New protein neutralizes COVID in tiny human kidney

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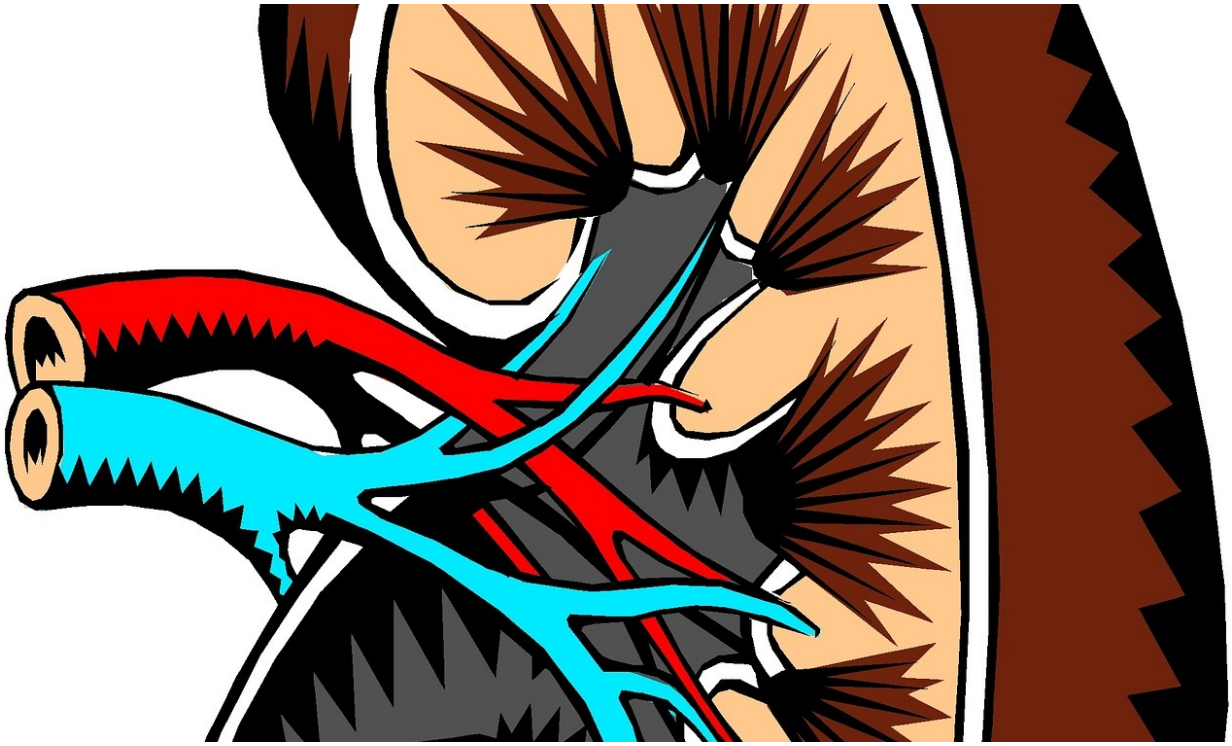

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Northwestern Medicine scientists have developed a new protein that acts as a trickster to neutralize the COVID-19 infection in a human kidney organoid, a miniature organ made from stem cells in the lab.

The protein is a variant of ACE2 (angiotensin converting enzyme-2), the

receptor the coronavirus uses to enter and infect human cells. The modified protein intercepts the S spike of the coronavirus and fools it into binding to it rather than the real ACE2 receptor in cell membranes.

"The idea was to administer our protein to intercept the coronavirus before it gets to the natural receptor in the cell membranes," said lead study author Dr. Daniel Batlle, a professor of medicine at Northwestern University Feinberg School of Medicine and a Northwestern Medicine physician. "To make it more efficacious, we modified the ACE2 protein to extend its duration of action from hours to days. That feature will be critical for patient use."

The study was published Feb. 1 in the *Journal of the American Society of Nephrology*.

The findings are proof of concept that the ACE2 protein will be effective in preventing and treating COVID-19 infection in humans, said Batlle, also the Earle, del Greco, Levin Professor of Nephrology and Hypertension at Feinberg.

"While widespread vaccination is the best way to combat the COVID-19 pandemic, there will always be a need for therapies for prevention and treatment of people who were not vaccinated or for whom the vaccine was not fully effective," Batlle said.

The protein was tested in the human kidney organoid because rodents are resistant to infection by the coronavirus causing COVID-19.

Batlle's lab has studied ACE2 for many years as part of a potential treatment for kidney disease. Batlle and study co-author Dr. Jan Wysocki, research assistant professor of medicine at Feinberg, have bioengineered novel ACE2 variants licensed to Northwestern University which they believe can be adapted for COVID-19 therapy by

intercepting the coronavirus and preventing it from attaching to the natural ACE2 receptor in the membrane of the cell.

The next steps involve the planning of safety studies needed before Investigational New Drug approval for future studies in patients with COVID-19.

Provided by Northwestern University