Second Woman May Be Cured of HIV After Stem Cell Transplant

This could be the eighth person with long-term viral remission after receiving donor stem cells to treat cancer.

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An eighth person appears to be cured of HIV after receiving a stem cell transplant for cancer treatment, according to a case report presented at the HIV Drug Therapy meeting in Glasgow.

The woman, who was treated in France, received a stem cell transplant for leukemia in July 2020 from a donor with a rare mutation that prevents the virus from entering cells. Although she stopped antiretroviral treatment a year ago, she has not yet experienced viral rebound.

The risky transplant procedure is appropriate only for HIV-positive people with advanced cancer, but each new case provides further information that could help scientists develop a more widely applicable functional cure.

Prior Cure Cases

Antiretroviral therapy can keep HIV suppressed indefinitely, but the virus inserts its genetic blueprints into host cells and establishes a long-lasting reservoir that drugs can't reach, making a cure nearly impossible.

Only a small number of people have been cured of HIV after receiving donor stem cells, which give rise to all types of blood cells and essentially replace the recipient's immune system.

The first, Timothy Ray Brown—known as the Berlin Patient—received two transplants to treat acute myeloid leukemia in 2006. His oncologist, Gero Hütter, MD, of Charité Hospital in Berlin, had the idea to use stem cells from a donor with two copies of the CCR5-delta32 mutation, which disables a receptor most strains of HIV use to enter cells.

Brown underwent intensive chemotherapy and radiation to prepare for the transplant, a conditioning regimen that kills off malignant cells to make room for healthy new ones from the donor. Afterward, he developed near-fatal graft-versus-host disease (GVHD), which occurs when donor immune cells attack the recipient. As first reported in 2008, he stopped antiretrovirals at the

time of his first transplant, but his viral load did not rebound. Over the years, researchers extensively tested his blood, gut and other tissues, finding no evidence of intact HIV. At the time of his death in September 2020, he had been free of HIV for more than 13 years.

Three other people—Adam Castillejo (the London Patient), Marc Franke (the Düsseldorf Patient) and Paul Edmonds (the City of Hope Patient)—were also cured after receiving stem cell transplants to treat leukemia or lymphoma from donors with a double CCR5-delta32 mutation. All three remain off antiretroviral therapy without viral rebound.

Many experts assumed these cures were attributable to the use of so-called homozygous donor cells with two copies of the mutation, but other cases suggest this isn't the only reason.

A mixed-race woman with leukemia (the New York Patient) experienced long-term HIV remission after receiving a combination of umbilical cord blood cells with the CCR5-delta32 mutation and partially matched adult stem cells from a relative without the mutation—a procedure sometimes used for people without a compatible donor.

In 2023, researchers presented the case of Romuald (the Geneva Patient), who remains in remission after a wild-type stem cell transplant, meaning his donor had no copies of the CCR5-delta32 mutation. And attendees at the 2024 International AIDS Conference heard about a cure case in which a German man (the Next Berlin Patient) and his donor both had only a single copy of the mutation.

The French Patient

The case presented as a poster at the Glasgow conference by Olivia Zaegel-Faucher, MD, of the Public Hospital of Marseille, and colleagues involves a woman in her mid-50s who was diagnosed with HIV in 1999. She started antiretroviral therapy early and had an undetectable viral load as of 2010.

In February 2020, she was diagnosed with acute myeloid leukemia. That July, she received a stem cell transplant from a donor with a double CCR5-delta32 mutation. Prior to the transplant, she received reduced-intensity conditioning therapy (the Baltimore regimen). Because her donor was not a close match, she also received medication to prevent graft-versus-host disease; nonetheless, she developed acute GVHD that resolved quickly, according to the report.

At the time of the transplant, she was taking raltegravir (Isentress) and tenofovir disoproxil fumarate/emtricitabine (Truvada). She had an undetectable viral load (below 20 copies) and a low level of HIV DNA in peripheral blood cells. However, her CD4 T-cell count was quite low, at 250 (200 is the threshold for an AIDS diagnosis).

During the ensuing months, the researchers measured her virus using ultrasensitive tests, finding no HIV RNA or DNA in circulating CD4 cells or blood plasma. Further laboratory testing showed that most of her CD4 cells could not be infected by HIV that uses CCR5 receptors, though her CD8 cells still carried the receptor. Her HIV antibodies "slightly declined over time," according to the report.

What's more, her CD4 count rose dramatically several months after the transplant, and her CD4-to-CD8 ratio normalized.

The woman began an antiretroviral treatment interruption in October 2023—39 months after the stem cell transplant. At that point, she was taking raltegravir, abacavir and lamivudine. A year later, her HIV RNA and DNA continued to be undetectable (less than two copies) in circulating CD4 cells and plasma and her CD4 count was near 1,300. HIV remission was sustained at the time of the report, with "no significant clinical events" except for a case of pneumococcal meningitis.

A year is a relatively short time after treatment interruption to suggest a "potential cure." Based on this report, the woman has not yet undergone more invasive testing to look for residual HIV in lymph node, gut or other tissues. Some researchers—and their institutions' press offices—have been more eager than others to declare a possible HIV cure, but as more cases accumulate, the threshold may be declining.

Adding to the Evidence

Scientists are still trying to figure out why these eight people were cured with stem cell transplants while other attempts have failed, and there does not seem to be a single decisive factor common to all cases. The use of HIV-resistant versus susceptible donor cells—which provides the virus with fewer targets—is one important factor. But the conditioning regimen, the severity of graft-versus-host disease, the size of the preexisting viral reservoir and individual immune response may all play a role.

Five people, including the latest patient, received transplants from donors with two copies of the CCR5-delta32 mutation, one received cells from a donor with a single copy, one received a mix of CCR5-delta32 homozygous and wild-type cells, and one had a donor without any copies of the mutation. Some underwent intensive pre-transplant conditioning therapy, while others received gentler regimens. Likewise, some experienced severe GVHD, but others did not.

Importantly, stem cell transplantation is an arduous procedure. The pretransplant conditioning therapy can leave patients prone to infections, and GVHD can lead to severe and prolonged symptoms. These risks—plus the high cost—mean it's not an answer for most people living with HIV worldwide. But each new case provides clues that could lead to more feasible functional cure approaches, such as CRISPR gene editing to delete or disable CCR5 receptors.

"All these cases are important scientifically—with every case, you learn more about what's possible and therefore what could be mimicked in an intervention," said HIV cure expert Sharon Lewin, MD, PhD, of the University of Melbourne, at this summer's International AIDS Conference. These rare cases are "inspirational to both people living with HIV and scientists," she added. "We need to give people hope but make it realistic."

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