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IISc provides alternative mechanism to render viruses like SARS-CoV-2 inactive

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Miniproteins that can launch two-pronged attacks on viral proteins

The rapid emergence of new strains of the SARS-CoV-2 virus has diminished the protection offered by COVID-19 vaccines. A new approach developed by researchers at the Indian Institute of Science (IISc), Bengaluru now provides an alternative mechanism to render viruses like SARS-CoV-2 inactive.

In a study published in *Nature Chemical Biology,* the researchers report the design of a new class of artificial peptides or miniproteins that can not only block virus entry into our cells but also clump virions (virus particles) together, reducing their ability to infect.

In the new study, the team has exploited an approach to design miniproteins that can bind to, and block the spike protein on the surface of the SARS-CoV-2 virus. This binding was further characterised extensively by cryo-electron microscopy (cryo-EM) and other biophysical methods.

The team decided to test their hypothesis by using one of the miniproteins called SIH-5 to target the interaction between the Spike (S) protein of SARS-CoV-2 and ACE2 protein in human cells. The next step was to ask if SIH-5 would be useful for preventing COVID-19 infection. To answer this, the team first tested the miniprotein for toxicity in mammalian cells in the lab and found it to be safe. Next, hamsters were dosed with the miniprotein, followed by exposure to SARS-CoV-2. These animals showed no weight loss and had greatly decreased viral load as well as much less cell damage in the lungs, compared to hamsters exposed only to the virus.

The miniprotein was also found to be thermostable, it can be stored for months at room temperature without deteriorating.