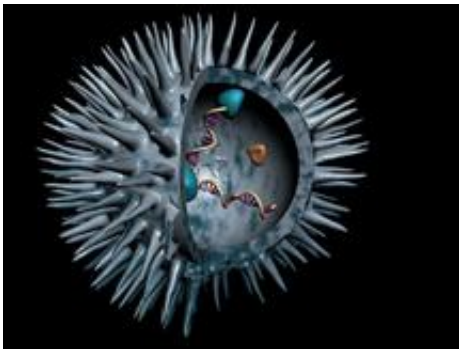


HIV is evolving to evade human immune responses

February 26 2009



An HIV viron

(PhysOrg.com) -- HIV is evolving rapidly to escape the human immune system, an international study led by Oxford University has shown. The findings, published in *Nature*, demonstrate the challenge involved in developing a vaccine for HIV that keeps pace with the changing nature of the virus.

‘The extent of the global HIV epidemic gives us a unique opportunity to examine in detail the evolutionary struggle being played out in front of us between an important virus and humans,’ says lead researcher Professor Philip Goulder of the Peter Medawar Building for Pathogen Research at Oxford University.

‘Even in the short time that HIV has been in the human population, it is

doing an effective job of evading our best efforts at natural immune control of the virus. This is high-speed evolution that we're seeing in the space of just a couple of decades.'

HIV has already killed 25 million people, and an estimated 33 million are currently infected. However, HIV does not kill all people at the same rate. On average, an adult with HIV will survive for ten years without anti-HIV drugs before developing AIDS. But some people will progress to AIDS within 12 months while others can make effective immune responses to the virus and survive without any anti-HIV therapy for over 20 years.

Genes encoding a key set of molecules in the human immune system called the human leucocyte antigens (HLA) are critically important. HLA determine the progress of many infectious diseases including HIV, and enable the recognition and killing of HIV-infected cells. Humans differ from each other in the exact HLA genes they have, and small differences can make the difference in how long it takes to progress to AIDS.

The research team set out to determine whether HIV is adapting to human immune responses. They looked at HIV genetic sequences in different countries around the world, including the UK, South Africa, Botswana, Australia, Canada, and Japan, wanting to see whether the HIV sequences could be related to the different HLA genes present in the different populations.

The collaboration between Oxford University, the Ragon Institute at Massachusetts General Hospital, Kumamoto University in Japan, the Royal Perth Hospital and Murdoch University in Australia and others analysed the genetic sequences of the HIV virus and human leucocyte antigen (HLA) genes in over 2,800 people. The work was funded by a number of organisations including the Wellcome Trust, the Medical

Research Council, the US National Institutes of Health, and Oxford's James Martin 21st Century School.

Mutations that allow HIV to get round immune responses directed by a particular HLA gene were found more frequently in populations with a high prevalence of that HLA gene. This is strong evidence for HIV adaptation to the human immune system at the level of populations.

'Where a favourable HLA gene is present at high levels in a given population, we see high levels of the mutations that enable HIV to resist this particular gene effect,' says author Professor Rodney Phillips, co-director of the James Martin Institute for Emerging Infections at Oxford University. 'The virus is outrunning human variation, you might say.'

'The temptation is to see this as bad news, that these results mean the virus is winning the battle,' says Professor Goulder. 'That's not necessarily the case. It could equally be that as the virus changes, different immune responses come into play and are actually more effective.'

The results are important because it is our most effective immune responses that vaccines against HIV would try and boost to a level that would protect against the virus.

'The implication is that once we have found an effective vaccine, it would need to be changed on a frequent basis to catch up with the evolving virus, much like we do today with the flu vaccine,' explains Professor Goulder.

'In this anniversary year of Darwin's birth, we are accustomed to think of evolution happening over thousands, tens of thousands and even millions of years,' says Professor Goulder. 'But we are seeing changes in HIV, and our immune response to the virus, in just a couple of decades.'

Provided by Oxford University ([news](#) : [web](#))

Citation: HIV is evolving to evade human immune responses (2009, February 26) retrieved 10 April 2024 from
<https://medicalxpress.com/news/2009-02-hiv-evolving-evade-human-immune.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.