JOHANNA HANSEN, Queen's University
Coinfection and the Evolution of Resistance

Recent experimental work in the rodent malaria model has shown that when two or more strains share a host, there is competitive release of drug resistant strains upon treatment. This within-host effect is predicted to have an important impact on the evolution and growth of resistant strains. However, how this effect translates to epidemiological parameters at the between-host level, the level at which disease and resistance spreads, is yet to be determined. Here we present a general between-host epidemiological model that explicitly takes into account the effect of coinfection and competitive release. Although our model does show that when there is coinfection competitive release may contribute to the emergence of resistance, it also highlights an additional betweeen-host effect that determines the overall effect of coinfection. It is the combination of these two effects, the between-host effect and the within-host effect, that contribute to the overall outcome of coinfection on the emergence of resistance. Therefore even when competitive release of drug resistant strains occurs it is not necessarily true that coinfection will result in the increased emergence of resistance. These results have important implications for the control of the emergence and spread of drug resistance.