Thesis Defense - Brian Hetrick, Ph.D. in Biosciences
May 25, 2021 2:00 PM - 4:00 PM
VIEW EVENT
All are invited to attend the defense. For more information please contact Graduate Coordinator at kharrism@gmu.edu.

Candidate: Brian Hetrick

Program: Ph.D. in Biosciences

Date: Tuesdayday, May 25, 2021

Time: 2:00 PM

Place: https://gmu.zoom.us/j/97821405850?pwd=OEVYZytzLzR2Z2drZmUvd3ZSa2Y2dz09

Title: Viral Vector Engineering in Diagnostic and Therapeutic Development

Committee Chair: Dr. Yuntao Wu

Committee Members: Dr. Kylene Kehn-Hall, Dr. Ramin Hakami, Dr. Mikell Paige

ABSTRACT:
Viral vector delivery of therapeutic or immunogenic genes is an expanding field with growing applications in the treatment of cancer, infectious diseases, and chronic genetic disorders. Here we explore two different applications of viral vector engineering with the development of a rapid SARS-CoV-2 infection assay and the development of a therapeutic vaccine treatment for HIV. As the COVID19 pandemic continues, there is an urgent need to develop strategies to combat the virus and the emerging variants. We have developed a new hybrid alphavirus-SARS-CoV-2 (Ha-CoV-2) particle that can be used for the rapid screening of neutralization antibodies, entry inhibiting drugs, host innate immune factors, and viral variants' infectivity. Another example where viral engineering use can benefit a public health crisis is with the ongoing HIV epidemic. While the advancement of HIV treatment has turned the once deadly virus into a manageable condition, there is no cure for HIV and those living with HIV must take highly active antiretroviral therapy (HAART) for the remainder of their lives. The HIV rev-dependent vector was developed as a therapeutic vaccine that can selectively target HIV-infected cells and induce an immune response against the virus. We conducted an animal trial to explore the efficacy of the rev-dependent therapeutic vaccine and discovered its use can stimulate an immune response that can maintain a low viral load after discontinuing the use of antiretroviral drugs. These two examples demonstrate how viral vectors are a diverse platform that can offer tissue specificity and precisely controlled genomic payloads, which can provide alternative diagnostic strategies or therapies to traditionally untreatable or hard to manage diseases.