Researchers discover unique blood plasma protein patterns in patients with long COVID

July 5 2023

Credit: Pixabay/CC0 Public Domain

Using advanced research techniques, including a form of artificial intelligence, a team of researchers has discovered unique patterns of blood plasma proteins in patients with suspected long COVID that could

improve patient outcomes. This research, which used multiple state-of the-art technologies, was enabled by existing expertise and infrastructure through CHRI. It was published in the *Journal of Translational Medicine*.

Currently, approximately 10–20% of people with a confirmed case of COVID-19 will get long COVID.

"Those patients experience a wide variety of symptoms, which may include fatigue, brain fog, and difficulty breathing," said Dr. Douglas Fraser, professor in the department of pediatrics at Schulich School of Medicine & Dentistry and physician at London Health Sciences Center (LHSC). "Their quality of life can be significantly altered, so anything that we can do to learn about this disorder and identify potential treatment targets is very important."

Called "the plasma proteome," the proteins are found in blood plasma and are released by cells that often play an important role in the body's immune response to viruses. The research team is studying how those proteins adapt and change in long COVID.

"Trying to understand this mechanism is quite important because it provides further insight into how patients are affected," says Dr. Michael Nicholson, associate scientist at Lawson, and respirologist at St. Joseph's Health Care London. "This paper sheds further light on a possible mechanism which may provide insight into why some patients have certain symptoms."

As part of the study, blood plasma samples were collected from long COVID outpatients through the Post-Acute COVID-19 Program at St. Joseph's and analyzed in comparison to acutely ill COVID-19 inpatients at LHSC and a group of healthy volunteers.

"We used novel technologies for this study, allowing us to analyze more than 3,000 proteins in blood plasma at the same time with multiple patients," explains Cristiana Iosef, research analyst at Children's Health Research Institute (CHRI), a program of Lawson. "We used a novel bioinformatic pipeline, a form of artificial intelligence (AI), to then analyze the proteins to determine the specific changes that occur in long COVID."

This technology allowed researchers to determine unique patterns in the blood proteins. The team discovered that people with suspected long COVID have prolonged inflammation associated with changes in their immune cells and blood vessels. These changes may lead to problems in specific organs, like the brain and the heart.

"The saved blood plasma samples we are using helped us determine the long-term responses to COVID-19; serial blood plasma samples from individuals that had a COVID-19 infection and now presumed long COVID will help us determine how proteins are changing over time," says Dr. Michael Knauer, associate scientist at Lawson.

Fraser, a professor at Schulich Medicine, said the proteins discovered could act as a potential drug target. The team is now examining potential new drug therapies with the hopes of improving outcomes for these patients.

"When we identify these signaling patterns within the blood plasma, we can then take the information and screen drug databases to better understand which drugs would be best to target the changes we identified in long COVID patients," said Fraser. "With this understanding, the identified drugs may be used in future long COVID clinical trials."

More information: Cristiana Iosef et al, Plasma proteome of Long-COVID patients indicates HIF-mediated vasculo-proliferative disease

with impact on brain and heart function, *Journal of Translational Medicine* (2023). DOI: 10.1186/s12967-023-04149-9