

IMMUNOLOGY

Teen is healthy 12 years after ending HIV drugs

Case is longest remission after treatment in a child.

BY ERIKA CHECK HAYDEN

A French 18-year-old who was infected with HIV at birth remains in good health despite taking her last dose of antiretroviral drugs 12 years ago. Her exceptional case is the longest-lasting example of a person infected at birth suppressing the virus after stopping treatment, and has revived some of the optimism that was crushed when the ‘Mississippi baby’ — who was apparently cured of HIV in 2013 by early and aggressive treatment — relapsed after just over two years (see *Nature* <http://doi.org/w2n>; 2014).

“At some point, the idea of remission was mixed with the idea of cure, and expectations were too high,” says translational researcher Asier Sáez-Cirión of the Pasteur Institute in Paris, who presented the French teenager’s case on 20 July at the annual meeting of the International AIDS Society in Vancouver, Canada. He says of the girl’s family: “They understand that this is not a cure, that this is a state of remission, and that we don’t know exactly what happened.”

The case intrigues researchers who hope to learn more about HIV and how best to control it using antiviral drugs. Those in the field would like to know whether there are characteristics that might be used to predict which people will fare well if their treatment is discontinued. French researchers are following 20 adults, known as the VISCONTI cohort (A. Sáez-Cirión *et al.* *PLoS Pathogens* **9**, e1003211; 2013), a group of ‘post-treatment controllers’ who have been able to suppress the virus after being off antivirals for a median length of 10 years.

These cases are distinct from those of ‘elite controllers’ — the roughly 1% of people with HIV who can keep the virus in check despite never starting treatment. That group shows distinct genetic and immunological characteristics compared to post-treatment controllers.

“It seems like something is different” between post-treatment and elite controllers, says virologist Steven Deeks of the University of California, San Francisco. But, he says of the French teenager and other post-treatment controllers, “it’s impossible to prove that they would not have done well in the absence of therapy.”

Sáez-Cirión reported that, like those in the VISCONTI cohort, the French girl has

particular variants of immune-system genes that seem to have predisposed her to particularly severe early HIV infection. Researchers are not sure how this might be connected to the ability to control the virus for several years after discontinuing treatment. One possibility is that the gene variants may cause their infections to be noticed sooner than in other people with HIV, and thus they can be treated earlier in the development of their disease.

Like the Mississippi baby, the French teen became infected by her mother around the time of birth. But there are some crucial differences between the timing and dosing of the treatment regimens that the two children received.

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The US baby was given highly active antiretroviral therapy — a combination of powerful medicines designed to control HIV — within 30 hours of birth. By contrast, the French

girl was initially treated for six weeks with a single drug, zidovudine. When her viral load shot up at the age of three months, she started a combination treatment with four antiretroviral drugs.

But her family decided, for reasons that have not been made public, to discontinue her treatment when she was between five and six years old. Even so, when doctors saw her as a six-year-old, she was apparently healthy, with an undetectable level of HIV in her body. Twelve years later, she is still healthy despite not taking any further medication for HIV.

“It’s an intriguing case, but it’s a very unique and unusual outcome,” says physician and virologist Deborah Persaud of Johns Hopkins Children’s Center in Baltimore, Maryland, who first reported on the Mississippi baby in 2013 (see *Nature* <http://doi.org/m2d>; 2013). “We’ve had many kids who are treated for years, then go off treatment and rebound, so the global message is still that kids should stay on treatment.”

The French teenager is now being studied as part of the VISCONTI cohort. Eighteen of the study participants remain drug-free. In general, only 5–15% of people who start early treatment are able to remain in control of the virus in this way after discontinuing treatment. ■

half a million dollars, mostly in the United States, and all from private gifts,” says Frank Drake, one of the pioneers of modern SETI, who is also on the Breakthrough Listen team. “Now we’re getting \$100 million, so that’s real progress.”

Milner, who is bankrolling the project, made his fortune through investments in Facebook and other Internet businesses, and in 2012 established the lucrative ‘Breakthrough’ prizes to reward excellence in the life sciences, fundamental physics, and mathematics. A particle-physics graduate, he jokes that his interest in SETI began in 1961, the year of his birth; he was named after Russian cosmonaut Yuri Gagarin, instilling a lifelong fascination with space and the possibility of alien life.

DATA TORRENT

The small SETI community will be inundated with a torrent of data — potentially as much in a day as earlier SETI projects collected in a year, Milner estimates. The data will be publicly available, to allow enthusiasts to join the search; Breakthrough Listen will also partner with the established SETI@home project that connects people’s home computers and uses them to crunch data. “The results belong to everyone equally,” says Milner, adding that transparency is particularly important in a project searching for aliens because “there are so many conspiracy theorists”.

Drake argues that Breakthrough Listen will have a positive impact on the wider astronomy community. The investment has saved the relatively old Green Bank and Parkes telescopes from the threat of closure, he says, as governments divert funds to larger-scale, higher-resolution projects such as the Square Kilometre Array (SKA). The sky survey might discover more pulsars, and help to home in on the origin of mysterious ‘fast radio bursts’ — pulses lasting only a few milliseconds.

Breakthrough Listen has not finalized its search strategy, but one of the project’s first tasks will be to fully scan stars for signals in the frequency band between about 1 and 10 gigahertz. The band has been identified in the past as a good channel for deliberate alien communication because signals can travel through interstellar space and Earth’s atmosphere without much interference. “Previously we’ve only been able to hunt and peck at it, now we’ll search that entire spectrum comprehensively,” says Siemion.

“It’s quite likely that we won’t find anything,” Milner concedes, adding that a negative result would allow astronomers to put some limits on what is out there. “But in ten years’ time, there will be even more advances and we can work out the best strategy for the next ten years of the project, and then maybe the next ten after that,” he says. ■