

A mathematical model of the immune system response to COVID-19

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Abstract: COVID-19 has infected millions of people all over the world leading to different disease outcomes ranging from asymptomatic illness to fatality. Studies of the immune response to COVID-19 are still not definitive for the different degrees of severity exhibited by different patients. Some studies have attributed the different outcomes to cytokines storm while others have associated the disease's severity to preexisting conditions. Other studies suggest genetic predisposition, a theory that suffers further scrutiny given that infected people with similar genotypes such as identical twins have presented with very different outcomes for COVID-19. This paper presents a mathematical model of the immune response to COVID-19 by attempting to capture the viral load generated by the virus and the collective response that is mounted against it. Numerical simulations of the model are compared to experimental data from murine studies involving rhesus macaque monkeys.