

# Luc Montagnier

(1932–2022)

## Virologist who won a Nobel prize for discovering HIV.

**L**uc Montagnier rose to scientific prominence and won a Nobel prize for co-discovering HIV. His work made it possible to develop diagnostic tests and treatments that have saved countless lives. He spent his later years dismantling that hard-won reputation by espousing fringe theories and opposing vaccination. His baseless claims about COVID-19 – that vaccines would drive the emergence of dangerous variants, or that the virus was engineered – were weaponized by misinformation campaigns. He died on 8 February at the age of 89.

Montagnier was born on 18 August 1932 in Chabris, France. The Second World War marked his childhood with hunger and uncertainty, but his interest in science blossomed early. He embarked on the activity that has spawned countless researchers: tinkering with explosive compounds in a home laboratory. Later, he rigged a time-lapse camera to a microscope and studied chloroplasts' response to light. He was inspired to become a virologist after learning of the 1957 discovery that RNA from the tobacco mosaic virus could transmit infection.

Montagnier worked in several laboratories before landing at the Pasteur Institute in Paris in 1972, building up his virology expertise along the way. He specialized in retroviruses – RNA viruses that can insert a DNA copy of their genetic material into the genome of their host. This, along with advances in culturing immune cells and his use of reagents that block antiviral proteins called interferons to awaken dormant retroviruses in cells, came in handy in 1983. A colleague sent him lymph node tissue taken from a French fashion designer thought to be in the early stages of AIDS.

At the time, when people were diagnosed with AIDS, they were often already living with a variety of infections, cancers and other disorders that complicated the search for the source of the disease. Researchers speculated wildly: some blamed fungi or chemical exposure. Others saw that a class of immune cells called CD4<sup>+</sup> T cells were depleted in people with AIDS, and wondered whether the body's immune system was targeting them. Montagnier was reminded of a known retrovirus that could infect CD4<sup>+</sup> T cells, and that was transmitted through blood and sexual activity.

In Montagnier's virology unit at the Pasteur Institute, Françoise Barré-Sinoussi isolated a new retrovirus from the lymph node



biopsy; the team called it lymphadenopathy associated virus (LAV; F. Barre-Sinoussi *et al. Science* **220**, 868–871; 1983). When, in September 1983, Montagnier presented the results at a small, late-night session of a scientific meeting at Cold Spring Harbor Laboratory in New York, his audience was sceptical. “This situation is not infrequent in science, since new discoveries often raise controversy,” he wrote in his

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Nobel prize biography.

Soon after that presentation, a team led by virologist Robert Gallo, then at the US National Cancer Institute in Bethesda, Maryland, helped to solidify the link between AIDS and the virus that Montagnier's team had found (formally named HIV in 1986). Gallo had previously discovered other retroviruses that infect human cells, called human T-lymphotropic virus (HTLV)-I and HTLV-II. In 1984, his team isolated a retrovirus from samples taken from people with AIDS, and he called it HTLV-III. But it turned out to be identical to LAV, samples of which Montagnier had supplied to his lab.

The two teams then waged an epic patent war

over who should have the intellectual-property rights to a diagnostic test based on the virus. Finally, in 1987, peace was brokered by US president Ronald Reagan and French prime minister Jacques Chirac, who agreed to divide the royalties from the test between the two countries, and to establish an international AIDS research and education fund.

Given this history, many were surprised when, in 2008, Gallo did not receive a share of the Nobel prize. Instead, Montagnier shared the prize for physiology or medicine with Barré-Sinoussi; virologist Harald zur Hausen was also honoured, for his unconnected discovery that human papillomaviruses are linked to cervical cancer.

After the discovery of HIV, Montagnier's work took a dismaying turn. He published a series of controversial articles claiming that highly diluted DNA from some pathogens emits electromagnetic waves. He invoked the debunked notion of ‘water memory’, arguing that the water is altered by the DNA in a way that retains some properties of the molecules even when they have been heavily diluted. (The concept of water memory had been championed by French immunologist Jacques Benveniste in a 1988 *Nature* paper that was later found to be irreproducible (J. Maddox *et al. Nature* **334**, 287–290; 1988)). At the age of 78, Montagnier left France to lead a research institute at Shanghai Jiao Tong University in China, to study the matter.

Over time, Montagnier seemed not only to be comfortable with controversy, but to court it. He embraced homoeopathy and pseudoscientific ideas about autism. “He reached a stage where no researchers were able to provide comments or explanations for his late evolution,” says Bernard Meunier, former president of the French Academy of Sciences. Others were more direct: “Luc Montagnier has lost it,” wrote *Science* columnist and chemist Derek Lowe in 2012.

During the COVID-19 pandemic, Montagnier's Nobel prize lent weight to his damaging views that the COVID-19 vaccine could be harmful. By the end of his life, the image of his face was circulating on social media in anti-vaccination memes. Hard to credit that it had once been on commemorative postage stamps in honour of his contributions to public health.

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