Optimizing treatment protocols when diagnostics are costly

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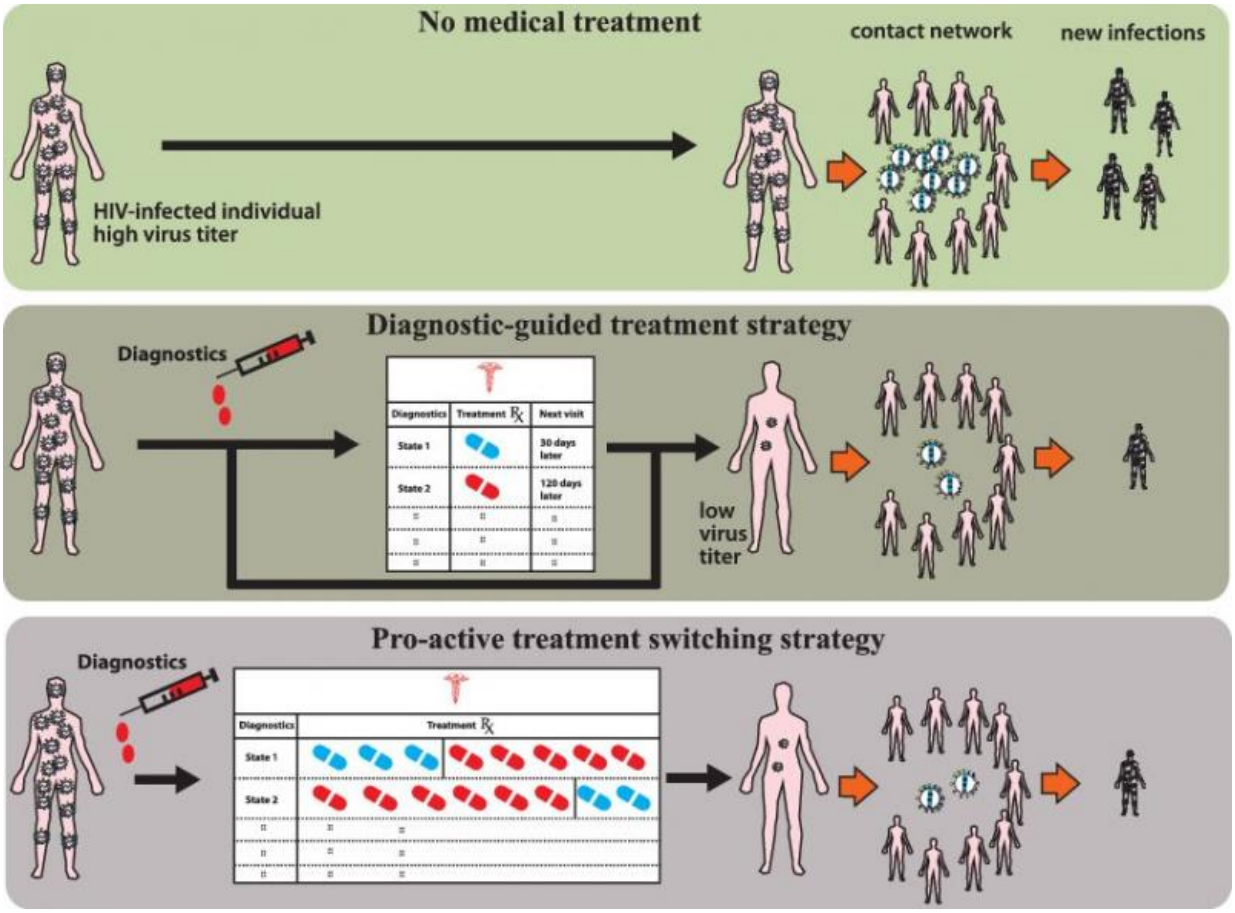

Optimal treatment strategies in the context of 'treatment for prevention' against HIV-1. Without medical treatment (upper panel) HIV-1 infected individuals have a high viral titer, which is related to a high probability to infect a sero-discordant partner after sexual contact. In contrast, diagnostic-guided (middle panel) and pro-active treatment switching strategies (lower panel) can durably suppress the virus in an HIV-1 infected individual, thus reducing the probability

that the individual spreads the infection. Credit: Sulav Duwal

HIV-1 continues to spread globally. While neither a cure, nor an effective vaccine are available, recent focus has been put on 'treatment-for-prevention', which is a method by which treatment is used to reduce the contagiousness of an infected person. A study published this week in *PLOS Computational Biology* challenges current treatment paradigms in the context of 'treatment for prevention' against HIV-1.

Sulav Duwal, Max von Kleist and their collaborators develop and employ optimal control theory to compute and assess diagnostic-guided vs. pro-active treatment strategies in terms of their expected costs, treatment benefit and reduction of onwards transmission.

In the study published this week in *PLOS Computational Biology*, the authors provide a mathematical platform that can be used to compute optimal diagnostic-guided vs. pro-active treatment strategies under consideration of available resources. They apply this framework to a stochastic model of viral intra-host dynamics and drug resistance development. When applied to resource-constrained settings, they show that pro-active strategies may be worthwhile.

More information: Duwal S, Winkelmann S, Schütte C, von Kleist M (2015) Optimal Treatment Strategies in the Context of 'Treatment for Prevention' against HIV-1 in Resource-Poor Settings. *PLoS Comput Biol* 11(4): e1004200. DOI: 10.1371/journal.pcbi.1004200