

Reliable measurement of SARS-CoV-2 T-cell response with MHC I Dextramer®

Nielsen, S. S. *et al.* SARS-CoV-2 Elicits Robust Adaptive Immune Responses Regardless of Disease Severity. [2020] BioRxiv preprint.

BACKGROUND

In this study the epitope-specific T-cell responses were investigated in a cohort of COVID-19 recovered patients using a selected panel of SARS-CoV-2 specific MHC I Dextramer® reagents. The patient's cohort presented asymptomatic to severe COVID-19 infections.

STUDY DESCRIPTION

A panel of nine different SARS-CoV-2 epitopes recently identified as potential targets for a CD8+ T-cell response to SARS-CoV-2 were chosen for this study. Blood from a cohort of 106 recovered COVID-19 patients (all HLA-A*0201 positive) were analyzed for CD8+ T cells reactivity against these nine different SARS-CoV-2 epitopes using MHC I Dextramer® reagents and flow cytometry.

RESULTS

90% of the recovered COVID-19 patients mounted a detectable SARS-CoV-2-specific CD8+ T-cell response to at least one, and up to seven, of the nine epitopes (**Table 1, Fig. 1**). The frequency of SARS-CoV-2 specific CD8+ T-cells was similar across all nine HLA-A2+ epitopes tested, with the highest individual responses observed for epitopes 3 and 6 (**Fig.2**). The cumulative frequency of SARS-CoV-2 specific CD8+ T cells across disease severity groups did not reveal any significant difference.

HLA-A*0201 epitope	SARS-CoV-2 Antigen	% Responders
1. TLACFVLAIV	Membrane	17%
2. GMSRIGMEV	Nucleocapsid	4%
3. LLLDRLNQL	Nucleocapsid	26%
4. ILLNKHIDA	Nucleocapsid	5%
5. RLNEVAKNL	Nucleocapsid	1%
6. YLQPRTFLF	Spike	81%
7. VLNDILSRL	Spike	3%
8. NLNESLIDL	Spike	3%
9. FIAGLIAIV	Spike	10%

Table 1 The nine SARS-CoV-2 epitopes sequence, antigen and % positive responders.

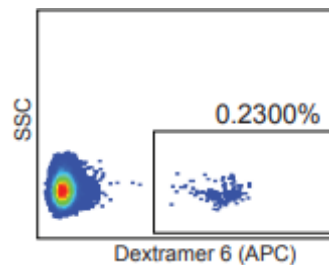


Fig. 1 Example of antigen-specific CD8+ T cells identification in blood from a COVID-19 patient using HLA-A*0201 / YLQPRTFLF MHC I Dextramer®.

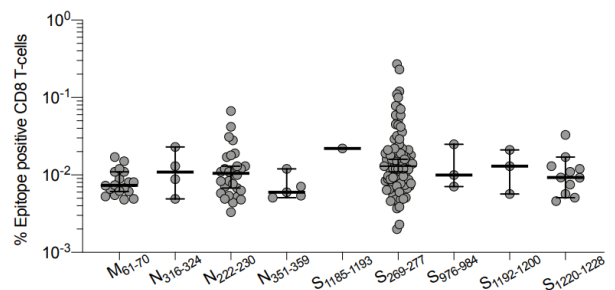


Fig. 2 Frequency of SARS-CoV-2 specific CD8+ T cells in the 106 HLA-A2+ individuals analyzed with the SARS-CoV-2 specific MHC I Dextramer® reagents.

CONCLUSIONS

- CD8+ T cells reactivity against SARS-CoV-2 plays a central role in the recovery of COVID-19 diseases
- 90% of the investigated individuals had a detectable SARS-CoV-2-specific CD8+ T-cell response
- "The panel of Dextramer® applied here provide a new and sensitive representation of the general CD8+ T-cell response to SARS-CoV-2. It will be an important tool in assessing long-term immunity following infection or vaccination"