

Cytokine Release Syndrome

WHAT PATIENTS & CAREGIVERS NEED TO KNOW



WHAT ARE CYTOKINES?

Cytokines are proteins that control the activity of the immune system, which works to fight off infections and prevent disease. However, when too many cytokines are released at once, they can cause inflammation and lead to side effects like those seen in Cytokine Release Syndrome.

CYTOKINE RELEASE SYNDROME (CRS)

Cytokine Release Syndrome (CRS) is a possible side effect of immunotherapy treatments, which utilize the body's immune system to combat cancer. Immunotherapies like CAR T-cell therapy, bispecific antibodies, and monoclonal antibodies use T-cells to help identify and attack lymphoma cells.

Following immunotherapy, the heightened activity of T-cells can lead to the release of cytokines, resulting in an overactive immune response. This excessive release of cytokines may cause inflammation, potentially damaging healthy cells, tissues, and organs. In severe cases, it can lead to life-threatening symptoms. Below you will find a list of potential symptoms.

Your healthcare team will closely monitor you for clinical signs of CRS, as symptoms may develop days to 1-2 weeks after immunotherapy.

WHO IS AT RISK FOR CRS?

Cytokine Release Syndrome (CRS) is most commonly seen in patients undergoing T-cell immunotherapy, as this therapy triggers a significant release of cytokines when T-cells attack lymphoma cells. Patients with more cancer in their body and higher levels of inflammation (shown by blood tests like ferritin and C-reactive protein or CRP) may have a higher risk of developing more severe CRS.

While the risk of CRS cannot be completely eliminated with medication, your doctor may use various strategies to reduce the risk and severity of CRS. Treatments like chemotherapy and other approaches can help minimize the likelihood and severity of CRS.

WHY IS IT IMPORTANT TO REDUCE THE RISK OF CRS?

An overactive immune system, which attacks both harmful and healthy cells, can lead to significant tissue damage. Left untreated, CRS can result in organ failure and potentially be life-threatening due to inflammation caused by the massive cytokine release. Timely treatment is essential and effective for preventing serious complications, and time in the Intensive Care Unit (ICU).

TREATMENT OPTIONS FOR CRS

CRS severity varies, and treatment is tailored accordingly. Your healthcare team will grade CRS based on symptoms and their impact, helping determine the appropriate treatment.

- **Mild CRS** may only require supportive care, including monitoring and managing symptoms like fever, rash, and headaches.
- **Severe CRS** may need emergency treatment if the patient's blood pressure drops very low or if they have trouble breathing and need extra oxygen. Medications like tocilizumab and corticosteroids are given right away and are essential in calming the immune system. These medications work by blocking cytokines—proteins that cause inflammation—so they stop the immune system from overreacting, which can lead to fast relief from symptoms.

WHAT YOU CAN DO FOR YOURSELF

SIGNS AND SYMPTOMS OF INFECTION

If you experience any of the following symptoms after immunotherapy, contact your healthcare provider or seek emergency care immediately:

- Fever with temperatures close to or higher than 40°C (fever can be a crucial indicator of infection)
- Cough or shortness of breath
- Rash
- Chills
- Fatigue
- Muscle aches
- Nausea or vomiting
- Diarrhea
- Headache
- Low blood pressure
- Fast heart rate (over 100 bpm)
- Abnormal heart rhythm
- Reduced oxygen levels

Most side effects are short-lived, but some may persist for weeks or months after treatment. In rare cases, side effects can be permanent. Additionally, some side effects may not appear until long after treatment has ended, known as late side effects. Your doctor will discuss potential side effects with you before starting treatment. Any symptoms following immunotherapy should be taken seriously, and immediate evaluation is necessary. If you develop a fever after treatment, it could lead to life-threatening complications if not treated promptly. Seek medical attention as soon as possible.

QUESTIONS TO ASK YOUR DOCTOR

Consider taking notes on any side effects during or after treatment. This can help you communicate your symptoms and concerns with your doctor, improving understanding and reducing stress. Here are some questions you may also want to ask your doctor before treatment:

- What are the potential risks or side effects of this treatment, and how serious are they?
- How will my symptoms be monitored during and after treatment?
- What symptoms should I report immediately, and who should I contact if they occur?
- How long should I monitor for side effects, and when will they subside?
- Are there any foods or activities I should avoid during and after treatment?