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AIDS science at 30: 'Cure' now part of lexicon

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Big names in medicine are set to give an upbeat assessment of the war on AIDS on Tuesday, 30 years after French researchers identified the virus that causes the disease.

Scientists will pay tribute to the astonishing success of AIDS drugs and highlight steps being taken towards a cure—a goal once deemed all but out of reach.

Entitled "Imagine the Future," the three-day conference builds on the 30th anniversary on Monday of the isolation of the human immunodeficiency virus (HIV).

The Nobel-winning achievement, by a team led by Luc Montagnier of France's Pasteur Institute, unmasked a killer.

Then began the drive to treat the disease and halt its spread.

"The discovery of HIV in 1983 and the proof that it was the cause of AIDS in 1984 were the first major scientific breakthroughs that provided a specific target for blood-screening tests and opened the doorway to the development of antiretroviral medications," said Anthony Fauci, director of the US National Institute of Allergy and Infectious Diseases (NIAID).

Introduced in 1996, after many years of frantic drug research, antiretrovirals are saving the lives of millions of people infected with

HIV and helping to contain the virus' spread, Fauci said in an email.

By suppressing viral levels, antiretrovirals can prevent HIV being transmitted by pregnant women to their unborn children, and by infected people to their sexual partners.

But there have also been setbacks, particularly in the quest for a vaccine.

Only last month, US authorities halted the latest clinical trial—launched in 2009—after the prototype formula failed to prevent infection.

Finding antibodies that are able to identify the slippery, mutating virus has proven to be almost as hard as the proverbial search for a needle in a haystack.

"Vaccine research continues to suffer from setbacks—but pursue a vaccine we must if we are to truly see the end of AIDS," said Adeeba Kamarulzaman, a professor of infectious diseases at the University of Malaya, who will co-chair a global conference on AIDS science in Kuala Lumpur in June.

Counter-intuitively, the main hope nowadays seems to rest on a cure.

Three years ago, Francoise Barre-Sinoussi—a 2008 Nobel co-recipient with Montagnier—mapped a strategy for attacking HIV's "reservoir."

This is the cellular bolthole where the virus lurks after being pounded with antiretrovirals. Once the drugs are stopped, the virus re-emerges and spreads once more through the bloodstream.

"The great challenge will be to fully understand where the virus hides, how it manages to stay hidden so effectively and how to lure it out of its hiding place. We've learnt a lot about this in the past few years," said

Sharon Lewin, a professor at Monash University in Melbourne, Australia.

'Functional cure'

Lewin is part of a team cautiously experimenting with an anti-cancer drug to flush out the virus that destroys the immune system and exposes infected people to pneumonia, TB, and other opportunistic diseases.

In trials on 20 patients, the cancer drug awoke the dormant virus in 90 percent of volunteers. The ultimate goal is to kill the newly-exposed virus, leaving the cell it hid in to die eventually of old age.

"We do have drugs that seem to wake up the virus but these are only the first steps in ultimately clearing it out completely," said Lewin.

Two other small studies using antiretrovirals at a very early stage of infection, before viral levels build up, have excited hopes of a "functional cure."

One involved a baby in Mississippi, apparently cleared of the virus after being given aggressive antiretroviral treatment within 30 hours of birth.

"It is certainly a very exciting finding, but this is only a single case and additional studies are needed to determine whether the circumstances of this particular case can be replicated among other HIV-exposed children," said Fauci.

The other is a small French study of 14 HIV patients, known as the VISCONTI cohort, given drugs very soon—within 10 weeks—after infection. Treatment normally starts only once the immune system becomes compromised, sometimes years after infection.

The VISCONTI group stopped taking the daily drugs after about three years, and have remained healthy.

And crucially, none of the individuals are among that rare group of people—fewer than one percent of the population—who seem able to naturally stave off HIV and are known as "natural" or "elite controllers."

AIDS has killed 30 million people.

An estimated 34 million people are infected with HIV worldwide, and about 1.8 million die every year.

A year after the Montagnier team's historic publication in *Science* on May 20, 1983, a team led by Robert Gallo of the United States published similar findings—triggering an acrimonious debate with research funding and prestige at stake.

It turned out that Gallo had worked on a viral sample originally sent to him by Montagnier.

Credit for isolating HIV thus went to the French team, but Gallo was recognised for determining that the virus caused AIDS, something the Montagnier study was not clear on.