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CYTOKINE STORM THE CAUSE AND REASON AND THE UNKNOWN ETIOLOGY

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This Report discusses about the cause, reason and the resolution for the exaggerated immune response to certain pathogenic infection in the human body called *Cytokine Storm*. It's an uncontrollable immune response from the immune system due to an infection. Cytokine storm is also known as Hypercytokinemia. Usually, the production of Cytokines is important for our body, but the over-production of the cytokines is a self-destructive process. Cytokines are small soluble molecules which functions as a messenger molecule for the immune system. These signaling molecules contains proteins and glycoproteins. These molecules are produced by wide range of immune cells. These are intercellular mediators as they bind to the specific cytokine receptor on the surface of cells. When they bind to those receptors, they change the specific activity of the cell like alter the protein functions or may be changing expression of genes and either increase the activity or decrease the activity.

The cytokines can impact the growth and development of the immune cells as well as maturation, activation and even impact on their life span. The most common two types of cytokines are Pro-inflammatory and Anti-Inflammatory cytokines. The pro-inflammatory cytokines are the cytokines that have detrimental effect such as stimulating the inflammation. In contrary, Anti-inflammatory cytokines serves to reduce the inflammation as a protective mechanism from the immune system.

In this report we will be focusing about the uncontrollable production of the Pro-Inflammatory cytokines. When pathogens like SARS CoV-1, SARS CoV-2, Influenza B, H5N1 and H1N1 Influenza, any other virus and any pathogen enters the body, the immune response from our immune system fights it back. Accordingly, as discussed earlier when a pathogen enters our body, the immune response increases and the strength of the immune response decreases gradually as it is getting cured or resolved. In contrary when the above-mentioned viruses cause infections the immune response will be potentially increasing without any gradual decrease later. This is a life threatening, uncontrolled local and systematic inflammatory response. Till now the cause of the above response is not clearly found and declared yet.

The cytokine storm conditions were first observed from the patients who were infected by bird flu through the virus called "H5N1 influenza virus". These patients have shown an uncontrollable high production of cytokines, and this marked its first observation as an external pathogen's trigger that caused a self-destruction mode. Recently, it was observed in the Covid-19 patients with SARS-CoV-2.

The Main mechanism of cytokine storm in the patients infected by SARS CoV-2 depended on the binding of S proteins in the surface of the virus to the cellular receptor (ACE2). When the virus enters respiratory epithelial cells, it provokes the immune response resulting in the production of the cytokine. This will be accompanied by a weak interferon response. The immune response of Th1 cells and intermediate CD14+, CD16+ monocytes are mediated and following the infiltration of *macrophages* and neutrophils into the lung tissue would result in the cytokine storm. The mainly secreted pro inflammatory cytokines are GM Colony Stimulating factor and interleukin 6. The GMCSF activates the inflammatory intermediate monocytes for the excess production of IL-6, Tumour necrosis factor -alpha, and other cytokines. According to Hirano et al, The Main contributors for the cytokine storm in covid 19 are the high expression of IL-6 and TNF-Alpha. Till date the reason for the uncontrollable cytokine production is unknown. Therapies are made by reducing some types of cytokines and as a result to keep it control which needs further clarification. In future, the discoveries about the cytokine storm should be focussed on developing different treatment models considering the fact that, the moment at which the cytokine production starts in different immunological conditions of the patients is unknown.