Mabtech SARS-CoV-2 peptide pools for T-cell analysis

Peptide pools for T-cell stimulation come in two main flavors, scanning pools and defined pools.

Scanning pools

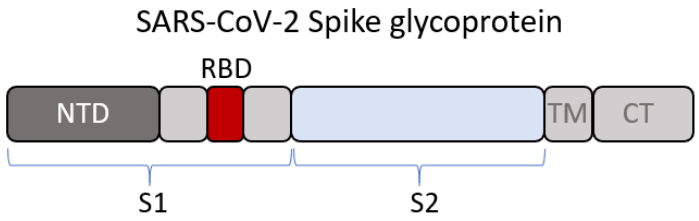
When new pathogens emerge, knowledge about CD4+ and CD8+ T-cell epitopes is often scarce. Scanning pools do not require prior knowledge about epitopes, they are designed by producing 15 mers overlapping by 11 amino acids, spanning the whole protein of interest. These overlapping peptides contain most of the possible epitopes which can bind to all different HLA types. 15 mers are optimal for CD4+ T-cell stimulation, when added to cells in culture they can be trimmed by proteases to shorter peptides, which are more suitable for CD8+ T-cell stimulation.

Defined epitope pools

Using sub-pools of large scanning pools, single epitopes can be defined and evaluated using T-cell assays such as ELISpot. Using recombinant MHC-I and MHC-II proteins, the MHC allele specificity of the epitope can also be defined. Epitopes can also be predicted in silico, produced and evaluated for MHC allele affinity. All defined epitopes can then be produced as peptides and pooled to make a defined peptide pool.

We have produced a scanning peptide pool covering the S1 domain of the spike protein. A similar pool covering the entire spike protein was used by Grifoni et al. The mean stimulation index observed by Grifoni et al. using CD4+ T-cell flow cytometry was 30. Using our pool in ELISpot we obtain a mean stimulation index of 100. This might be explained by the fact that ELISpot is a more sensitive method than flow cytometry.

We have also produced a peptide pool based on epitopes from S2 and the nucleoprotein (N) defined during the SARS-CoV-1 outbreak, the chosen epitopes are 100% homologous to SARS-CoV-2 (Ahmed et al.)



NTD= N terminal domain, RBD = receptor binding domain, TM= transmembrane domain, CT = Intracytoplasmic tail

MABTECH PEPTIDE POOLS

- S1 scanning pool (166 peptides, 15 mers overlapping by 11)
- S2 N defined pool (41 peptides)

REFERENCES

Grifoni et al. Targets of T cell responses to SARS-CoV-2 coronavirus in humans with COVID-19 disease and unexposed individuals. Cell, 7 May 2020.

Ahmed et al. Preliminary Identification of Potential Vaccine Targets for the COVID-19 Coronavirus (SARS-CoV-2) Based on SARS-CoV Immunological Studies. Viruses, 25 Feb 2020.