



PRESS RELEASE

AI models predict absolute virological response to HIV therapy over time

New models designed for use in all settings regardless of their definition of virological response

London, UK; 15th March, 2019. New predictive computer models, designed to optimize HIV therapy in countries with different definitions of virological response, are published online ahead of print in the *Journal of AIDS* (JAIDS). The models, which were developed with data from tens of thousands of patients around the world, accurately predict the change in the amount of HIV in the blood over time following the initiation of a new combination of HIV drugs.

Previous models developed by the RDI estimated the probability that the level of HIV in the plasma would fall below 50 copies HIV-RNA/ml, a stringent definition of virological response in widespread use in high-income countries. Many groups, particularly in low- and middle-income countries, use higher thresholds for response such as 200, 400 or, in the case of the World Health Organisation, 1,000 copies/ml. These latest models predict the absolute level of HIV over time and can therefore be used in any setting, regardless of their definition of response.

In independent testing the models' predictions correlated highly significantly with the actual changes in viral load observed at different time points in the clinic (the coefficient of correlation was 0.68, $p < 0.00001$). The models were also able to identify alternative regimens they predicted to be effective for the majority of cases where the new regimen used in the clinic failed.

“These models represent a significant step forward towards the individualisation of HIV therapy in low income countries, where higher definitions of response are generally used,” commented Dr Brendan Larder, Scientific Chair of the RDI and an author on the paper. “Only a restricted range of drugs are available in these settings, so the selection of the best combination is particularly critical.”

Used as part of the RDI's online HIV treatment response system, HIV TRePS, the predicted viral load for several different alternative new regimens will be presented graphically over a year. This will facilitate clinicians selecting the most effective combinations of drugs no matter what definition of virological response is used.



Currently, drug changes are not generally individualized in low- and middle-income countries but made according to set protocols. This can lead to sub-optimal treatments being introduced that can enable the development of drug resistance. Resistance is on the increase in such settings, which poses a threat, not only to the individual but to whole populations, through the increased risk of onward transmission of drug-resistant virus.

The new models will soon be available to be used by healthcare professionals as part of the RDI's HIV Treatment Response Prediction System (HIV-TRePS), which is freely available online at www.hivr.org/treps.

The RDI's participation in this project is through a subcontract with Leidos Biomedical Research, the prime contractor for the Frederick National Laboratory for Cancer Research, sponsored by the National Cancer Institute.

The RDI is an independent, not-for-profit international research collaboration set-up in 2002 with the mission to improve the clinical management of HIV infection through the application of bioinformatics to HIV drug resistance and treatment outcome data. Over the 14 years since its inception, the RDI has worked with many of the leading clinicians and scientists in the world to develop the world's largest database of HIV drug resistance and treatment outcome data, containing information from approximately 240,000 patients in more than 30 countries.

HIV-TRePS is an experimental system intended for research use only. The predictions of the system are not intended to replace professional medical care and attention by a qualified medical practitioner and consequently the RDI does not accept any responsibility for the selection of drugs, the patient's response to treatment or differences between the predictions and patients' responses.

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The paper

Revell AD, Wang D, Perez-Elias M-J *et al*. Predicting virological response to HIV treatment over time: a tool for settings with different definitions of virological response. *JAIDS* 2019; doi: 10.1097/QAI.0000000000001989.

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