

Clear signs of brain injury with severe COVID-19

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Certain patients who receive hospital care for coronavirus infection (COVID-19) exhibit clinical and neurochemical signs of brain injury, a University of Gothenburg study shows. In even moderate COVID-19

cases, finding and measuring a blood-based biomarker for brain damage proved to be possible.

Some people infected with the coronavirus SARS-CoV-2 get only mild, cold-like symptoms, while others become severely ill and require hospital treatment. Among the latter, it has become clear that the patients sometimes show obvious signs of the brain not functioning as it should. These cases are not common, but do occur.

In a project at Sahlgrenska Academy, University of Gothenburg, [blood samples](#) were taken from 47 patients with mild, moderate and severe COVID-19 in the course of their hospital stay. These samples were analyzed by means of highly sensitive biomarkers for brain [injury](#). The results were compared with those from a healthy control group comprising 33 people matched by age and sex.

Now that the research is being presented in the journal *Neurology*, it is evident that an increase in one of the biomarkers took place even with moderate COVID-19—that is, in patients admitted to hospital but not in need of ventilator support. This marker, known as GFAP (glial fibrillary acidic protein), is normally present in astrocytes, a star-shaped neuron-supportive cell type in the brain, but leaks out in the event of astrocytic injury or overactivation.

The second biomarker investigated was NfL (neurofilament light chain protein), which is normally to be found inside the brain's neuronal outgrowths, which it serves to stabilize, but which leaks out into the blood if they are damaged. Elevated plasma NfL concentrations were found in most of the patients who required ventilator treatment, and there was a marked correlation between how much they rose and the severity of the disease.

"The increase in NfL levels, in particular, over time is greater than we've

seen previously in studies connected with [intensive care](#), and this suggests that COVID-19 can in fact directly bring about a brain injury. Whether it's the virus or the [immune system](#) that's causing this is unclear at present, and more research is needed," says Henrik Zetterberg, Professor of Neurochemistry, whose research team at Sahlgrenska Academy performed the measurements.

Magnus Gisslén, Professor of Infectious Diseases at Sahlgrenska Academy and chief physician at the Department of Infectious Diseases, Sahlgrenska University Hospital, leads the Academy's clinical research on COVID-19.

In his view, blood tests for biomarkers associated with brain injury could be used for monitoring patients with moderate to severe COVID-19, to reduce the risk of [brain](#) injury.

"It would be highly interesting to see whether the NfL increase can be slowed down with new therapies, such as the new dexamethasone treatment that's now been proposed," Gisslén says.

More information: Nelly Kanberg et al, Neurochemical evidence of astrocytic and neuronal injury commonly found in COVID-19, *Neurology* (2020). [DOI: 10.1212/WNL.0000000000010111](https://doi.org/10.1212/WNL.0000000000010111)

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