Basic Research

CD8 T cell responses against SARS-CoV-2 Spike antigen differ qualitatively from the responses against antigens from common viral infections.

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Introduction:

CD8+ T cells are major arm of antiviral immune response. These cytotoxic T cells are able to clear viral infection by eliminating infected cells. They secrete cytokines like interleukin, IFN-γ and TNF-α to exert cytotoxic response in order to clear pathogen. CD107a is degranulation marker present on activated CD8+ T cells. This study serves as qualitative comparison between SARS-CoV-2 Spike antigen and CEF peptides derived from human Cytomegalovirus, Epstein-Barr Virus and Influenza Virus which is antigen for common viral infection.

Methodology:

Healthy male participants (n=24) from age 20 to 30 were enrolled and 10 ml of venous blood was collected in EDTA vacutainers from the participants. Peripheral blood mononuclear cells were separated and stimulated overnight with SARS-CoV-2 Spike antigen and CEF peptide. PMA/Ionomycin was used as positive control. The next day, intracellular cytokine staining assay was performed and the cells were acquired on multicolor flow cytometer (FACSAria Fusion). Monofunctional (CD107a, IFN-γ, IL-2 & TNF-α) and polyfunctional (by Boolean gating) T cells responses were analyzed using FlowJo software. Wilcoxon matched paired t test was performed using GraphPad Prism5 for statistical analysis.

Results:

Frequency of CD107a expressing CD8+T cells was significantly higher in response to Spike protein than that against CEF peptides ($p = 0.0208$) indicating higher degranulation inducing capacity of SARS-CoV-2 Spike antigen. Frequency of IFN-γ expressing CD8+T cells was significantly higher in response CEF than against Spike protein ($p=0.0407$). Similarly, bifunctional and polyfunctional (expression of 3 or more cytokines) CD8+T cell responses were higher with CEF than that against the Spike protein ($p=0.0405$-one tailed and <0.0001, respectively).

Conclusion:

Significant differences were observed in CD8+ T cells responses against CEF antigen and SARS-CoV-2 Spike antigen. Polyfunctional response was higher in response to CEF antigen along with IFN-γ expression but CD107a response was higher in response to the Spike protein.