Effect of synaptic cell-to-cell transmission on HIV recombination dynamics

Jesse Kreger[1] **Natalia L. Komarova**[1] **Dominik Wodarz**[1]

[1] *University of California, Irvine, CA, US, 92617*

kregerj@uci.edu
komarova@uci.edu
dwodarz@uci.edu

In this talk, we investigate mathematical models regarding the evolutionary outcomes of human immunodeficiency virus (HIV), in humans. We analyze how the interplay between synaptic cell-to-cell transmission, free virus transmission, and the process of recombination affects the dynamics of an infection taking place. We first consider non-spatial models that take into account multiplicity of infection, co-infection, and competition between virus strains. We then introduce a novel agent-based model that takes into account the spatial nature of cell-to-cell transmission. We show that a combination of both free virus transmission and cell-to-cell transmission minimizes the time to a double hit mutant virus formation. We then analyze the growth and robustness of the double hit mutant virus population in the context of many different fitness landscapes and recombination rates.

References

[1] Komarova, N.L. and Wodarz, D. Virus dynamics in the presence of synaptic transmission. *Mathematical Biosciences*, 242(2):161-171, 2013.

⋆Mini-Symposium: Evolutionary Theory of Disease