

A biomarker found in SARS-CoV-2 infection can predict disease severity and mortality in individual patients

Scientists identified a molecular marker that can predict the severity of COVID-19 and optimize individual therapy

The study that identified a molecule playing a key role in SARS-CoV-2 infection, sphingosine-1-phosphate, was completed in Milan, one of the Italian cities most affected by the pandemic.

The research carried out by a multidisciplinary team of experts, led by Giovanni Marfia and coordinated by Stefano Centanni and Laura Riboni, is the result of a well-established collaboration between the University of Milan, the Policlinico Hospital of Milan, and the Air Force with the Institute of Aerospace Medicine of Milan.

The study conducted on 111 patients has found a biomarker associated with the aggressiveness of COVID-19, describing one of the potential mechanisms responsible for its morbidity and mortality, and providing a key predictor of the evolution of the disease in individual patients.

Giovanni Marfia, Head of the Laboratory of Experimental Neurosurgery and Cell Therapy of the Policlinico Hospital of Milan and Medical Officer of the Air Force Medical Corps, explained: “Low circulating levels of sphingosine-1-phosphate are indicative of an increased likelihood of a severe clinical condition requiring admission to an intensive care unit, as well as of an adverse outcome, and therefore of death. Based on our data, we determined a sphingosine-1-phosphate cut-off, measurable through a blood sample at the onset of initial symptoms, below which there is an increased incidence of complications and severe organ damage, including lungs, liver and kidneys.” The study shows that marker dosage upon admission to the emergency room, would allow for patient stratification according to individual risk, and for timely therapeutic intervention.

“Sphingosine-1-phosphate is an important biomodulator in many vital cell processes, including vascular development and integrity, lymphocyte trafficking and inflammatory processes,” said **Laura Riboni**, Full Professor of Biochemistry at the University of Milan. Decreasing levels of sphingosine-1-phosphate cause vascular damage and an altered immune system response, resulting in excessive and persistent inflammation. Restoring the physiological levels of sphingosine-1-phosphate may be a good strategy to reduce the risk of poor clinical progression in COVID-19 patients, as well as to induce an effective immune response after vaccination.

Stefano Centanni, Head of the Department of Health Sciences and of the ASST Santi Paolo e Carlo Pneumology Unit, stated: “This 100 percent Italian study may have important clinical implications, as sphingosine-1-phosphate can be used as a prognostic and monitoring marker for the course of the disease, allowing for a more accurate patient classification and early intervention.” Another important aspect of this study is that sphingosine-1-phosphate may be considered a new therapeutic target, both in terms of restoring normal circulating levels, and strengthening therapeutic protocols in higher-risk patients, with a better allocation of healthcare resources.

“We are proud of the research team that has formed and led to this important milestone,” said **Giuseppe Ciniglio Appiani**, Head of the Medical Service of the Air Force. “As representatives of the Armed Forces, we have served the country through active management of COVID-19 outbreaks during the most critical phases of the emergency in Lombardy. We are honoured that we have been able to

contribute to this important scientific study, which will certainly have a significant impact on COVID-19 patient management.”

The research findings are made available to the scientific community through publication in EMBO Molecular Medicine.

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Decreased serum level of sphingosine-1-phosphate: a novel severity predictor of COVID-19

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