Titre

Heterogeneity in the efficacy of prevention may impact the performance of control strategies for infectious disease

Encadrant

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Lieu

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Description

Background:

Epidemic control often requires optimal distribution of available vaccines and prophylactic tools, to protect from infection those susceptible. Well-established theory recommends prioritizing those at highest risk of exposure. But risk is hard to estimate, especially for diseases involving stigma and marginalization. In a recent work (see ref), we proved that one should target those at high risk only if the infection-averting efficacy of prevention is above a critical value, which we derive analytically. We applied this to the distribution of pre-exposure prophylaxis (PrEP) of the Human Immunodeficiency Virus (HIV) among men-having-sex-with-men (MSM), a population particularly vulnerable to HIV.

REF: Steinegger et al. (2022) Non-selective distribution of infectious disease prevention may outperform risk-based targeting. *Nat Comm* **13**:3028
https://www.nature.com/articles/s41467-022-30639-3

Project:

Prevention tools do not have the same effect on everyone. They may fail to elicit immunity altogether in specific people, and/or they may protect different people to different degrees. How does this heterogeneity in the efficacy of the prevention tool impact the performance of distribution strategies? Does it determine which distribution strategy prevents most infections in the population? The student will answer these questions by extending the previously developed formalism to the case of heterogeneous efficacy, and building a computational model of community spread of HIV coupled with PrEP roll-out, and fitted on surveillance and behavioral data.