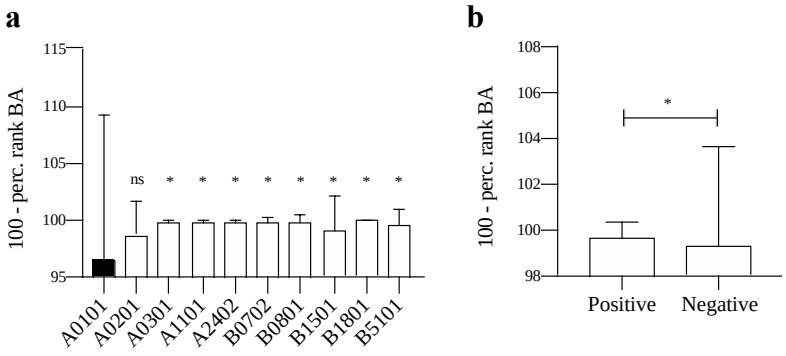
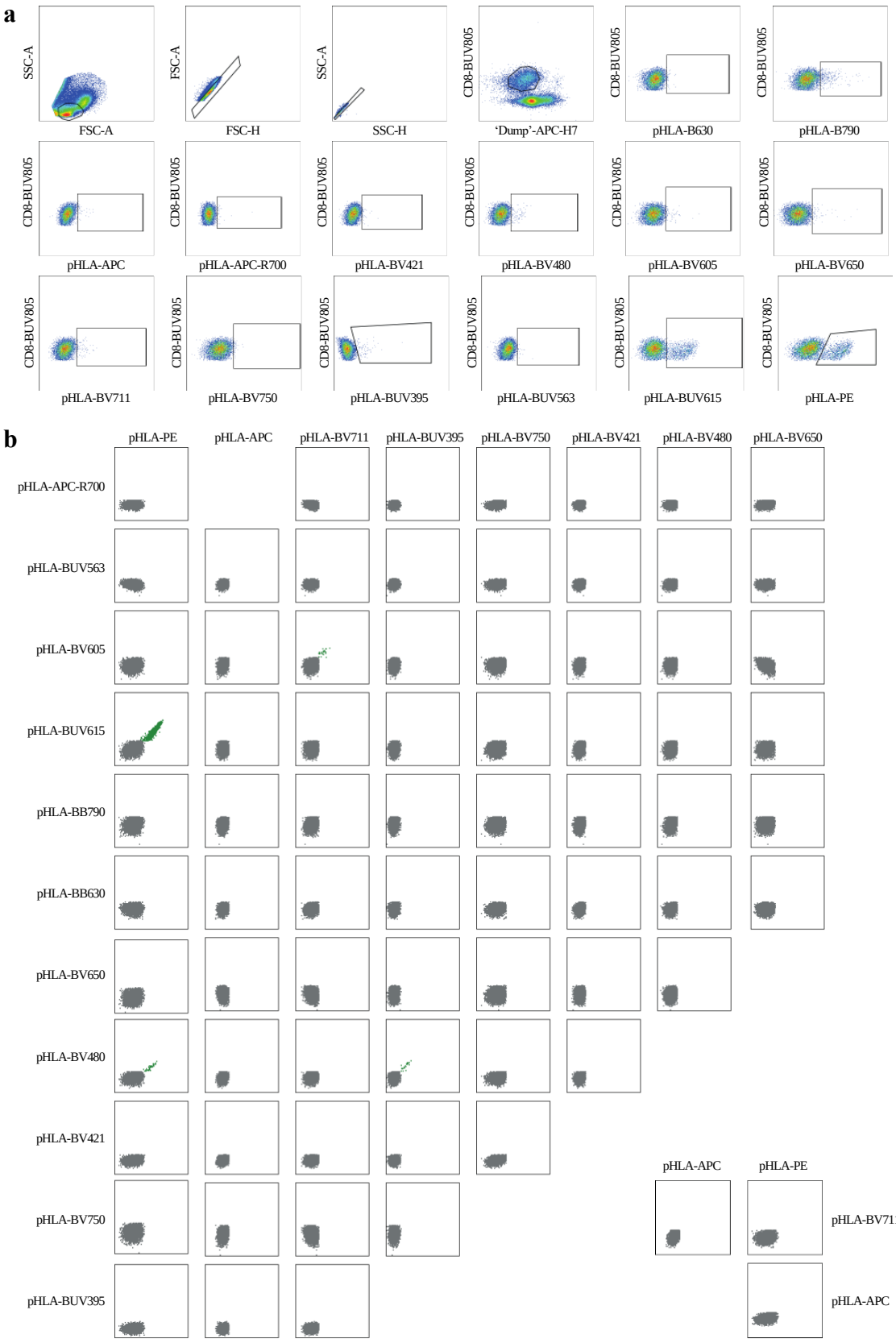
Supplementary Information



Supplementary Figure 1:

a) Overview of the inverse predicted percentile rank binding affinity of the included epitopes to their HLA alleles. On average, the epitopes restricted to HLA-A*01:01 are predicted to bind significantly poorer to their HLA than the other epitopes to their associated HLA alleles, with the exception of epitopes restricted to HLA-A*02:01. Statistical significance was tested with ordinary one-way ANOVA. ns: not significant, *P < 0.05.

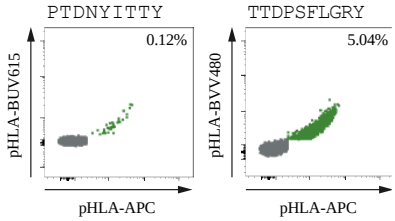
b) Comparison of the inverse predicted percentile rank binding affinity of the SARS-CoV-2 epitopes to which a positive CD8 T cell response was detected and the SARS-CoV-2 epitopes to which no CD8 T cell response was detected. Epitopes to which a positive CD8 T cell response was detected are predicted to have a significantly stronger binding affinity to their HLA. Statistical significance was tested with a two-tailed Mann-Whitney U test. P = 0.03. A higher percentile rank indicates stronger predicted binding. Percentile rank binding affinity was determined using NetMHCpan-4.0[16].


a
SSC-A
FSC-A
FSC-A
FSC-H
SSC-A
SSC-H
CD8-BUV805
'Dump'-APC-H7
CD8-BUV805
pHLA-B630
CD8-BUV805
pHLA-B790
CD8-BUV805
pHLA-APC
CD8-BUV805
pHLA-APC-R700
CD8-BUV805
pHLA-BV421
CD8-BUV805
pHLA-BV480
CD8-BUV805
pHLA-BV605
CD8-BUV805
pHLA-BV650
CD8-BUV805
pHLA-BV711
CD8-BUV805
pHLA-BV750
CD8-BUV805
pHLA-BUV395
CD8-BUV805
pHLA-BUV563
CD8-BUV805
pHLA-BUV615
CD8-BUV805
pHLA-PE
b
pHLA-PE
pHLA-APC
pHLA-BV711
pHLA-BUV395
pHLA-BV750
pHLA-BV421
pHLA-BV480
pHLA-BV650
pHLA-APC-R700
pHLA-BUV563
pHLA-BV605
pHLA-BUV615
pHLA-BB790
pHLA-BB630
pHLA-BV650
pHLA-BV480
pHLA-BV421
pHLA-BV750
pHLA-BUV395
pHLA-APC
pHLA-PE
pHLA-BV711
pHLA-APC

Supplementary Figure 2:

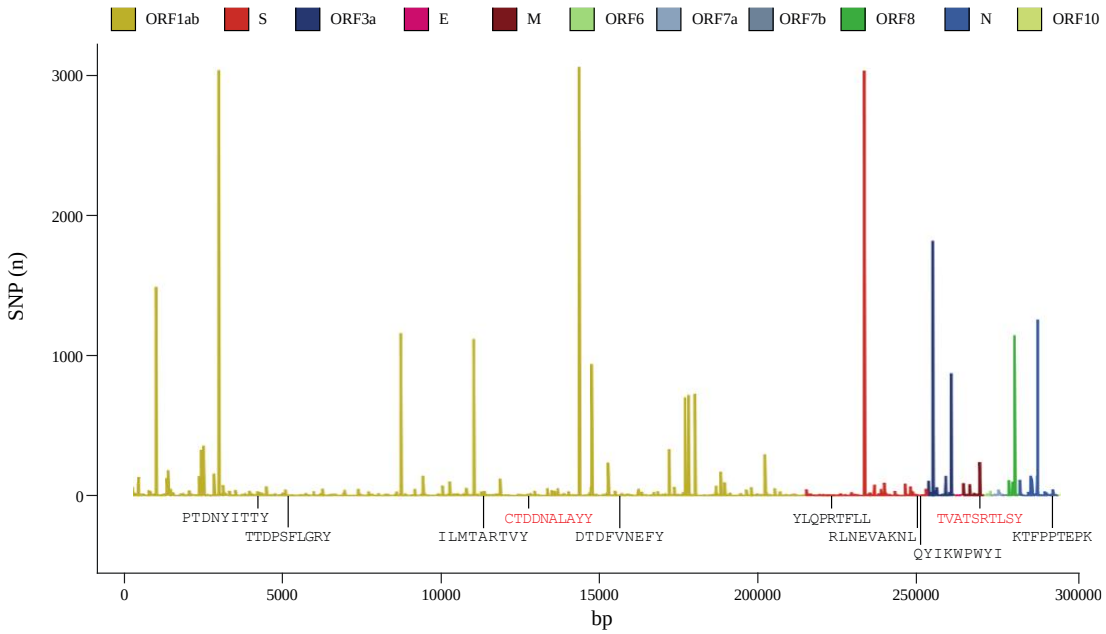
a) Representative gating strategy used for the identification of antigen-specific CD8 T cell responses. Single mononuclear cells were selected by FSC and SSC. Within the single cells, live CD8 T cells were selected based on gating on single live mononuclear cells positive for anti-CD8-BUV805, dim of live/dead and negative for anti-CD4/-CD14/-CD16/-CD19-APC-H7. Antigen-specific CD8 T cells were identified based on selection of CD8 T cells positive for only two of the 14 fluorescent pHLA multimers using Boolean gating. pHLA, peptide-major histocompatibility complex.

a) Representative overview of all 75 dual colour combinations used to identify the antigen-specific CD8 T cell responses (green) in patient COVID-143.



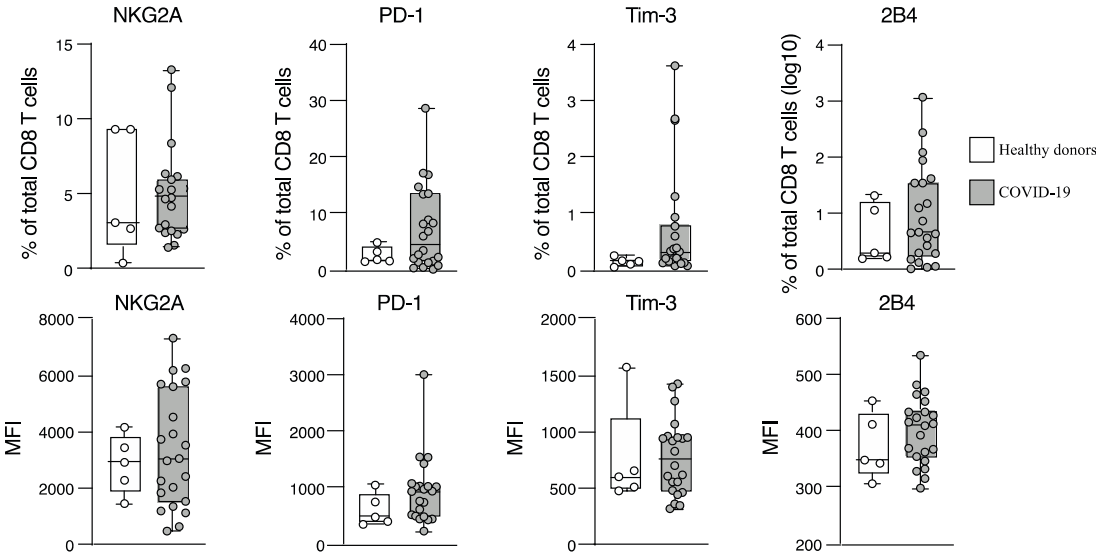
Supplementary Figure 3:

Representative flow cytometry plots for confirmed responses in patient COVID-096.



Supplementary Figure 4:

Bar graph indicating the number of SNPs reported across the SARS-CoV-2 genome. The location of the CD8 T cell recognized SARS-CoV-2 epitopes are indicated. The peptides in red are peptides that contain sites of significant homoplasy according to the SARS-CoV-2 Alignment Screen tool. The exact coding nucleotide ranges of the epitopes on the SARS-CoV-2 genome are: PTDNYITTY (4226-4252), TTDPSFLGRY (5174-5203), ILMTARTVY (11342-11368), CTDDNALAYY (12752-12781), DTDFVNEFY (15652-15678), YLQPRTFLL (22367-22393), RLNEVAKNL (25115-25141), QYIKWPWYI (25184-25210), TVATSRTLSY (27027-27056) and KTFPPTEPK (29354-29380). More information about the SNPs can be found in Table S. 2. Adapted from van Dorp et al. [21].



Supplementary Figure 5:

Fraction (% of total CD8 T cells) and expression levels (MFI) of total CD8 T cells expressing PD-1, NKG2A, 2B4 and Tim-3 in COVID-19 patients compared to healthy donors. Statistical significance was tested with a two-tailed Mann-Whitney U-test. No significance was found.

HLA allele	Peptide	Length (aa)	Protein	Response detected in this study	ViPR T cell response	ViPR Positive-High	ViPR Positive-Intermediate	ViPR Positive-Low	Prachar et al., 2020	[12]Nerli and Sgourakis, 2020	[13]Baruah and Bose, 2020	[16]NetMHCpan4.0	SARS-CoV-1 overlap	HCoV-NL63 overlap	HCoV-229E overlap	HCoV-OC43 overlap	HCoV-HKU1 overlap	Cpan-4.0 perc.rank bindin	en pMHC Stability	etta binding energy	ViPR Assay type	ViPR Method	ViPR Measurement
A*01:01	ACTDDNALAY	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0099					
B*18:01	AEWFLAYIL	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0447					
A*01:01	AFLLFLVLI	9	Non-structural protein 7b					X				X	TRUE					54.8273			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
A*11:01	AGFSLWVYK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0555	79.10483113				
A*03:01	AIDAYPLTK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.109	76.1567837				
A*11:01	AIDAYPLTK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.3305	56.95007325				
A*03:01	ALAYYNTTK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0887	87.45708806				
A*11:01	ALAYYNTTK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.1939	76.84344516				
A*03:01	ALCTFLLNK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0383	81.39145123				
A*11:01	ALCTFLLNK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0529	70.59910482				
A*11:01	ALGGSVAIK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE			X		0.9386	63.36480165				
A*02:01	ALNTLVKQL	9	Spike protein (S)		X			X		X		X	TRUE					3.6612		-70.822	MHC Binding, T Cell	cellular MHC/direct/fluorescence, 51 chromium, ELISPOT	qualitative binding, cytotoxicity, IFNg release
A*02:01	ALNTPKDHI	9	Nucleoprotein (N)		X			X				X	TRUE					10.8127			MHC Binding, T Cell	cellular MHC/direct/fluorescence, ELISPOT	qualitative binding, IFNg release
A*03:01	ALRANSAVK	9	Replicase polyprotein 1ab (ORF1ab)			X	X		X			X	TRUE					0.2267	97.73211799		MHC Binding	purified MHC/competitive/radioactivity, purified MHC/direct/radioactivity, purified MHC/direct/fluorescence	dissociation constant KD (~IC50), half life, dissociation constant KD (~EC50)
A*02:01	ALSKGVHFV	9	Protein 3a						X	X		X	FALSE					0.1011	60.32367555	-62.668			
B*15:01	ALWEIQQVV	9	Replicase polyprotein 1ab (ORF1ab)					X				X	TRUE					8.1737			MHC Binding	purified MHC/direct/fluorescence	dissociation constant KD (~EC50)
A*01:01	AMDEFIERY	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0754	58.66461464				
B*15:01	AMSAFAMMF	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.074					
B*07:02	APHGHVMVEL	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0606					
B*07:02	APHGVVFLHV	10	Spike protein (S)				X					X	TRUE					1.4136			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*07:02	APRTLLTKGTL	11	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0572					
B*07:02	APSASAFFGM	10	Nucleoprotein (N)				X					X	TRUE					0.3474			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*51:01	APSASAFFGM	10	Nucleoprotein (N)					X				X	TRUE					8.5325			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
A*11:01	AQCFKMFYK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0195	76.00237967				
B*15:01	AQFAPSASAFF	11	Nucleoprotein (N)									X	TRUE					0.0391					
B*15:01	AQYELKHGTF	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.047					
B*15:01	ASFSASTSAF	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0316					
A*01:01	ASHMYCSFY	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.2238	30.55056215				
A*03:01	ASMPTTIAK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0087	96.38867409				
A*11:01	ASMPTTIAK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.1188	84.16456062				
A*01:01	ATSRTLSYY	9	Membrane protein (M)			X			X			X	TRUE					0.0594	97.56856051		MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
A*03:01	AVAKHDFFK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.169	100.3019817				
A*11:01	AVAKHDFFK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0139	95.00814889				
A*11:01	AVLQSGFRK	9	Replicase polyprotein 1ab (ORF1ab)			X			X			X	TRUE					0.0344	64.8584305		MHC Binding	purified MHC/direct/radioactivity	half life
B*15:01	AVMYMGTLSY	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0096					
A*24:02	AYANSVFNI	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE		X			0.0475	67.0969952				
A*24:02	AYILFTRFF	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.1121	70.97676431				
A*24:02	AYLRKHFSM	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.355	57.52374147				
B*08:01	AYLRKHFSMM	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0702					
B*08:01	CLLNRYFRL	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0757					
B*51:01	CPAEIVDTV	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0427					
A*01:01	CTDDNALAY	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.005	91.09404679				
A*01:01	CTDDNALAYY	10	Replicase polyprotein 1ab (ORF1ab)	YES								X	TRUE					0.0061					
A*01:01	CVADYSVLY	9	Spike protein (S)			X			X			X	TRUE					0.0696	12.58259808		MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*51:01	DAPAHISTI	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0672					
B*18:01	DEFIERYKL	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0384					
B*18:01	DEFSSNVANY	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0159					
B*18:01	DEFTPFDVV	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.1039					
B*18:01	DEISMATNY	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0112					
B*18:01	DEWSMATYY	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0081					
B*18:01	DEWSMATYYL	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0709					
B*18:01	DEWSMATYYLF	11	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0338					
B*08:01	DGARRVWTL	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.1727					
B*18:01	DLDEWSMATYY	11	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0845					
B*08:01	DMTYRRLISM	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.1151					
A*01:01	DSFKEELDKY	10	Spike protein (S)					X				X	TRUE					0.8712			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
A*01:01	DTDFVNEFY	9	Replicase polyprotein 1ab (ORF1ab)	YES					X			X	FALSE					0.0097	79.88266538				
B*51:01	DTYPSLETI	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0926					
B*51:01	EAMYTPHTV	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0854					
B*18:01	EEFEPSTQY	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0185					
B*18:01	EEFEPSTQYEY	11	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.045					
B*18:01	EEIAIILASF	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0217					
B*18:01	EEKFKEGVEF	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0962					
B*18:01	EELPDEFVV	9	Protein 9b					X				X	TRUE					0.5504			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*18:01	EETGLLMPL	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0413					
A*01:01	EIDPKLDNY	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.2039	31.68843888				
B*07:02	EPVLKGVKL	9	Spike protein (S)								X	X	TRUE					1.3224					
A*24:02	EWFLAYILF	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.4064	23.53287915				
B*08:01	FARTRSMWSF	10	Membrane protein (M)									X	TRUE					0.0419					
B*18:01	FDEISMATNY	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.084					
B*18:01	FEEAALCTF	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0344					
B*18:01	FEHIVYGDF	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0621					
B*18:01	FEIKLAKKF	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.037					
B*18:01	FELEDFIPM	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0121					
B*18:01	FEPSTQYEY	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.098					
B*18:01	FERDISTEIY	10	Spike protein (S)									X	FALSE					0.0731					
B*18:01	FEYYHTTDPSF	11	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0895					
A*24:02	FFASFYYVW	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0752	63.92522783				
B*18:01	FGEYSHVVAF	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0168					
A*02:01	FIAGLIAIV	9	Spike protein (S)		X	X			X	X		X	TRUE					0.0926	1.506999499	-75.254	MHC Binding, T Cell	purified MHC/competitive/radioactivity, ELISA, ELISPOT	dissociation constant KD (~IC50), half maximal inhibitory concentration (IC50), IFNg release
B*08:01	FKLVNKFLAL	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0891					
A*02:01	FLAHIQWMV	9	Replicase polyprotein 1ab (ORF1ab)						X	X		X	FALSE					0.005	65.40162422	-71.124			
A*02:01	FLARGIVFM	9	Replicase polyprotein 1ab (ORF1ab)						X	X		X	FALSE					0.0313	47.77638739	-75.32			
A*01:01	FLCWHTNCY	9	Protein 3a						X			X	FALSE					0.4448	44.29323977				
A*02:01	FLFVAAIFYL	10	Replicase polyprotein 1ab (ORF1ab)							X		X	FALSE					0.0303		-80.099			
B*08:01	FLGRYMSAL	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0994					
A*02:01	FLLNKEMYL	9	Replicase polyprotein 1ab (ORF1ab)			X			X	X		X	TRUE					0.0078	81.10748499	-65.495	MHC Binding	purified MHC/competitive/radioactivity	half maximal inhibitory concentration (IC50)
B*08:01	FLLNKEMYL	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.1635					
A*02:01	FLLPSLATV	9	Replicase polyprotein 1ab (ORF1ab)			X			X	X		X	TRUE					0.0076	78.73321268	-77.116	MHC Binding	purified MHC/competitive/radioactivity	half maximal inhibitory concentration (IC50)
A*02:01	FLMSFTVLC	9	Replicase polyprotein 1ab (ORF1ab)						X	X		X	FALSE					0.6832	49.88469449	-73.532			
A*02:01	FLNRFTTTL	9	Replicase polyprotein 1ab (ORF1ab)			X			X	X		X	TRUE					0.0413	83.09235169	-71.651	MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50), half maximal inhibitory concentration (IC50)
B*08:01	FLNRFTTTL	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.1481					
A*01:01	FLTENLLLY	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.1066	63.17167924				
B*15:01	FLYENAFLPF	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0205					
B*15:01	FMGRIRSVY	9	Replicase polyprotein 1ab (ORF1ab)			X						X	TRUE					0.0536			MHC Binding	purified MHC/direct/radioactivity	half life
B*51:01	FPFTIYSLL	9	ORF10 protein									X	FALSE					0.0091					
B*51:01	FPFTIYSLLL	10	ORF10 protein									X	FALSE					0.018					
B*51:01	FPLCANGQV	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0324					
B*51:01	FPLCANGQVF	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.1255					
B*07:02	FPLKLRGTA	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.1416					
B*07:02	FPLKLRGTAV	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0372					
B*08:01	FPLKLRGTAV	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.07					
B*51:01	FPLKLRGTAV	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.1224					
B*07:02	FPLKLRGTAVM	11	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.1742					
B*51:01	FPLNSIIKTI	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0255					
B*07:02	FPNITNLCPF	10	Spike protein (S)				X					X	TRUE					0.1902			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*51:01	FPNITNLCPF	10	Spike protein (S)			X						X	TRUE					0.1788			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*07:02	FPPTSFGPL	9	Replicase polyprotein 1ab (ORF1ab)			X	X					X	TRUE					0.1544			MHC Binding	purified MHC/direct/fluorescence, purified MHC/competitive/radioactivity	qualitative binding, dissociation constant KD (~IC50), dissociation constant KD (~EC50)
B*51:01	FPPTSFGPL	9	Replicase polyprotein 1ab (ORF1ab)				X					X	TRUE					0.3302			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*51:01	FPPTSFGPLV	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0777					
B*07:02	FPRGQGVPI	9	Nucleoprotein (N)			X						X	TRUE					0.0086			MHC Binding	purified MHC/direct/fluorescence, purified MHC/competitive/radioactivity, purified MHC/direct/radioactivity	qualitative binding, dissociation constant KD (~IC50), dissociation constant KD (~EC50), half life
B*08:01	FPRGQGVPI	9	Nucleoprotein (N)				X					X	TRUE					0.046			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*51:01	FPRGQGVPI	9	Nucleoprotein (N)				X					X	TRUE					0.5901			MHC Binding	purified MHC/direct/fluorescence	dissociation constant KD (~EC50)
B*08:01	FRLFARTRSM	10	Membrane protein (M)									X	TRUE					0.0659					
A*01:01	FSAVGNICY	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0213	65.38879744				
A*01:01	FSNSGSDVLY	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0144					
A*01:01	FTDGVCLFW	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.248	48.23943562				
A*01:01	FTSDYYQLY	9	Protein 3a						X			X	FALSE					0.0089	78.82581609				
B*08:01	FVKHKHAFL	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0098					
A*02:01	FVMMSAPPA	9	Replicase polyprotein 1ab (ORF1ab)						X	X		X	TRUE					0.2124	54.74538021	-67.946			
A*24:02	FYGGWHNML	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.2913	76.32422051				
A*24:02	FYLTNDVSF	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0995	81.29298859				
B*18:01	GEYSHVVAF	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0172					
A*02:01	GLMWLSYFI	9	Membrane protein (M)						X	X		X	FALSE					0.0211	45.89467362	-70.149			
A*02:01	GMSRIGMEV	9	Nucleoprotein (N)		X	X	X			X		X	TRUE					0.6094		-56.47	MHC Binding, T Cell	cellular MHC/direct/fluorescence, purified MHC/competitive/fluorescence, ELISA, ELISPOT	qualitative binding, dissociation constant KD, IFNg release
A*01:01	GTDLEGNFY	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0117	70.47473053				
A*03:01	GVAMPNLYK	9	Replicase polyprotein 1ab (ORF1ab)			X	X		X			X	TRUE					0.0136	85.99881393		MHC Binding	purified MHC/competitive/radioactivity, purified MHC/direct/radioactivity, purified MHC/direct/fluorescence	dissociation constant KD (~IC50), half life, dissociation constant KD (~EC50)
A*11:01	GVAMPNLYK	9	Replicase polyprotein 1ab (ORF1ab)			X	X		X			X	TRUE					0.055	88.32147246		MHC Binding	purified MHC/competitive/radioactivity, purified MHC/direct/radioactivity, purified MHC/direct/fluorescence	dissociation constant KD (~IC50), half life, dissociation constant KD (~EC50)
A*03:01	GVYFASTEK	9	Spike protein (S)						X		X	X	FALSE					0.0371	75.55956533				
A*11:01	GVYFASTEK	9	Spike protein (S)						X			X	FALSE					0.0536	116.5676639				
A*03:01	GVYYHKNNK	9	Spike protein (S)						X			X	FALSE					0.1381	47.99149935				
A*11:01	GVYYHKNNK	9	Spike protein (S)						X			X	FALSE					0.4041	73.9058903				
A*24:02	GYKSVNITF	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.2069	27.7536214				
B*18:01	HEFCSQHTM	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE	X	X	X	X	0.0121					
B*18:01	HEGKTFYVL	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.075					
B*18:01	HEVLLAPLL	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0625					
A*03:01	HISRQRLTK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.3547	46.89659849				
A*11:01	HLMGWDYPK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0537	61.6838179				
A*03:01	HLYLQYIRK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0383	75.02419207				
A*11:01	HLYLQYIRK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.2906	69.0885084				
B*07:02	HPLADNKFAL	10	Protein 7a				X					X	TRUE					0.1311			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*51:01	HPLADNKFAL	10	Protein 7a					X				X	TRUE					3.6549			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
A*01:01	HSYFTSDYY	9	Protein 3a						X			X	FALSE					0.0996	58.36495813				
A*11:01	HVVGPNVNK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.2473	75.41677124				
B*51:01	IAIPTNFTI	9	Spike protein (S)									X	FALSE					0.0382					
B*18:01	IDFYLCFLAF	10	Non-structural protein 7b					X				X	TRUE					0.5557			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*18:01	IEVNSFSGY	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.078					
A*03:01	IINNTVYTK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.1018	79.79144439				
A*11:01	IINNTVYTK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.1725	67.34951155				
B*08:01	ILFTRFFYVL	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0984					
B*15:01	ILGLPTQTV	9	Replicase polyprotein 1ab (ORF1ab)					X				X	TRUE					11.5582			MHC Binding	purified MHC/direct/fluorescence	dissociation constant KD (~EC50)
A*02:01	ILGTVSWNL	9	Replicase polyprotein 1ab (ORF1ab)			X	X		X	X		X	TRUE					0.2601	58.33601833	-68.402	MHC Binding	purified MHC/direct/fluorescence, purified MHC/direct/radioactivity	qualitative binding, half life, dissociation constant KD (~EC50)
A*02:01	ILHCANFNV	9	Replicase polyprotein 1ab (ORF1ab)			X	X		X	X		X	TRUE					0.101	53.15018143	-67.543	MHC Binding	purified MHC/direct/fluorescence, purified MHC/competitive/radioactivity, purified MHC/direct/radioactivity	qualitative binding, dissociation constant KD (~IC50), half maximal inhibitory concentration (IC50), half life, dissociation constant KD (~EC50)
A*02:01	ILLNKHIDA	9	Nucleoprotein (N)		X		X			X		X	TRUE					3.5129		-69.852	MHC Binding, T Cell	cellular MHC/direct/fluorescence, ELISPOT	qualitative binding, IFNg release
B*15:01	ILMTARTVY	9	Replicase polyprotein 1ab (ORF1ab)	YES (HD)								X	TRUE					0.0346					
A*03:01	IMASLVLAR	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.4706	71.6692249				
A*24:02	IMQLFFSYF	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.3774	43.38547947				
B*07:02	IPIQASLPF	9	Protein 3a									X	FALSE					0.0934					
B*07:02	IPRRNVATL	9	Replicase polyprotein 1ab (ORF1ab)				X					X	TRUE					0.0093			MHC Binding	purified MHC/direct/radioactivity	half life
B*51:01	IPTNFTISV	9	Spike protein (S)									X	FALSE					0.0262					
B*07:02	IPVAYRKVL	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0261					
B*07:02	IPVAYRKVLL	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.1614					
B*51:01	IPYNSVTSSI	10	Protein 3a									X	FALSE					0.0312					
A*03:01	IQITISSFK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.1895	63.20096903				
A*11:01	IQITISSFK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.1393	80.7652725				
A*24:02	IQLSSYSLF	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0269					
B*15:01	IQLSSYSLF	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.1154	42.55987416				
A*01:01	ISDYDYYRY	9	Replicase polyprotein 1ab (ORF1ab)			X			X			X	TRUE					0.0107	83.61643991		MHC Binding	purified MHC/direct/fluorescence, purified MHC/competitive/radioactivity, purified MHC/direct/radioactivity	qualitative binding, dissociation constant KD (~IC50), half life
A*03:01	ITPVHVMSK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.2268	68.24405856				
A*11:01	ITPVHVMSK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.521	83.47858162				
A*24:02	IYLYLTFYL	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0702	96.73205084				
A*24:02	IYNDKVAGF	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.2688	68.76674701				
B*15:01	KAYNVTQAF	9	Nucleoprotein (N)									X	FALSE					0.0732					
B*07:02	KFPRGQGVPI	10	Nucleoprotein (N)									X	FALSE					0.0132					
B*07:02	KKPNELSRVL	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.1204					
A*03:01	KLFAAETLK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0183	87.20096339				
A*11:01	KLFAAETLK	9	Replicase polyprotein 1ab (ORF1ab)			X	X		X			X	TRUE					0.1386	80.80526741		MHC Binding	purified MHC/competitive/radioactivity, purified MHC/direct/radioactivity, purified MHC/direct/fluorescence	dissociation constant KD (~IC50), half life, dissociation constant KD (~EC50)
A*03:01	KLFDRYFKY	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0402	61.14058326				
B*08:01	KLFIRQEEV	9	Protein 7a					X				X	TRUE					3.8491			MHC Binding	purified MHC/direct/fluorescence	dissociation constant KD (~EC50)
A*02:01	KLIEYTDFA	9	Replicase polyprotein 1ab (ORF1ab)						X	X		X	FALSE					0.0468	58.45156053	-58.035			
A*02:01	KLKDCVMYA	9	Replicase polyprotein 1ab (ORF1ab)						X	X		X	FALSE					0.48	83.47872556	-67.542			
A*02:01	KLSYGIATV	9	Replicase polyprotein 1ab (ORF1ab)			X			X	X		X	TRUE					0.1181	75.36286321	-63.661	MHC Binding	purified MHC/competitive/radioactivity	half maximal inhibitory concentration (IC50)
B*08:01	KLVNKFLAL	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.1269					
A*02:01	KLWAQCVQL	9	Replicase polyprotein 1ab (ORF1ab)			X	X		X	X		X	TRUE					0.1657	56.99438946	-79.908	MHC Binding	purified MHC/direct/fluorescence, purified MHC/competitive/radioactivity, purified MHC/direct/radioactivity	qualitative binding, dissociation constant KD (~IC50), half maximal inhibitory concentration (IC50), half life, dissociation constant KD (~EC50)
B*15:01	KMFDAYVNTF	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0198					
B*07:02	KPNELSRVL	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0162					
B*07:02	KPREQIDGYVM	11	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.1196					
B*07:02	KPTETICAPL	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.1227					
B*07:02	KPVETSNSF	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.1536					
B*15:01	KQFDTYNLW	9	Replicase polyprotein 1ab (ORF1ab)				X					X	TRUE					15.994			MHC Binding	purified MHC/direct/fluorescence	qualitative binding, dissociation constant KD (~EC50)
B*15:01	KQLIKVTLVF	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0114					
A*03:01	KSAAEASKK	9	Nucleoprotein (N)						X			X	TRUE					0.4849	59.15563935				
A*11:01	KSAAEASKK	9	Nucleoprotein (N)						X			X	TRUE					0.3791	55.58320891				
A*03:01	KSAGFPFNK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0099	95.0930672				
A*11:01	KSAGFPFNK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0574	85.12466025				
A*01:01	KSDGTGTIY	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.0645	38.26864572				
A*03:01	KTFPPTEPK	9	Nucleoprotein (N)	YES		X	X		X			X	TRUE					0.046	74.56854902		MHC Binding	purified MHC/direct/radioactivity, purified MHC/competitive/radioactivity, purified MHC/direct/fluorescence	half life, dissociation constant KD (~IC50), dissociation constant KD (~EC50)
A*11:01	KTFPPTEPK	9	Nucleoprotein (N)			X	X	X	X			X	TRUE					0.0152	79.74163833		MHC Binding	x-ray crystallography, purified MHC/direct/radioactivity, purified MHC/direct/fluorescence, purified MHC/competitive/radioactivity	3D structure, half life, dissociation constant KD (~EC50), dissociation constant KD (~IC50)
A*03:01	KTIQPRVEK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.0926	60.15805506				
A*11:01	KTIQPRVEK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	FALSE					0.2173	59.27376156				
A*11:01	KVKYLYFIK	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE					0.3029	74.6520267				
A*24:02	KYTQLCQYL	9	Replicase polyprotein 1ab (ORF1ab)						X			X	TRUE	X		X	X	0.1442	100.6170314				
A*02:01	LALLLLDRL	9	Nucleoprotein (N)		X	X						X	TRUE					12.4467			MHC Binding, T Cell	cellular MHC/direct/fluorescence, ELISPOT	qualitative binding, IFNg release
B*51:01	LAWLYAAVI	9	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0289					
B*18:01	LDEWSMATYY	10	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0482					
B*18:01	LEAPFLYLY	9	Protein 3a									X	FALSE					0.0092					
B*18:01	LEGNFYGPF	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0827					
B*18:01	LEMELTPVV	9	Replicase polyprotein 1ab (ORF1ab)									X	FALSE					0.0653					
B*18:01	LEQWNLVIGF	10	Membrane protein (M)				X					X	TRUE					0.1318			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*18:01	LEWLAMAVM	9	Protein 14									X	FALSE					0.0176					
A*01:01	LFLAFVVFL	9	Envelope small membrane protein (E)					X				X	TRUE					44.2207			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
A*01:01	LFLAFVVFLL	10	Envelope small membrane protein (E)					X				X	TRUE					8.9095			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*15:01	LGIITTVAAF	10	Non-structural protein 8									X	FALSE					0.0636					
A*01:01	LIDLQELGKY	10	Spike protein (S)				X					X	TRUE					0.0903			MHC Binding	purified MHC/competitive/radioactivity	dissociation constant KD (~IC50)
B*15:01	LILMTARTVY	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0397					
A*02:01	LITGRLQSL	9	Spike protein (S)		X							X	TRUE					8.8948			T Cell	ELISA, ELISPOT	IFNg release
B*07:02	LKFPRGQGVPI	11	Nucleoprotein (N)									X	FALSE					0.1475					
B*15:01	LLAKDTTEAF	10	Replicase polyprotein 1ab (ORF1ab)									X	TRUE					0.0481					
B*08:01	LLALHRSYL	9	Spike protein (S)									X	FALSE					0.0375					

A*11:01	YVATNGPLK	9	Replicase polyprotein 1ab (ORF1ab)							X					X	FALSE					0.1858	77.01574864					
B*15:01	IVFFASFFY	9	Replicase polyprotein 1ab (ORF1ab)					X							X	TRUE					0.8974			MHC Binding	purified MHC/chromatography	dissociation constant KD (~5726	
A*02:01	YLATALTLV	9	Replicase polyprotein 1ab (ORF1ab)						X		X				X	FALSE					0.0678	47.91270051	48.149				
A*02:01	YLDAYNMMM	9	Replicase polyprotein 1ab (ORF1ab)			X			X		X				X	TRUE					0.009	80.94107666	49.451	MHC Binding	purified MHC/competitive high affinity	half maximal inhibitory concentration (IC50)	
B*58:01	YLKLIESWL	9	Replicase polyprotein 1ab (ORF1ab)												X	FALSE					0.0045						
A*02:01	YLMTDNQVA	9	Replicase polyprotein 1ab (ORF1ab)												X	FALSE					0.0256						
B*15:01	YLKLIESWV	9	Replicase polyprotein 1ab (ORF1ab)						X						X	FALSE					0.1196	57.13331385					
A*02:01	YLKDTNSFV	9	Replicase polyprotein 1ab (ORF1ab)								X				X	FALSE					0.2232	78.42852084	44.182				
A*02:01	YLNSTLTLV	9	Replicase polyprotein 1ab (ORF1ab)			X			X		X				X	TRUE					0.0212	58.98912733	44.419	MHC Binding	purified MHC/competitive high affinity	half maximal inhibitory concentration (IC50)	
B*51:01	YLPTRTGYLV	10	Replicase polyprotein 1ab (ORF1ab)												X	TRUE	X	X		X	0.018						
A*02:01	YLQPRTTLL	9	Spike protein (S)	YES							X		X		X	FALSE					0.0202	83.69033332	73.771				
B*08:01	YLQPRTTLL	9	Spike protein (S)												X	FALSE					0.0455						
B*08:01	YLRKHFSMM	9	Replicase polyprotein 1ab (ORF1ab)												X	TRUE	X				0.0067						
B*08:01	YLRKHFSMM	10	Replicase polyprotein 1ab (ORF1ab)												X	TRUE	X				0.0163						
A*02:01	YLTNDVSFL	9	Replicase polyprotein 1ab (ORF1ab)								X		X		X	FALSE					0.077	57.22292364	69.855				
A*02:01	YLYALVYFL	9	Protein 3b								X		X		X	FALSE					0.0675	61.52716456	72.002				
B*51:01	YMPASWVMR	10	Replicase polyprotein 1ab (ORF1ab)												X	TRUE					0.0448						
B*51:01	YMPETGTLI	10	Replicase polyprotein 1ab (ORF1ab)												X	TRUE					0.0111						
A*24:02	YNFANFSQI	9	Spike protein (S)								X				X	FALSE					0.6825	45.06645079					
B*07:02	YPALNDLCF	10	Replicase polyprotein 1ab (ORF1ab)												X	FALSE					0.0231						
B*07:02	YPFLELGSY	11	Protein 9b												X	FALSE					0.0548						
B*15:01	YPIDYNGLTV	10	Replicase polyprotein 1ab (ORF1ab)												X	FALSE					0.1222						
B*51:01	YPSLETIQI	9	Replicase polyprotein 1ab (ORF1ab)												X	FALSE					0.0133						
B*15:01	YQEVSKMQEY	9	Replicase polyprotein 1ab (ORF1ab)												X	TRUE					0.1279			MHC Binding	purified MHC/chromatography	qualitative binding	
A*02:01	YSVNTHSDK	9	Replicase polyprotein 1ab (ORF1ab)								X				X	FALSE					0.3575	75.1609189					
B*51:01	YSVNTHSDK	9	Replicase polyprotein 1ab (ORF1ab)								X				X	FALSE					0.3662	72.51231623					
A*01:01	YTDFATGAC	9	Replicase polyprotein 1ab (ORF1ab)								X				X	FALSE					0.1646	68.42369535					
A*01:01	YTMDIEFCT	9	Replicase polyprotein 1ab (ORF1ab)								X				X	FALSE					0.0873	31.81353783					
A*02:01	YTMADLVYA	9	Replicase polyprotein 1ab (ORF1ab)			X					X		X		X	TRUE					0.0805	74.77709571	44.774	MHC Binding	purified MHC/competitive high affinity	half maximal inhibitory concentration (IC50)	
B*15:01	YVNTFSLVH	9	Replicase polyprotein 1ab (ORF1ab)												X	FALSE					0.0167						
B*08:01	YVYSFVSEE	9	Envelope small membrane protein (E)												X	TRUE					0.13						
A*24:02	YWHTFSFGV	9	Replicase polyprotein 1ab (ORF1ab)								X				X	FALSE					0.1317	61.55597014					
A*24:02	YWQIEMDSF	9	Replicase polyprotein 1ab (ORF1ab)								X				X	FALSE					0.1484	102.2890682					
A*24:02	YYQLYSTQL	9	Protein 3a								X				X	FALSE					0.0997	35.91107468					
A*24:02	YYRSLFYVY	9	Replicase polyprotein 1ab (ORF1ab)								X				X	FALSE					0.1089	25.43143857					
A*24:02	YYSLLMPIL	9	Replicase polyprotein 1ab (ORF1ab)								X				X	TRUE					0.1781	44.14198574					
A*24:02	YYTAAFTTF	9	Replicase polyprotein 1ab (ORF1ab)								X				X	FALSE					0.0437	85.82754107					

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https://www.viprbrc.org

Supplementary Table 1: List of selected epitopes.

List including the literature source of included peptides (columns 'ViPR T cell response' to 'NetMHCpan4.0')[16], reported scores (percentile rank binding affinity according to NetMHCpan-4.0[16], percentage pMHC stability as determined by NeoScreen MHC binding assays[37], average binding energy of the peptide to the MHC as predicted by RosettaMHC (dG kcal/mol; Nerli and Sgourakis, 2020) and annotation in the Virus Pathogen Database and Analysis Resource (ViPR)) columns 'NetMHCpan-4.0[16] perc.rank binding affinity' to 'ViPR measurement'), and overlap of included peptide with the the SARS-CoV proteome (UniProt: UP000160648) and known 'common cold' coronaviruses (HCoV-NL63, UniProt: UP000145724; HCoV-299E, UniProt: UP000006716; HCoV-OC43, UniProt: UP000007552; HCoV-HKU1, UniProt: UP000006551). The overlap between viruses was determined by comparing the peptides in this study with all 9-11mer peptide sequences encompassing each compared viral proteome.

Supplementary Table 2:

Overview of the CD8 T cell recognized epitopes and associated SNPs as reported by van Dorp et al.[21]. NCBI reference sequence NC_045512.2 was used to indicate the location of the SNPs. Empty cells are 'unknown'. *Due to lack of annotation of SNPs, the estimated minimum frequency of isolates was obtained by dividing the reported number of SNPs by the total number of samples in the database (7667 per May 14th, 2020) multiplied by a 100. SNP: Single Nucleotide Polymorphism, AA: Amino acid, nt: nucleotide.

Viral gene	T cell recognized epitope	SNP location (nt)	Ratio (A:C:G:T)	Total reported SNPs	Ref. codon	Ref. AA	SNP codon	AA change	Alt. epitope	Isolates with alt. epitope (%)
ORF1ab	PTDNYITTY	4236		6	AAT	N		yes	yes	0.0783*
		4246		1	ACC	T		no	no	
		4252		1	TAC	Y				
	TTDPSFLGRY	5183	0:6994:0:7	7	CCT	P	TCT	P > S	TTDSSFLGRY	0.100
		5184		1	CCT	P		yes	yes	0.0130*
		5192		1	CTG	L				
		5194		1	CTG	L		no	no	
	ILMTARTVY	11355	0:7002:0:3	3	GCA	A	GTA	A > V	ILMTVRTVY	0.0428
		11356		1	GCA	A		no	no	
	CTDDNALAYY	12754		1	TGC	C				
		12756	0:7002:0:3	3	ACT	T	ATT	T > I	CIDDNALAYY	0.0428
		12769		1	GCG	A		no	no	
		12778	2:7000:0:3	5	TAC	Y	TAA, TAT	Y > stop, no	CTDDNALA	0.0285
		12781	0:6994:0:11	11	TAC	Y	TAT	no	no	
	DTDFVNEFY	15654	0:7003:0:2	2	GAC	D	GAT	no	no	
		15672		1	GAG	E				
S	YLQPRTFLL	22374		2	CAA	Q				
		22381		1	AGG	R				
		22384		1	ACT	T		no	no	
		22388		1	CTA	L				
		22391		1	TTA	L				
		22393		1	TTA	L				
	RLNEVAKNL	25116		1	CGC	R		yes	yes	0.0130*
		25135	0:0:7001:3	3	AAG	K	AAT	K > N	RLNEVANNL	0.0428
	QYIKWPWYI	25187		1	TAT	Y		yes	yes	0.0130*
		25191		1	ATA	I		yes	yes	0.0130*
		25207	0:6997:0:6	6	TAC	Y	TAT	no	no	
		25209		2	ATT	I		yes	yes	0.0130*
		25210		1	ATT	I				
N	KTFPPTEPK	29360		1	TTC	F		yes	yes	0.0130*
		29361		1	TTC	F		yes	yes	0.0130*
		29362		1	TTC	F				
		29366		1	CCA	P		yes	yes	0.0130*
		29370	0:6994:0:2	2	ACA	T	ATA	T > I	KTFPPIEPK	0.0286
		29374		18	GAG	E				
M	TVATSRTLSY	27046	0:6796:0:201	238	ACG	T	ATG	T > M	TVATSRMLSY	2.87
		27056	0:2:0:7002	2	TAT	Y	TAC	no	no	

Supplementary Table 3:

Overview of UV-sensitive peptides used for generating the corresponding UV-sensitive pHLA monomers. ‘J’ indicates the UV-sensitive amino acid.

Allele	Conditional ligand
A*01:01	STAPG-J-LEY[36]
A*02:01	KILGFVF-J-V[31]
A*03:01	RIYR-J-GATR[36]
A*11:01	AIFQSS-J-TK[36]
A*24:01	VYG-J-VRACL[35]
B*07:02	AARG-J-TLAM[36]
B*08:01	FLRGRA-J-GL[34]
B*15:01	ILGP-J-GSVY[34]
B*18:01	SELE-J-KRY
B*51:01	IPT-J-FSISI