T Cells and Covid Vaccine

ePortfolio # 2: T cells and COVID Vaccine

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New research into vaccines have been developed with the idea in mind that neutralizing antibodies (NAbs) are more efficient against SARS-CoV-2 while failing to observe the effects of CD4+ T-cells, CD8+ T-cells, memory B cells, and even antibodies. The goal of the research was to protect against infections, prevent transmission, and defend against severe disease. Early high Nab titers post-mRNA had promising effects but have shown declined after four to six months, which meant more research was required to better understand how the efficiency was working alongside the variants that challenged it (Wherry & Barouch, 2022). Antibodies respond with two different methods: short-lived and long-lived plasma cells that are generated in germinal centers. Then it migrates to the bone marrow and is ready to convert to plasma cells if reinfection occurs. In addition to the two forms of antibodies, memory T-cells play a large part in long-term immunity. T-cells endure for decades after an infection and can recognize far more than NAbs, which could provide more flexible immunity against variants of SARS-CoV-2 and other viral agents (Wherry & Barouch, 2022). Clinical data on bivalent mRNA boosters have expressed the Omicron BA.1 spike and ancestral spikes. While NAb-induced vaccines had only adapted to ancestral spikes. The pivotal question that is presented due to the research is whether the future of optimizing T-cell immunity with COVID-19 vaccines is more efficient than NAbs. The figure presented in this paper illustrates the emphasis that needs to be placed on the consequences that can arise when evading T-cell responses. It shows the cause and effect of how NAbs can protect in high titers from infection, but when in low concentrations, it can lead to severe disease and even viral dissemination. (Wherry & Barouch, 2022). The future of this field should be focused on developing optimal methods of monitoring T-cell responses and how to refine current vaccines to advance the next generation of vaccines to be more susceptible to mutations and adapt to them.

In an investigation of the immunological determinants and protective efficiency against SARS-CoV-2, it was found that certain adoptive transfers resulted in more reliable protection against SARS-CoV-2. In a study on adoptive transfers that focused on the purified IgG in a recovering patient, it was noted that the NAbs connected with protection in the humoral immunity were more portent (McMahan, et al., 2021). During the adoptive transfer, it was also observed that when Nab titers were underperforming, CD8+ T-cells would also be used for protection (McMahan, et al., 2021). Another study in the therapeutic adoptive transfer study looked into the use of recovering patients’ plasma for the treatment of SARS-CoV-2 infections. During this study, the researchers emphasize the need for a vaccine to induce potent humoral and cellular immune responses (McMahan, et al., 2021). The result of this study proved that the concept of insight into immunological deterrents correlated to the protection against SARS-CoV-2.

Other researchers have experimented with the durability of mRNA vaccines and the highly conserved nature of cellular immunity against SARS-CoV-2 variants. Studies that utilized the function of binding assays assessed that the humoral immune response to SARS-CoV-2 spike protein is an indication that antibodies decay more rapidly than those in the original strain (Pegu, et al., 2021). At the same time, other studies have revealed that cellular immunity induced by vaccines is consistent against the variant Omicron’s spike protein with specific CD8+ and CD4+ T-cells (Liu, et al., 2022). Although NAbs were reduced, the vaccine continued to respond and gave researchers better insight into the longevity of vaccine-induced immunity (Liu, et al., 2022).

References

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