

Quantitative Population Dynamics in Interdisciplinary Biology

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Through the course of life, from the moment of birth till death, an organism will achieve various states of equilibrium or 'homeostasis' which will inevitably encounter perturbations. The processes of cell growth, differentiation, infection, mutation, evolution and adaptation work together as a coordinated 'system', described by mathematical models for population dynamics, to maintain a healthy state. Any disruptions to this system leads to disease including infection, allergy, cancer, and aging. We are conducting interdisciplinary research to elucidate "Quantitative Population Dynamics" through the course of life with original mathematical theory and computational simulation, which are both our CORE approach. Our mathematical model-based approach has quantitatively improved a current gold-standard approach essentially relying on the statistical analysis of "snapshot data" during dynamic interaction processes in life sciences research. In this talk, I will explain how our interdisciplinary approach extends our understanding for complicated clinical data and apply real world problem with an example of the Novel Coronavirus Disease, COVID-19.

