

New study shows virus-like particle can effectively 'shock and kill' latent HIV reservoir

March 26 2024, by Cynthia Fazio

HLP outperforms clinically relevant LRAs at induction of viral transcripts. (A) After LRA stimulations, we measured induced HIV-1 reactivation by qRT-PCR of viral RNA detected in supernatant. (B) Activation of CD4⁺ T cells with LRAs was determined by IFN- γ ELISpot. Purple dots are spot forming units (SFU) from ELISpot wells, from participant 31 with subtype D infection. Credit: *Emerging Microbes & Infections* (2024). DOI: 10.1080/22221751.2024.2327371

By 2030, the World Health Organization (WHO), the Global Fund and UNAIDS are hoping to end the human immunodeficiency virus (HIV) and AIDS epidemic. An international team of researchers led by Eric Arts, professor at the Schulich School of Medicine & Dentistry, and Jamie Mann, senior lecturer at the University of Bristol (U.K.), has brought us another step closer to meeting this goal, by finding an effective and affordable targeted treatment strategy for an HIV cure.

In [the study](#) published in the journal *Emerging Microbes and Infections*, the team demonstrated that the patented therapeutic candidate, an HIV-virus-like-particle (HLP), is 100 times more effective than other candidate HIV [cure](#) therapeutics for people living with chronic HIV on combined [antiretroviral therapy](#) (cART).

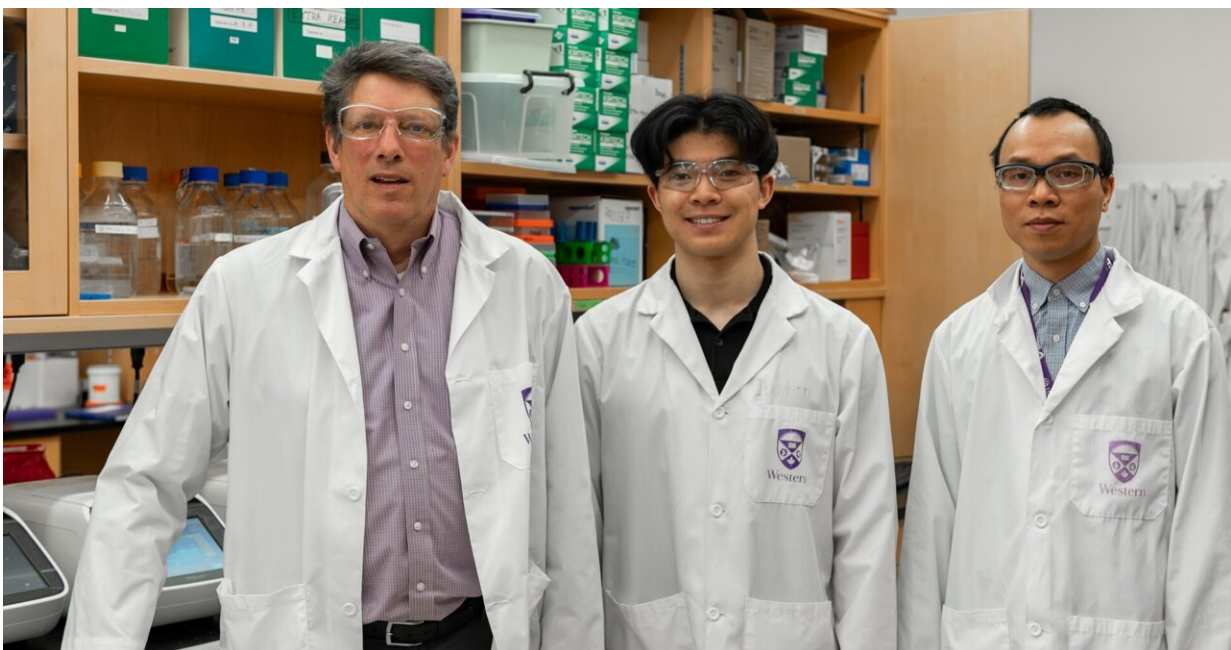
If successful in clinical trials, HLP could be used by millions of people living around the world to free them of HIV. This study was done using blood samples from people living with chronic HIV.

HLPs are dead HIV particles hosting a comprehensive set of HIV proteins that increase immune responses without infecting a person. When compared with other potential cure approaches, HLP is an affordable biotherapeutic and can be administered by intramuscular

injection—similar to the seasonal flu vaccine.

"The development of this HIV cure was 10 years in the making but with strong support from our collaborators in the U.S., Canada and Uganda, we have observed a striking ability of HLP to drive out the last remnants of HIV-1, which we hope will provide an affordable cure for all," said Arts, who is a Canada Research Chair in HIV Pathogenesis and Viral Control. "To live HIV-free is a goal for the 39 million infected. It is also the priority of the UN and WHO to end the HIV pandemic by 2030."

HIV is a retrovirus that attacks the body's immune system and if left untreated, can lead to acquired immunodeficiency syndrome (AIDS). The virus weakens a person's immune system by destroying CD4-T white blood cells, which are tasked with helping the immune system fight infections. Approximately 95% of people living with HIV have chronic HIV—where the virus is slowly causing a slow destruction of the patients' immune systems when they initiated lifelong cART.



The study shows that the researchers' patented therapeutic candidate, HLP, has the ability to drive out the last remnants of HIV-1. (From left) Schulich School of Medicine & Dentistry professor Eric Arts, master's student Ryan Ho and postdoctoral scholar Minh Ha Ngo. Credit: Megan Morris/Schulich School of Medicine & Dentistry photo

Larger global studies planned in future

While cART is effective at treating HIV, it has been unable to completely eliminate the virus from the body. This is because of the virus' ability to create a "latent reservoir"—where it hides dormant inside of cells, safe from detection.

Using blood samples from 32 participants living with chronic HIV from the U.S., Uganda and Canada, who were on stable cART for a median of approximately 13 years, researchers found that HLP was able to specifically target just the immune cells containing latent HIV reservoir and purge these cells of their HIV, a critical step towards an HIV-1 cure.

An HIV cure is typically described as therapy and approach that eliminates all HIV without the need of continuous antiretroviral therapy.

"Over time, the virus grows more diverse within a single individual that is not on treatment which makes it more difficult to target," said co-lead author Ryan Ho, master's student in the department of microbiology and immunology. "This formulation we've crafted covers the theoretical diversity so it can reach the HIV-1 in all those people living with HIV."

Minh Ha Ngo, lead author and postdoctoral scholar in the department of microbiology and immunology, says one concern expressed among people living with HIV for years is that continued use of cART could

lead to the virus becoming unreachable and unable to be eliminated.

The results of this study, by contrast, demonstrate that combining HLP with cART is still able to trigger the latent reservoir, even in chronic cases. If these dormant latent reservoirs can be awakened, then they can be eliminated from the body.

"Owing to its high mutation rate, HIV exhibits remarkable genetic diversity, resulting in different viral subtypes; some of which predominate in particular regions of the globe," said Mann. "We were excited to see preliminary evidence that our HLP cure therapy reverses latency irrespective of the subtype of the individual's infection. While this needs to be explored further, it hints at the global applicability of our approach."

In the future, researchers plan to test HLP on a larger representative HIV cohort with subtype C infections, which includes people living in South Africa, Ethiopia, Vietnam and India. This would help determine if the treatment strategy is effective for most people living with acute and chronic HIV.

Current studies involve confirming a lack of toxicity in preparation for human [clinical trials](#).

More information: Minh Ha Ngo et al, Effective and targeted latency reversal in CD4⁺ T cells from individuals on long term combined antiretroviral therapy initiated during chronic HIV-1 infection, *Emerging Microbes & Infections* (2024). [DOI: 10.1080/22221751.2024.2327371](https://doi.org/10.1080/22221751.2024.2327371)

Provided by University of Western Ontario

Citation: New study shows virus-like particle can effectively 'shock and kill' latent HIV reservoir (2024, March 26) retrieved 8 May 2024 from <https://medicalxpress.com/news/2024-03-virus-particle-effectively-latent-hiv.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.