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Immunopathogenesis and Immunotherapeutics of COVID-19

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Commentary Article

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DESCRIPTION

The Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2)-caused new Coronavirus Disease (COVID-19) outbreak is seeing a significant increase in affected individuals worldwide. The host's immune response to SARS-CoV-2 appears to be crucial in disease development and clinical symptoms. In patients with severe COVID-19, SARS-CoV-2 can trigger not only antiviral immune responses, but also uncontrolled inflammatory responses characterised by strong pro-inflammatory cytokine production, leading to lymphopenia, lymphocyte dysfunction, and granulocyte and monocyte abnormalities.

SARS-CoV-2-induced immune disorders could lead to microbiological infections, septic shock, and severe multiple organ failure. As a result, the processes underlying immunological abnormalities in COVID-19 patients must be understood in order to guide clinical care of the disease. Furthermore, judicious modulation of SARS-CoV-2 immune responses, which includes boosting antiviral immunity while reducing systemic inflammation, could be crucial to a successful treatment. The immunopathology of COVID-19, its probable causes, and clinical consequences are discussed to facilitate the development of new COVID-19 therapy options.

Immune patterns are increasingly linked to disease progression in people infected with viruses, according to growing research. In individuals with Severe Acute Respiratory Syndrome, a decrease in peripheral T cell subsets is a distinct feature (SARS). A quick restoration of peripheral T cell subsets is observed in recovered patients; consequently, peripheral T cell number can be used as an accurate diagnostic test for SARS. Another study demonstrated that the immune system was harmed during SARS, which revealed a similar phenomenon.

Immunological characteristics are now being identified as potential biomarkers for disease development as well as prospective treatment targets for COVID-19, thanks to the discovery of the link between immune responses and COVID-19.

Coronavirus Disease 2019 (COVID-19) is a "public health emergency of international concern" caused by the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2). The virus is extremely contagious, has a high fatality rate, and its pathogenesis is unknown. COVID-19 aetiology includes pulmonary inflammation with significant lung damage, as well as widespread immune dysregulation. The first component, lung injury, appears to be caused, at least in part, by immunological dysregulation. Indeed, studies have demonstrated that immunological change is likely the fundamental pathogenic aspect of COVID-19, rather than only an association, as it might be in systemic infections.

Moreover, in COVID-19, precise immune response modulation, i.e., increasing antiviral immunity while limiting systemic inflammation, could be crucial to successful treatment. In this paper, we look at the latest research on COVID-19 immunology, covering innate and adaptive immune responses to the virus, as well as mechanisms of viral-induced immune dysregulation. Given that current antiviral medications are largely experimental, options for illness control using immunotherapy have also been examined. Understanding COVID-19 immunology is critical for creating effective COVID-19 therapeutics, as well as diagnostic and preventive methods.

Severe Acute Respiratory Distress Syndrome (SARDS) is a severe form of acute respiratory distress coronavirus (SARS-CoV-2) is to blame for the world's current public health crisis. SARS-CoV-2 is structurally and behaviorally identical to its forerunners, SARS and Middle East Respiratory Syndrome (MERS), although it has a lower fatality rate and a faster transmission rate. We've come a long way to recognise SARS and MERS, so our understanding of SARS-CoV-2 isn't entirely fresh. The large range of clinical symptoms in Coronavirus disease-2019 is due to various immune system reactions (COVID-19). Because the innate immune response is the first line of defence, it is activated very soon after the virus enters the body. As a result, the adaptive immune response is triggered in order to eliminate the virus.

This does not occur in every case, and the immune response varies is the primary cause of COVID-19 clinical symptoms. Inefficient and/or insufficient immune responses associated with cytokine storm are linked to lethal

manifestations of the disease. The current COVID-19 treatment strategy favours decreasing excessive inflammatory reactions while keeping the immune system aware and receptive to the virus. This, along with the use of antiviral medicines in these patients, could be a factor. Supplementing with various substances, such as vitamin D, has also been shown to affect immune system responses. A complete comprehension of COVID-19's historical occurrences that would aid in the development of a very effective treatment has yet to be discovered.

COVID-19 is an acute respiratory condition caused by the SARS-COV-2 virus, which has now spread globally. Increased serum levels of C-Reactive Protein (CRP), Interleukin-6 (IL-6), and a decline in the CD^{4+} and CD^{8+} T cell populations are the most commonly reported immunological findings in these individuals, according to the immunopathogenesis of COVID-19. In individuals with COVID-19, high levels of additional inflammatory cytokines and chemokines, such as IL-2 and IL-8, together with an increased number of neutrophils and eosinophils, may cause immunological problems.

There is mounting evidence that a better knowledge of COVID-19's immunopathogenesis will pave the way for the development of novel therapeutic medicines. Specific and non-specific immunotherapies, such as Convalescent Plasma (CP), are commonly used to treat individuals with severe COVID-19; however, there is no conclusive evidence that these treatments are successful. As a result, the goal of this review was to highlight the most recent and current investigations in order to uncover new immunotherapeutics for COVID-19.