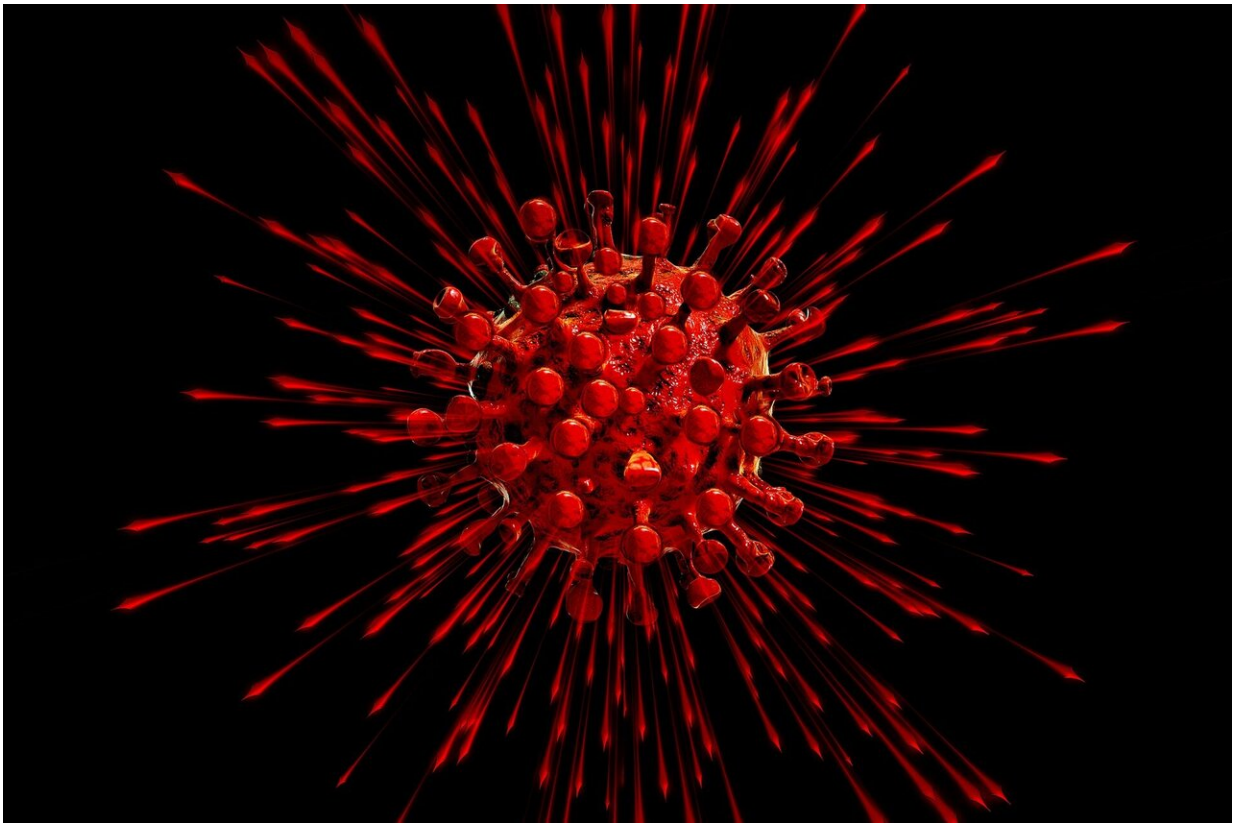


COVID-19: Patients improve after immune-suppressant treatment

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Most patients hospitalized with COVID-19 (coronavirus) pneumonia experienced improvement after receiving a Food and Drug Administration-approved drug normally given for rheumatoid arthritis,

according to an observational study at Cedars-Sinai. Outcomes for patients who received the drug, tocilizumab, included reduced inflammation, oxygen requirements, blood pressure support and risk of death, compared with published reports of illness and death associated with severely ill COVID-19 patients.

The single-center, [observational study](#) of 27 patients was led by Stanley Jordan, MD, director of the Cedars-Sinai Nephrology and Transplant Immunology Programs, and published June 23 in *Clinical Infectious Diseases*.

While the patient outcomes were encouraging, investigators said they were not sufficient to prove the drug was safe and effective for use in COVID-19 patients because they did not conduct a clinical trial with a control group.

The team examined laboratory and clinical changes—including oxygen levels, the need for medication to increase blood pressure and patient survival—in 27 patients with COVID-19 pneumonia who received the immunosuppressive drug tocilizumab to slow an out of control immune response. The researchers observed improved inflammatory markers and patient survival, compared with reports of patients not treated with tocilizumab.

"Researchers have been studying tocilizumab for a decade, focusing on its use for rheumatoid arthritis and cytokine storms with cancer," said Jordan, a Cedars-Sinai professor of Medicine. The medication was approved in 2010 by the FDA as treatment for [rheumatoid arthritis](#).

The Cedars-Sinai investigators found that interleukin 6—a protein that fuels immune cell production and is the target for tocilizumab—was the main cytokine elevated in COVID-19 patients.

"Since tocilizumab blocks interleukin 6, we reasoned that it made sense to try it with COVID-19 pneumonia patients," Jordan explained.

Cytokines are molecules secreted by multiple cell types, including immune system cells that regulate the body's immune response. A cytokine storm is a severe reaction in which immune cells flood and attack healthy organs they are supposed to protect. In COVID-19 patients, the virus stimulates immune cells that lead to collateral lung damage, which may cause blood vessels to leak and blood to clot. The patient's blood pressure sinks, and organs start to fail.

Early on in the COVID-19 pandemic, healthcare professionals discovered that cytokine storms were causing rapid deterioration in some patients. The key to patient survival, investigators are learning, is to keep that storm from gathering strength.

Most of the patients who received tocilizumab were on ventilators to support breathing. They each received one dose of tocilizumab, which helps block the signaling of the cytokine, interleukin 6—the only cytokine detected in damaging amounts in all of the study patients.

"The more interleukin 6 present in the body, the worse the patient outcome," Jordan said.

Post-treatment results showed that 23 patients experienced significant drops in body temperature and C-reactive protein (CRP) levels. CRP levels increase when infection is present in the body. Four patients did not have rapid declines in CRP levels, and three of them had poorer outcomes. Adverse events were minimal, but two deaths unrelated to tocilizumab occurred, Jordan said.

"Our observational study suggests the medication may help reduce inflammation, oxygen requirements, blood pressure support and the risk

of death," Jordan said.

Jordan's current research builds on his earlier work with tocilizumab. That research focused on the drug's potential for blocking the harmful effects of interleukin 6 on organ transplantation, including rejection of a donor organ. The study found that tocilizumab helps regulate the [immune response](#) and prevents organ rejection. Jordan and his colleagues currently are carrying out a randomized, placebo-controlled trial of the investigational medication clazakizumab, another interleukin 6 blocker.

Based on his past and current research, Jordan is encouraged about potential benefits of tocilizumab for patients with COVID-19 pneumonia.

"Based on our preliminary results, I am hopeful that this class of drugs may help patients with COVID-19 pneumonia improve," Jordan said. "But we won't know the outcome until we complete a randomized controlled clinical trial."

More information: Stanley C Jordan et al, Compassionate Use of Tocilizumab for Treatment of SARS-CoV-2 Pneumonia, *Clinical Infectious Diseases* (2020). [DOI: 10.1093/cid/ciaa812](https://doi.org/10.1093/cid/ciaa812)

Provided by Cedars-Sinai Medical Center

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