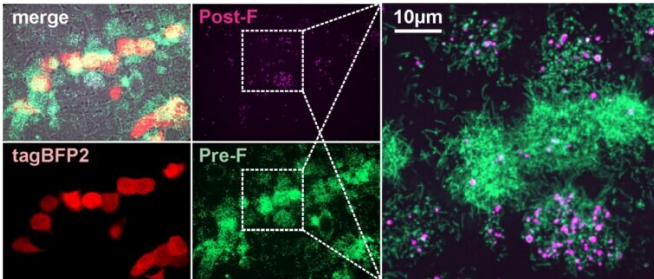


Shape of virus particles may determine respiratory syncytial virus infection outcomes

21 October 2021, by Beth Miller



Pre-F and post-F containing RSV particles occur naturally in cell culture. Credit: Vahey lab

Respiratory syncytial virus, more commonly known as RSV, is a highly contagious respiratory virus that can be very serious and even fatal for young children and the elderly. In summer of 2021, health care providers saw an unseasonable spike in the virus, which typically causes illness from October through March. While the virus has been recognized since the 1950s, there is no vaccine available.

Michael D. Vahey, a biomedical engineer at the McKelvey School of Engineering at Washington University in St. Louis, along with Jessica Kuppan and Margaret Mitrovich, both doctoral students in his lab and co-first authors of the paper, has developed a fluorescent system allowing him and his lab members to monitor the interactions between the virus particles and the proteins in the immune system that help to defend against infections, known as complement proteins. Through this system, they found that the viruses produced during RSV infection change shape—converting from long, rod-shaped particles to more rounded ones—and this makes a difference in whether the complement proteins are activated or not. Results of the work are published online in

the journal *eLife*.

For RSV viruses to infect a cell, the membranes surrounding each of them have to fuse together through the action of the RSV F protein. Antibodies that bind to the F protein can prevent the virus from infecting cells. But the F protein is a well-known shape shifter, making it notoriously unstable, said Vahey, assistant professor of biomedical engineering, who studies infectious diseases.

"Ideally, we would like the immune system to target the form of F that can cause infection, but this doesn't always happen," Vahey said. "We found that when RSV changes shape from rods to spheres, the F protein tends to change shape, too. What we end up with is a situation where the virus particles that activate the complement system frequently have the wrong form of F on their surface. This may instruct the immune system to go after the wrong target."

Vahey said the findings show that the biophysical properties of a virus, including its size and shape, matter in terms of how it is recognized by the immune system and may be important to consider when developing potential treatments or vaccines.

More information: Jessica P Kuppan et al, A morphological transformation in respiratory syncytial virus leads to enhanced complement deposition, *eLife* (2021). [DOI: 10.7554/eLife.70575](https://doi.org/10.7554/eLife.70575)

Provided by Washington University in St. Louis

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