



May 18th, 5:00 PM - 7:00 PM

A Within-Host Modeling Framework For SARS-CoV-2 Infection to Support Vaccine Strategies

Morgan Rose

Applied Research Associates, Inc., mrose@ara.com

Rachel Jennings

Applied Research Associates, Inc., rljennings@ara.com

Jeffry Schroeter

Applied Research Associates, Inc., jschroeter@ara.com

Follow this and additional works at: <https://scholarscompass.vcu.edu/bamm>



Part of the [Life Sciences Commons](#), [Medical Immunology Commons](#), [Physical Sciences and Mathematics Commons](#), and the [Virus Diseases Commons](#)

<https://scholarscompass.vcu.edu/bamm/2022/wed/37>

This Event is brought to you for free and open access by the Dept. of Mathematics and Applied Mathematics at VCU Scholars Compass. It has been accepted for inclusion in Biology and Medicine Through Mathematics Conference by an authorized administrator of VCU Scholars Compass. For more information, please contact libcompass@vcu.edu.

A Within-Host Modeling Framework For SARS-CoV-2 Infection to Support Vaccine Strategies, Jeffrey Schroeter¹, Rachel Jennings¹, Morgan Rose¹, Jonathan Rolfs¹, and Angela Reynolds²

¹Applied Research Associates, Arlington, VA, USA

¹Department of Mathematics, Virginia Commonwealth University, Richmond, VA, USA

COVID-19 initially develops as a respiratory infection but may progress systemically. Vaccines have garnered much attention due to their rapid development in response to the COVID-19 pandemic and their dramatic success in reducing viral spread. Here, we introduce a mathematical model to study mucosal and systemic immunity conferred by intramuscular and intranasal vaccines following exposure to SARS-CoV-2. The model delineates between viral kinetics in the upper and lower respiratory tracts as well the differentiates between the immunological responses activated at each site. Numerical simulations were performed in an effort to assess optimal vaccination strategies, which may include a combination of intranasal and intramuscular vaccines to elicit a sufficient combined mucosal and systemic immune response.