

Arthritis drug may improve respiratory function in some patients with severe covid-19

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A small study in Greece found that the clinically approved anti-inflammatory drug anakinra, used to treat rheumatoid arthritis, improved

respiratory function in patients with severe coronavirus disease 2019 (COVID-19). The eight patients also had a condition called secondary hemophagocytic lymphohistiocytosis (sHLH), which is characterized by overactivation of the immune system and organ failure. One patient, who did not require mechanical ventilation, improved rapidly after starting treatment with the drug and was discharged from the hospital 9 days later. But the therapy did not prevent three out of seven patients on ventilators from dying, and it's not yet clear whether it improves mortality rates. The report appears May 14 in the journal *Cell Host & Microbe*.

"These data argue that the administration of anakinra may be a viable treatment in severe COVID-19 with sHLH, supporting larger clinical studies to validate this concept," says senior author Evangelos J. Giamarellos-Bourboulis, a professor of internal medicine at the Medical School of the National and Kapodistrian University of Athens.

The death rate in patients with severe COVID-19 admitted to intensive care units (ICUs) is estimated to be between 50% and 65%. Severe complications of COVID-19 are thought to be driven by inflammatory responses, particularly through signaling molecules called interleukin 1 β (IL-1 β) and interleukin 6 (IL-6). The overproduction of IL-1 β by immune cells called macrophages can cause sHLH, also known as macrophage activation syndrome, which is characterized by low counts of blood cells, excessive blood clotting, kidney injury, and liver dysfunction. Anakinra inhibits IL-1 β signaling and has been shown to reduce the mortality of patients with signs of sHLH by 30%.

In the new study, the researchers tested whether anakinra could effectively treat severely ill COVID-19 patients with pneumonia and sHLH. Seven of the eight patients were males who had respiratory failure, were on ventilators in ICUs in Greece, and had serious underlying conditions such as heart disease and high blood pressure.

They were treated with anakinra intravenously 200 mg every 8 hours for 7 days. They also received treatment with the antimalarial drug hydroxychloroquine and broad-spectrum antibiotics. The researchers monitored their outcomes over the course of 4 weeks.

Anakinra treatment improved the majority of laboratory findings and decreased signs of sHLH in the ICU patients. All of them showed improved respiratory function, as indicated by a 15% to 117% increase in the ratio of partial pressure arterial oxygen and fraction of inspired oxygen (PaO₂/FiO₂), which compares the oxygen level in the blood to the oxygen concentration that is breathed. Moreover, six patients needed a lower dose of drugs that increase blood pressure. Although three of the ICU patients died, previous studies have shown that sHLH can lead to death rates as high as 67%.

The non-ICU patient was a 71-year-old woman who was hospitalized in the Netherlands for COVID-19 2 weeks after the third cycle of chemotherapy. This patient was also on hydroxychloroquine for [rheumatoid arthritis](#). She received anakinra treatment 300 mg once daily intravenously for 4 days, followed by 100 mg once daily for an additional 5 days. She improved within the first day of anakinra treatment, showing a reduced need for oxygen and a decrease in signs of sHLH, and was discharged 9 days after starting treatment. According to the authors, these results suggest that anakinra may prevent the progression of respiratory failure and the need for [mechanical ventilation](#) in COVID-19 patients with sHLH.

"We believe that [anakinra](#) has the potential to improve outcomes in patients with severe COVID-19," says first author George Dimopoulos of the National and Kapodistrian University of Athens. "Larger clinical trials are warranted to validate these results and demonstrate the usefulness of anti-IL-1 therapy when COVID-19 is complicated by sHLH."

More information: George Dimopoulos et al, Favorable Anakinra Responses In Severe Covid-19 Patients With Secondary Hemophagocytic Lymphohistiocytosis, *Cell Host & Microbe* (2020). DOI: [10.1016/j.chom.2020.05.007](https://doi.org/10.1016/j.chom.2020.05.007)

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