

SUPPLEMENTAL TABLES

Supplemental Table 1 – Donor Characteristics

Donor	Age	Gender	Ethnicity	HLA Type
1	53	Female	Caucasian	A 02:01:01G, 03:01:01G; B 07:02:01G, 44:02:01G; C 05:01:01G, 07:02:01G; DPB1 01:01:01G, 02:01:02G; DQA1 01:02:01G, 01:02:01G; DQB1 06:02:01i, 06:02:01i; DRB1 15:01:01i, 15:01:01i; DRB5 01:01:01i, 01:01:01i
2	43	Male	Asian	A 02:01:01G, 24:07; B15:02:01G, 35:05:01G; C04:01:01G, 08:01:01G; DPB1 04:02:01G, 05:01:01G; DQA1 03:01:01G, 06:01:01G; DQB1 03:01:01i, 03:03:02i; DRB1 09:01:02i, 12:02:01i; DRB3 03:01:01i, 03:01:01i; DRB4 01:01:01i; DRB3*03:01:01i; DRB4 01:01:01i, 01:01:01i
3	36	Male	Caucasian	A 01:XX, 24:XX; B 08:XX, 58:XX; C 03:XX, 07:XX; DQA1 05:01, 05:BHS; DQB1 02:++, 02:**; DRB1 03:xx; DRB3 01:xx, 02:xx
4	40	Male	Caucasian	A 03:01:01, 29:02:01; B 14:02:01, 35:01:01; C 04:01:01, 08:02:01; DPA1 01:03:01, 01:04; DPB1 04:01:01, 15:01:01; DQA1 01:04:01, 02:01:01; DQB1 02:02:01, 05:03:01; DRB1 14:54:01, 07:01:01; DRB3 02:02:01; DRB4 01:01:01
5	40	Male	Black	A 11:01:01, 24:02:01; B 15:02:01, 48:02:01; C 04:01:01, 08:01:01; DPA1 01:03:01, 02:01:01; DPB1 04:02:01, 10:01:01; DQA1 01:05:01, 03:01:01; DQB1 03:02:01, 05:01:01; DRB1 10:01:01, 04:11:01; DRB4 01:03:01
6	74	Female	Caucasian	A 11:01, 66:01; B 41:02, 52:01; C 12:02, 17:03; DPB1 02:01, 04:01; DRB1 03:01, 15:02; DRB3 02:02; DRB5 01:02; DQB1 02:01, 06:01

Supplemental Table 2 – Class I Epitopes Recognized by Donor HLA Alleles to Reference Sequence Peptides and Peptides

Mutated in B.1.1.7 or Additional Peptides Mutated in B.1.351

* epitope falls between mutations in variants; similar to reference

Strong Binder, Weak Binder

Shared Allele (Ref :: Variant)					
Reference	B.1.1.7 Sequence	Donor	Shared HLA A	Shared HLA B	Shared HLA C
PFFSNVTWF*	PFFSNVTWF	5	24:02	---	---
		2	24:07	---	---
		3	24:XX	---	---
SNVTWFHAI*	SNVTWFHAI	6		52:01	---
AIHVSGTNGTK	AI--SGTNGTK	1	03:01 :: 03:01	---	---
QFCNDPFLGVY*	QFCNDPFLGVY	4	29:02	---	---
FCNDPFLGVY*	FCNDPFLGVY	3	01:XX	---	---
CNDPFLGVY*	CNDPFLGVY	3	01:XX	---	---
VYYHKNNKSW*	VYHKNNKSW	5	24:02	---	---
		2	24:07	---	---
		3	24:XX	---	---
YFPLQSYGF*	YFPLQSYGF	5	24:02	---	---
		2	24:07	---	---
		3	24:XX	---	---
		5	---	---	04:01
		2	---	---	04:01
		4	---	---	04:01
		1	---	---	07:02
FPLQSYGF*	FPLQSYGF	2	---	35:05	---
		4	---	35:01	---

GFQPTNGVG Y	GFQPT ^Y GVGY	4	29:02 :: 29:02	---	---
FQPTNGVG Y	FQPT ^Y GVGY	2	---	15:02 :: 15:02	---
		5	---	15:02 :: 15:02	---
		5	---	48:02 :: 48:02	---
		1	---	---	07:02 :: 07:02
		6	---	---	12:02 :: 12:02
VG YQP YRV*	VG YQP YRV	6	---	52:01	---
			---		---
QP YRVVLSF*	QP YRVVLSF	1	---	07:02	---
		4	---	14:02	---
		2	---	35:05	---
P YRVVLSF*	P YRVVLSF	5	24:02	---	---
		2	24:07	---	---
		3	24:XX	---	---
QP YRVVL*	QP YRVVL	1	---	07:02	---
		3	---	08:XX	---
		2	---	35:05	---
YQP YRVVL*	YQP YRVVL	3	---	08:XX	---
		4	---	14:02	---
		6	---	52:01	---
		1	---	---	07:02
		2	---	---	08:01
		5	---	---	08:01
		6	---	---	12:02
		6	---	---	17:03
YRVVLSF*	YRVVLSF	1	---	---	07:02
KKFLPFQQF*	KKFLPFQQF	5	---	48:02	---
		6	---	52:01	---

		1	---	---	07:02
KFLPFQQF*	KFLPFQQF	5	24:02	---	---
		2	24:07	---	---
		3	24:XX	---	---
TTDAVRDPQTL*	TTDAVRDPQTL	1	---	---	05:01
		4	---	---	08:02
DAVRDPQTL*	DAVRDPQTL	4	---	14:02	---
TNTSNQVAVLY*	TNTSNQVAVLY	3	01:XX	---	---
NTSNQVAVLY*	NTSNQVAVLY	3	01:XX	---	---
		4	29:02	---	---
TSNQVAVLY*	TSNQVAVLY	3	01:XX	---	---
		4	29:02	---	---
		6	66:01	---	---
		2	---	15:02	---
		5	---	15:02	---
		4	---	35:01	---
		2	---	35:05	---
		3	---	58:XX	---
		6	---	---	12:02
VLYQDVNCTEV	VLYQGVNCTEV	1	02:01 :: 02:01	---	---
		2	02:01 :: 02:01	---	---
NSPRRARSV	NSHRRARSV	3	---	08:01 :: 08:XX	---
SVASQSIAY*	SVASQSIAY	4	29:02	---	---
		6	66:01	---	---
		2	---	15:02	---
		5	---	15:02	---
		4	---	35:01	---
		6	---	---	12:02

VASQSIIAY*	VASQSIIAY	3	01:XX	---	---
		4	29:02	---	---
		2	---	15:02	---
		5	---	15:02	---
		4	---	35:01	---
		2	---	35:05	---
		5	---	48:02	---
QYGSFCTQL	QYGSFCIQL	5	24:02 :: 24:02	---	---
		2	24:07 :: 24:07	---	---
		3	24:XX :: 24:XX	---	---
GSFCTQLNR	GSFCIQLNR	5	11:01 :: 11:01	---	---
		6	11:01 :: 11:01	---	---
NRALTGIAY*	NRALTGIAY	4	---	14:02	---
SVLNDILSRL	SVLNDILARL	1	02:01 :: 02:01	---	---
		2	02:01 :: 02:01	---	---
		5	--- :: 11:01	---	---
		6	--- :: 11:01	---	---
		6	--- :: 66:01	---	---
VLNDILSRL	VLNDILARL	1	02:01 :: 02:01	---	---
		2	02:01 :: 02:01	---	---
		2	---	---	04:01 :: 04:01
		4	---	---	04:01 :: 04:01
		5	---	---	04:01 :: 04:01
		1	---	---	05:01 :: 05:01
		6	---	---	17:03 :: 17:03
SRLDKVEAEV	ARLDKVEAEV	1	---	---	05:01 :: 05:01
RLDKVEAEV*	RLDKVEAEV	1	02:01	---	---
		2	02:01	---	---

		2	---	---	04:01
		4	---	---	04:01
		5	---	---	04:01
		1	---	---	05:01
		4	---	---	08:02
RNFYEPQII*	RNFYEPQII	6	---	52:01	---
FYEPQIITT*	FYEPQIITT	4	29:02	---	---
		2	---	---	04:01
		4	---	---	04:01
		5	---	---	04:01
QIITTDNTF	QIITTHNTF	2	---	15:02 :: 15:02	---
		5	---	15:02 :: 15:02	---
EPQIITTDNTF	EPQIITTHNTF	4	---	35:01 :: 35:01	---
Reference	B.1.351 Sequence	Donor	HLA-A	HLA-B	HLA-C
SIIAYTMSL*	SIIAYTMSL	1	2:01	---	---
		2	2:01	---	---
		6	66:01:00	---	---
		3	---	08:XX	---
		6	---	---	17:03
RFDNPVLPF	RFANPVLPF	2	24:07 :: 24:07	---	---
		3	24:XX :: 24:XX	---	---
		5	24:02 :: 24:02	---	---
IYSKHTPINL*	IYSKHTPINL	2	24:07	---	---
		3	24:XX	---	---
		5	24:02	---	---
QTGKIADYNY	QTGNIADYNY	3	01:XX :: 01:XX	---	---
LTTRTLPPAY	FTTRTLPPAY	3	01:XX :: 01:XX	---	---
GFNCYFPLQSY	GFNCYFPLQSY	4	29:02	---	---

GFNCYFPLQSY	NCYFPLQSY	4	29:02	---	---
		2	---	15:02	---
		5	---	15:02	---
		2	---	35:05	---
		4	---	35:01	---
		6	---	---	12:02
TPINLVRDL	TPINLVRGL	1	---	07:02 :: 07:02	---
LPQGFSAL*	LPQGFSAL	1	---	07:02	---
INITRFQTL*	INITRFQTL	3	---	08:XX	---
		4	---	14:02	---
		6	---	52:01	---
NITRFQTL*	NITRFQTL	3	---	08:XX	---
KIYSKHTPI*	KIYSKHTPI	3	---	08:XX	---
SLGAENSVAY	SLGVENSVAY	2	---	15:02 :: 15:02	---
		5	---	15:02 :: 15:02	---
LGAENSVAY	LGVENSVAY	2	---	15:02 :: 15:02	---
		5	---	15:02 :: 15:02	---
		4	---	35:01 :: 35:01	---
		6	---	---	12:02 :: 12:02
LVRDLPQGF	LVRGLPQGF	2	---	15:02 :: 15:02	---
		5	---	15:02 :: 15:02	---
		6	---	41:02, 52:01	12:02 :: 12:02
AYSNNIAI*	AYSNNIAI	2	02:01, 24:07	---	---
LPFNDGVY*	LPFNDGVY	2	---	35:05	---
		4	---	35:01	---
NPVLPFNDGVY*	NPVLPFNDGVY	2	---	35:05	---
		4	---	35:01	---
VNLTTTQTL	VNFTTTQTL	4	---	14:02 :: 14:02	---

		6	---	52:01 :: 52:01	---
MSLGAENSVAY	MSLG V ENSVAY	4	---	35:01 :: 35:01	---
SQSIIAYTM*	SQSIIAYTM	5	---	48:02	---
		6	---	52:01	---
GQTGKIADY	GQTG N IADY	5	---	48:02 :: 48:02	---
TRTQLPPAY*	TRTQLPPAY	5	---	48:02	---
		1	---	---	07:02
VAYSNNSI*	VAYSNNSI	6	---	52:01	---
RQIAPGQTGKI	RQIAPGQTG N I	6	---	52:01 :: 52:01	---
SKHTPINLV*	SKHTPINLV	6	---	52:01	---
IADYNYKL*	IADYNYKL	2	---	---	04:01
		4	---	---	04:01
		5	---	---	04:01
		1	---	---	05:01
		2	---	---	08:01
		5	---	---	08:01
		4	---	---	08:02
KRFDNPVLPF*	KRFANPVLPF	1	---	---	07:02 :: 07:02
YSKHTPINL*	YSKHTPINL	6	---	---	12:02
		6	---	---	17:03

Supplemental Table 3 – Class II Epitopes Recognized by Donor HLA Alleles to Reference Sequence Peptides and Peptides Mutated in B.1.1.7 or Additional Peptides Mutated in B.1.351

Strong Binder, *Weak Binder*

Shared Allele (Ref :: Variant)									
Reference Sequence	B.1.1.7 Sequences	Donor	DPB1	DQA1	DQB1	DRB1	DRB3	DRB4	DRB5
CSNLLLQYGSFCTQL	CSNLLLQYGSFC I QL	1	02:01 :: 02:01	---	---	15:01 :: 15:01			---
		4	04:01 :: 04:01	---	---	---	---	---	
		6	02:01 :: 02:01		---	---	---		---
			04:01 :: 04:01						
GTNTSNQVAVLYQDV	GTNTSNQVAVLYQ G V	1	---	01:02 :: 01:02	06:02 :: 06:02	---			---
LLQYGSFCTQLNRAL	LLQYGSFC I QLNRAL	1	---	---	---	15:01 :: 15:01			---
		2	---	---	---	---	---	---	
		4	---	---	---	---	---	---	
		6	---		---	---	---		---
PFFSNVTWFHAIHVS	PFFSNVTWFHAI --S	1	02:01 :: 02:01	---	---	---			---
		4	04:01 :: 04:01	---	---	---	02:02 :: 02:02	---	
		6	02:01 :: 02:01		---	---	02:02 :: 02:02		---
FQFCNDPFLGVYYHK	FQFCNDPFLGVY -HK	1	02:01 :: 02:01	---	---	---			---
		4	04:01 :: 04:01	---	---	---	---	---	

		6	02:01 :: 02:01		---	---	---		---
			04:01 :: 04:01						
TQLNRALTGI AVEQD	IQLNRALTGI AVEQD	1	---	01:02 :: 01:02	06:02 :: 06:02	---			---
		4	---	---	---	---	---	---	
		5	---	03:01 :: 03:01	03:02 :: 03:02	---		---	
GSFCTQLNRALTGI A	GSFCIQLNRALTGI A	2	---	---	---	---	---	---	
		4	---	---	---	---	02:02 :: 02:02	---	
		6	---	---	---	---	02:02 :: 02:02		---
KKFLPFQQFGRDIAD	KKFLPFQQFGRDIAD	1	02:01 :: 02:01	---	---	---			01:01 :: 01:01
		4	04:01 :: 04:01	---	---	---	---	---	
		6	02:01 :: 02:01		---	---	---		---
			04:01 :: 04:01						
PRRARSVASQSIIAY	HRRARSVASQSIIAY	2	---	---	---	---	---	01:01 :: 01:01	
		4	---	---	---	07:01 :: 07:01	---	01:01 :: 01:01	
NVTWFHAIHVSGTNG	NVTWFHAI--SGTNG	2	---	---	---	09:01 :: 09:01	---	---	
NFGAISSVLNDILSR	NFGAISSVLNDILAR	2	---	---	---	---	---	01:01 :: 01:01	
		4	---	---	---	---	---	01:01 :: 01:01	
LSRLDKVEAEVQIDR	LARLDKVEAEVQIDR	5	---	03:01 :: 03:01	03:02 :: 03:02	---		---	
LGVYYHKNNKSWMES	LGVY-HKNNKSWMES	6	---		---	---	02:02 :: 02:02		---
Reference Sequence	B.1.351 Variant Sequence	Donor	DPB1	DQA1	DQB1	DRB1	DRB3	DRB4	DRB5

INITRFQTLALHRS	INITRFQTL---HIS	1	01:01 :: 01:01	---	---	15:01 :: 15:01			---
			02:01 :: 02:01						
		2	04:02 :: 04:02	---	---	---	---	01:01 :: 01:01	
		4	04:01 :: 04:01	---	---	---	---	01:01 :: 01:01	
		6	02:01 :: 02:01	---	---	---		---	
			04:01 :: 04:01						
RFQTLALHRSYLTP	RFQTL---HISYLTP								
		2	04:02 :: 04:02	---	---	---	---	01:01	
		4	04:01 :: 04:01	---	---	07:01 :: 07:01	---	---	
		6	04:01 :: 04:01		---	---	---		---
SQSIAYTMSLGAEN	SQSIAYTMSLGVEN	1	01:01, 02:01	01:02	06:02	15:01			01:01
		2	---	---	---	09:01 :: 09:01	---	---	
		4	---	---	---	---	02:02 :: 02:02	---	
		6	---		---	03:01, 15:02	02:02 :: 02:02		---
LVLLPLVSSQCVNLT	LVLLPLVSSQCVNFT	1	---	---	---	15:01 :: 15:01			01:01
		2	---	---	---	---	---	01:01 :: 01:01	
		4	---	---	---	---	---	01:01 :: 01:01	
FKIYSKHTPINLVRD	FKIYSKHTPINLVRG	2	---	---	---	09:01 :: 09:01	---	---	
		4	---	---	---	07:01 :: 07:01	02:02 :: 02:02	---	
		6	---		---	---	02:02 :: 02:02		---

IAYTMSLGAENSVAY	IAYTMSLG V ENSVAY	2	---	---	---	09:01 :: 09:01	---	---	
		4	---	---	---	---	02:02 :: 02:02	---	
		6	---		---	---	02:02 :: 02:02		---
PINLVRDLPQGFSAL	PINLVR G LPQGFSAL	2	---	---	---	---	---	01:01 :: 01:01	
		4	---	---	---	---	---	01:01 :: 01:01	
SKHTPINLVRDLPQG	SKHTPINLVR G LPQG	2	---	---	---	---	---	01:01 :: 01:01	
		4	---	---	---	---	---	01:01 :: 01:01	
AENSVAYSNNSIAIP	V ENSVAYSNNSIAIP	4	---	---	---	---	02:02 :: 02:02	---	
		6	---		---	---	02:02 :: 02:02		---

Supplemental Table 4 – Full List of Class I Epitopes Recognized by Donor HLA Alleles to Mutated Peptides in B.1.1.7 and Additional Mutated Peptides on B.1351

B.1.1.7 Sequence	Donor	HLA-A	HLA-B	HLA-C
AISGTNGTK	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
YFPLQSYGF	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
FPLQSYGF	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
LQSYGFQPTY	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
QSYGFQPTY	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX

	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
FQPTYGVGY	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
QPYRVVLSF	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
PYRVVLSF	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
QPYRVVL	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
YRVVLSF	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
TTDAVRDPQTL	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
DAVRDPQTL	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
RDIDDTTDA	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
VGYPYRV	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
YQPYRVVL	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03

KKFLPFQQF	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
VLYQGVNCTEV	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
SVLNDILARL	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
VLNDILARL	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
RLDKVEAEV	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
ARLDKVEAE	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
SVASQSIAY	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02

	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
VASQSIAY	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
TSNQVAVLY	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
QIITTHNTF	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
FYEPQIITT	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
GSFCIQLNR	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
PFFSNVTWF	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
VYHKNNKSW	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01

	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
HAISGTNGTKR	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
SNVTWFHAI	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
RNFYEPQII	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
LQYGSFCI	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
QFCNDPFLGVY	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
GFQPTYGVGY	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
NTSNQVAVLY	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
NRALTGIAV	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
EPQIITHTNF	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
FCNDPFLGVY	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
CNDPFLGVY	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
TNTSNQVAVLY	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
NSHRRARSV	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
KFLPFQQF	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
QYGSFCIQL	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
B.1.351 Sequence	Subject	HLA-A	HLA-B	HLA-C
SIIAYTMSL	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
RFANPVLPP	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01

IYSKHTPINL	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
QTGNIADYNY	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
FTTRTQLPPAY	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
GFNCYFPLQSY	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
NCYFPLQSY	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
TPINLVRGL	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
LPQGFSAL	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
INITRFQTL	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
NITRFQTL	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
KIYSKHTPI	3	01:XX, 24:XX	08:XX, 58:XX	03:XX, 07:XX
SLGVENSVAY	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
LGVENSVAY	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
LVRGLPQGF	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
LPFNDGVY	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02

FANPVLPF	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
NPVLPFNDGVY	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
VNFTTRTQL	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
MSLGVENSVAI	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
SQSIAYTM	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
GQTGNIADY	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
TRTQLPPAY	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
VAYSNNIS	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
RQIAPGQTGNI	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
IAYTMSLGV	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
SKHTPINLV	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
IADYNYKL	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
	2	02:01, 24:07	15:02, 35:05	04:01, 08:01
	5	11:01, 24:02	15:02, 48:02	04:01, 08:01
	4	03:01, 29:02	14:02, 35:01	04:01, 08:02
KRFANPVLPF	1	02:01, 03:01	07:02, 44:02	05:01, 07:02
YSKHTPINL	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
	6	11:01, 66:01	41:02, 52:01	12:02, 17:03
AYSNNISAI	2	02:01, 24:07	15:02, 35:05	04:01, 08:01

Supplemental Table 5 – Full List of Class II Epitopes Recognized by Donor HLA Alleles to Mutated Peptides in B.1.1.7 and Additional Mutated Peptides on B.1351

B.1.1.7 Sequence	Donor	DPB1	DQA1	DQB1	DRB1	DRB3	DRB4	DRB5
CSNLLLQYGSFCIQL	1	01:01, 02:01	01:02	06:02	15:01			01:01
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
GTNTSNQVAVLYQGV	1	01:01, 02:01	01:02	06:02	15:01			01:01
LLQYGSFCIQLNRAL	1	01:01, 02:01	01:02	06:02	15:01			01:01
	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
PFFSNVTWFHAIS	1	01:01, 02:01	01:02	06:02	15:01			01:01
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
FQFCNDPFLGVYHK	1	01:01, 02:01	01:02	06:02	15:01			01:01
	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
IQLNRALTGIAVEQD	1	01:01, 02:01	01:02	06:02	15:01			01:01
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	5	04:02, 10:01	01:05, 03:01	03:02, 05:01	10:01, 04:11		01:03	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
GSFCIQLNRALTGIA	1	01:01, 02:01	01:02	06:02	15:01			01:01
	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
KKFLPFQQFGRDIDD	1	01:01, 02:01	01:02	06:02	15:01			01:01

	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
SYQTQTNSHRRARSV	1	01:01, 02:01	01:02	06:02	15:01			01:01
SNQVAVLYQGVNCTE	1	01:01, 02:01	01:02	06:02	15:01			01:01
HRRARSVASQSIIAY	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
FYEPQIITHTNTFVS	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
ISSVLNDILARLDKV	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	03:01	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
NVTWFHAISGTNG	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
NFGAISSVLNDILAR	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
LARLDKVEAEVQIDR	5	04:02, 10:01	01:05, 03:01	03:02, 05:01	10:01, 04:11		01:03	
LGVYHKNNKSWMES	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
B.1.351 sequence	Donor	DPB1	DQA1	DQB1	DRB1	DRB3	DRB4	DRB5
INITRFQTLHIS	1	01:01, 02:01	01:02	06:02	15:01			01:01
	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
RFQTLHISYLTP	1	01:01, 02:01	01:02	06:02	15:01			01:01
	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
SQSIIAYTMSLGVEN	1	01:01, 02:01	01:02	06:02	15:01			01:01
	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
LVLLPLVSSQCVNFT	1	01:01, 02:01	01:02	06:02	15:01			01:01

	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
FKIYSKHTPINLVRG	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
IAYTMSLGVENSVAY	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
PINLVRGLPQGFSAL	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
SKHTPINLVRGLPQG	2	04:02, 05:01	03:01, 06:01	03:01, 03:03	09:01, 12:02	03:01	01:01	
	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
VENSVAYSNNNSIAIP	4	04:01, 15:01	01:04, 02:01	02:02, 05:03	14:54, 07:01	02:02	01:01	
	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02
TNGTKRFANPVLPFN	6	02:01, 04:01		02:01, 06:01	03:01, 15:02	02:02		01:02

Supplemental Table 6 – Reference Spike Peptide Library

MFVFLVLLPLVSSQC	LVLLPLVSSQCVNLT	PLVSSQCVNLTRTQ	SQCVNLTRTQLPPA	NLTTRTQLPPAYTNS	RTQLPPAYTNSFTRG
PPAYTNSFTRGVYYP	TNSFTRGVYYPDKVF	TRGVYYPDKVFRSSV	YYPDKVFRSSVLHST	KVFRSSVLHSTQDLF	SSVLHSTQDLFLPFF
HSTQDLFLPFFSNVT	DLFLPFFSNVTWFHA	PFFSNVTWFHAIHVS	NVTWFHAIHVS GTNG	FHAIHVS GTNGTKRF	HVSGTNGTKRFDNPV
TNGTKRFDNPVLPFN	KRFDNPVLPFNDGVY	NPVLPFNDGVYFAST	PFNDGVYFASTEKSN	GVYFASTEKSNIRG	ASTEKSNIRGWIFG
KSNIIRGWIFGTTLD	IRGWIFGTTLD SKTQ	IFGTTLD SKTQSLLI	TLDSKTQSLLIVNNA	KTQSLLIVNNATNVV	LLIVNNATNVVIVKC
NNATNVVIVKCEQF	NVVIKVECFQFCNDP	KVCEQFQFCNDPFLGV	FQFCNDPFLGVYHK	NDPFLGVYHKNNKS	LGVYHKNNKSWMES
YHKNNKSWMESEFRV	NKSWMESEFRVYSSA	MESEFRVYSSANNCT	FRVYSSANNCTFEYV	SSANNCTFEYVSQPF	NCTFEYVSQPFMDL
EYVSQPFMDLEGKQ	QPFMDLEGKQGNFK	MDLEGKQGNFKNLRE	GKQGNFKNLREFVK	NFKNLREFVKFNIDG	LREFVKFNIDGYFKI
VFKNIDGYFKIYSKH	IDGYFKIYSKH TPIN	FKIYSKH TPINLVRD	SKH TPINLVRDLPQG	PINLVRDLPQGFSAL	VRDLPQGFSALEPLV
PQGFSALEPLVDLPI	SALEPLVDLPIGINI	PLVDLPIGINITRFQ	LPIGINITRFQTLLA	INITRFQTLLALHRS	RFQTLLALHRSYLT
LLALHRSYLT PGDSS	HRSYLT PGDSSSGWT	LTPGDSSSGWTAGAA	DSSSGWTAGAAAYYV	GWTAGAAAYYVGYLQ	GAAAYYVGYLQPRTF
YYVGYLQPRTFLLKY	YLQPRTFLLKY NENG	RTFLLKY NENG TITD	LKY NENG TITDAVDC	ENG TITDAVDCALDP	ITDAVDCALDPLSET
VDCALDPLSETKCTL	LDPLSETKCTLKSFT	SETKCTLKSFTVEKG	CTLKSFTVEKGIYQT	SFTVEKGIYQTSNFR	EKGIYQTSNFRVQPT
YQTSNFRVQPTESIV	NFRVQPTESIVRFPN	QPTESIVRFPNITNL	SIVRFPNITNLCPFGE	FPNITNLCPFGEVFN	TNLCPFGEVFNATRF
PFGEVFNATRFASVY	VFNATRFASVYAWNR	TRFASVYAWNRKRIS	SVYAWNRKRISNCVA	WNRKRISNCVADYSV	RISNCVADYSVLNYS
CVADYSVLNYSASF	YSVLNYSASFSTFKC	YNSASFSTFKCYGVS	SFSTFKCYGVSPTKL	FKCYGVSPTKLNDLC	GVSPPTKLNDLCFTNV
TKLNDLCFTNVYADS	DLCFTNVYADSFVIR	TNVYADSFVIRGDEV	ADSFVIRGDEV RQIA	VIRGDEV RQIAPGQT	DEV RQIAPGQTGKIA
QIAPGQTGKIADYNY	GQTGKIADYNYKLPD	KIADYNYKLPDDFTG	YNYKLPDDFTGCVIA	LPDDFTGCVIAWNSN	FTGCVIAWNSNNLDS
VIAWNSNNLDSKVGG	NSNNLDSKVGGNYNY	LDSKVGGNYNYLRL	VGGNYNYLRLFRKS	YNYLRLFRKSNLKP	YRLFRKSNLKPFERD
RKSNLKPFERDISTE	LKPFERDISTEIQYA	ERDISTEIQYAGSTP	STEIQYAGSTPCNGV	YQAGSTPCNGVEGFN	STPCNGVEGFNCYFP
NGVEGFNCYFPLQSY	GFNCYFPLQSYGFQP	YFPLQSYGFQPTNGV	QSYGFQPTNGVGYQP	FQPTNGVGYQPYRVV	NGVGYQPYRVVLSF
YQPYRVVLSFELLH	RVVLSFELLHAPAT	LSFELLHAPATVCGP	LLHAPATVCGPKKST	PATVCGPKKSTNLVK	CGPKKSTNLVKNKCV
KSTNLVKNKCVNFNF	LVKNKCVNFNFNGLT	KCVNFNFNGLTGTGV	FNFNGLTGTGVLTES	GLTGTGVLTESNKKF	TGVLTESNKKFLPFQ
TESNKKFLPFQQFGR	KKFLPFQQFGRDIAD	PFQQFGRDIADTTDA	FGRDIADTTDAVRDP	IADTTDAVRDPQTLE	TDAVRDPQTLEILDI
RDPQTLEILDITPCS	TLEILDITPCSFGGV	LDITPCSFGGVSVIT	PCSFGGVSVITPGTN	GGVSVITPGTNTSNQ	VITPGTNTSNQVAVL
GTNTSNQVAVLYQDV	SNQVAVLYQDVNCTE	AVLYQDVNCTEVPVA	QDVNCTEVPVAIHAD	CTEVPVAIHADQLTP	PVAIHADQLTP TWRV
HADQLTP TWRVYSTG	LTPTWRVYSTG SNVF	WRVYSTG SNVFQTRA	STG SNVFQTRAGCLI	NVFQTRAGCLIGAEH	TRAGCLIGAEHVNNS
CLIGAEHVNNSYECD	AEHVNNSYECDIPIG	NNSYECDIPIGAGIC	ECDIPIGAGICASYQ	PIGAGICASYQTQTN	GICASYQTQTN SPRR
SYQTQTN SPRRARSV	QTN SPRRARSVASQS	PRRARSVASQSIIAY	RSVASQSIIAYTMSL	SQSIIAYTMSLGAEN	IAYTMSLGAENSVAY
MSLGAENSVAYSNNS	AENSVAYSNNSIAIP	VAYSNNSIAIPTNFT	NNSIAIPTNFTISVT	AIPTNFTISVTTEIL	NFTISVTTEILPVSM
SVTTEILPVSMTKTS	EILPVSMTKTSVDCT	VSMTKTSVDCTMYIC	KTSVDCTMYICGDST	DCTMYICGDSTEC SN	YICGDSTEC SNLLLQ
DSTEC SNLLLQYGSF	CSNLLLQYGSFCTQL	LLQYGSFCTQLNRAL	GSFCTQLNRALTGIA	TQLNRALTGIAVEQD	RALTGIAVEQDKNTQ
GIAVEQDKNTQEVFA	EQDKNTQEVFAQVKQ	NTQEVFAQVKQIYKT	VFAQVKQIYKTPPIK	VKQIYKTPPIKDFGG	YKTPPIKDFGGFNFS
PIKDFGGFNFSQILP	FGGFNFSQILPDPSK	NFSQILPDPSKPSKR	ILPDPSKPSKRSFIE	PSKPSKRSFIEDLLF	SKRSFIEDLLFNKVT
FIEDLLFNKVT LADA	LLFNKVT LADAGFIK	KVT LADAGFIKQYGD	ADAGFIKQYGDCLGD	FIKQYGDCLGDIAAR	YGDCLGDIAARDLIC
LGDI AARDLICAQKF	AARDLICAQKFNGLT	LICAQKFNGLTVLPP	QKFNGLTVLPPLLTD	GLTVLPPLLTDEMIA	LPLLTDEMIAQYTS
LTDEMIAQYTSALLA	MIAQYTSALLAGTIT	YTSALLAGTITSGWT	LLAGTITSGWTFGAG	TITSGWTFGAG AALQ	GWTFGAG AALQIPFA

GAGAALQIPFAMQMA	ALQIPFAMQMAYRFN	PFAMQMAYRFNGIGV	QMAYRFNGIGVTQNV	RFNGIGVTQNVLYEN	IGVTQNVLYENQKLI
QNVLYENQKLIANQF	YENQKLIANQFNSAI	KLIANQFNSAIGKIQ	NQFNSAIGKIQDSL	SAIGKIQDSLSTAS	KIQDSLSTASALGK
SLSSTASALGKLQDV	TASALGKLQDVVNQN	LGKLQDVVNQNAQAL	QDVVNQNAQALNTLV	NQNAQALNTLVKQLS	QALNTLVKQLSSNFG
TLVKQLSSNFGAISS	QLSSNFGAISSVLND	NFGAISSVLNDILSR	ISSVLNDILSRLDKV	LNDILSRDKVEAEV	LSRLDKVEAEVQIDR
DKVEAEVQIDRLITG	AEVQIDRLITGRLQS	IDRLITGRLQSLQTY	ITGRLQSLQTYVTQQ	LQSLQTYVTQQLIRA	QTYVTQQLIRAAEIR
TQQLIRAAEIRASAN	IRAAEIRASANLAAT	EIRASANLAATKMSE	SANLAATKMSECVLG	AATKMSECVLGQSKR	MSECVLGQSKRVDFC
VLGQSKRVDFCGKGY	SKRVDFCGKGYHLMS	DFCGKGYHLMSFPQS	KGYHLMSFPQSAPHG	LMSFPQSAPHGVVFL	PQSAPHGVVFLHVTY
PHGVVFLHVTYVPAQ	VFLHVTYVPAQEKNF	VTYVPAQEKNFTTAP	PAQEKNFTTAPAICH	KNFTTAPAICHDGKA	TAPAICHDGKAHFPR
ICHDGKAHFPRGVF	GKAHFPRGVFVSNG	FPREGVFSNGTHWF	GVFVSNGTHWFVTQR	SNGTHWFVTQRNFYE	HWFVTQRNFYEPQII
TQRNFYEPQIITTDN	FYEPQIITDNTFVS	QIITDNTFVSGNCD	TDNTFVSGNCDVVIG	FVSGNCDVVIGIVNN	NCDVVIGIVNNTVYD
VIGIVNNTVYDPLQP	VNNTVYDPLQPELDS	VYDPLQPELDSFKEE	LQPELDSFKEELDKY	LDSFKEELDKYFKNH	KEELDKYFKNHTSPD
DKYFKNHTSPDVLG	KNHTSPDVLGDISG	SPDVLGDISGINAS	DLGDISGINASVVNI	ISGINASVVNIQKEI	NASVVNIQKEIDRLN
VNIQKEIDRLNEVAK	KEIDRLNEVAKNLNE	RLNEVAKNLNESLID	VAKNLNESLIDLQEL	LNESLIDLQELGKYE	LIDLQELGKYEQYIK
QELGKYEQYIKWPWY	KYEQYIKWPWYIWL	YIKWPWYIWLGFIA	PWYIWLGFIAGLIAI	WLGFIAGLIAIVMVT	IAGLIAIVMVTIMLC
IAIVMVTIMLCCMTS	MVTIMLCCMTSCCSC	MLCCMTSCCCLKGC	MTSCCCLKGCCSCG	CCLKGCCSCGSCCK	KGCCSCGSCCKFDED
SCGSCCKFDEDDSEP	CCKFDEDDSEPVKLG	DEDDSEPVKGVKLH	SEPVKGVKLHYT		

Supplemental Table 7 – Variant Spike Peptide Library

Reference	B1.1.7 Variant	Reference	B.1.351 Variant
PFFSNVTWFHAIHVS	PFFSNVTWFHAIS	LVLLPLVSSQCVNLT	LVLLPLVSSQCVNFT
NVTWFHAIHVSGTNG	NVTWFHAISGTNG	PLVSSQCVNLTTRTQ	PLVSSQCVNFTTRTQ
FHAIHVSGTNGTKRF	FHAISGTNGTKRF	SQCVNLTTRTQLPPA	SQCVNFTTRTQLPPA
HVSGTNGTKRFDNPV	SGTNGTKRFDNPV	NLTTRTQLPPAYTNS	NFTTRTQLPPAYTNS
FQFCNDPFLGVYYHK	FQFCNDPFLGVYYHK	HVSGTNGTKRFDNPV	HVSGTNGTKRFANPV
NDPFLGVYYHKNNKS	NDPFLGVYYHKNNKS	TNGTKRFDNPVLPFN	TNGTKRFANPVLPFN
LGVYYHKNNKSWMES	LGVYYHKNNKSWMES	KRFDNPVLPFNDGVY	KRFANPVLPFNDGVY
YFPLQSYGFQPTNGV	YFPLQSYGFQPTYGV	FKIYSKHTPINLVRD	FKIYSKHTPINLVRG
QSYGFQPTNGVGYQP	QSYGFQPTYGVGYQP	SKHTPINLVRDLPQG	SKHTPINLVRGLPQG
FQPTNGVGYQPYRVV	FQPTYGVGYQPYRVV	PINLVRDLPQGFSAL	PINLVRGLPQGFSAL
NGVGYQPYRVVLSF	YGVGYQPYRVVLSF	VRDLPQGFSALEPLV	VRGLPQGFSALEPLV
KKFLPFQQFGRDIAD	KKFLPFQQFGRDIDD	INITRFQTLALHRS	LPIGINITRFQTL
PFQQFGRDIADTTDA	PFQQFGRDIDDTTDA	RFQTLALHRSYLTP	INITRFQTLHIS
FGRDIADTTDAVRDP	FGRDIDDTTDAVRDP	LLALHRSYLTPGDSS	RFQTLHISYLTP
IADTTDAVRDPQTL	IDDTTDAVRDPQTL	HRSYLTPGDSSSGWT	LHISYLTPGDSS
GTNTSNQVAVLYQDV	GTNTSNQVAVLYQGV	DEVQRQIAPGQTGKIA	HISYLTPGDSSSGWT
SNQVAVLYQDVNCTE	SNQVAVLYQGVNCTE	QIAPGQTGKIADYNY	DEVQRQIAPGQTGNIA
AVLYQDVNCTEVPVA	AVLYQGVNCTEVPVA	GQTGKIADYNYKLPD	QIAPGQTGNIADYNY
QDVNCTEVPVAIHAD	QGVNCTEVPVAIHAD	KIADYNYKLPDDFTG	GQTGNIADYNYKLPD
GICASYQTQTNSPRR	GICASYQTQTNSHRR	YQAGSTPCNGVEGFN	NIADYNYKLPDDFTG
SYQTQTNSPRRARSV	SYQTQTNSHRRARSV	STPCNGVEGFNCYFP	YQAGSTPCNGVKGFN
QTNSPRRARSVASQS	QTNSHRRARSVASQS	NGVEGFNCYFPLQSY	STPCNGVKGFNCYFP
PRRARSVASQSIIAY	HRRARSVASQSIIAY	SQSIIAYTMSLGAEN	NGVKGFNCYFPLQSY
CSNLLLQYGSFCTQL	CSNLLLQYGSFCIQL	IAYTMSLGAENSVAY	YFPLQSYGFQPTYGV
LLQYGSFCTQLNRAL	LLQYGSFCIQLNRAL	MSLGAENSVAYSNNS	QSYGFQPTYGVGYQP
GSFCTQLNRALTGIA	GSFCIQLNRALTGIA	AENSVAYSNSIAIP	FQPTYGVGYQPYRVV
TQLNRALTGIAVEQD	IQLNRALTGIAVEQD		
NFGAISSVLNDILSR	NFGAISSVLNDILAR		
ISSVLNDILSRDKV	ISSVLNDILARLDKV		
LNDILSRDKVEAEV	LNDILARLDKVEAEV		
LSRLDKVEAEVQIDR	LARLDKVEAEVQIDR		
TQRNFYEPQIITTDN	TQRNFYEPQIITTHN		
FYEPQIITTDNTFVS	FYEPQIITTHNTFVS		
QIITTDNTFVSGNCD	QIITTHNTFVSGNCD		

=

SUPPLEMENTAL FIGURES

Supplemental Figure 1. Antibody levels in donors measured at multiple timepoints during the pandemic and prior to the vaccination were all below the positive cutoff. Each circle is a donor tested (5 of 6 donors were tested at least twice). Blue measures antibody to nucleoprotein, and red measures antibody to Spike.

Supplemental Figure 2. Comparison of baseline (blue) expanded (red) T cell responses in peripheral blood mononuclear cells derived from six donors before (A), three weeks after the first vaccine but before the second vaccine (B), and three to four weeks after the second vaccine. Expansion of PBMC did not result in non specific recognition of antigens (as shown by continued negative responses to actin and other non-vaccine antigens nucleoprotein, envelope, and membrane).

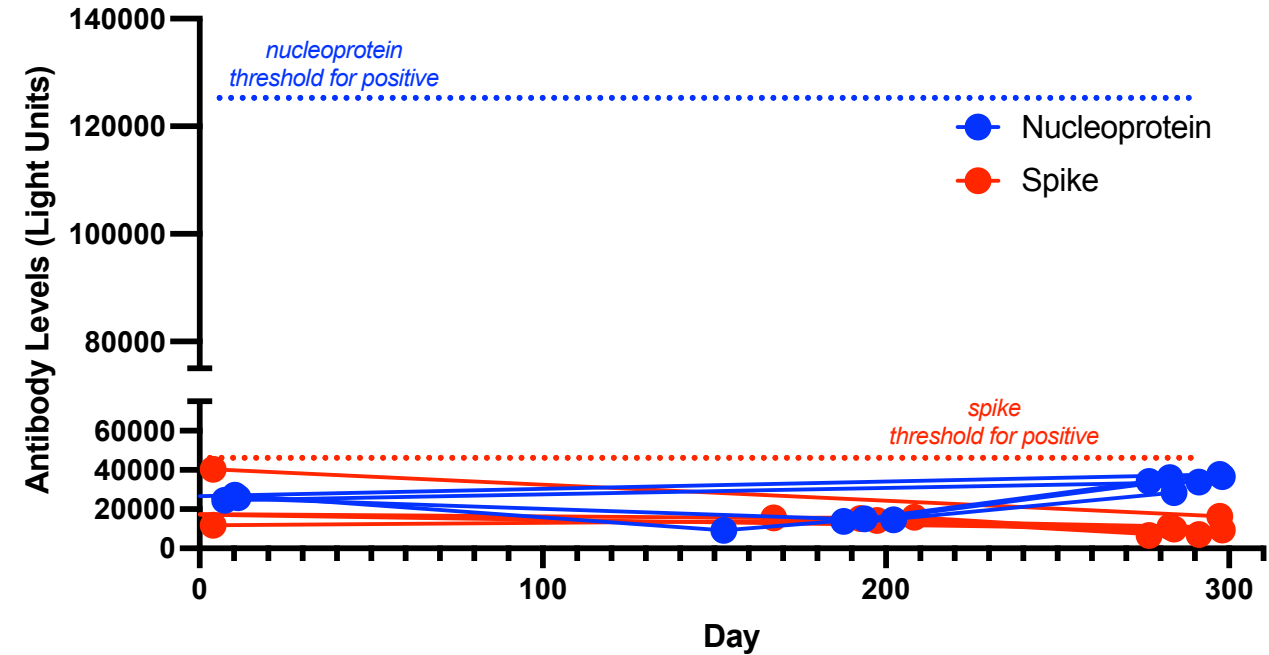
Supplemental Figure 3. Individual donor T cell responses as measured by IFN- γ ELISpot after 10-11 day expansion of peripheral blood mononuclear cells with COVID-19 reference Spike (stimulating antigen indicated in orange bar). Bars depict mean, and error show standard deviation.

Supplemental Figure 4. Individual donor T cell responses as measured by IFN- γ ELISpot after 10-11 day expansion of peripheral blood mononuclear cells with COVID-19 B.1.1.7 variant Spike sequences (stimulating antigen indicated in orange bar). Bars depict mean, and error show standard deviation.

Supplemental Figure 5. Individual donor T cell responses as measured by IFN- γ ELISpot after 10-11 day expansion of peripheral blood mononuclear cells with COVID-19 B.1.351 variant Spike. Sequences (stimulating antigen indicated in orange bar). Bars depict mean, and error show standard deviation.

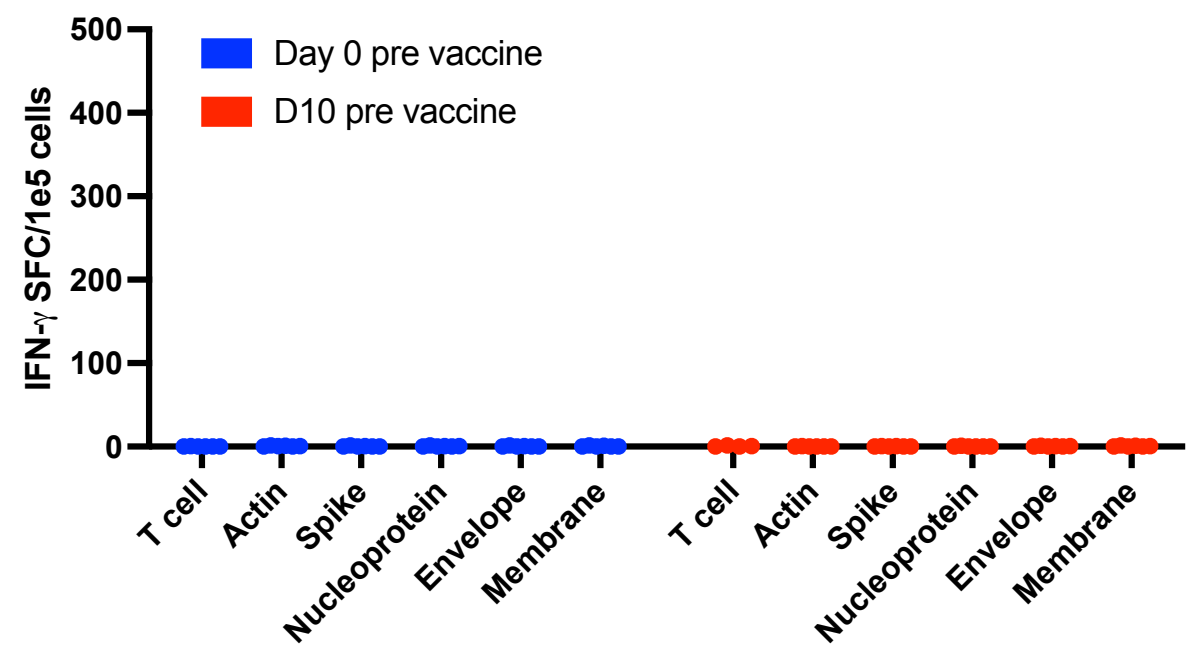
Supplemental Figure 6. Gating strategy for assessing percentages of responding CD4+ and CD8+ T cells in response to antigen. Gates for IFN- γ and TNF- α are based off cells with surface protein only-stain (absent the intracellular stains).

Supplemental Figure 1. Donors Have a History of Seronegativity to SARS CoV 2

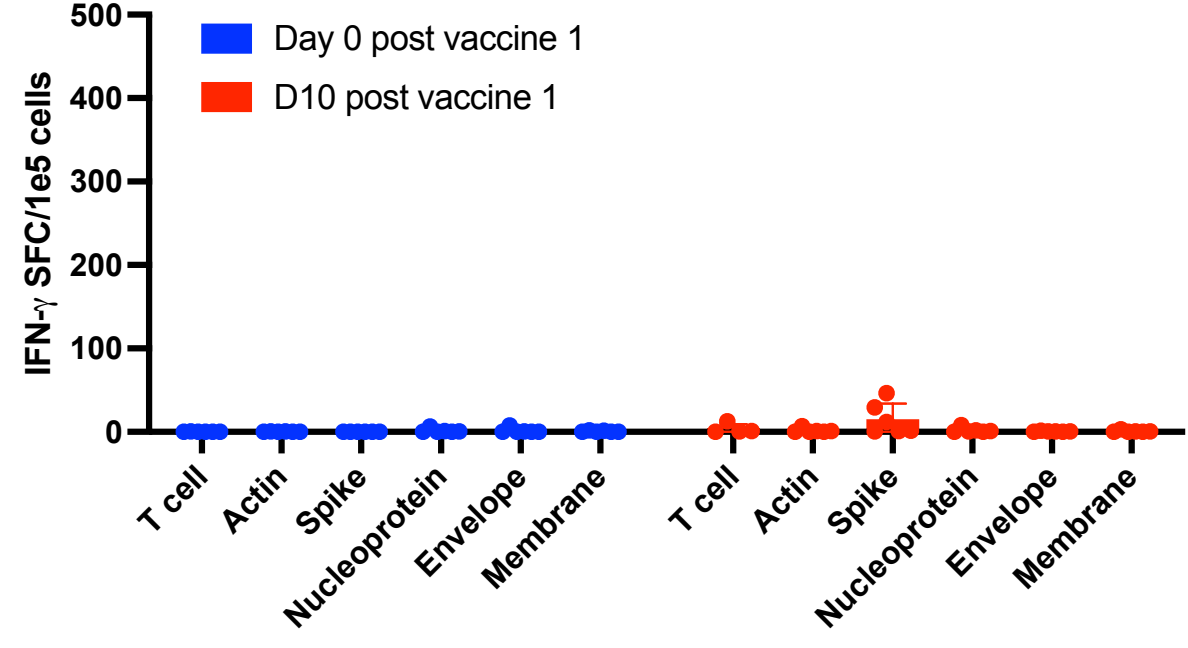


Supplemental Figure 2. Expansion of antigen-specific T cells

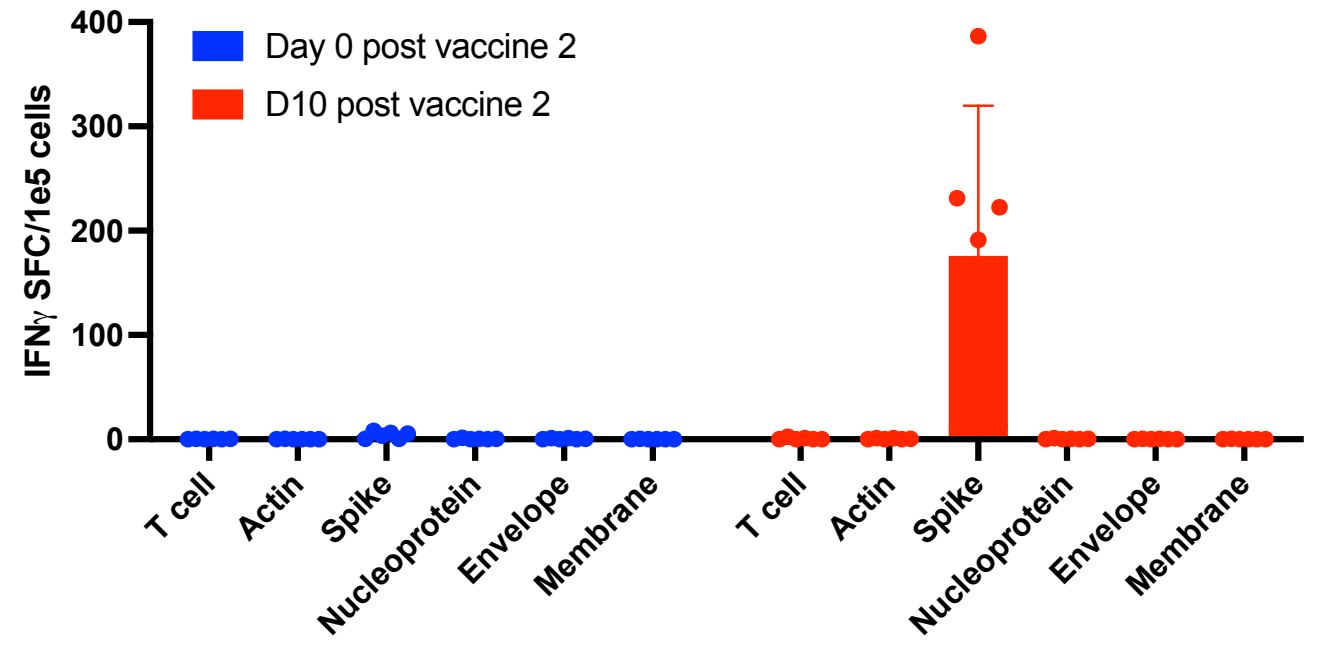
A.



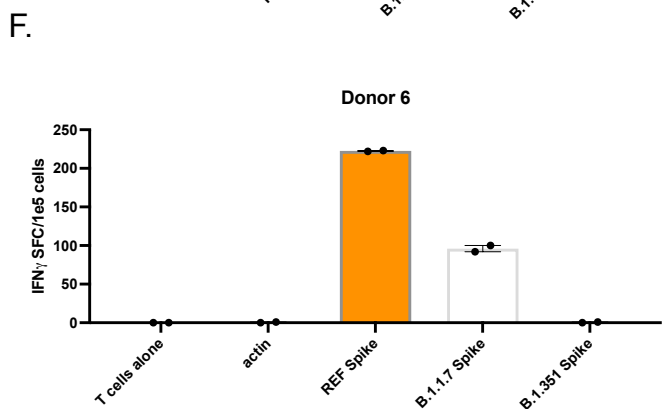
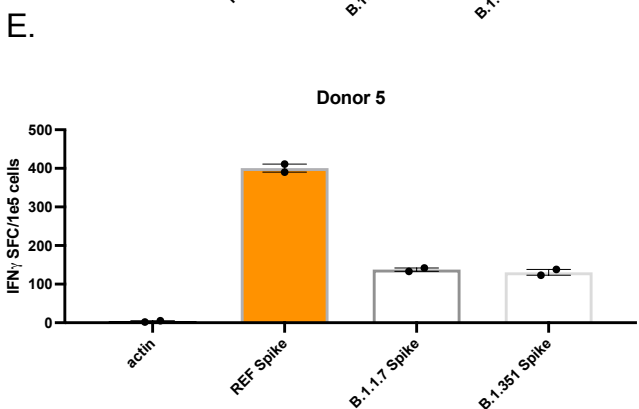
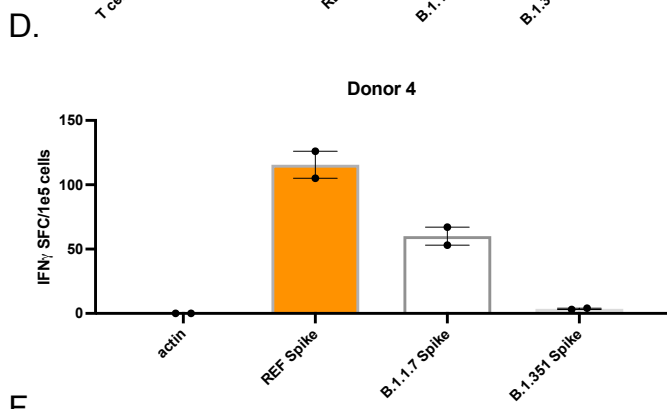
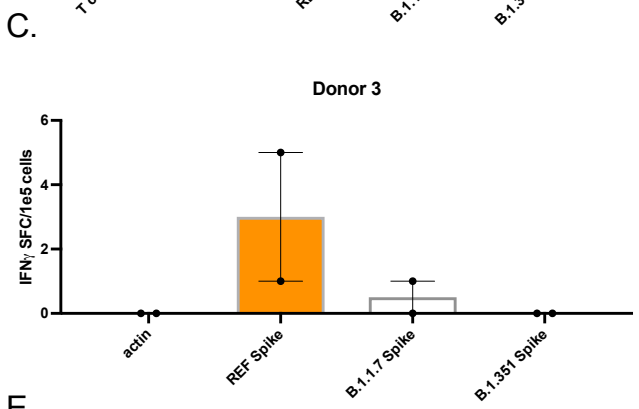
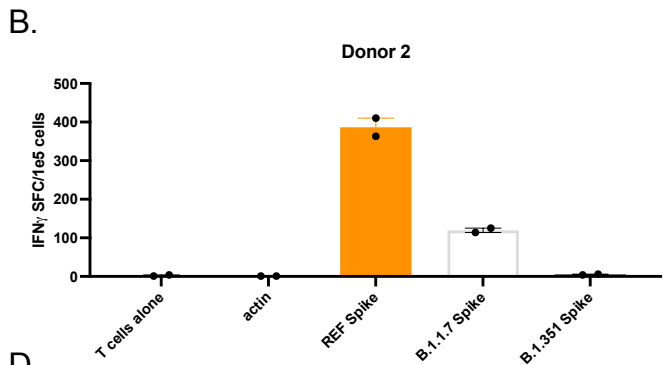
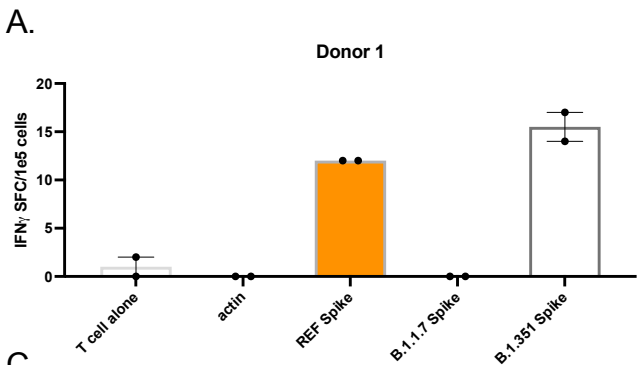
B.



C.

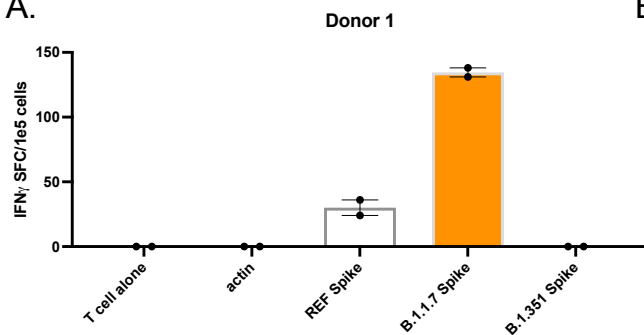


Supplemental Figure 3. Reference Spike Peptide-Expanded PBMC (Individual Donors)

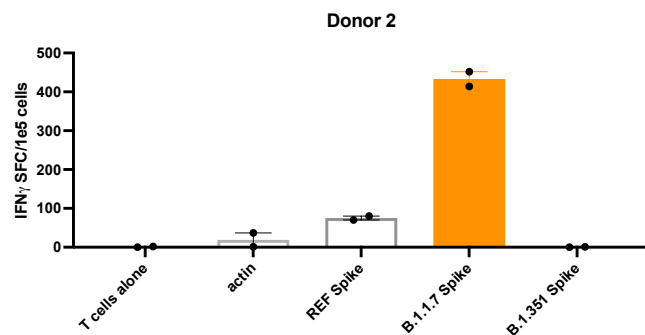


Supplemental Figure 4. B.1.1.7 Spike Peptide-Expanded PBMC (Individual Donors)

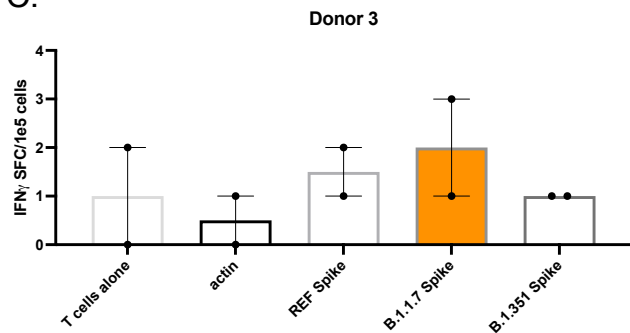
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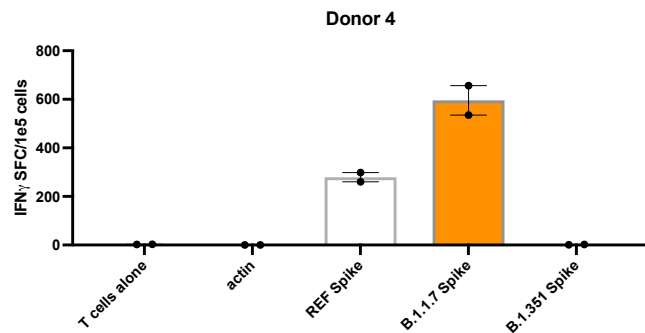
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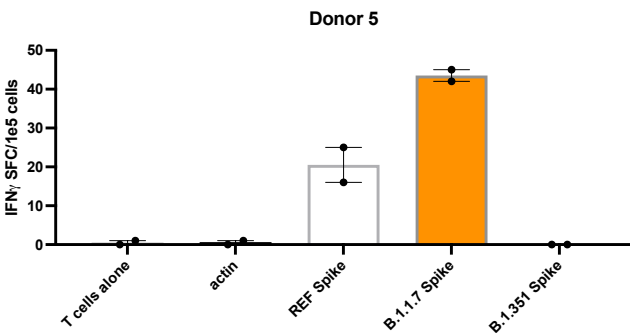
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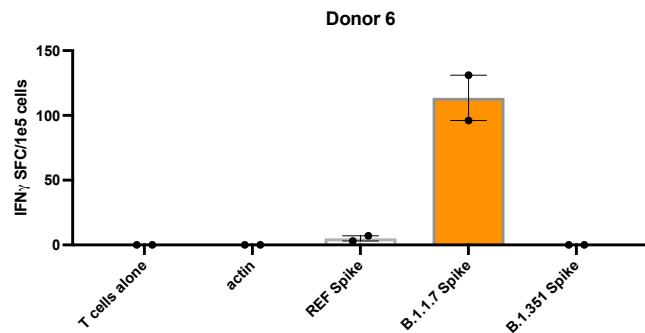
D.



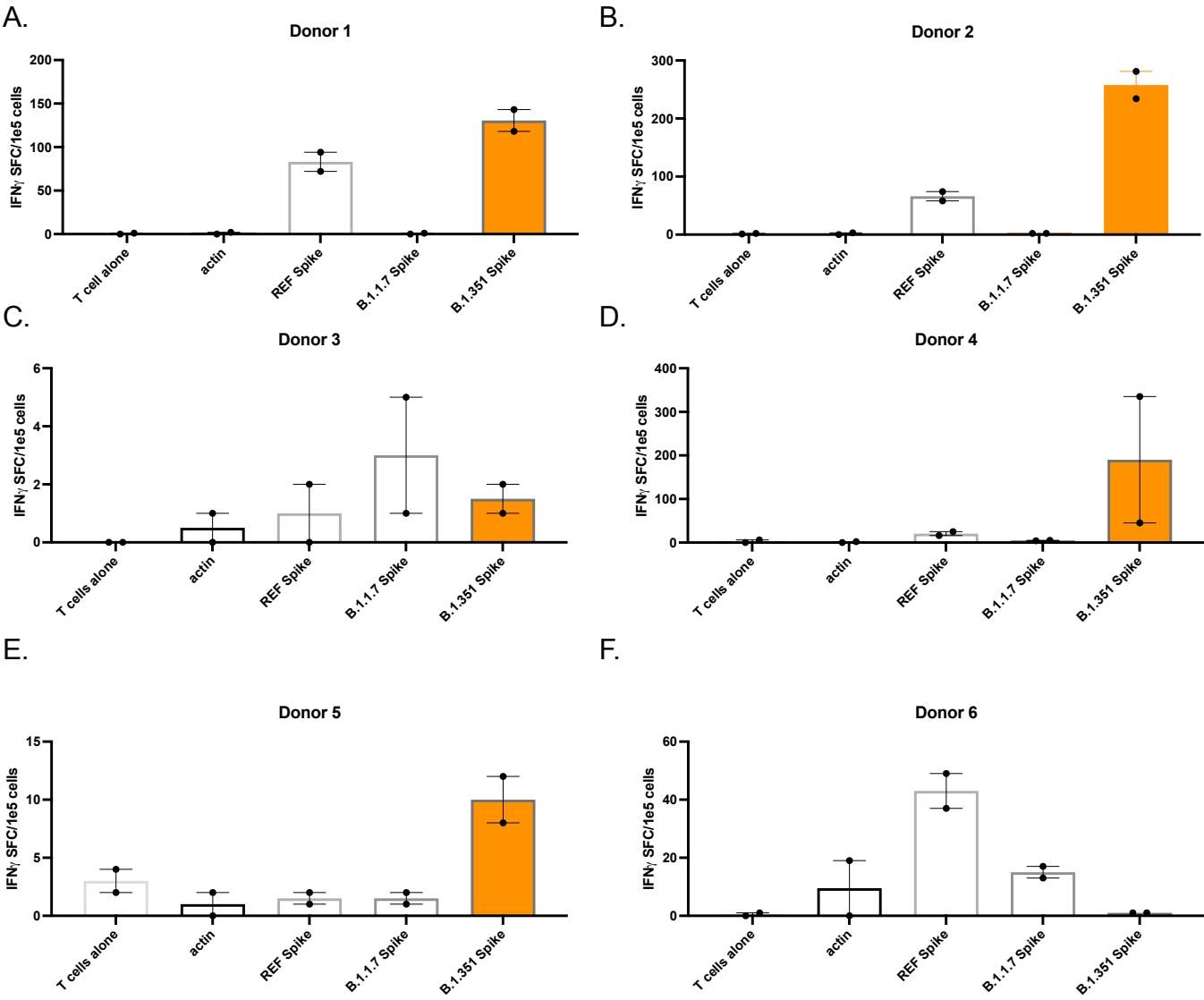
E.



F.



Supplemental Figure 5. B.1.351 Spike Peptide-Expanded PBMC (Individual Donors)



Supplemental Figure 6. Flow cytometry gating strategy (donor 1)

