

Mathematical Immunology: How to account for individual heterogeneity in theoretical models of the immune response?

Fabien Crauste

Immune cells allow a priori fast and efficient responses against non-self agents. They rely upon the ability of the organism to identify threats and trigger the most appropriate reactions. Cytotoxic immune responses aim in particular at inducing infected cell death, and to do so they integrate early on information about the nature of the infection in order to perform an appropriate differentiation program. This leads to an important inter-individual variability in terms of cell counts and temporal dynamics among individuals of a given population (for instance, mice or humans). Most theoretical models of immune responses, either mathematical or computational models, usually consider only population-aggregated values such as mean and standard deviation. I will discuss modeling approaches of specific immune responses, their ability to properly describe the differentiation process leading to the clearance of an infection, and how they can account for inter-individual variability without over-complexifying models.
