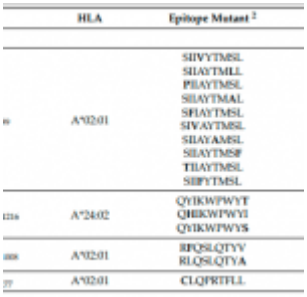
SARS-CoV-2 and T-cell escape



	HLA	Epitope Mutant [2]
	A*02:01	SIIVYTMSL SIIAYTMLL PIIAYTMSL SIIAYTMAL SFIAYTMSL SIVAYTMSL SIIAYAMSL SIIAYTMSF TIIAYTMSL SIIFYTMSL
	A*24:02	QYIKWPWYT QHIKWPWYI QYIKWPWYS
	A*02:01	RPQSLQTYV RLQSLQTYA
	A*02:01	CLQPRTFLL

Infection and immunisation against SARS-CoV-2 is capable of generating specific neutralising antibodies and T-cells. However, this immunity may begin to fade due to evolutionary mutations of the virus (Read more here).

Recent studies have reported that the specific T-cell response to SARS-CoV-2 is robust and are relatively unaffected by the mutations seen in the variants of concern (VOCs). It must be said that a loss of CD8+ T-cell responses has been observed in a small group of individuals who have either recovered from infection or who are vaccinated against the SARS-CoV-2 Omicron variant.

The evolution of CD8+ T-cell epitopes has left a weaker T-cell response in some individuals, therefore compromising the protection established through vaccinations and/or infection.

A recent paper by Ahmed, et al., aimed to identify and screen the mutations of SARS-CoV-2 involved in CD8+ T-cell escape. The researchers looked at 753 distinct HLA-specific CD8+ T-cell epitopes and SARS-CoV-2 genetic sequence data.

In this present study they found 83 SARS-CoV-2 mutations of CD8+ T-cell epitopes which may result in an escape of the T-cell response (Table 1). In future, these mutations may become of concern as they may affect the ability of SARS-CoV-2 to evade the immune response in previously-infected and vaccinated individuals.

Table 1: List of SARS-CoV-2 immunoprevalent HLA-specific CD8+ T cell epitope mutants recommended for experimental investigation (Ahmed, et al., 2022).

Epitope [1]	HLA	Epitope Mutant [2]	Count
S			
$_{691}$SIIAYTMSL$_{699}$	A*02:01	SIIVYTMSL	720
		SIIAYTMLL	655
		PIIAYTMSL	205
		SIIAYTMAL	181
		SFIAYTMSL	38
		SIVAYTMSL	24
		SIIAYAMSL	7
		SIIAYTMSF	7
		TIIAYTMSL	5
		SIIFYTMSL	5
$_{1208}$QYIKWPWYI$_{1216}$	A*24:02	QYIKWPWYT	314
		QHIKWPWYI	15
		QYIKWPWYS	13
$_{1000}$RLQSLQTYV$_{1008}$	A*02:01	RFQSLQTYV	20
		RLQSLQTYA	10
$_{269}$YLQPRTFLL$_{277}$	A*02:01	CLQPRTFLL	6

Table 1. *Cont.*

Epitope [1]	HLA	Epitope Mutant [2]	Count
M			
$_{26}$FLFLTWICL$_{34}$	A*02:01	FLFLTWICF	1478
		FLFLIWICL	1394
		FLFLTCICL	154
		LLFLTWICL	85
		FFFLTWICL	33
		CLFLTWICL	17
		FVFLTWICL	14
		FLFLTWICI	13
		VLFLTWICL	8
		FLLLTWICL	7
N			
$_{338}$KLDDKDPNF$_{346}$	A*02:01	KLDDKDSNF	633
		KLDNKDPNF	226
		KLNDKDPNF	177
		KFDDKDPNF	118
		KLDVKDPNF	78
		KLDHKDPNF	62
		KLGDKDPNF	38
		KLDDKDQNF	35
		KLDVKDPNF	13
		KLEDKDPNF	11
		KLDGKDPNF	10
		KLADKDPNF	6
		KLVDKDPNF	6
		KLDAKDPNF	6
		KLDDKDPNS	5
$_{361}$KTFPPTEPK$_{369}$	A*03:01	KKFPPTEPK	300
		KTFPPTEPN	107
		KTFPPTEPI	57
		KRFPPTEPK	30
		KTFPPTEPE	16
		KTFPPTEPT	14
		KTFPPTEPL	6
$_{361}$KTFPPTEPK$_{369}$	A*11:01	KKFPPTEPK	300
		KTFPPTEPN	107
		KTFPPTEPI	57
		KRFPPTEPK	30
		KTFPPTEPE	16
		KTFPPTEPT	14
		KTFPPTEPL	6
$_{156}$ATEGALNTPK$_{165}$	A*11:01	AIEGALNTPK	9685
		VTEGALNTPK	1162
		AAEGALNTPK	196
		ANEGALNTPK	101
		APEGALNTPK	36
		TTEGALNTPK	27
$_{361}$KTFPPTEPKK$_{370}$	A*03:01	KKFPPTEPKK	300
		KRFPPTEPKK	30
		KTFPSTEPKN	28
$_{103}$SPRWYFYYL$_{111}$	B*07:02	SSKWYFYYL	23

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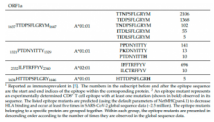
Table 1. *Cont.*

Epitope [1]	HLA	Epitope Mutant [2]	Count
ORF3a			
$_{112}$VYFLQSINF$_{120}$	A*24:02	VHFLQSINF	339
		VYFLQSINC	112
		VYFLQSINS	50
$_{139}$LLYDANYFL$_{147}$	A*02:01	LFYDANYFL	2582
		LLYDANYFF	1276
$_{207}$FTSDVYQLY$_{215}$	A*01:01	FTSDYYQLC	121
		FTSDYYQLH	64



Journal article: Ahmed, S. F., et al., 2022. Identification of Potential SARS-CoV-2 CD8+ T Cell Escape Mutants. *Vaccines*.

Summary by Stefan Botha