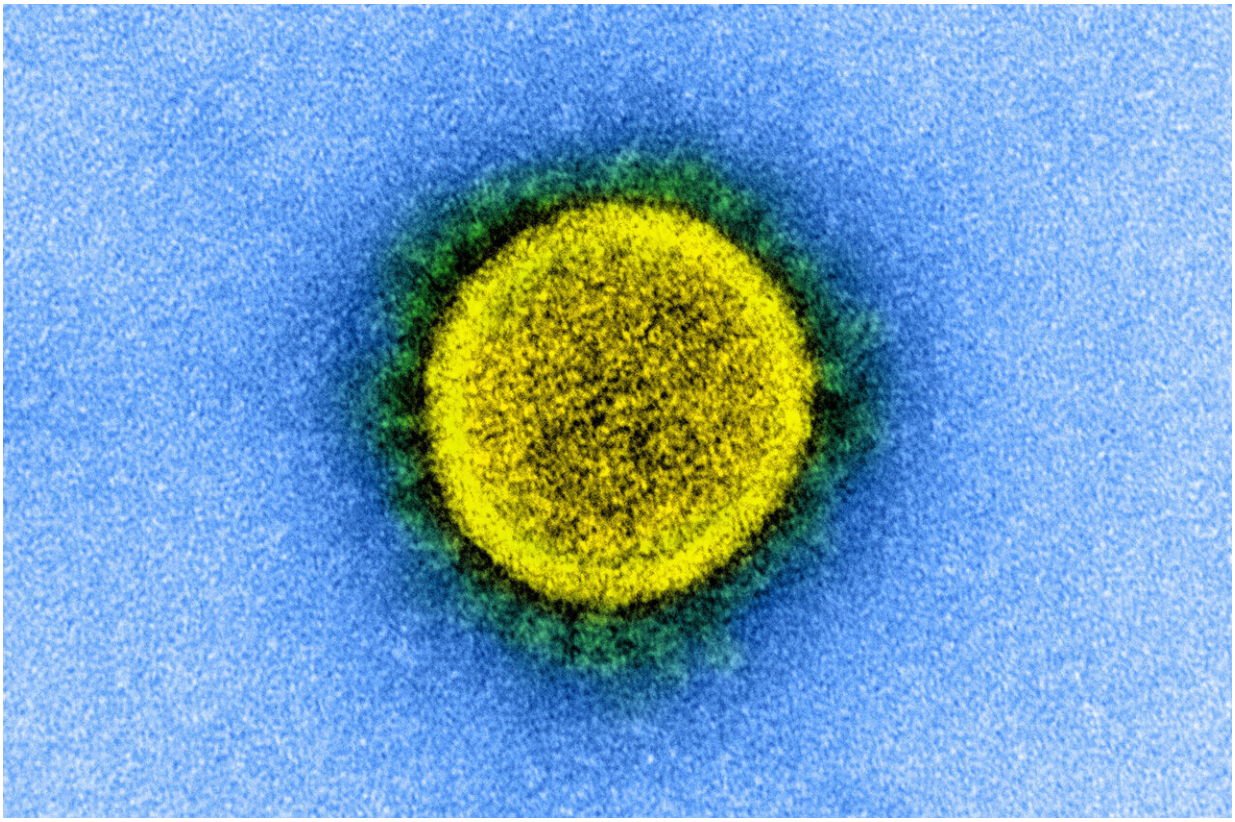
Rare hyperinflammatory syndrome in children with COVID-19 described

September 7 2020



SARS-CoV-2 (shown here in an electron microscopy image). Credit: National Institute of Allergy and Infectious Diseases, NIH

Researchers at Karolinska Institutet and Science for Life Laboratory in Sweden and Tor Vergata University of Rome in Italy have mapped the

immune response in children affected by a rare but life-threatening inflammatory syndrome associated with COVID-19. The study, which is published in the scientific journal *Cell*, reveals that the inflammatory response differs from that in Kawasaki disease and severe acute COVID-19.

In the current SARS-CoV-2 pandemic, with very few exceptions, children have presented with mild symptoms. However, paediatricians have discovered a new, life-threatening hyperinflammatory syndrome resembling Kawasaki disease and named Multisystem Inflammatory Syndrome in Children associated with COVID-19, MIS-C (see box).

In a new collaborative study, researchers have worked out the immunological aspects of this rare condition. They compared blood samples from 13 MIS-C-patients treated at Karolinska University Hospital in Stockholm, Sweden and Bambino Gesù Children's Hospital in Rome, Italy, with samples from 28 Kawasaki disease patients collected from 2017 to 2018, prior to COVID-19. The analyses also included samples from children with mild COVID-19.

Differs from other inflammatory states

"Our results show that MIS-C is truly a distinct inflammatory condition from Kawasaki disease, despite having some shared features," says Petter Brodin, paediatrician and researcher at the Department of Women's and Children's Health, Karolinska Institutet, and one lead author of the study. "The hyperinflammation and cytokine storm detected in children with MIS-C is also different from that seen in adult patients with severe, acute COVID-19, which we recently described in another publication."

When comparing MIS-C to these other inflammatory states, the study observed differential frequency of specific immune cell populations,

inflammatory cytokines and chemokines in the blood. Unlike children with Kawasaki disease and children with mild COVID-19, children who developed MIS-C were lacking IgG-antibodies to common cold coronaviruses. The researchers also found several autoantibodies that target the body's own proteins and that may contribute to the pathogenesis of MIS-C. They are now also looking into genetic risk factors for developing MIS-C after SARS-CoV-2 infection.

Adding a piece to the puzzle

"There is an urgent need to better understand why a small minority of children infected with SARS-CoV-2 develop MIS-C, and we are adding a piece to the puzzle," says Dr. Brodin. "Better knowledge of the pathogenesis is important for development of optimal treatments that can dampen the cytokine storm and hopefully save lives, as well as for vaccine development to avoid MIS-C caused by vaccination."

More information: Camila Rosat Consiglio et al. The Immunology of Multisystem Inflammatory Syndrome in Children with COVID-19, *Cell* (2020). DOI: 10.1016/j.cell.2020.09.016

Provided by Karolinska Institutet