
A multi-strain epidemic model for COVID-19 with infected and asymptomatic cases: application to French data

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Résumé

Many SARS-CoV-2 variants have appeared over the last months, and many more will continue to appear. Understanding the competition between these different variants could help make future predictions on the evolution of epidemics. In this talk we will present our study which use a mathematical compartmental model to investigate the impact of three different SARS-CoV-2 variants on the spread of COVID-19 across France. between January-May 2021 (before vaccination was extended to the full population). To this end, we use the data from Geodes (produced by Public Health France) and a particle swarm optimisation algorithm, to estimate the model parameters and further calculate a value for the basic reproduction number R_0 . Sensitivity and uncertainty analysis is then used to better understand the impact of estimated parameter values on the number of infections leading to both symptomatic and asymptomatic individuals. The results confirmed that, as expected, the alpha, beta and gamma variants are more transmissible than the original viral strain. In addition, the sensitivity results showed that the beta/gamma variants could have lead to a larger number of infections in France (of both symptomatic and asymptomatic people).

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