	N/A	N/A
CD4 epitope	6276-VA-1	1136	15	TVYDPLQPELDSFKE	0.0116	2.90%	N/A	N/A	None			N/A	N/A
CD4 epitope	6276-VA-1	1141	15	LQPELDSFKEELDKY	0.0276	6.89%	N/A	N/A	None			N/A	N/A
CD4 epitope	6276-VA-1	1146	15	DSFKEELDKYFKNHT	0.0166	4.14%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	21	15	RTQLPPAYTNSFTRG	0.0265	1.49%	N/A	N/A	P26S	RTQLP**S**AYTNSFTRG	P.1. (Gamma)	N/A	N/A
CD4 epitope	6277-VA-1	26	15	PAYTNSFTRGVYYPD	0.0405	2.28%	N/A	N/A	P26S	**S**AYTNSFTRGVYYPD	P.1. (Gamma)	N/A	N/A
CD4 epitope	6277-VA-1	41	15	KVFRSSVLHSTQDLF	0.0125	0.70%	N/A	N/A	Q52R	KVFRSSVLHST**R**DLF	B.1.525 (Eta)	N/A	N/A
CD4 epitope	6277-VA-1	56	15	LPFFSNVTWFHAIHV	0.0145	0.81%	N/A	N/A	H69del; V70del; A67V	LPFFSNVTWFHA**I**; LPFFSNVTWFH**V**IHV	B.1.1.7 (Alpha) & B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	131	15	CEFQFCNDPFLGVYY	0.0235	1.32%	N/A	N/A	D138Y; G142D; V143del; Y144del; Y145del	CEFQFCN**Y**PFLGVYY; CEFQFCNYPFL**D**VYY; CEFQFCNDPFLG	P.1. (Gamma), B.1.526.1 & B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	166	15	CTFEYVSQPFLMDLE	0.0335	1.88%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	176	15	LMDLEGKQGNFKNLR	0.0205	1.15%	N/A	N/A	R190S	LMDLEGKQGNFKNL**S**	P.1. (Gamma)	N/A	N/A
CD4 epitope	6277-VA-1	191	15	EFVFKNIDGYFKIYS	0.0165	0.93%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	196	15	NIDGYFKIYSKHTPI	0.0505	2.84%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	231	15	IGINITRFQTLLALH	0.0135	0.76%	N/A	N/A	41del; L242del; A243	IGINITRFQTLH	B.1.351 (Beta)	N/A	N/A
CD4 epitope	6277-VA-1	256	15	SGWTAGAAAYYVGYL	0.0145	0.81%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	261	15	GAAAYYVGYLQPRTF	0.0105	0.59%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	266	15	YVGYLQPRTFLLKYN	0.0145	0.81%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	311	15	GIYQTSNFRVQPTES	0.0265	1.49%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	316	15	SNFRVQPTESIVRFP	0.0465	2.61%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	351	15	YAWNRKRISNCVADY	0.0455	2.56%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	371	15	SASFSTFKCYGVSPT	0.0175	0.98%	N/A	N/A	S371L; S373P; S375F	**LAPFFT**FKCYGVSPT	B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	386	15	KLNDLCFTNVYADSF	0.0115	0.65%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	396	15	YADSFVIRGDEVRQI	0.0115	0.65%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	431	15	GCVIAWNSNNLDSKV	0.0265	1.49%	N/A	N/A	N440K	GCVIAWNSN**K**LDSKV	B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	531	15	TNLVKNKCVNFNFNG	0.1105	6.21%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	541	15	FNFNGLTGTGVLTES	0.0435	2.44%	N/A	N/A	T547K	FNFNGL**K**GTGVLTES	B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	546	15	LTGTGVLTESNKKFL	0.0325	1.83%	N/A	N/A	T547K	L**K**GTGVLTESNKKFL	B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	641	15	NVFQTRAGCLIGAEH	0.0595	3.34%	N/A	N/A	H655Y	NVFQTRAGCLIGAE**Y**	(Gamma) & B.1.1.529 (omi	N/A	N/A
CD4 epitope	6277-VA-1	666	15	IGAGICASYQTQTNS	0.0115	0.65%	N/A	N/A	Q677H; N679K	IGAGICASYQ**TH**TNS; IGAGICASYQTQ**TK**S	B.1.525 (Eta) & B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	686	15	SVASQSIIAYTMSLG	0.0235	1.32%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	691	15	SIIAYTMSLGAENSV	0.0335	1.88%	N/A	N/A	A701V	SIIAYTMSLG**V**ENSV	B.1.351 (Beta)	N/A	N/A
CD4 epitope	6277-VA-1	706	15	AYSNNSIAIPTNFTI	0.0185	1.04%	N/A	N/A	T716I	AYSNNSIAIP**I**NFTI	B.1.1.7 (Alpha)	N/A	N/A
CD4 epitope	6277-VA-1	746	15	STECSNLLLQYGSFC	0.2005	11.27%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	751	15	NLLLQYGSFCTQLNR	0.1905	10.71%	N/A	N/A	N764K	NLLLQYGSFCTQL**K**R	B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	761	15	TQLNRALTGIAVEQD	0.0905	5.09%	N/A	N/A	G769V; N764K	TQLNRALT**V**IAVEQD; TQL**K**RALTGIAVEQD	R1 & B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	781	15	VFAQVKQIYKTPPIK	0.0625	3.51%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	866	15	TDEMIAQYTSALLAG	0.0565	3.18%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	871	15	AQYTSALLAGTITSG	0.0175	0.98%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	881	15	TITSGWTFGAGAALQ	0.0185	1.04%	N/A	N/A	F888L	TITSGWT**L**GAGAALQ	B.1.525 (Eta)	N/A	N/A
CD4 epitope	6277-VA-1	891	15	GAALQIPFAMQMAYR	0.0505	2.84%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	896	15	IPFAMQMAYRFNGIG	0.1005	5.65%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	901	15	QMAYRFNGIGVTQNV	0.0415	2.33%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	921	15	KLIANQFNSAIGKIQ	0.0135	0.76%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	951	15	VVNQNAQALNTLVKQ	0.0115	0.65%	N/A	N/A	Q954H	VVN**H**NAQALNTLVKQ	B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	956	15	AQALNTLVKQLSSNF	0.0295	1.66%	N/A	N/A	N969K	AQAL**K**TLVKQLSSNF	B.1.1.529 (omicron)	N/A	N/A
CD4 epitope	6277-VA-1	991	15	VQIDRLITGRLQSLQ	0.0355	1.99%	N/A	N/A	None			N/A	N/A
CD4 epitope	6277-VA-1	1076	15	TTAPAICHDGKAHFP	0.0505	2.84%	N/A	N/A	None			N/A	N/A
CD8 epitope	6264-VA-1	1144	9	ELDSFKEEL	0.039	10.73%	A*02:01	1.1	None				
CD8 epitope	6264-VA-1	135	9	FCNDPFLGV	0.0133	3.66%	A*02:01	0.75	D138Y; G142D	FCN**Y**PFLGV; FCNDPFL**D**V	P.1. (gamma) & B.1.1.529 (omicron)	2.9	0.26
CD8 epitope	6264-VA-1	982	10	SRLDKVEAEV	0.0159	4.38%	A*02:01	0.91	S982A	**A**RLDKVEAEV	B.1.1.7 (alpha)	0.89	1.02
CD8 epitope	6264-VA-1	637	10	STGSNVFQTR	0.0112	3.08%	A*68:01	0.07	None				
CD8 epitope	6264-VA-1	1099	9	GTHWFVTQR	0.0126	3.47%	A*68:01	0.08	None				
CD8 epitope	6264-VA-1	122	9	NATNVVIKV	0.0188	5.17%	B*51:01	0.06	None				
CD8 epitope	6264-VA-1	267	9	VGYLQPRTF	0.0104	2.86%	B*51:01	0.65	None				
CD8 epitope	6264-VA-1	92	9	FASTEKSNI	0.0236	6.49%	B*51:01	0.42	T95I	FAS**I**EKSNI	B.1.526 (iota) & B.1.1.529 (omicron)	0.37	1.14
CD8 epitope	6264-VA-1	718	9	FTISVTTEI	0.0229	6.30%	B*52:01	0.24	None				
CD8 epitope	6264-VA-1	122	9	NATNVVIKV	0.0293	8.06%	B*52:01	0.28	None				
CD8 epitope	6264-VA-1	919	9	NQKLIANQF	0.011	3.03%	B*52:01	0.28	None				
CD8 epitope	6264-VA-1	1054	9	QSAPHGVVF	0.0127	3.49%	C*03:04	0.05	None				
CD8 epitope	6264-VA-1	923	9	IANQFNSAI	0.0202	5.56%	C*03:04	0.1	None				
CD8 epitope	6264-VA-1	122	9	NATNVVIKV	0.0354	9.74%	C*16:02	0.33	None				
CD8 epitope	6264-VA-1	1060	9	VVFLHVTYV	0.027	7.43%	C*16:02	0.36	None				
CD8 epitope	6264-VA-1	50	9	STQDLFLPF	0.0122	3.36%	C*16:02	0.4	Q52R	STRDLFLPF	B.1.525 (eta)	0.37	1.08
CD8 epitope	6264-VA-1	603	9	NTSNQVAVL	0.0156	4.29%	C*16:02	0.41	None				
CD8 epitope	6264-VA-1	28	10	YTNSFTRGVY	0.0146	4.02%	C*16:02	0.48	None				
CD8 epitope	6264-VA-1	699	9	LGAENSVAY	0.0177	4.87%	C*16:02	0.51	A701V	LG**V**ENSVAY	B.1.351 (beta) & B.1.526 (iota)	0.78	0.65
CD8 epitope	6276-VA-1	509	9	RVVVLSFEL	0.1507	21.70%	A*32:01	0.21	None				
CD8 epitope	6276-VA-1	35	9	GVYYPDKVF	0.0131	1.89%	A*32:01	0.29	None				
CD8 epitope	6276-VA-1	976	9	VLNDILSRL	0.1275	18.36%	A*32:01	0.31	L981F; S982A	VLNDI**F**SRL; VLNDIL**A**RL	B.1.1.7 (alpha) & B.1.1.529 (omicron)	0.33	0.94
CD8 epitope	6276-VA-1	962	9	LVKQLSSNF	0.0211	3.04%	A*32:01	0.43	N969K	LVKQLSS**K**F	B.1.1.529 (omicron)		
CD8 epitope	6276-VA-1	628	9	QLTPTWRVY	0.1393	20.06%	A*32:01	0.43	None				
CD8 epitope	6276-VA-1	1087	9	AHFPREGVF	0.0214	3.08%	B*39:01	0.13	None				
CD8 epitope	6276-VA-1	861	9	LPPLLTDEM	0.0134	1.93%	B*51:01	0.49	None				
CD8 epitope	6276-VA-1	898	9	FAMQMAYRF	0.1741	25.07%	B*51:01	0.51	None				
CD8 epitope	6276-VA-1	1095	9	FVSNGTHWF	0.0111	1.60%	C*12:03	0.37	None				
CD8 epitope	6276-VA-1	951	9	VVNQNAQAL	0.0227	3.27%	C*15:02	0.49	Q954H	VVN**H**NAQAL	B.1.1.529 (omicron)		
CD8 epitope	6277-VA-1	304	9	KSFTVEKGI	0.0141	50.36%	B*52:01	0.41	None				
CD8 epitope	6277-VA-2	818	9	IEDLLFNKV	0.0146	52.14%	B*52:01	0.43	None				
CD8 epitope	6277-VA-3	710	9	NSIAIPTNF	0.014	50.00%	B*52:01	0.52	T716I	NSIAIP**I**NF	B.1.1.7 (alpha)	0.38	1.37
CD8 epitope	6277-VA-4	1107	9	RNFYEPQII	0.0243	86.79%	B*52:01	0.09	None				
CD8 epitope	6277-VA-5	786	9	KQIYKTPPI	0.0173	61.79%	B*52:01	0.15	None				
CD8 epitope	6277-VA-6	898	9	FAMQMAYRF	0.0102	36.43%	B*57:03	0.23	None				