FFIRE Faculty Mentor – Dr. Pejman Rohani

Available projects

Rohani (co-PI) 04/01/2021-03/31/2028
NIAID Centers of Excellence for Influenza Research and Response: Center for Influenza Disease and Emergence Research

As part of this long-term center of excellence contract, we have a collaborative project with colleagues in the College of Veterinary Medicine focused on the evolution and transmission dynamics of influenza A and B viruses. My lab is tasked with developing multi-scale models of single- and two-virus dynamics. These models are intended to capture the within-host viral progression, host immunological responses and potential viral interference. These models will be fitted to data from infection experiments carried out by our collaborators. Subsequently, the models will inform population-level viral propagation and potential treatment with both pharmaceutical and non-pharmaceutical interventions.

Rohani (PI) 10/01/2022-09/30/2025
Computational Methods for Influenza Forecasting

The goal of this project is to use information on influenza virus evolution to improve forecasts of seasonal influenza outbreaks. We are developing a range of stochastic epidemiological models of influenza transmission dynamics, with potential covariates (such as climate drivers, vaccine uptake) to produce probabilistic predictions of the timing, size, and duration of seasonal epidemics. These models will be comprised of two viruses in order to take into account the potentially cross-protective effects of co-circulating influenza viruses. Most importantly, however, we plan to use virus sequences to include measures of the evolutionary distance between viruses used to produce vaccines and those in circulation, which would affect the reactivity of prior antibodies to contemporary viruses.

Rohani (PI) 10/01/2022-12/30/2023 (no cost extension possible)
Using Validated Transmission Models to Inform Pertussis Vaccine Development and Policy

This award is focused on using computational statistics to fit stochastic, age-structured models of pertussis vaccination and transmission to long-term incidence data with the aim of establishing the effectiveness of existing vaccines. The fitted models can then be used to establish efficient, cost-effective vaccine booster scheme to reduce the incidence of pertussis as well as to identify which mechanisms of vaccine failure (eg waning, or failure for vaccines to "take") are priorities for vaccine improvement.