

Discovery of HIV 'invisibility cloak' reveals new treatment opportunities

6 November 2013

Scientists have discovered a molecular invisibility cloak that enables HIV, the virus that causes AIDS, to hide inside cells of the body without triggering the body's natural defence systems.

Their study shows how 'uncloaking' the [virus](#) using an [experimental drug](#) triggers an immune response that stops the virus from replicating in [cells](#) grown in the laboratory.

The findings could lead to new treatments and help to improve existing therapies for HIV infection.

The [innate immune system](#) is the body's first line of defence against infection and incorporates an alarm system present in all cells of the body that detects the presence of 'foreign' material from invading bacteria and viruses. When the alarm is tripped, the infected cell begins an anti-viral programme and sends out warning signals to alert other cells that a virus is around. HIV infects vital cells of the [immune system](#) so its ability to replicate undetected without triggering this alarm system has puzzled scientists since the discovery of the virus.

The team identified two molecules inside host cells that are recruited by HIV after infection that stop the virus from reproducing its genetic material too early. The effect is to shield the virus from the alarm system and stop the innate immune system from kicking into action.

In the absence of these molecules, either by depletion from infected cells or blocking their recruitment using an experimental drug, HIV is exposed to the alarm system and an anti-virus immune response is triggered. Targeting the cloaking molecules and not the virus itself makes it much more difficult for the virus to mutate and become resistant to this treatment approach, a significant problem with standard HIV therapies.

Professor Greg Towers, a Wellcome Trust Senior

Research Fellow at UCL and lead author of the study, said: "HIV is extremely adept at hiding from our body's natural defences, which is part of the reason the virus is so dangerous. Now we've identified the virus' invisibility cloak, and how to expose it, we've uncovered a weakness that could be exploited for new HIV treatments.

"There's a great deal more research needed but the potential for this approach is huge, as a possible treatment in itself but also as a complement to existing therapies. We're also interested to see whether blocking these cloaking molecules can help to boost immune responses to experimental vaccines against HIV or be used to protect against HIV transmission.

"The hope is that one day we may be able develop a treatment that helps the body to clear the virus before the infection is able to take hold."

The experimental drug used in the study is based on Cyclosporine, a drug that is widely used to prevent organ rejection in transplant patients because of its ability to dampen the [immune response](#). Cyclosporines have been shown to block the replication of HIV and other viruses but are not suitable for treating infected patients because of their negative effects on the immune system. The team used a modified version of the drug, which blocks the effects of the two cloaking molecules without suppressing immune activity.

Dr Kevin Moses, Director of Science Funding at the Wellcome Trust said: "In 2012, 2.3 million people were newly infected with HIV. Whilst existing treatments are helping people with HIV to live longer and healthier lives, the challenge of adherence to treatment programmes means that drug resistance remains a threat and the virus continues to burden the world's poorest communities. Understanding how HIV interacts with the body's own defences might just be crucial for developing the best approaches to therapy."

More information: Rasaiyaah J et al. HIV-1 evades innate immune recognition through specific co-factor recruitment. *Nature*, 6 November 2013.
[DOI: 10.1038/nature12769](https://doi.org/10.1038/nature12769)

Provided by Wellcome Trust

APA citation: Discovery of HIV 'invisibility cloak' reveals new treatment opportunities (2013, November 6) retrieved 5 October 2022 from <https://medicalxpress.com/news/2013-11-discovery-hiv-invisibility-cloak-reveals.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.