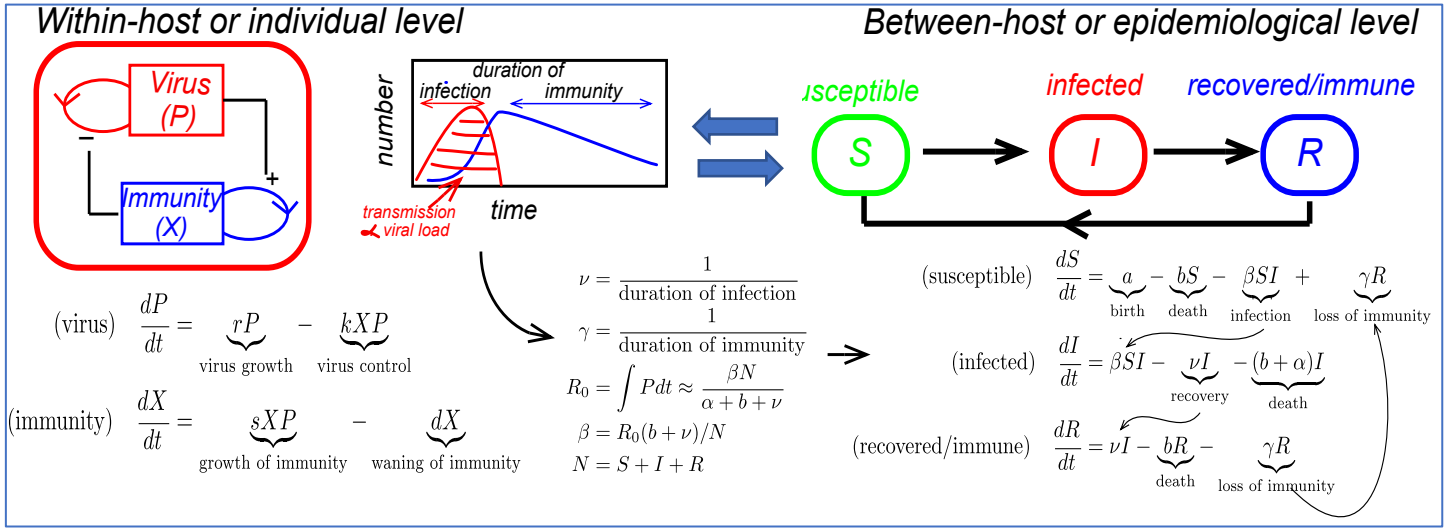
Multi-scale modeling of influenza vaccination for optimal T cell immunity

Problems with the current influenza vaccine:

● low and variable vaccine efficacy ● requires frequent reformulation ● does not protect against pandemic strains

Background and Approach: Most current *universal* influenza vaccine research targets conserved antibody epitopes. However, T cells epitopes are also conserved and are potential targets for vaccination. The effectiveness of T cell-based vaccine is complicated by two main factors. First, pre-existing immunity preventing the attenuated vaccine virus from replicating and inducing an immune response. Second, T cell immunity prevents pathology (and to a lesser extent infection), so vaccine effectiveness needs to take into account boosting of immunity by asymptomatic infection with the circulating virus.



What is new inside?

(i) ***Development*** and ***empirical validation*** of a quantitative framework to determine how CD8 T cell immunity affects dynamics of infection and transmission.

(ii) ***Multi-scale model*** that incorporates ***reciprocal feedback*** between immunity at the individual level and boosting at the epidemiological level.

End Users: The ***multi-scale models*** will guide the development of new T cell-based vaccine and strategies for its implementation.

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Grant support: NIH/NHLBI U01 HL139483-01A1