

# Two cases of a “functional cure” for HIV/AIDS

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30 March 2013

Evidence that an infant was cured of Human Immunodeficiency Virus (HIV) was presented last month at the Conference on Retroviruses and Opportunistic Infections in Atlanta. A second breakthrough was announced shortly thereafter, as French researchers published in the journal *PLOS Pathogens* that they had been studying 14 people that have been “functionally cured” of HIV.

HIV itself is a virus that leads to acquired immunodeficiency syndrome (AIDS), where a human’s immune system is steadily compromised, allowing even common colds to develop into much more serious, even life-threatening, conditions.

The virus infects humans by the transfer of sexual fluids, blood and breast milk. Once contracted, it begins to attach to cells in the bloodstream known as lymphocytes, specifically the helper T cells. Once inside, HIV will rewrite the genetic code, the DNA, of the helper T cells and make copies of itself to spread to other helper T cells and stop the infected cells from performing their task inside the body, which is to identify harmful bacteria and viruses so that other cells in the bloodstream can eliminate the foreign entities.

Without helper T cells, the ability of the body to respond to even the most basic infection is lost, easily leading to even a minor disease being fatal.

AIDS was first clinically identified in the United States in 1981 among a group of injection drug users that developed a form of pneumonia only found in those with compromised immune systems. They had no previous history of impaired immune systems. Other cases of infections that occur only in those with compromised immune systems began happening, leading researchers to search for an underlying cause for the growing cases of immune deficiency being observed.

The virus was only categorized after five years of studying the various cases of impaired immune systems, and realizing that the symptoms were not specific to drug users, but could happen to the entire population. Moreover, they slowly realized that the basic symptom was not a variety of diseases related to immune deficiency, but the immune deficiency itself. The virus that caused this, when finally uncovered, was termed HIV.

In developed countries there is less than a one percent chance for a child to contract HIV/AIDS from their mother during pregnancy because of the monumental progress in science over the last few decades. Mothers are tested and are given a type of medicine known as antiretroviral treatments (ART) during their pregnancy, which keeps the infant from contracting the virus during the pregnancy by not letting the virus reproduce.

This concept was extended to the infant cured. While the mother of the infant was tested too late for the treatment to work on the child while in the womb, it was decided that the newborn would be treated with similar drugs thirty hours after birth. A test, taken two days after delivery, confirmed that the child had contracted the virus in the womb.

What is unique about this case is that the child tested positive for HIV when tested 12 and 20 days after birth. However, starting at 29 days the tests were unable to detect the virus in the child’s blood. This continued until the baby was 18 months old.

After the 18-month test the mother and daughter did not come back to the clinic for another 5 months. The doctors thought that in this time the baby would go into remission and present with elevated viral load in her blood. Once the mother and child returned, doctors were surprised that the infant was not coming up positive for the virus.

The child is now 26 months old and has not gotten any treatment since she was 18 months old. With a more sensitive test, doctors were able to detect that the child still had traces of HIV, but her immune system was able to manage it. She is “functionally cured,” meaning that while traces of the virus exist, it is not expected to become active again.

Something similar occurred in a study on seventy adults with HIV. All of the patients in the trial had an interruption in their treatment, which normally allows a resurgence of the virus. However, in fourteen of the subjects, the typical blood tests were unable to detect the virus. Like the child, tests on all fourteen of the adults had to be much more sensitive than normal to detect the virus. Additionally, in those fourteen, the virus is being handled by the patients’ immune systems. They are all “functionally cured.”

All 14 have been off treatment for up to almost 10 years.

“You haven’t eradicated the virus, but interestingly, when you stop therapy, even though the virus is still there and you can measure it, it doesn’t come back with a vengeance and cause disease in the person,” said Dr. Anthony Fauci, director of the National Institutes of Health’s National Institute of Allergy and Infectious Diseases.

Researchers realized that all of these people had one thing in common: all received treatment within 10 weeks of infection. The majority of people get tested only after they become sick, which can mean the virus was in their system for years.

The hypothesis is that in the 10-week period, the virus is not given the time to build a reservoir in the long-lived helper T cells, unlike persons that do not get treatment immediately. This reservoir in the long-lived helper T cells is thought to be the spark that ignites the relapses once treatment has been stopped.

Instead the virus is only able to build a reservoir in short-lived lymphocytes making it possible for the body to control the virus and keep the levels low enough so that the person doesn’t become sick.

Lead study author Asier Saez-Cirion of the Institute Pasteur in Paris said that these findings give hope to the idea of a vaccine, which would be able to prime the body to develop a response to the virus before a real infection, thus being able to combat it in an efficient manner.

The findings support the idea of making health care and HIV testing more available and increasing testing in higher-risk populations in low-income areas.

Yet in the midst of such remarkable breakthroughs, the gains that had been made in safety nets and health care for the poor and uninsured are quickly being chipped away by austerity policies of the Obama administration and its counterparts around the world. The working class is being thrown into deeper poverty, putting it at higher risk for epidemics. Even with advances in science, the fruits of modern health technology are unable to reach those that need it the most.



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