Scientists uncover potential antiviral treatment for COVID-19

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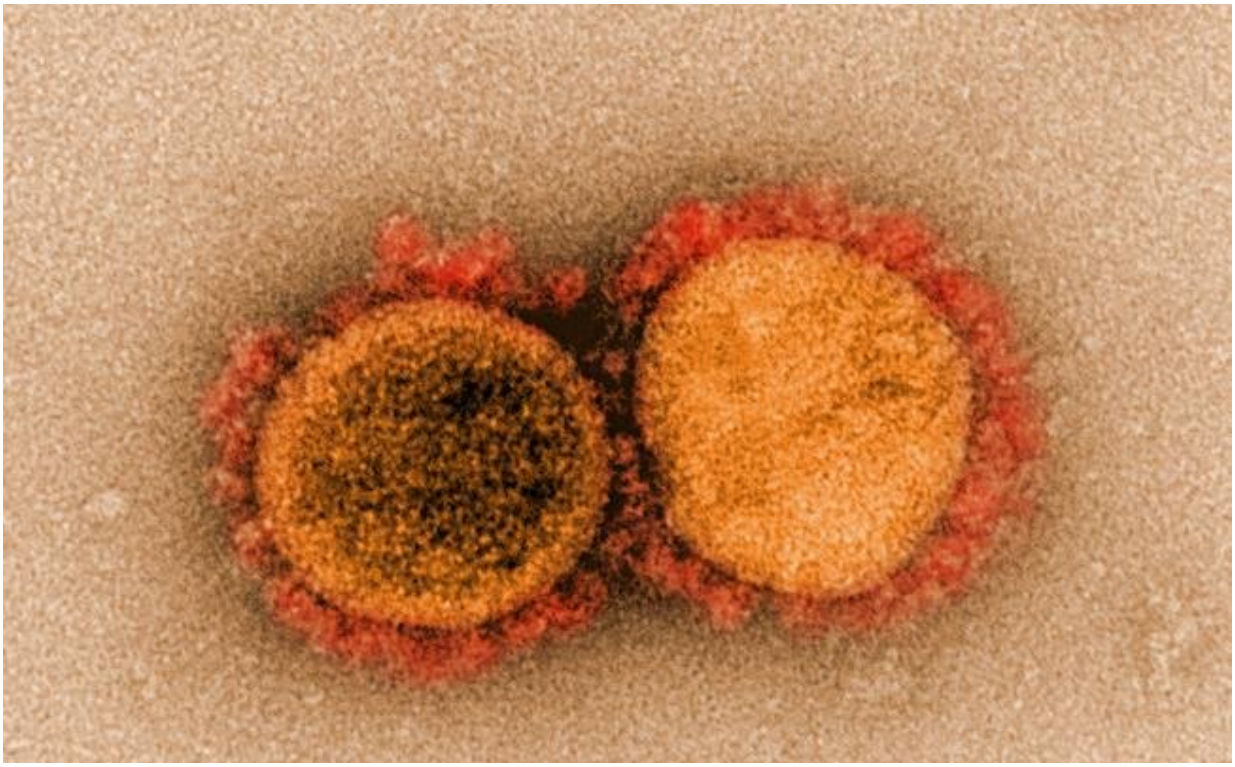

Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient. Image captured and color-enhanced at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Maryland. Credit: NIAID

Researchers from the University of Nottingham have discovered a novel antiviral property of a drug that could have major implications in how future epidemics / pandemics—including COVID-19—are managed.

The study, published in *Viruses*, shows that thapsigargin is a promising broad spectrum antiviral, highly effective against COVID-19 virus (SARS-CoV-2), a common cold coronavirus, respiratory syncytial virus (RSV) and the influenza A virus.

Given that acute respiratory virus infections caused by different viruses are clinically indistinguishable on presentation, an effective broad-spectrum that can target different virus types at the same time could significantly improve clinical management. An antiviral of this type could potentially be made available for community use to control active infection and its spread.

The study is a collaborative project led by Professor Kin-Chow Chang and experts at the University of Nottingham (Schools of Veterinary Medicine and Sciences, Biosciences, Pharmacy, Medicine, and Chemistry), and colleagues at the Animal and Plant Health Agency (APHA), China Agricultural University and the Pirbright Institute.

In this ground-breaking study, the team of experts found that the plant-derived antiviral, at small doses, triggers a highly effective broad-spectrum host-centred antiviral innate immune response against three major types of human respiratory viruses—including COVID-19.

The key features based on cell and animal studies, which make thapsigargin a promising antiviral are that it is:

- effective against viral infection when used before or during active infection
- able to prevent a virus from making new copies of itself in cells for at least 48 hours after a single 30-minute exposure.
- stable in acidic pH, as found in the stomach, and therefore can be taken orally, so could be administered without the need for injections or hospital admission.

- not sensitive to virus resistance.
- at least several hundred-fold more effective than current antiviral options.
- just as effective in blocking combined infection with coronavirus and influenza A virus as in single-virus infection.
- safe as an antiviral (a derivative of thapsigargin has been tested in prostate cancer).

Professor Chang said: "Whilst we are still at the early stages of research into this antiviral and its impact on how viruses such as COVID-19 can be treated, these findings are hugely significant.

"The current pandemic highlights the need for effective antivirals to treat active infections, as well as vaccines, to prevent the infection. Given that future pandemics are likely to be of animal origin, where animal to human (zoonotic) and reverse zoonotic (human to animal) spread take place, a new generation of antivirals, such as thapsigargin, could play a key role in the control and treatment of important viral infections in both humans and animals."

Indeed, influenza virus, coronavirus and RSV are global pathogens of humans as well as animals. Thapsigargin represents a lead compound in the development of a new generation of powerful host-centred antivirals (as opposed to conventional antiviral drugs that directly target viruses) that could even be adopted in a holistic "One Health" approach to control human and animal viruses.

Professor Chang adds: "Although more testing is clearly needed, current findings strongly indicate that thapsigargin and its derivatives are promising antiviral treatments against COVID-19 and influenza virus, and have the potential to defend us against the next Disease X pandemic."

Provided by University of Nottingham