



## Covid-19 & Cytokine Storms

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### Why in News

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Accumulating evidence suggests that a **subset of patients with severe Covid-19** might have a **“Cytokine Storm Syndrome” (CSS)**.

- CSS is an **overly vigorous immune response** to a triggering event, frequently certain viral infections.
- **Severe COVID-19 patients** are defined by manifestations that include **respiratory failure** requiring **mechanical ventilation** and shock or organ failure that requires intensive care, and which may lead to death.

### Cytokine Storm Syndrome

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- **Body’s Immune Response Working**
  - The immune systems in our bodies protect us from bacteria, viruses, and parasites by removing them from our systems.
  - The immune system gets activated by things that the body does not recognise as its own. These things are called **antigens**, and include **bacteria, fungi and viruses**.
  - An **effective immune system response involves inflammation**, an important and indispensable part of the process. **For example**, Inflammation is visible when one hurts one's knee or ankle — the area of this external injury becomes red and swollen.
  - Immune system deploys **white blood cells** to the injured area to begin work on repairs.
  - Without such an immune response, injuries would not heal, and infections would become deadly.

- **Role of Cytokines**

- **Cytokines are inflammatory immunological proteins** that are there to fight off infections and ward off cancers.
- The **release of inflammatory mediators increases the blood flow to the area**, which allows larger numbers of immune system cells to be carried to the injured tissue, thereby aiding the repairing process. Thus, inflammation has an important protective function.
- However, if this **inflammatory response is not regulated**, very dangerous consequences can follow. This is when a '**cytokine storm**' can be triggered.

- **Cytokine Storm Syndrome**

- CSS is characterised by the **overproduction of immune cells and the cytokines** themselves because of a dysregulation in the process.
- **Reasons:** A cytokine storm can occur due to an infection, auto-immune condition (when the body's immune system **attacks healthy cells** as in case of coeliac disease- an immune disorder that **primarily affects the small intestine**), or other diseases.
- **Signs and symptoms** include high fever, inflammation (redness and swelling), severe fatigue, and nausea.

In the **case of any flu infection**, a cytokine storm is associated with a **surge of activated immune cells** into the lungs, which, instead of fighting off the antigen, leads to **lung inflammation** and fluid build-up, and **respiratory distress**.

- **Harm**

- A severe immune reaction, leading to the secretion of too many cytokines in the bloodstream, can be harmful since an excess of immune cells can attack healthy tissue as well.
- The damage to the surrounding cells can be catastrophic, leading to sepsis and potentially, death.

Sepsis occurs when the body's response to infection is out of balance, triggering changes that can **damage multiple organ systems**.

- **CSS and Covid-19**

- Cytokine storms are **not exclusive to coronavirus patients**. It is an immune reaction that can occur during other infectious and non-infectious diseases as well.
- CSS is seen as a likely **major cause of mortality in both the 1918-20 Spanish Flu** that killed more than 50 million people worldwide, and the **H1N1 (swine flu)** and **H5N1 (bird flu)** outbreaks in recent years.
- **Increased pro-inflammatory cytokine** responses against human coronaviruses such as SARS-CoV-1 (which caused Severe Acute Respiratory Syndrome - SARS), SARS-CoV-2 (which is responsible for the current COVID-19 pandemic), and Middle East Respiratory Syndrome (MERS) **can result in acute lung injury and Acute Respiratory Distress Syndrome (ARDS)**.
- If the clinical features of CSS are not recognised and adequate treatment is not promptly instituted, multiple organ failure can result. Researchers writing in The Lancet have suggested that **all severe COVID-19 patients should be screened for hyper inflammation**.

**Source: IE**