MICHAEL LI, University of Alberta

Estimation of the Proportion of Population Infected by COVID-19: Mathematical Models as a Tool for Data Analysis

The COVID-19 has turned into one of the largest pandemics and public health crises in history, with close to 1 million daily cases world-wide by the end of April 2021, and a total death toll of more than 3 million and rising. During the COVID-19 pandemic, mathematical modeling has played a crucial role in informing public health responses and policy. In addition to its well-perceived function of predicting epidemic trends, mathematical models are also being used as an important tool for retrospective data analysis.

In this talk, I present our work using the SIR models to analyze the surveillance data and estimate the proportion of the population in Alberta that have been infected by SARS-CoV-2 during the first wave of the COVID-19. The estimation results have been validated by seroprevalence data. In addition, we are able to estimate the impact of social-distancing measures, the case-infection ratio, and the time dependent infection-fatality rate. A key step of the estimation process is to overcome the nonidentifiability problem in parameter estimation, which is a bottle-neck issue during model calibration from data. This is a collaboration between our research group and Alberta Health.