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Press release
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COVID-19: Graz scientists conduct research on prognosis tools
Biomarker may predict particularly severe disease progression

Graz, 13 January 2022: After two years of COVID-19, we have learned many things including that the progression of a SARS-CoV-2 infection can unfortunately not be predicted and seemingly harmless symptoms may abruptly develop into life-threatening pneumonia. In the renowned journal "Antioxidants," Med Uni Graz researchers have presented a biomarker that may predict particularly severe disease progression so that treatment steps can be adapted at an early stage.

COVID-19: Disease progression as the great unknown

In the past two years, nearly 14,000 people have died with or from COVID-19 in Austria alone. In some people, what often begins with harmless symptoms develops into life-threatening pneumonia after five to fourteen days. This severe disease progression can affect anyone, people with preexisting conditions as well as completely healthy young people. "If a blood value that could predict further disease progression was available in the first days of the illness when the patients still perceive themselves as feeling good, treatment could be adapted and organized more effectively," summarizes Harald Mangge from the Division of Medical and Chemical Laboratory Diagnostics at Med Uni Graz. For this reason, he and his colleagues are working on finding biomarkers that might predict a particularly severe disease progression. A current publication in the renowned journal "Antioxidants" presents the initial findings of the Med Uni Graz researchers.

Immunological imbalance: "Inflammatory storm" leads to organ failure

The life-threatening form of COVID-19 is accompanied by a so-called "inflammatory storm" (cytokine storm) in which the immune system severely overreacts and begins to attack itself. "The initial lifesaving immune response to the virus ends in a type of immunological and inflammatory suicide," describes Harald Mangge. Out of control, the body's own immune system destroys organ systems, above all the lungs. If this inflammatory storm exceeds a certain level, all medical support fails and the COVID-19 disease takes a fatal turn.

In blood samples of patients from the first and second COVID-19 waves, the Graz researchers "hunted" for potential indicators (biomarkers) in the early phase of the illness that might signal a subsequent fatal course of the disease. They focused on previously known lab parameters, for example inflammation levels, as well as on tryptophan metabolism. "For many years, tryptophan has been the subject of intensive research since this amino acid plays a role in the immune response," explains Harald Mangge.

Potential biomarker: Scientists focus on kynurenine

Relevant to COVID-19 is kynurenine, a main metabolite of tryptophan. This metabolite in turn influences the activity of T-cells, the "helper cells" of the immune system. "Our investigations have shown that the kynurenine levels in blood from COVID-19 patients with fatal disease progression were very high relatively early on in the disease. Thus, kynurenine might be a new biomarker that gives grounds for earlier and more effective therapeutic intervention. Before a therapeutic recommendation—for example timely administration of a high dose of cortisone—can be made, a larger population of patients must be examined more closely," says Harald Mangge. "The fact is that kynurenine plays a role in the immune response. Further research is required to determine whether its increase is the cause or the consequence of unusual immune responses that may lead to a fatal inflammatory storm," concludes Harald Mangge, looking to the future.

Profile: Harald Mangge

Harald Mangge is a specialist in laboratory medicine at Med Uni Graz who conducts research on the immune system, inflammation and lipid metabolism. His work focuses on biomarkers in overweight and obese individuals. In a large number of scientific papers, he has demonstrated the significance of disturbed communication between chemical messengers of the fatty tissue and those of the immune system in adiposity-related complications.

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Publication

Increased Kynurenine Indicates a Fatal Course of COVID-19
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