Measles and immunity distributions

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Despite great availability of a highly effective vaccine, the measles virus continues to circulate around the globe, causing epidemics in some locations and small outbreaks in countries that have achieved eradication status. We are interested in studying mechanisms of immunity that may increase or decrease herd immunity to measles in populations. In this talk we will introduce and discuss our mathematical models of measles immunity distributions in heterogeneous populations consisting of immigrant and locally-born individuals, with specific vaccine uptake rates. We will also introduce the concept of waning immunity, and will discuss the effects of waning measles vaccine-induced immunity [1] on populations with high vaccination coverage. Our model and sensitivity analysis results show that immigration rates most aid in the development of herd immunity, and show that given even small waning rates, herd immunity may not be achieved, however, the probability of disease outbreaks can remain very low.

References

[1] N. Crowcroft, S. Bolotin, et al., Measles waning immunity: correlate of protection and vaccine efficacy, in prep.

⋆Mini-Symposium: Immuno-Epidemiological Models