"SARS-CoV-2 vaccination induces immunological memory able to cross-recognize variants Alpha to Omicron"

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Cell

Available online 24 January 2022

In Press, Journal Pre-proof

CellPress

Article

SARS-CoV-2 vaccination induces immunological T cell memory able to cross-recognize variants from Alpha to Omicron

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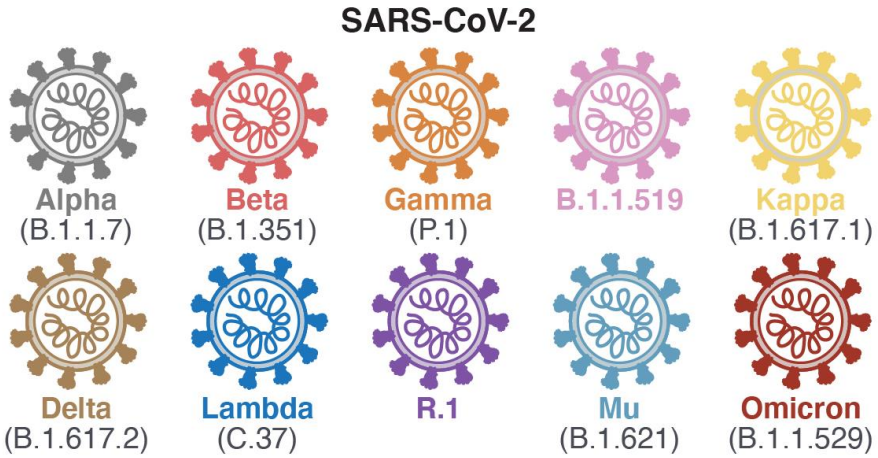
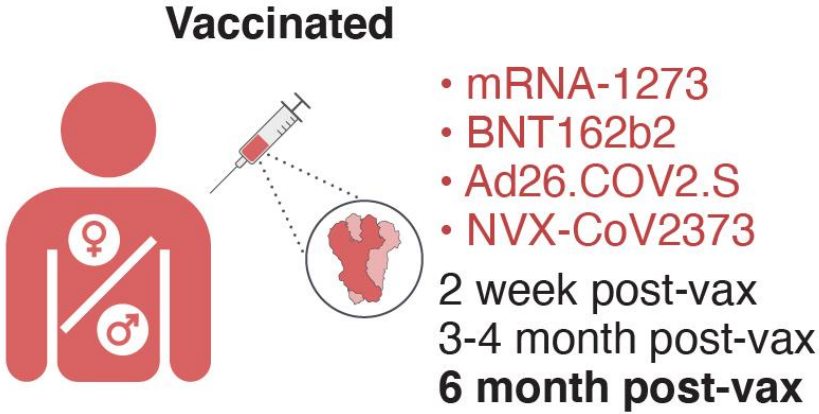
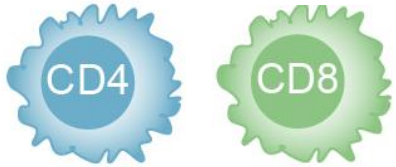
Spike-specific T cell reactivity to SARS-CoV-2 variants in vaccinated individuals



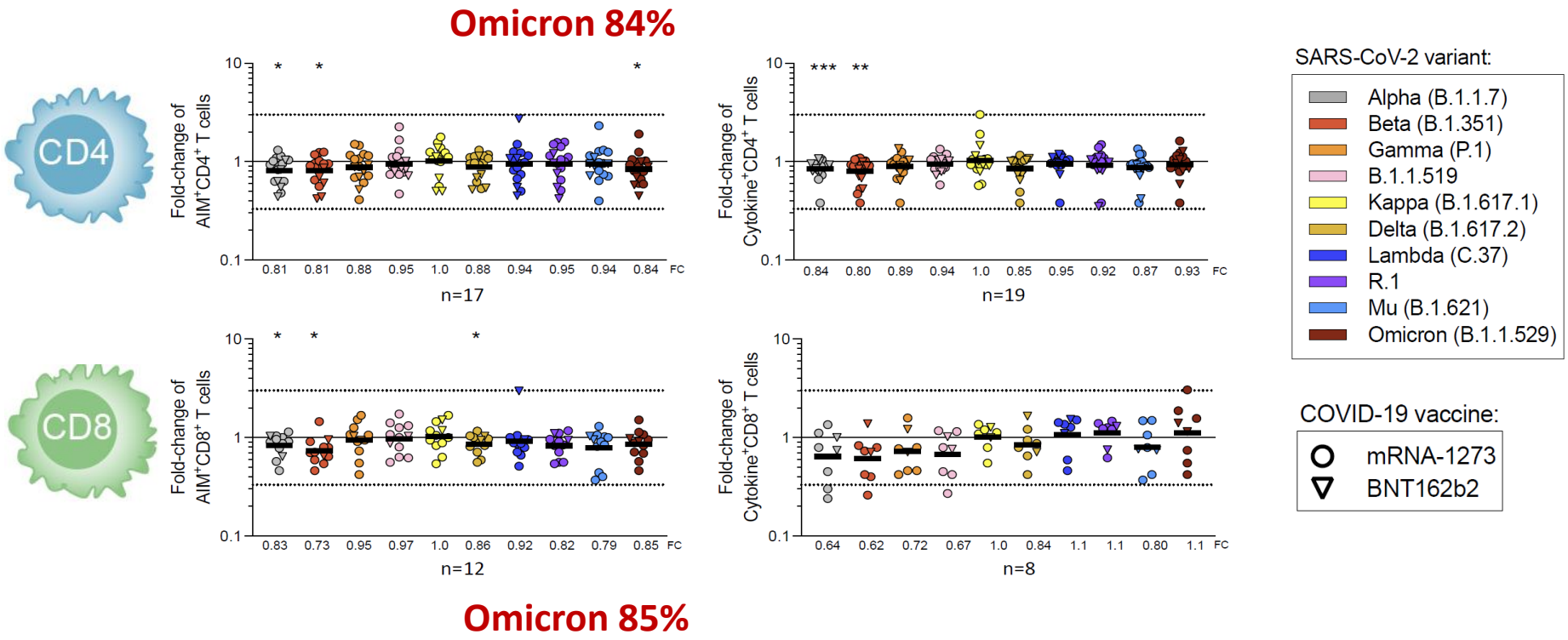




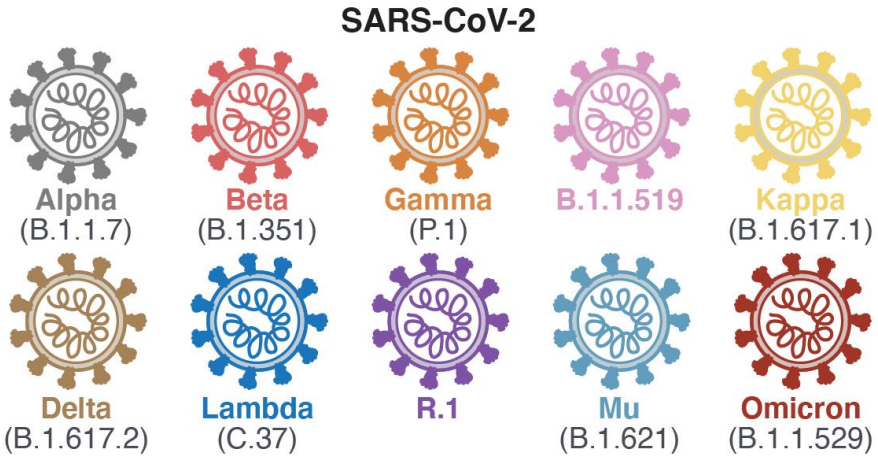
CD4 : **Avg. 90%**

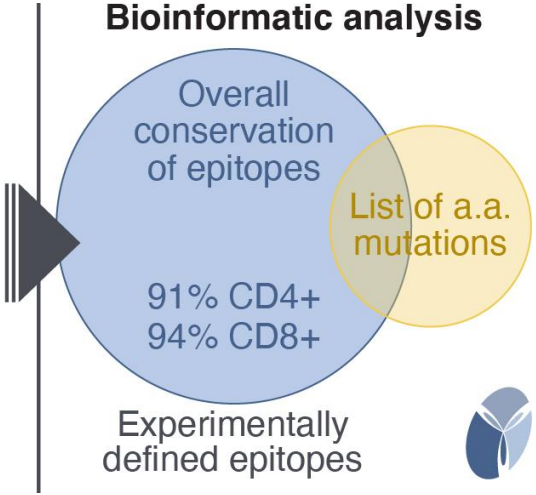
CD8 : **Avg. 87%**

Cross-recognition of SARS-CoV-2 variants by memory T cells

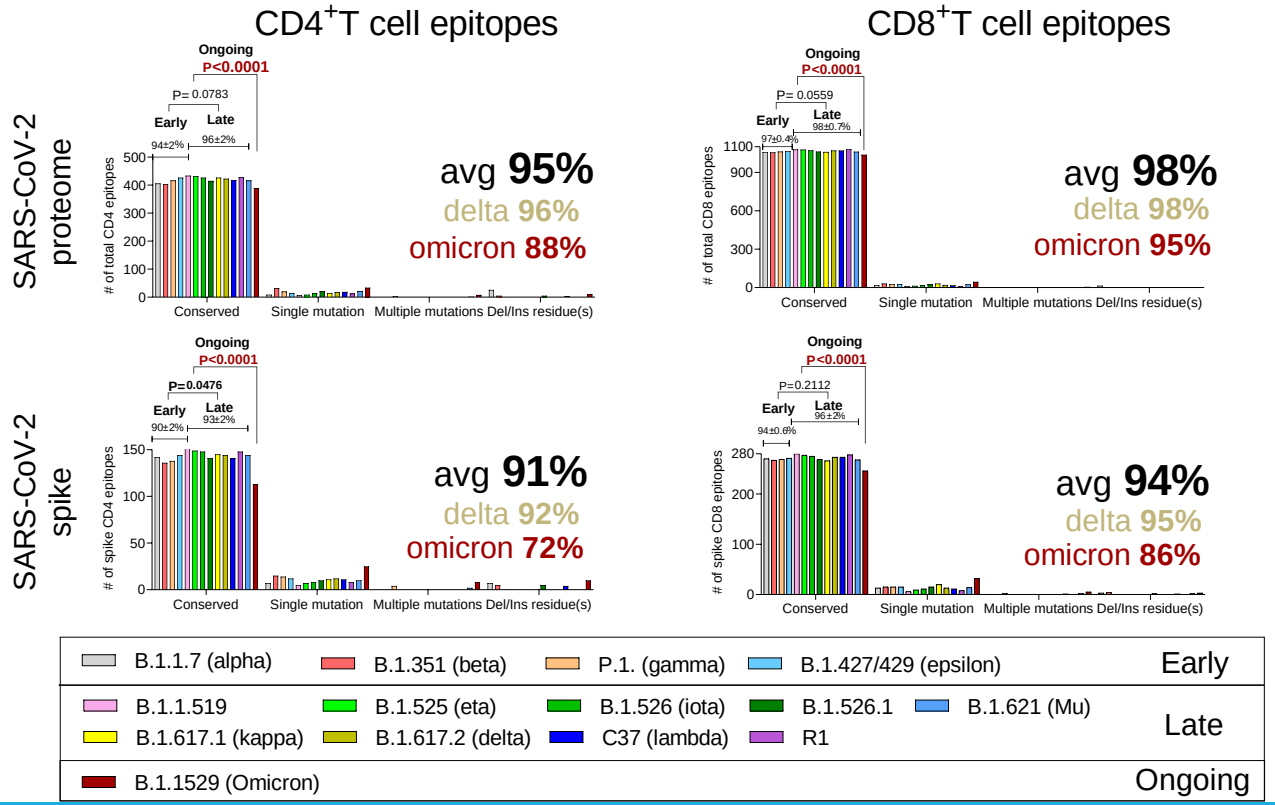


Predicted impact of SARS-CoV-2 variants on T cell epitopes

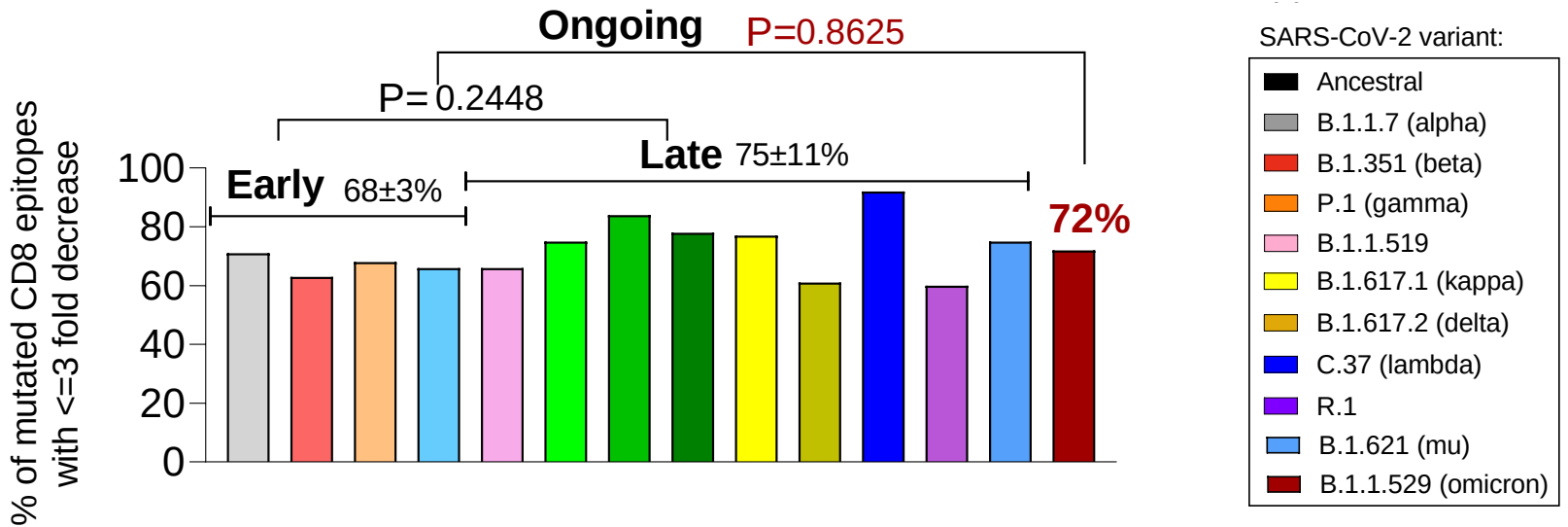




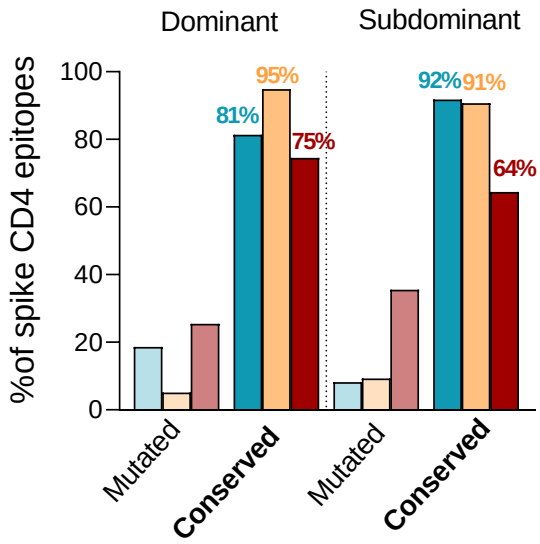
Conservation of T cell epitopes in Omicron

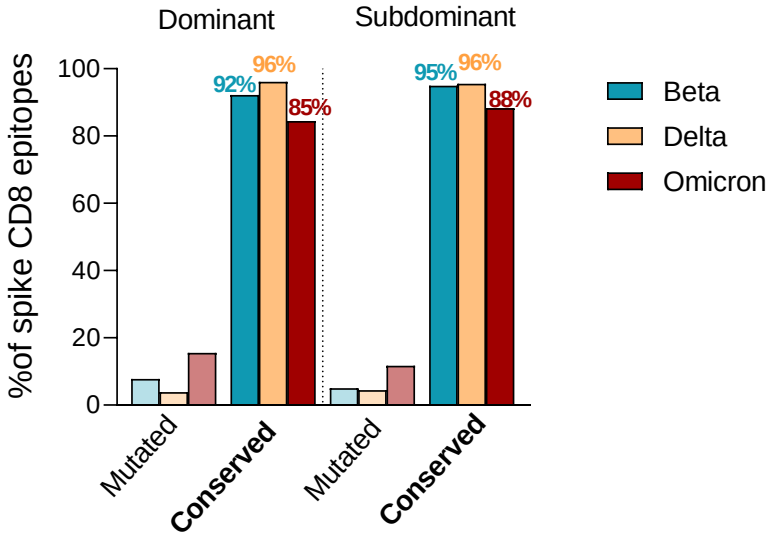


The majority of mutated CD8+T cell epitopes in Omicron are still able to bind HLA class I molecules

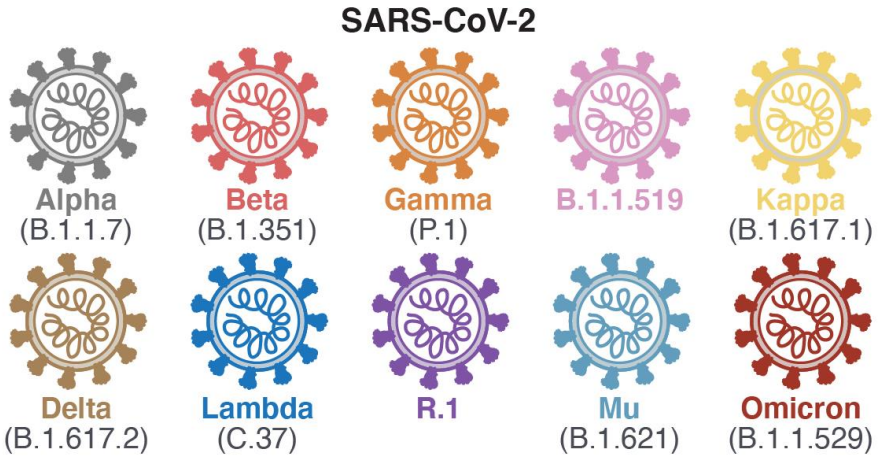


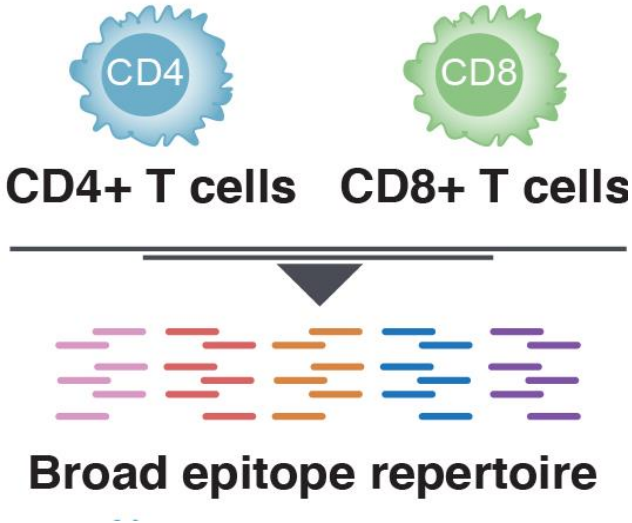
Dominant CD4 T cell epitopes are more conserved in Omicron



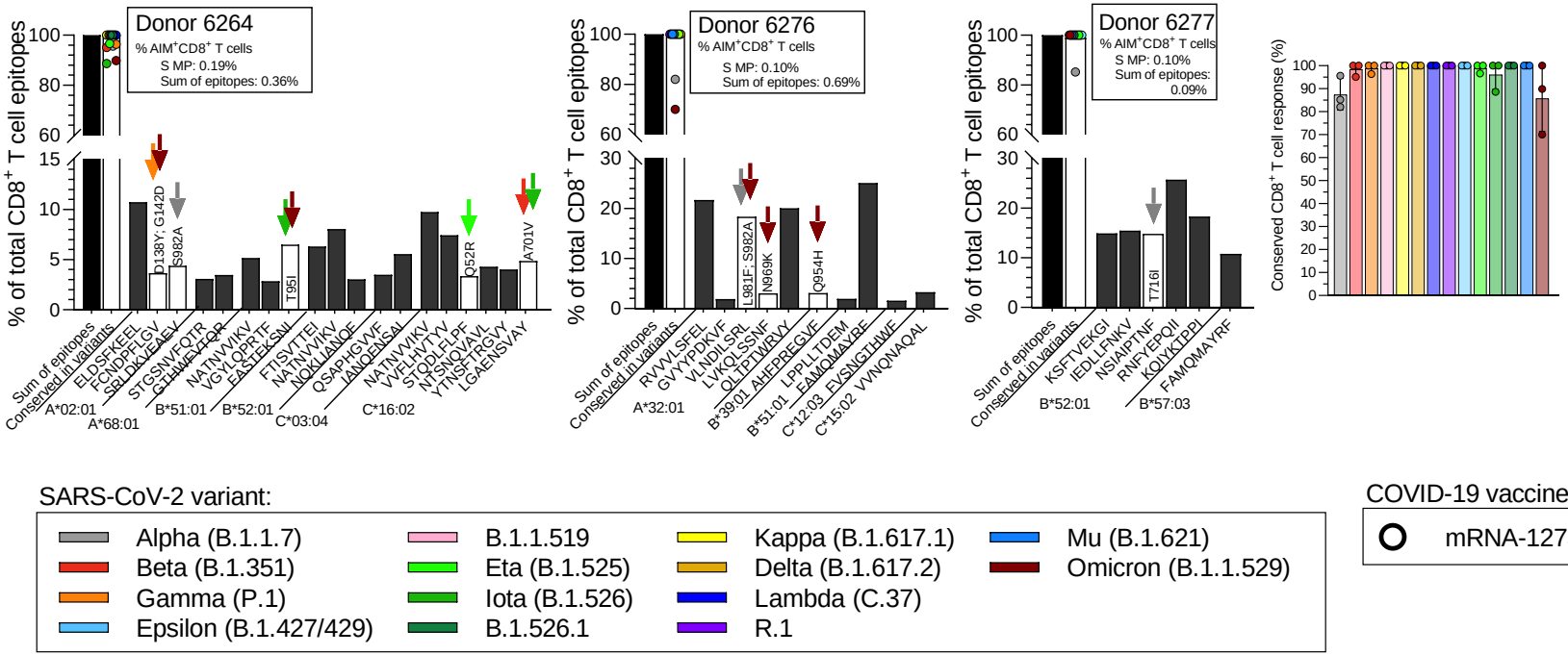


Breadth of T cell epitope repertoire and its conservation in variants





CD8+ T cell epitope repertoire



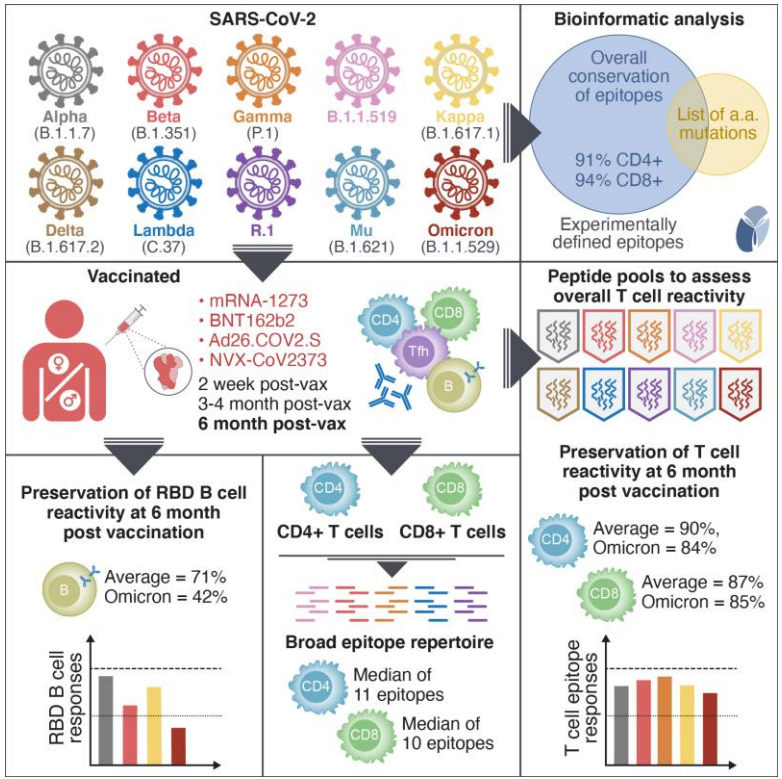
SARS-CoV-2 variant:

Alpha (B.1.1.7)	B.1.1.519	Kappa (B.1.617.1)	Mu (B.1.621)
Beta (B.1.351)	Eta (B.1.525)	Delta (B.1.617.2)	Omicron (B.1.1.529)
Gamma (P.1)	Iota (B.1.526)	Lambda (C.37)	
Epsilon (B.1.427/429)	B.1.526.1	R.1	

COVID-19 vaccine:

○ mRNA-1273

Cross-recognition of SARS-CoV-2 variants



➢**Bioinformatic analysis show the majority of spike epitopes are fully conserved**

- CD4 : Avg. 91% Omicron 72%
- CD8 : Avg. 94% Omicron 86%
- 74% of mut CD8 epitopes are predicted to still bind HLA

➢**B cells recognition is significantly reduced**

- (Avg. 71%, Omicron 42%)

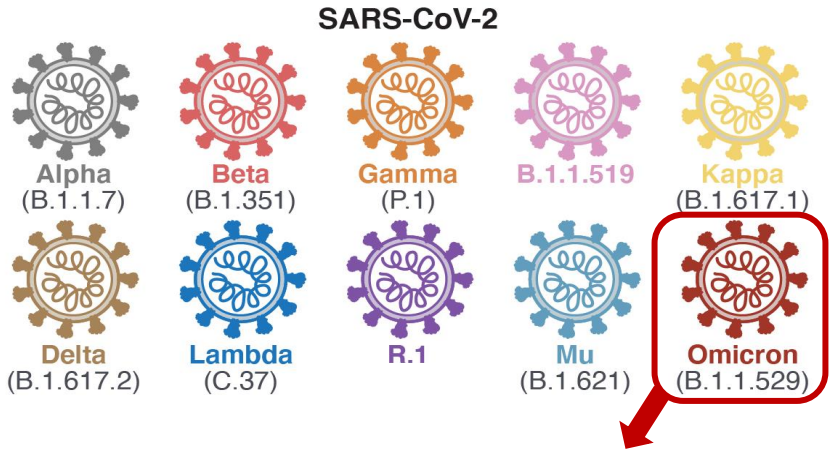
➢**T cells of vaccinees cross-recognize SARS-CoV-2 variants**

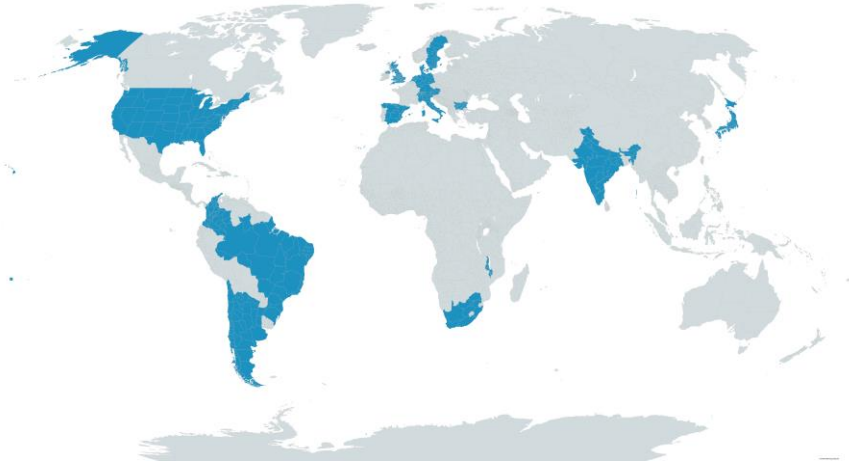
- Responses are also retained at the ICS level
- Irrespective of vaccine platform
- Effective recognition also after a first shot
- Memory recognition:
  - CD4 : Avg. 90% Omicron 84%
  - CD8 : Avg. 87% Omicron 85%

➢**T cell epitope repertoire**

- A median of 11 CD4 and 10 CD8 spike epitopes are
- Avg preservation > 80% for Omicron at the epitope level.

Worldwide collaboration sharing spike variant pools





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- Keeton et al., Nature 2022; South Africa — Wendy Burgers
- GeurtsvanKessel et al.,2022 Sci Imm; Netherlands — Rory DeVries/ Bart Haagmans
- Gao et al., Nat Med 2022; Sweden — Marcus Buggert