Researchers identify cytokine signature that allows COVID-19 patients with worst prognosis to be spotted early

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New research being presented at this year's European Congress of Clinical Microbiology & Infectious Diseases (ECCMID) in Lisbon,

Portugal (23-26 April) has identified a panel of cytokines that can help predict which COVID-19 patients are at risk of serious illness and death.

An overreaction of the immune system, in which excessive levels of proteins called cytokines produce damaging levels of inflammation, can lead to organ failure and death in COVID-19 patients.

It isn't known, however, which cytokines drive the process. Being able to measure levels of these cytokines when patients are admitted to the hospital would allow those with the worst prognosis to be identified and their therapy personalized.

Dr. Emanuela Sozio, of the Infectious Disease Clinic, Azienda Sanitaria Universitaria Friuli Centrale, Udine, Italy, and colleagues from Department of Laboratory Medicine, carried out a retrospective study of 415 patients (65.5% male) hospitalized with COVID-19 between May 2020 and March 2021. The cohort included patients with disease of all levels of severity.

The patients, who had an average age of 70 years, were classified as having mild/moderate disease or severe/critical disease, according to the World Health Organization definition.

15.7% of the patients died in hospital and 23.6% had a negative outcome (orotracheal intubation and/or death).

Serum levels of a large panel of cytokines were measured on admission and compared against outcomes, in combination with other biomarkers such as C-reactive protein (CRP) and mid regional pro-adrenomedullin (MR-proADM).

The researchers were able to build a decision tree (a type of flow chart) that allowed them to predict those at risk of a negative outcome, based

on the levels of the cytokines and other biomarkers in their blood.

This first split patients into two groups, based on their IL-6 levels, before using their levels of IL-10, MR-proADM, sIL2Ra, IP10, and CRP to determine whether they were at risk of a negative outcome.

The analysis also revealed that high levels of IP-10 on admission can signal an excessive immune response that may lead to the patient developing lung fibrosis and needing intubation.

A further finding was that high levels of IL-6, a pro-inflammatory cytokine, can be accompanied by elevated levels of sIL2Ra and IL-10, which have an anti-inflammatory role. This is important, because in such cases, the immunosuppressive drugs normally used to treat severe COVID could do more harm than good.

Dr. Sozio concludes: "It is not always possible to determine which COVID-19 patients have the worst prognosis, especially early on. It is becoming increasingly clear, however, that the earlier we treat excessive inflammation, the more likely we are to turn it off quickly and definitively and so avoid irreversible organ damage.

"Our work may help select patients with worse prognoses who need to be admitted to high dependency units, as well as potentially help personalize their treatment."

The role of cytokines in helping predict a negative outcome is also explored in another study by Dr. Sozio being presented at this year's ECCMID (L0463, see links below). The research in this second abstract L0463 was carried out in collaboration with the International School for Advanced Studies (SISSA), Trieste, Italy.

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