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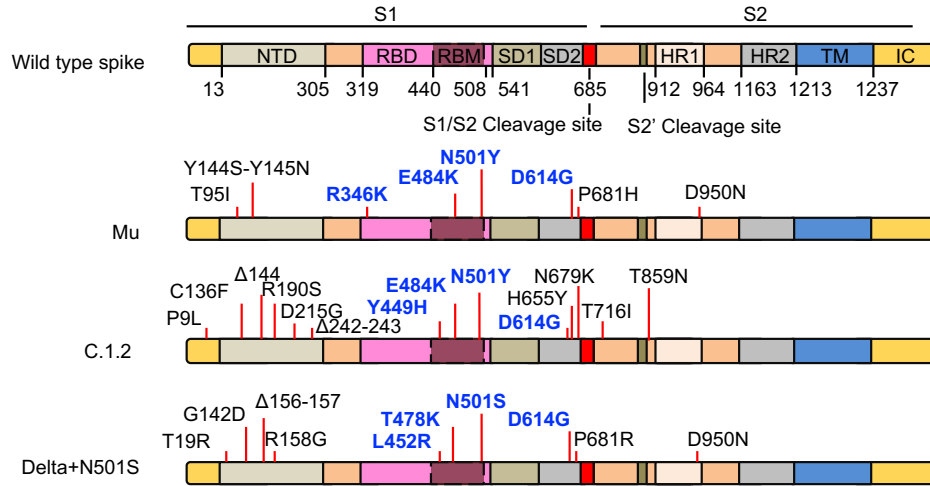
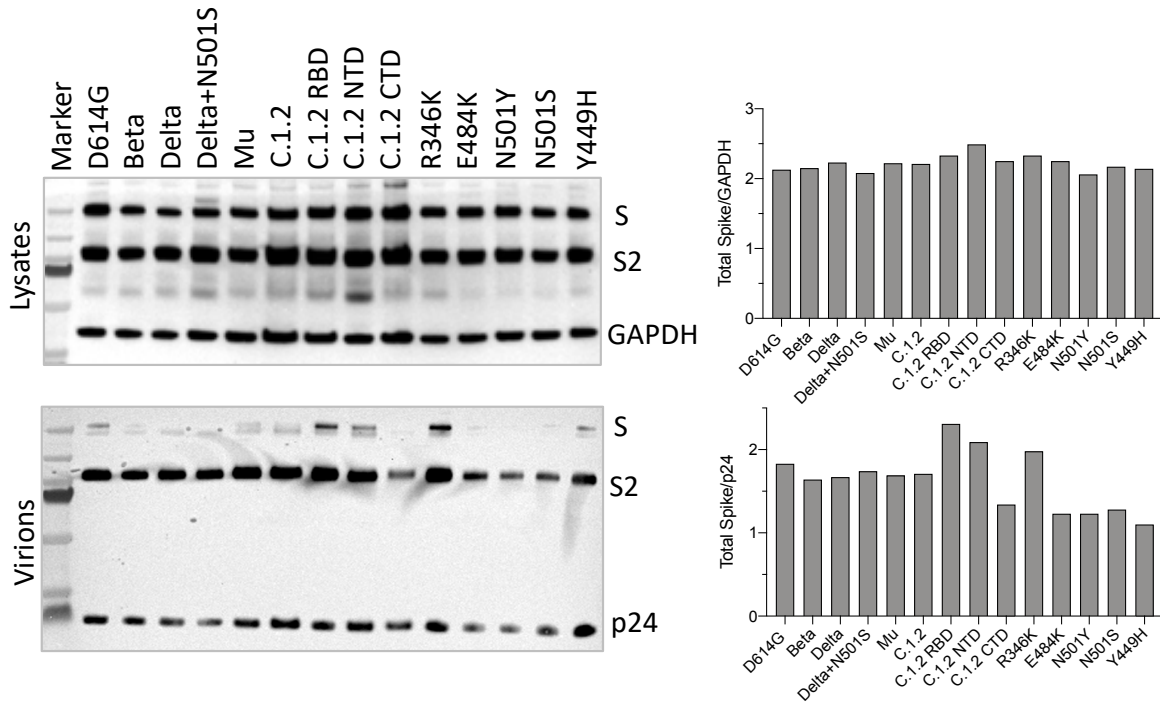
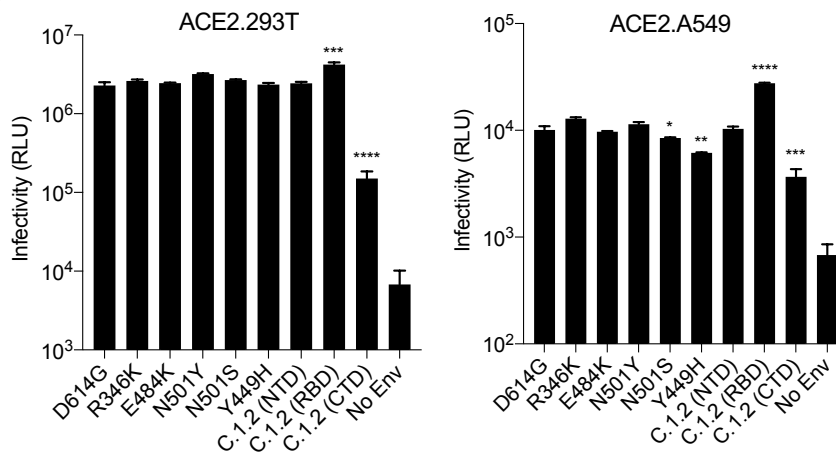
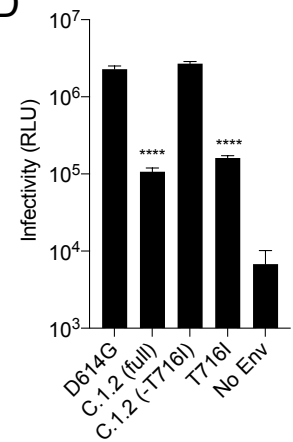
**Supplemental information**

**High-titer neutralization of Mu and C.1.2**

**SARS-CoV-2 variants by vaccine-elicited**

**antibodies of previously infected individuals**

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**A****B****C****D**

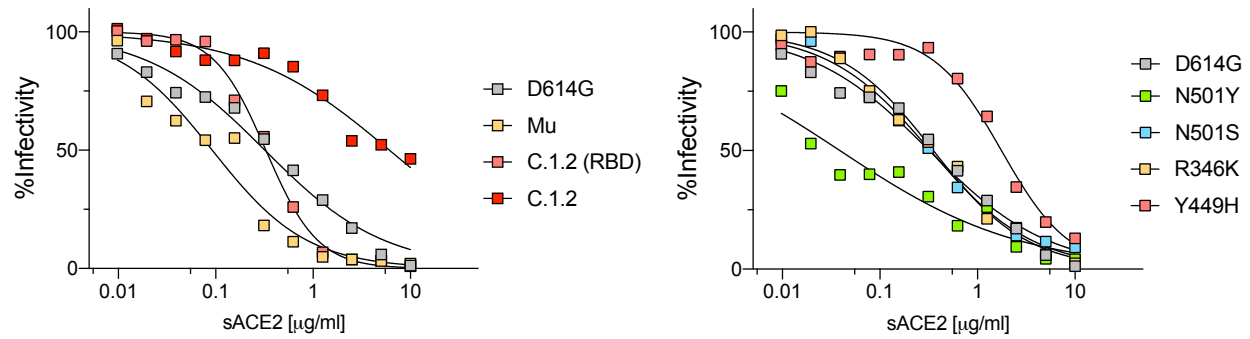
**Figure S1. Infectivity of variant spike viruses and spike expression levels. Related to Figure 1.**

(A) The domain structure of the SARS-CoV-2 spikes of Mu (B.1.621), C.1.2 and Delta+N501S is diagrammed. NTD, N-terminal domain; RBD, receptor-binding domain; RBM, receptor-binding motif; SD1 subdomain 1; SD2, subdomain 2; HR1, heptad repeat 1; HR2, heptad repeat 2; TM, transmembrane region; IC, intracellular domain.

(B) Immunoblot analysis of the variant spike proteins in transfected 293T cells. Pseudotyped viruses were produced by transfection of 293T cells. Two days post-transfection, virions were analyzed on an immunoblot probed with anti-spike antibody and anti-HIV-1 p24. The cell lysates were probed with anti-spike antibody and anti-GAPDH antibodies as a loading control. Spike expression levels were quantified and normalized by either GAPDH or p24, Total spike/loading control ratio were shown in the bar chart.

(C) Infectivity of virus pseudotyped by Beta, Delta, Delta+N501S, Mu, C.1.2 variant individual spikes pseudotyped lentivirus in ACE2.293T and ACE2.A549 cells.

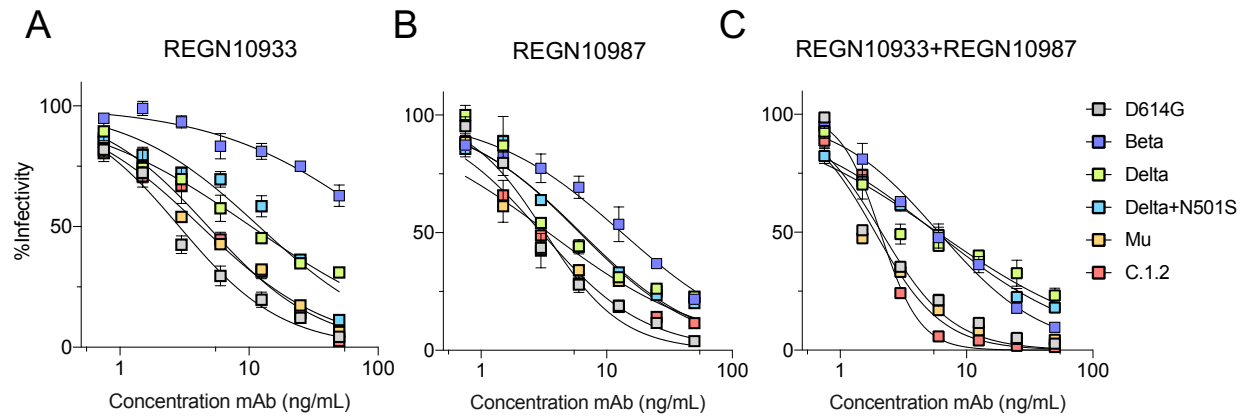
(D) Infectivity of virus pseudotyped by C.1.2 (full), C.1.2. (-T716I) variant spikes and T716I variant individual spike pseudotyped lentivirus in ACE2.293T cells. The experiment was done twice with similar results.



IC50 (sACE2; µg/ml)							
D614G	Mu	C.1.2 (RBD)	C.1.2	R346K	H449H	N501Y	N501S
0.32	0.09	0.33	6.08	0.35	1.76	0.04	0.33

**Figure S2. Neutralization of spike protein variants by sACE2. Related to Figure 3.**

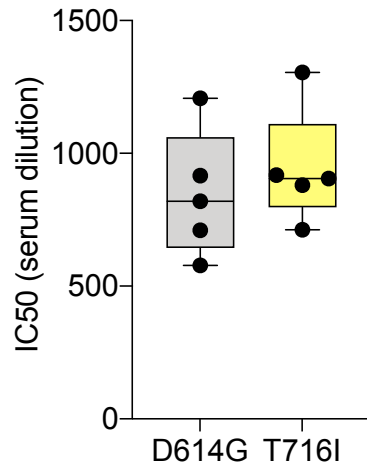
Serially diluted sACE2 was mixed with variant pseudotypes (D614G, Mu, C.1.2) (left) and single point mutated virus (N501Y, N501S, R346K, Y449H) (right) for 30 minutes. The mixture was added on ACE2.293T cells. After 2 days of infection, luciferase activity was measured. The experiment was done three times with similar results.



	IC50 (ng/ml)					
	D614G	Beta	Delta	Delta+N501S	Mu	C.1.2
REGN10933	2.9	112.5	10.4	12.0	4.3	4.8
REGN10987	3.2	13.2	6.1	6.2	3.4	3.0
REGN-COV2	2.1	6.0	5.9	5.7	1.9	2.1

**Figure S3. Neutralization of spike protein variants by monoclonal antibodies REGN10933 and REGN10987. Related to Figure 2.**

(A-C) Neutralization of D614G, Beta, Delta, Delta+N501S, Mu, C.1.2 variant spikes by REGN10933 and REGN10987. Neutralization of viruses by REGN10933 (A), REGN10987 (B), and 1:1 mixture of REGN10933 and REGN10987 (C) was measured. IC50 of REGN10933 (Beta) was calculated as estimated value. The table shows the calculated IC50 for each curve. The experiment was done three times with similar results.



**Figure S4. Neutralization of T716I spike pseudotyped viruses by antibodies elicited by BNT162b2. Related to Figure 2.**

Neutralization of D614G and T716I spikes serum samples from BNT162b2 vaccinated individuals (n=5) was tested. The serum was collected at 7 days after vaccination. Each dot represents the IC50 for a single donor.

**Table S1. Related to Figure 2.** IC<sub>50</sub> of Convalescent, BNT162b2, mRNA-1273 and Ad26.COVS elicited antibodies against viruses with variant spike proteins. Age, Sex and Comorbidities are shown.

<b>Convalescent</b>						
IC <sub>50</sub> (serum dilution)						
donor	D614G (B.1)	Beta (B.1.351)	Delta (B.1.617.2)	Delta +N501S	Mu (B.1.621)	C.1.2
1	239	72	52	96	25	17
2	167	97	77	92	61	10
3	74	74	167	171	143	61
4	394	39	48	56	85	41
5	583	61	98	59	59	27
6	369	131	62	105	161	92
7	503	107	106	66	12	54
8	345	25	83	77	19	40
Mean (SD)	334 (169)	76 (35)	87 (38)	90 (37)	71 (56)	43 (26)

<b>BNT162b2</b>										
IC <sub>50</sub> (serum dilution)										
donor	Days post 2 <sup>nd</sup> dose	Age	Sex	Comorbidities	D614G	Beta	Delta	Delta +N501S	Mu	C.1.2
1	84	39	F	None	740	98	219	283	86	99
2	52	23	F	None	1713	119	451	636	96	77
3	101	26	F	Asthma	1320	399	543	412	273	315
4	109	33	F	None	738	205	393	325	199	127
5	60	35	F	Hypothyroidism, Psoriasis	1308	80	113	88	49	46
6	81	42	F	Asthma	374	62	72	109	0	0
7	108	26	F	None	694	369	148	126	269	271
8	107	24	M	None	389	166	131	130	55	0
9	110	35	M	None	485	112	238	209	119	46
Mean (SD)	90 (22)	31 (7)			862 (474)	179 (124)	256 (167)	257 (180)	127 (98)	109 (112)

mRNA-1273										
donor	Days post 2 <sup>nd</sup> dose	Age	Sex	Comorbidities	IC <sub>50</sub> (serum dilution)					
					D614G	Beta	Delta	Delta +N501S	Mu	C.1.2
1	89	26	M	None	1378	188	296	557	198	111
2	92	53	M	None	1379	390	358	390	254	124
3	61	67	M	Prediabetes	1053	100	122	407	251	97
4	93	33	F	None	570	60	296	135	0	0
5	44	32	M	None	1162	447	325	553	255	191
6	100	29	F	None	1355	516	481	524	148	0
7	52	33	F	None	1426	228	500	328	187	122
8	105	55	F	Asthma	656	394	286	262	253	151
Mean (SD)	80 (24)	41			1122 (339)	290 (169)	333 (119)	394 (150)	193 (88)	100 (68)

Ad26.COVS.S										
donor	Days post 2 <sup>nd</sup> dose	Age	Sex	Comorbidities	IC <sub>50</sub> (serum dilution)					
					D614G	Beta	Delta	Delta +N501S	Mu	C.1.2
1	57	42	F	None	47	58	43	32	54	14
2	58	28	F	None	138	38	49	97	48	58
3	66	36	F	None	521	ND	ND	ND	48	ND
4	92	33	F	None	344	18	36	29	ND	ND
5	87	39	F	Prediabetes	253	ND	45	107	ND	ND
6	72	32	M	None	280	61	61	26	ND	ND
7	92	39	F	None	260	52	55	95	42	17
8	71	75	F	None	304	57	82	87	8	ND
9	105	30	M	None	58	6	76	48	52	51
10	115	33	F	None	487	48	55	79	ND	ND
Mean (SD)	82 (20)	39 (13)			245 (180)	32 (25)	50 (23)	58 (37)	28 (25)	16 (22)



**Table 2. Related to Figure 2.** IC50 of sera from uninfected and previously infected individuals before and after vaccination with BNT162b2 against viruses with variant spike proteins. Age, Sex and Comorbidities are shown.

<b>Uninfected BNT162b2</b>											
Note: Uninfected samples had no detectable levels of antibodies against variants before vaccination											
donor	Days post 2 <sup>nd</sup> dose	Age	Sex	Comorbidities	IC <sub>50</sub> (serum dilution) (post vaccination)						
					D614G	Beta	Delta	Delta +N501S	Mu	C.1.2 (RBD)	C.1.2 (full)
1	8	62	Male	none	1824	285	882	871	141	136	80
2	8	34	Male	none	1307	171	802	825	267	322	0
3	8	40	Female	none	1109	287	804	687	221	141	93
4	8	39	Female	none	713	120	251	317	0	251	110
5	9	39	Male	none	481	0	201	341	0	0	107
Mean (SD)	8.2 (0.4)	43 (11)			1087 (524)	173 (121)	588 (332)	608 (264)	126 (123)	170 (123)	78 (45)

<b>Previously infected BNT162b2</b>																		
donor	Days post 2 <sup>nd</sup> dose	Age	Sex	Comorbidities	IC <sub>50</sub> (serum dilution)													
					D614G		Beta		Delta		Delta +N501S		Mu		C.1.2		C.1.2 (full)	
					Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
1	10	34	M	none	66	5477	107	2462	129	1957	165	2157	31	755	69	1660	29	838
2	11	46	M	none	163	7844	51	3183	171	4964	192	4157	17	2118	71	2585	3	660
3	7	60	M	none	287	3852	129	3133	125	3823	120	5268	76	2501	184	1731	53	807
4	9	42	F	none	470	2179	40	853	90	652	86	752	62	570	0	939	0	863
5	12	43	M	none	237	1829	51	1421	79	1539	111	979	0	1247	61	771	0	311
6	8	37	F	none	236	2760	89	3299	112	4007	105	4488	63	1029	94	668	61	696
7	10	54	F	Hypertension, History of obesity	156	2101	125	2246	148	1178	168	794	23	1051	105	461	12	468
8	7	34	F	none	220	1739	72	1368	141	1218	199	1592	11	1080	98	454	0	468
9	7	32	F	Anemia, Asthma, GERD	54	1970	74	667	86	1025	107	797	88	453	0	437	22	471
10	11	24	F	none	179	2412	109	1793	114	2485	93	2027	20	577	15	771	13	785
11	10	49	F	Hypertension, Rhinosinusitis	126	1343	133	591	135	1742	127	2395	35	651	9	610	5	618
12	6	44	F	Hereditary Hemorrhagic Telangiectasias, Eosinophilic Esophagitis	51	2664	125	993	82	1754	98	1783	28	921	0	1357	0	1388
Mean (SD)	9 (2)	42 (11)			187 (118)	3014 (1885)	92 (34)	1834 (1008)	118 (29)	2195 (1359)	131 (39)	2266 (1554)	38 (28)	1079 (629)	59 (57)	1037 (665)	17 (21)	698 (279)