

Strong initial immune response could produce worst COVID outcome, Tulane study says

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Dr. Monica Vaccari is the lead author of a new study that found having a robust initial immune response to coronavirus infection might not be helpful in fighting off the virus. (Photo by Sally Asher)

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While having a robust immune response to coronavirus infection may sound helpful, Dr. Monica Vaccari, associate professor of microbiology and immunology at Tulane

National Primate Research Center and lead author of a new study published in [*Nature Communications*](#), says that the opposite may be true.

To better understand how variations in early host immune responses affect disease outcomes, researchers at the Center followed the course of disease in the four weeks following COVID-19 infection in non-human primates. They discovered robust early immune responses to the virus and a recruitment of immune cells from the blood to the lungs. They also found that certain cytokines — i.e., cell-signaling proteins that help to regulate pro- and anti-inflammatory responses — may prove helpful in predicting disease outcomes.

These results suggest that in these early weeks post-infection, the stronger the initial host immune response, the worse the disease outcome, Vaccari says.

Vaccari explains that while the body mounts a pro-inflammatory “innate” immune response as a first line of defense to protect against the spread of infection and heal damaged tissue, it is a dysregulated or over-reactive immune response that can cause severe damage. Too much inflammation in the lungs, for example, can result in decreased oxygen.

“A pro-inflammatory response is usually our body’s first line of defense, and it can be a very helpful mechanism. But what we’re seeing with coronavirus infection is that somewhere down the line, there is uncontrolled inflammation. We want to know when and why this happens,” says Vaccari.

Understanding what happens in the immune system during this short period following infection will be essential in developing effective therapeutics against COVID-19. While immune functions can be modulated, scientists want to avoid “turning off” immune responses that may be critical to fighting infection.

One of the most vexing aspects of the novel coronavirus is the broad spectrum of disease outcomes associated with it. A disease that causes few or mild symptoms for most also has the capacity to cause severe and lasting damage or death for others. While scientists and clinicians have long suspected that it is the host - or person that acquires the disease - that dictates disease severity, they have not known which specific individual immune markers are harmful and which are protective, particularly in the earliest stages of disease.

This new study identified variations in early host immune responses that may be predictive of COVID-19 disease severity.