CHRISTIAN FLEMMING/LINDAU NOBEL LAUREATE MEETINGS

Q&A Françoise Barré-Sinoussi
HIV adversary

Françoise Barré-Sinoussi and Luc Montagnier were jointly awarded the 2008 Nobel prize in Physiology or Medicine for their discovery of HIV in 1983. Three decades on, Barré-Sinoussi is director of the Retroviral Infections unit at the Pasteur Institute in Paris. Here, she tells Iria Gomez-Touriño about the latest strategies to combat the virus.

HIV was discovered more than 30 years ago. How far have we come since then?
The main achievement after the discovery of HIV was the diagnostic test, which meant that we could prevent transmission of the virus by blood and blood derivatives. The next big steps were the prevention of mother-to-child transmission using the antiretroviral treatment AZT in 1994 and the advent of potent combinations of antiretroviral therapies in 1996. These are both good examples of what we call translational science, whereby basic knowledge is used to develop tests and treatments for the benefit of patients.

It is estimated that for every HIV-infected person starting therapy two individuals are newly infected. What are we doing wrong?
People are still really scared about being tested for HIV, even if they know that there is a treatment for it. In my experience, people worry that others could think they are drug users or sex workers and are afraid about being rejected by society. Unfortunately, this stigma still exists not only in resource-limited countries but also in countries such as France.

Does the solution lie in better education or further research into treatments?
Education is part of prevention, care and treatment. We can't say prevention is more important than treatment or vice versa. If we do not treat the 35 million people who are already infected, the epidemic will continue. The treatment itself is also prevention, as we can reduce the transmission to others. We should also campaign for the use of existing preventative tools, such as the condom, but also for the development of new ones. Earlier this year there were some encouraging preliminary results based on a single injection of long-lasting antiretrovirals, monthly. This kind of technology could certainly be a breakthrough.

➲ **NATURE.COM**
Four films with laureates and young students:
go.nature.com/uzypa2

To what extent is religion the cause of more people becoming infected?
Religion is one of many factors, but it is an important one. When Pope Benedict XVI claimed [in 2005] that condoms are not the solution for HIV, this had a really bad impact on African Catholic countries and this is really a shame. We also have some countries drawing up homophobic legislation under the influence of religious dogma, but such measures will not reduce HIV infection. However, I have been in many places where local religious leaders are doing a remarkable job informing people about the risks and encouraging them to protect themselves.

What is the most promising route towards a cure for HIV infection?
In my opinion, remission, which means that the virus is still present in a patient's body but controlled so it does not replicate, is more likely to be achievable than a complete eradication. We already have examples in which very early treatment after the infection has led to such remission.

The VISCONTI patients [a group of 14 patients in France who were all given antiretroviral drugs soon after becoming infected] maintained a tight control of HIV replication several years after treatment was stopped. Also, the 'Mississippi baby' [an infant treated immediately after she was born with HIV] was able to maintain virological control of her infection for more than two years after the medication was stopped. Sadly, in this case the infection rebounded recently. We need to develop better tools to detect and measure the persistent virus.

Why is a vaccine for HIV proving so elusive?
There are lots of reasons. One is that the development of broadly neutralizing antibodies is very slow. Being highly variable, the virus can escape easily from the control of the immune system and the infection is very rapid, resulting in abnormal alteration of the immune defence. Vaccines are efficient and very often you still have very low levels of replication, which is good because it re-stimulates the immune system. In the case of the HIV antigen, re-stimulation can also be bad because trace amounts of antigens that are harmful to the immune system will prevent the vaccine from working. We have a list of antigens that can be harmful, but we don't know which antigens initiate the abnormal signalling in immune cells.

A real breakthrough was the use of an SIV [simian immunodeficiency virus — the non-human primate equivalent of HIV] vaccine candidate using cytomegalovirus (CMV) as a vector. This CMV-based SIV vaccine is able to induce very efficient immune responses and to clear SIV infection in macaques. Recent results also show that a cocktail of broadly neutralizing antibodies in mice and macaques can efficiently suppress HIV plasma viraemia and reduce proviral DNA.

In 2012 the International AIDS Society published seven priorities for HIV research. What has been the impact of this strategy?
We decided to launch the Towards an HIV Cure initiative to stimulate and coordinate international efforts, and also to advocate for more research in the area. Several consortiums in the United States have been established to develop a cure for HIV, with experts coming from fields such as immunology, genetics, virology and also the private sector. Our knowledge of HIV persistence under antiretroviral treatment has progressed in past years. Strategies being investigated include reactivating the latent virus to flush it out of the cells and then to kill the virus with immune agents or a vaccine. Gene therapy to make cells resistant to HIV infection is also being explored.

"If we do not treat the 35 million people who are already infected, the epidemic will continue."

For the first time, this year's Lindau meeting boasts more female young researchers than male. How can more women be encouraged to take scientific posts?
When I first started work in the 1970s at the Institut Pasteur in Paris, France, there were no more than five female professors; today, the same institution has close to 50% female professors, which is wonderful. One way forward is to better recognize the work of women, although I think that this is already progressing. Another issue is children. I made the choice not to have children because I thought it was too difficult at that time to have a career and a family — although it might not be the best solution and many other women scientists do choose to have a family. Certainly we can better organize research institutions to offer childcare, for instance. While we all can agree that equity is a good thing, women shouldn't be selected just because they are women. ■

Iria Gomez-Touriño completed her PhD in biology at the University of Santiago de Compostela, Spain, and is a Marie Curie postdoctoral fellow in the immunobiology department of King's College London, where she focuses on identifying the T-cell receptors of autoreactive T cells in type 1 diabetes.

CHRISTIAN FLEMMING/LINDAU NOBEL LAUREATE MEETINGS

Q&A Michael Bishop
Free thinker

Michael Bishop and Harold Varmus proved that genetic changes could drive the formation of tumours. They were awarded the 1989 Nobel prize in Physiology or Medicine for discovering the origin of retroviral oncogenes. Bishop — now director of the GW Hooper Foundation at the University of California, San Francisco — tells Kipp Weiskopf about 40 years in cancer research.

What first drew you to science, and to biomedical research in particular?
My first scientific hero was Arrowsmith — the main character in the 1925 novel of the same name by Sinclair Lewis, which almost every medical student of my generation read. It is about an idealistic young man who starts out as a family physician but is not satisfied and wants to be a medical scientist who cures diseases. I identified with him because I grew up in rural Pennsylvania wanting to be a doctor but I was not very sophisticated. When I went to medical school at Harvard in Boston, Massachusetts, I had never seen the inside of a research laboratory, so I immediately took up with classmates who had undergraduate research experience and I credit them with my decision to try research.

What has been the most exciting stage of your career?
I had a great time working on polio in my early years in the lab. But I switched to retroviruses just before the discovery of reverse transcriptase, which was essential to the biotechnology revolution. We found ourselves at the cutting edge of an absolutely new field in which things were moving extremely rapidly. Every young scientist's objective should be to start something new because that's when things are really fun. If I were beginning my scientific career today I would study neuroscience, which has fascinated me ever since I encountered it during my first year at Harvard Medical School and which still has thrilling frontiers.

Has working in the San Francisco Bay Area been a particular influence?
When I arrived in 1968 it was in the middle of the Haight-Ashbury 'hippie heaven' era [named after a district in San Francisco], and a degree of openness also pervaded the academic community. I had other offers from institutes on the East Coast, but I disliked their academic pyramid structures. So I went to the University of California, San Francisco