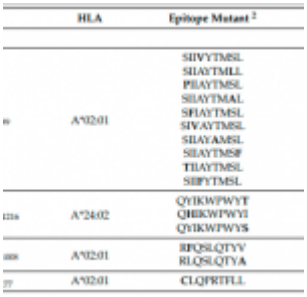
# SARS-CoV-2 and T-cell escape



| | HLA | Epitope Mutant [2] |
|---|---|---|
| | A*02:01 | SIIVYTMSL<br>SIIAYTMLL<br>PIIAYTMSL<br>SIIAYTMAL<br>SFIAYTMSL<br>SIVAYTMSL<br>SIIAYAMSL<br>SIIAYTMSF<br>TIIAYTMSL<br>SIIFYTMSL |
| | A*24:02 | QYIKWPWYT<br>QHIKWPWYI<br>QYIKWPWYS |
| | A*02:01 | RPQSLQTYV<br>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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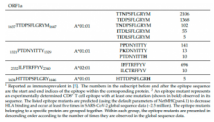
**Table 1.** *Cont.*

| 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*