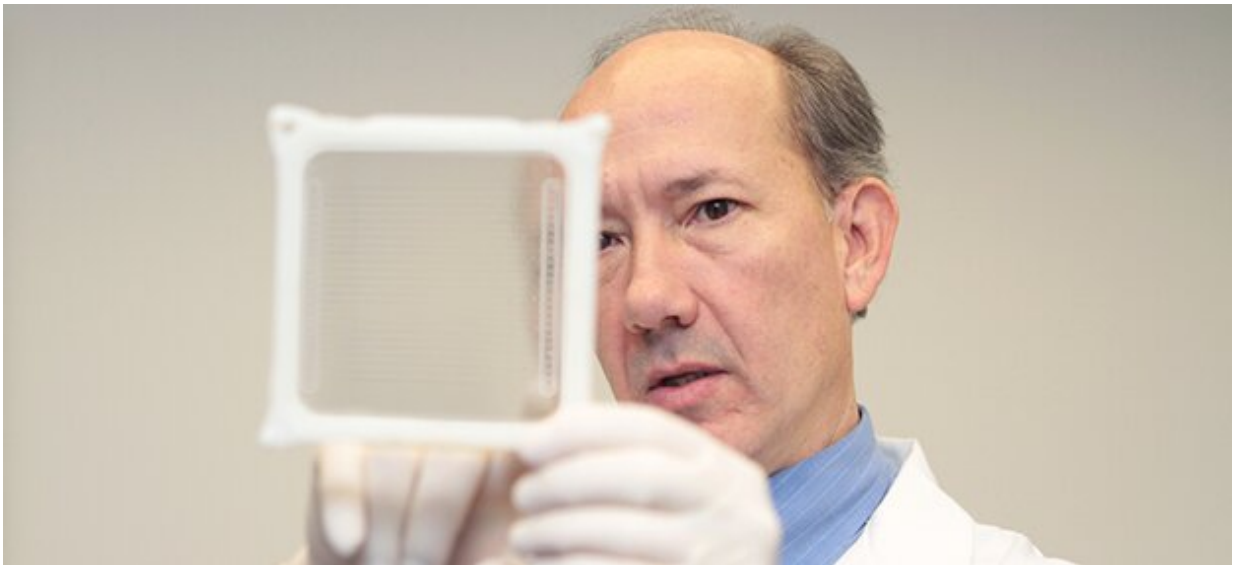# Researchers create test to quickly identify COVID-19 infection and disease severity

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Timothy McCaffrey holding slide. Credit: George Washington University

George Washington University researchers have developed a blood test that quickly detects if someone has COVID-19 and predicts how severely the immune system will react to the infection, according to a new study coming out On Janurary 26 in *PLOS One*. The findings could one day lead to a powerful tool to help doctors determine the best treatment plan for people with COVID-19.

Currently, there is no good way to predict how the immune system will

respond to the virus that causes COVID-19 or other disease-causing microbes. The immune response could range from mild symptoms, all the way to critically severe symptoms, which can lead to the intensive care unit or even death.

To understand more about the variation in symptoms and prognosis, the GW researchers sequenced whole blood RNA from COVID-19 patients whose symptoms ranged from asymptomatic to severe. They found visible changes in the cells of people with COVID-19. Their analysis also revealed that COVID-19 severity was associated with an increase in neutrophil activity and a decrease in T-cell activity. Neutrophils and T-cells, both a type of white blood cell, are part of the body's immune system and help fight off infections. In other words, the body's immune system response, as measured by neutrophil activity, signals that there's an infection whether caused by a known, novel, or variant pathogen.

"This test could prove very valuable during the pandemic, especially as variants continue to spread and doctors need to be confident in identifying the problem and providing effective treatment," said Timothy McCaffrey, professor of medicine at GW and lead researcher on the project. "When we sequence whole blood RNA, we're given a fuller, more dynamic picture of what's happening inside the body, and our test helps identify those who need the more aggressive treatments."

Previous research by McCaffrey and others identified RNA biomarkers for infection in patients with inflammatory conditions such as appendicitis and pneumonia. Similar to their more recent findings with COVID patients, when they measured RNA levels in the patients' blood, they detected an increase in neutrophil-related RNAs. When the pandemic hit, McCaffrey and his team pivoted and applied their approach to identifying RNA biomarkers for COVID-19 infection detection and severity. The point-of-care device they've developed and are testing would be able to detect infection from pathogens such as

SARS-CoV-2, but would also have other useful applications, according to McCaffrey.

"Beyond the current pandemic, our technique would be able to detect any infection with a high degree of accuracy," he said. "That has applications for all sorts of conditions wherein doctors diagnosing patients need to quickly rule in or rule out whether they are dealing with an infection or something else.

If additional studies prove the test is effective, the researchers plan to seek an emergency use authorization from the U.S. Food and Drug Administration. Such authorization could take 6 months or longer, but if approved, the test would give clinicians a powerful tool in the fight against this and future pandemics, McCaffrey said.

The paper, "RNA sequencing in COVID-19 patients identifies neutrophil activation biomarkers as promising diagnostic platform for infections" appeared in *PLOS One* on January 26.

  More information: "RNA sequencing in COVID-19 patients identifies neutrophil activation biomarkers as promising diagnostic platform for infections," *PLOS One* (2022). journals.plos.org/plosone/arti … journal.pone.0261679

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