

Table S1. Anti-spike-RBD binding antibody validation data by ELISA

Specimen Basic Information		Raw Data				Results	
Specimen	Concentration	Dilution	450 nm	620 nm	450-620 nm	Diluted BAU/mL	BAU/mL
Negative control	-	-	0.000	0.000	0.000	-	-
WHO IS 20/136 -01	80 BAU/mL	-	1.300	0.000	1.300	-	-
WHO IS 20/136 -02	40 BAU/mL	-	1.284	0.000	1.284	-	-
WHO IS 20/136 -03	20 BAU/mL	-	1.208	0.001	1.207	-	-
WHO IS 20/136 -04	10 BAU/mL	-	1.050	0.001	1.049	-	-
WHO IS 20/136 -05	5 BAU/mL	-	0.981	0.000	0.981	-	-
WHO IS 20/136 -06	2.5 BAU/mL	-	0.907	0.001	0.906	-	-
WHO IS 20/136 -07	1.25 BAU/mL	-	0.669	0.000	0.669	-	-
WHO IS 20/136 -08	0.625 BAU/mL	-	0.389	0.001	0.388	-	-
WHO IS 20/150	High	1:400	0.818	0.000	0.818	2.077	830.8
WHO IS 20/148	Mid	1:100	0.905	0.000	0.905	2.407	240.7
WHO IS 20/142	Negative control	1:400	0.047	0.000	0.047	<0.625	-
WHO IS 20/136 -09	2.5 BAU/mL	-	1.141	0.002	1.139	-	-
WHO IS 20/136 -10	1.25 BAU/mL	-	0.670	0.002	0.668	-	-
WHO IS 20/136 -11	0.625 BAU/mL	-	0.398	0.000	0.398	-	-
20/150	High	1:400	1.150	0.002	1.148	2.504	1001.47
20/148	Mid	1:100	0.987	0.001	0.986	2.093	209.28
20/142	Negative control	1:400	0.023	0.000	0.023	<0.625	-
Negative control	-	-	0.002	0.000	0.002	-	-
WHO IS 20/136 -12	2.5 BAU/mL	-	0.968	-0.007	0.975	-	-
WHO IS 20/136 -13	1.25 BAU/mL	-	0.663	-0.007	0.67	-	-
WHO IS 20/136 -14	0.625 BAU/mL	-	0.375	-0.006	0.381	-	-
20/150	High	1:400	0.862	0.002	0.861	2.063	825.07
20/148	Mid	1:100	0.817	0.000	0.817	1.92	191.97
20/142	Negative control	1:400	0.109	-0.002	0.111	<0.625	-

Table S2. Anti-spike-RBD neutralizing antibody validation data by ELISA

Specimen Basic Information		Raw Data				Results	
Specimen	Concentration	Dilution	450 nm	620 nm	450-620 nm	Diluted IU/mL	IU/mL
Negative control	-	-	1.594	0.000	1.594	-	-
WHO IS 20/136 -01	80 IU/mL	-	0.029	0.000	0.029	-	-
WHO IS 20/136 -02	40 IU/mL	-	0.566	0.000	0.566	-	-
WHO IS 20/136 -03	20 IU/mL	-	0.873	0.000	0.873	-	-
WHO IS 20/136 -04	10 IU/mL	-	1.045	0.000	1.045	-	-
WHO IS 20/136 -05	5 IU/mL	-	1.278	0.000	1.278	-	-
WHO IS 20/136 -06	2.5 IU/mL	-	1.365	0.000	1.365	-	-
WHO IS 20/136 -07	1.25 IU/mL	-	1.541	0.000	1.541	-	-
WHO IS 20/136 -08	0.625 IU/mL	-	1.599	0.001	1.598	-	-
WHO IS 20/150	High	1:100	0.982	0.000	0.982	13.64	1364
WHO IS 20/148	Mid	1:20	0.923	0.000	0.923	17.21	344.2
WHO IS 20/142	Negative control	1:100	1.561	0.000	1.561	<10	-
Negative control	-	-	1.59	-0.01	1.60	-	-
WHO IS 20/136 -09	40 IU/mL	-	0.28	-0.01	0.29	-	-
WHO IS 20/136 -10	20 IU/mL	-	0.81	-0.01	0.82	-	-
WHO IS 20/136 -11	10 IU/mL	-	1.08	-0.01	1.09	-	-
20/150	High	1:100	1.04	-0.01	1.05	12.012	1201.2
20/148	Mid	1:10	0.74	-0.01	0.75	23.206	232.057
20/148	Mid	1:15	1.02	-0.01	1.03	12.538	188.063
20/142	Negative control	1:100	1.69	-0.01	1.70	<10	-
Negative control	-	-	1.84	0.00	1.84	-	-
WHO IS 20/136 -12	40 IU/mL	-	0.54	0.00	0.54	-	-
WHO IS 20/136 -13	20 IU/mL	-	1.12	0.00	1.12	-	-
WHO IS 20/136 -14	10 IU/mL	-	1.48	0.00	1.48	-	-
20/150	High	1:100	1.29	0.00	1.29	15.458	1545.81
20/148	Mid	1:10	1.15	0.00	1.15	20.039	200.387
20/148	Mid	1:15	1.38	0.00	1.38	12.435	186.532
20/142	Negative control	1:100	1.72	0.00	1.72	<10	-
Negative control	-	-	2.28	0.01	2.27	-	-
WHO IS 20/136 -15	40 IU/mL	-	0.83	0.04	0.79	-	-
WHO IS 20/136 -16	20 IU/mL	-	1.51	0.00	1.51	-	-
WHO IS 20/136 -17	10 IU/mL	-	2.00	0.01	1.99	-	-
20/150	High	1:100	1.62	0.01	1.61	18.787	1878.68
20/148	Mid	1:10	1.22	0.01	1.21	28.82	288.201
20/148	Mid	1:15	1.62	0.00	1.62	18.682	280.228
20/142	Negative control	1:100	2.00	0.00	2.00	<10	-

Table S3. Demographic Information for vaccinated SARS-CoV-2 naïve subjects

Number of individuals, n (%)

Prime dose	AZD1222	BNT162b2	mRNA-1273	AZD1222
Second dose	AZD1222	BNT162b2	mRNA-1273	mRNA-1273
Total number	n= 14	n= 10	n= 8	n= 3
Male	9 (64.3%)	6 (60.0%)	6 (75.0%)	3 (100.0%)
Female	5 (35.7%)	4 (40.0%)	2 (25.0%)	0 (0%)

Table S4. Reagents used for ELISA and spike-RBD specific memory B cells detection

Reagent	Vendor	Identifier	Concentration / dilution
Part I: Neutralizing antibody ELISA assay			
ELISA Buffer kit	TONBO biosciences	41-9245-KIT	
Recombinant SARS-CoV-2 Spike RBD	R&D Systems	10500-CV-100	100 ng
ACE2 (Human) Recombinant Protein	Abnova	P6639	50 ng
LYNX Rapid HRP antibody conjugation kit	BIO-RAD	LNK006P	40 µg
WHO International Standard for anti-SARS-CoV-2 immunoglobulin	NIBSC	20/136	1000 IU/mL
WHO International Reference Panel for anti-SARS-CoV-2 immunoglo	NIBSC	20/268	
Part II: Binding antibody ELISA assay			
ELISA Buffer kit	TONBO biosciences	41-9245-KIT	
Recombinant SARS-CoV-2 Spike RBD	R&D Systems	10500-CV-100	100 ng
HRP Donkey anti-human IgG	BioLegend	410902	1:20000
Anti-SARS-CoV-2 Spike Glycoprotein S1 antibody CR3022	abcam	ab273073	10 µg/mL, 1:10
WHO International Standard for anti-SARS-CoV-2 immunoglobulin	NIBSC	20/136	1000 BAU/mL
WHO International Reference Panel for anti-SARS-CoV-2 immunoglo	NIBSC	20/268	
Part III: Spike-RBD specific cell dectecting			
Recombinant SARS-CoV-2 Spike RBD	R&D Systems	10500-CV-100	0.5 µg
Recombinant SARS-CoV-2 B.1.1.529 Spike RBD	R&D Systems	11056-CV-100	0.5 µg
DAPI			1:50
PerCP anti-human CD19	BioLegend	392510	1:30
FITC anti-human CD27	BioLegend	356404	1:30
Rabbit Anti-Human IgG	Jackson ImmunoResearch	309-001-008	1:100
Qdot800 anti-Rabbit IgG	Invitrogen	Q-11471MP	1:100
APC anti-human CD3	BioLegend	317318	1:50
DyLight 550 Conjugation Kit	abcam	AB201800-3X10UG	

Figure S1

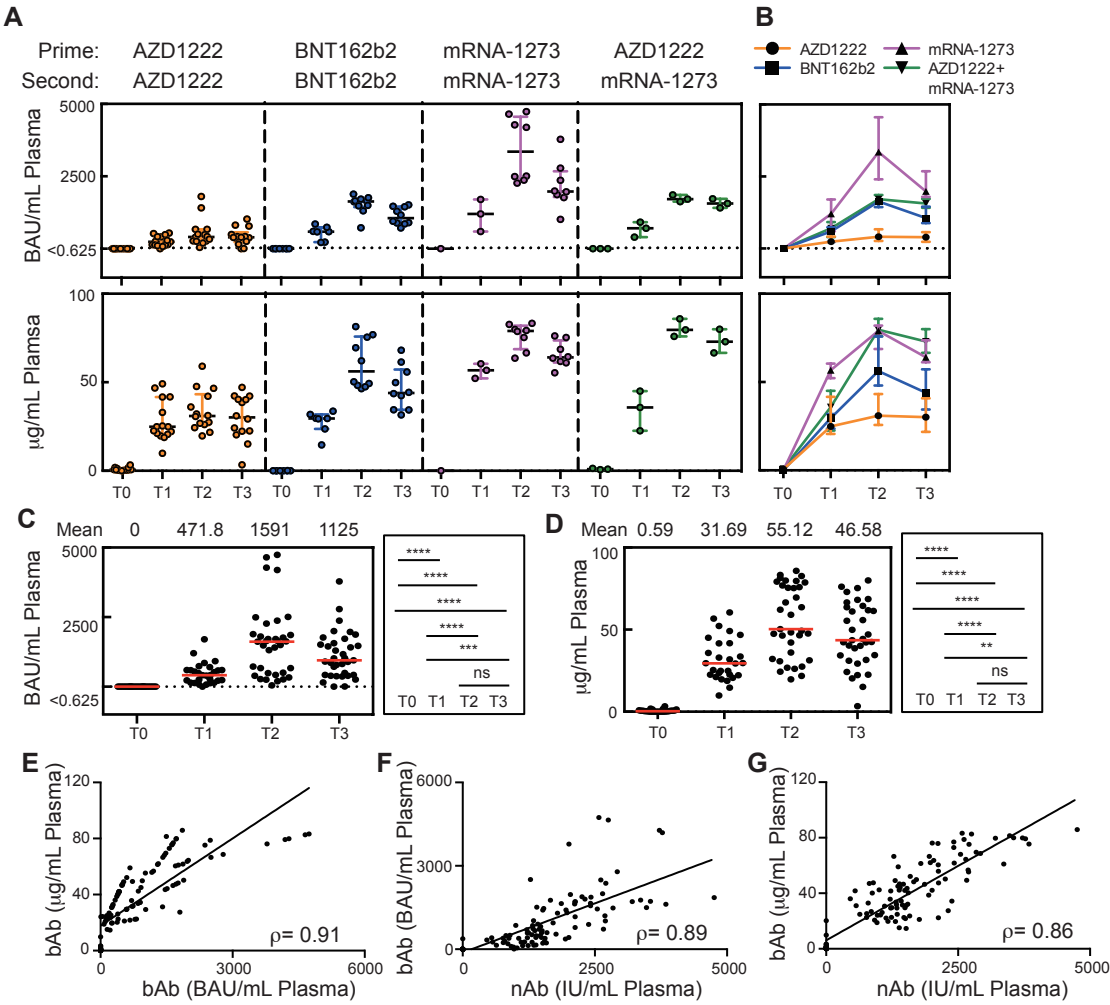


Figure S2

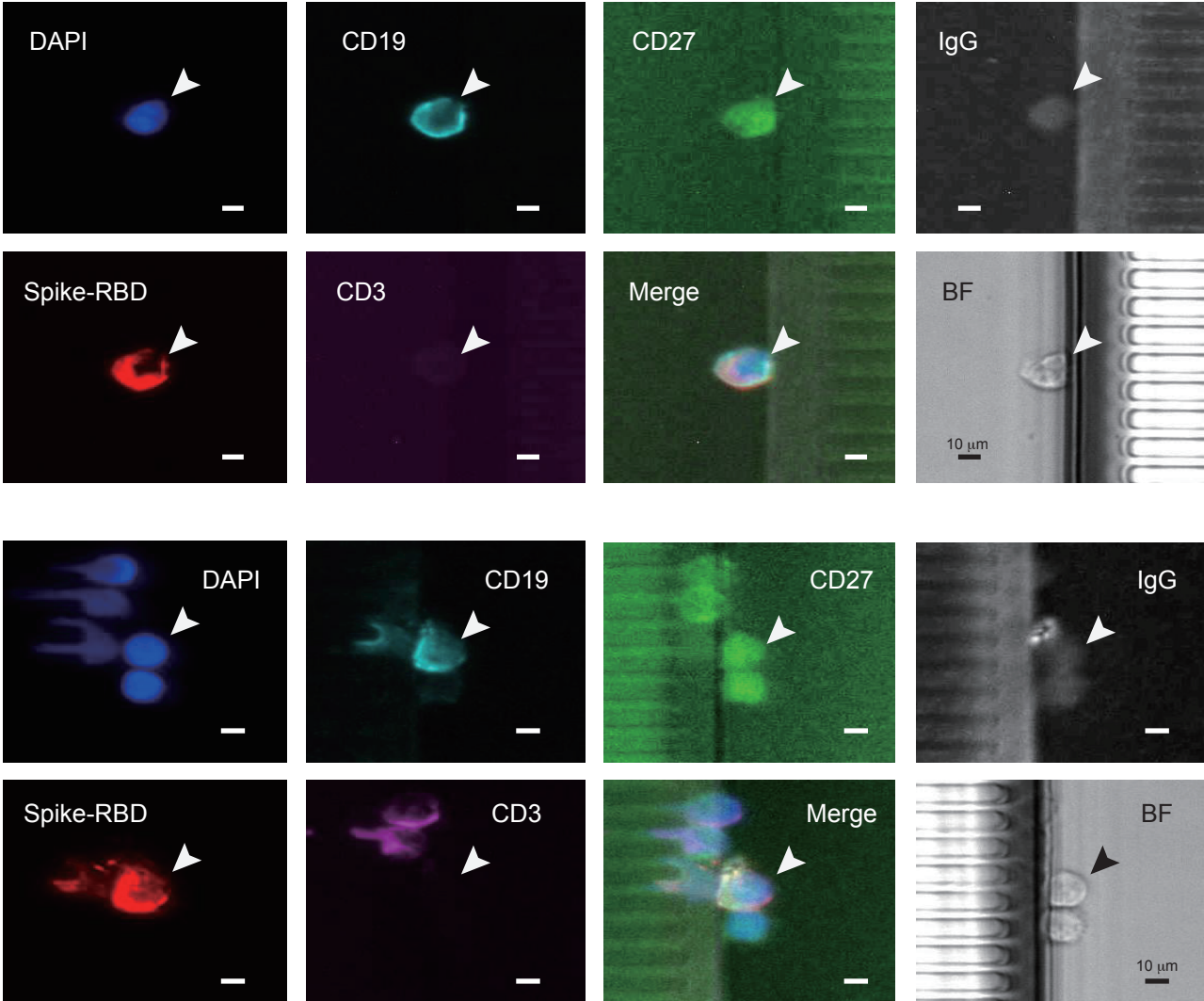


Figure S3

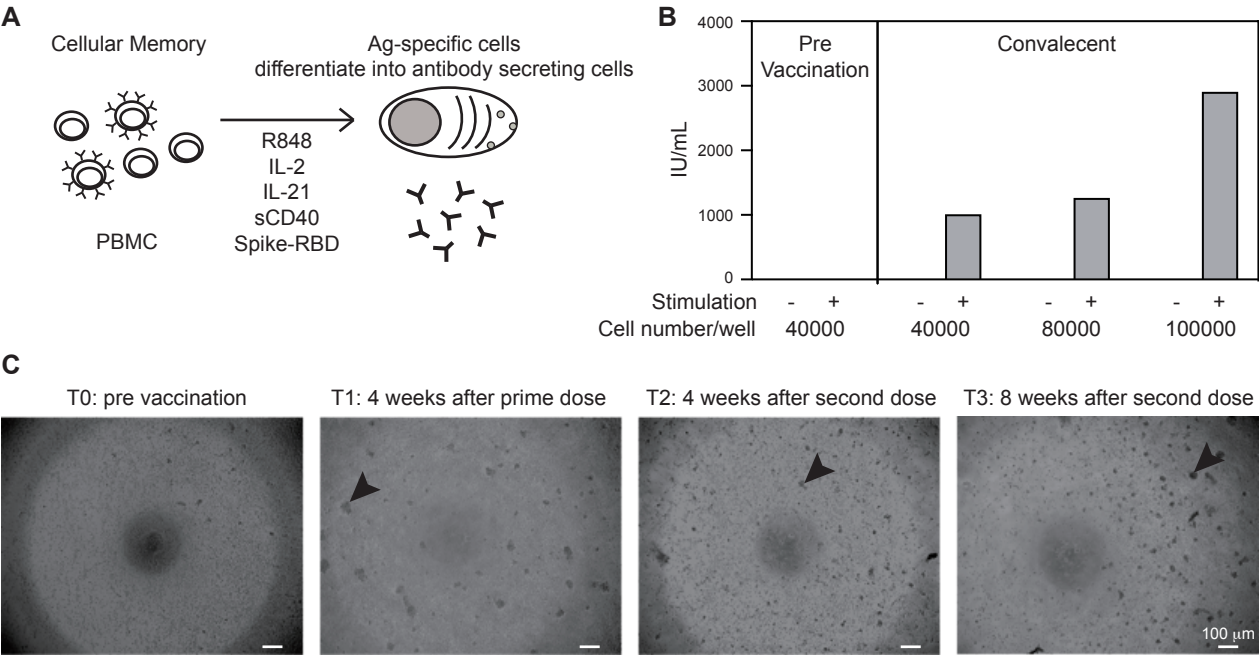


Figure S4

