

# SARS-CoV-2 and T-cell escape

HLA	Epitope Mutant <sup>2</sup>	
66	A*0201	SIIVYTMRL
		SIAYTMRL
		FIAYTMRL
		SIAYTMAL
		SFIAYTMRL
		SIVAYTMRL
		SIAYAMRL
		SIAYTMRF
123	A*2402	QVIRWFWYT
		QIRWFWYT
		QVIRWFWYS
408	A*0201	RFSLSQIVY
		RIQSLSQIVY
27	A*0201	CLQRFITLL

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 <sup>1</sup>	HLA	Epitope Mutant <sup>2</sup>	Count
<b>S</b>			
691SIAYTMSL <sub>699</sub>	A*02:01	SIIVYTMSL	720
		SIAYTMLL	655
		PIIAYTMSL	205
		SIAYTMAL	181
		SFIAYTMSL	38
		SIVAYTMSL	24
		SIAYAMSL	7
		SIAYTMSF	7
		THAYTMSL	5
SIIFYTMSL	5		
1208QYIKWPWYI <sub>1216</sub>	A*24:02	QYIKWPWYT QHKKWPWYI QYIKWPWYS	314 15 13
1000RLQSLQTYV <sub>1008</sub>	A*02:01	RFQSLQTYV RLQSLQTYA	20 10
200YLQPRIFLL <sub>277</sub>	A*02:01	CLQPRIFLL	6

Table 1. Cont.

Epitope <sup>1</sup>	HLA	Epitope Mutant <sup>2</sup>	Count
<b>M</b>			
25FLRLTWICL <sub>34</sub>	A*02:01	FLRLTWICF	1479
		FLRLTWICL	1384
		FLRLTWICL	154
		LLFLTWICL	85
		FFFLTWICL	33
		CLFLTWICL	17
		IVFLTWICL	14
		FLRLTWICL	13
		VFLRLTWICL	8
FLLLTWICL	7		
<b>N</b>			
128KLDKDPNF <sub>136</sub>	A*02:01	KLDKDPNF	633
		KLDKDPNF	226
		KLDKDPNF	177
		KFDKDPNF	118
		KLDKDPNF	78
		KLDKDPNF	62
		KLDKDPNF	58
		KLDKDPNF	35
		KLDKDPNF	13
		KLDKDPNF	11
		KLDKDPNF	10
		KLDKDPNF	6
		KLDKDPNF	6
KLDKDPNF	5		
341KTFPTTEPK <sub>350</sub>	A*03:01	KKTFPTTEPK	300
		KTFPTTEPK	307
		KTFPTTEPK	57
		KTFPTTEPK	30
		KTFPTTEPK	16
		KTFPTTEPK	14
341KTFPTTEPK <sub>350</sub>	A*11:01	KKTFPTTEPK	300
		KTFPTTEPK	307
		KTFPTTEPK	57
		KTFPTTEPK	30
		KTFPTTEPK	16
		KTFPTTEPK	14

156ATEGALNTPK <sub>163</sub>	A*11:01	AIEGALNTPK	9685
		VIEGALNTPK	1162
		AAEGALNTPK	196
		ANEALNTPK	101
		APEGALNTPK	36
		TIEGALNTPK	27
361KTFPTTEPK <sub>370</sub>	A*03:01	KKTFPTTEPK	300
		KTFPTTEPK	30
		KTFPTTEPK	28
305SPRWYFYLL <sub>323</sub>	B*07:02	SRWYFYLL	23

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Table 1. Cont.

Epitope <sup>1</sup>	HLA	Epitope Mutant <sup>2</sup>	Count
<b>O0F3a</b>			
102VYFLQSINF <sub>120</sub>	A*24:02	VHFLQSINF	339
		VYFLQSINC	112
		VYFLQSINS	50
138LLYDANYFL <sub>147</sub>	A*02:01	LIFDANYFL	2582
		LLYDANYFF	1276
207FTSDVYQLC <sub>215</sub>	A*01:01	FTSDVYQLC FTSDVYQLH	121 64

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	LLYDANYFF	1276	
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	FTSDVYQLH	64	

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PIIAYTMSL

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SIVAYTMSL

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SIAYAMSL

7

SIAYTMSF

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THAYTMSL

5

SIIFYTMSL

5

A\*24:02

QYIKWPWYT

314

QHKKWPWYI

15

QYIKWPWYS

13

A\*02:01

RFQSLQTYV

20

RLQSLQTYA

10

A\*02:01

CLQPRIFLL

6

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FLRLTWICF

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

*Summary by Stefan Botha*