

Supplemental information

**The T-cell-directed vaccine BNT162b4 encoding
conserved non-spike antigens protects animals
from severe SARS-CoV-2 infection**

Christina M. Arieta, Yushu Joy Xie, Daniel A. Rothenberg, Huitian Diao, Dewi Harjanto, Shirisha Meda, Krisann Marquart, Byron Koenitzer, Tracey E. Sciuto, Alexander Lobo, Adam Zuiani, Stefanie A. Krumm, Carla Iris Cadima Couto, Stephanie Hein, André P. Heinen, Thomas Ziegenhals, Yunpeng Liu-Lupo, Annette B. Vogel, John R. Srouji, Stephanie Fesser, Kaushik Thanki, Kerstin Walzer, Theresa A. Addona, Özlem Türeci, Uğur Şahin, Richard B. Gaynor, and Asaf Poran

Supplementary Information

Supplemental Tables

Table S1 - Summary of SARS-CoV-2 antigenic segments selected for inclusion in BNT162b4. SARS-CoV-2 amino acid coordinates are based on the NCBI Reference Sequence NC_045512 (Related to Figure 1).

Segment	Antigen	SARS-CoV-2 Start	SARS-CoV-2 End	BNT162b4 Start	BNT162b4 End
1	Nucleocapsid	206	372	30	196
2	ORF1ab NSP2	807	816	201	210
3	ORF1ab NSP1	108	123	211	226
4	ORF1ab NSP2	282	290	227	235
5	ORF1ab NSP3	906	916	236	246
6	ORF1ab NSP2	376	387	247	258
7	ORF1ab NSP3	2384	2392	259	267
8	Membrane	37	103	272	338
9	ORF1ab NSP3	1636	1650	343	357
10	ORF1ab NSP3	1937	1947	358	368
11	ORF1ab NSP4	2799	2809	369	379
12	ORF1ab NSP3	2563	2571	380	388
13	ORF1ab NSP3	2616	2626	389	399
14	ORF1ab NSP3	1367	1375	400	408
15	Membrane	156	188	413	445
16	ORF1ab NSP3	1148	1156	450	458
17	ORF1ab NSP3	1863	1873	459	469
18	ORF1ab NSP3	1319	1329	470	480
19	ORF1ab NSP2	735	747	485	497
20	ORF1ab NSP3	825	833	498	506
21	ORF1ab NSP2	474	484	507	517

Table S2 - Summary of number of unique peptide-HLA-I pairs, epitopes, and alleles contained within each segment of BNT162b4 (Related to Figure 1 and Figure S1).

Segment Number	Antigen	Length (Amino Acids)	Unique Peptide-HLA-I Pairs	Unique Epitopes	Unique HLA-I Alleles
1	Nucleocapsid	167	732	200	105
2	ORF1ab NSP2	10	40	4	34
3	ORF1ab NSP1	16	195	27	77
4	ORF1ab NSP2	9	12	3	11
5	ORF1ab NSP3	11	112	9	63
6	ORF1ab NSP2	12	59	12	38
7	ORF1ab NSP3	9	25	3	16
8	Membrane	67	544	124	87
9	ORF1ab NSP3	15	78	18	40
10	ORF1ab NSP3	11	41	7	29
11	ORF1ab NSP4	11	26	6	19
12	ORF1ab NSP3	9	5	3	5
13	ORF1ab NSP3	11	47	6	22
14	ORF1ab NSP3	9	6	1	6
15	Membrane	33	197	48	79
16	ORF1ab NSP3	9	8	1	8
17	ORF1ab NSP3	11	15	6	11
18	ORF1ab NSP3	11	27	7	24
19	ORF1ab NSP2	13	52	10	42
20	ORF1ab NSP3	9	29	2	28
21	ORF1ab NSP2	11	7	3	7
Total for BNT162b4		598	2257	500	105

Table S3 - Summary of number of unique peptide-HLA-II pairs, epitopes, and alleles contained within N and M segments of BNT162b4 (Related to Figure 1).

Segment Number	Antigen	Length (Amino Acids)	Unique Peptide-HLA-II Pairs	Unique HLA-II Epitopes	Unique HLA-II Alleles
1	Nucleocapsid	167	1396	605	58
8	Membrane	67	265	187	22
15	Membrane	33	331	94	35
Total for BNT162b4		598	1992	886	70