



Agency for
Science, Technology
and Research

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UNRAVELING THE MYSTERY BEHIND HIV/AIDS

New findings by Nobel Laureate shed light on the elusive AIDS virus and may lead to effective HIV vaccine development

1. Professor Françoise Barre-Sinoussi¹, winner of the 2008 Nobel Prize in Physiology or Medicine and co-discoverer of the Human Immunodeficiency Virus (HIV) responsible for AIDS, was in Biopolis, Singapore, on 3 March 2010 to share her latest research findings on natural protection against AIDS found in infected humans and primates she studied. Despite prolonged infection, these subjects do not develop AIDS and serve as valuable models to understand what constitute protection against AIDS. The models include a rare population of HIV-infected humans called “HIV controllers”², and African Green Monkeys which are natural hosts of the Simian Immunodeficiency Virus – a virus that is highly similar to HIV.

2. Globally, there are more people who are being newly infected with HIV than there are HIV-infected people being treated with highly active antiretroviral therapy (HAART). This is so in spite of the international efforts for universal access to HAART. “The development of an effective HIV/AIDS vaccine is critical to prevent new infections and to reverse the curb of this devastating pandemic,” said Prof Barre-Sinoussi, who is Director of the Regulation of Retroviral Infections Unit of the

¹ Françoise Barre-Sinoussi was first author of the publication that reported in 1983 the discovery of the retrovirus responsible for AIDS. This retrovirus was later named Human Immunodeficiency Virus (HIV). For their discovery of HIV, Françoise Barre-Sinoussi and Luc Montagnier, who headed the research team in 1983, won the Nobel Prize in Physiology or Medicine in 2008. (Refer to Annex for biography of Françoise Barre-Sinoussi.)

² “HIV controllers” belong to a rare group of HIV-positive individuals who, despite being infected for more than 10 years, are able to cope with the virus internally and avoid the subsequent onslaught of opportunistic infections and symptoms that commonly affect HIV-positive patients. About 1 out of every 300 infected persons is a HIV controller.

Virology Department, Institut Pasteur in France. Through studying these models of natural protection, Prof Barre-Sinoussi hopes to identify immune correlates of protection³ that will contribute to and overcome the obstacles researchers have faced in the search for an effective HIV/AIDS vaccine.

3. In high income countries, access to HAART has had an extraordinary impact on HIV-related mortality. The pronounced decline (more than 85% reduction) in AIDS-related deaths as a result of advances in treatment has led to an increase in HIV prevalence in these countries, making HIV infection a chronic condition. “Some patients on long term HAART are presenting a number of complications like metabolic disorders, cancers or cardiovascular disease. This highlights the need for careful monitoring and management of HIV infection in patients on HAART. Having a HIV vaccine would not only circumvent such complications, but would also be less costly than the treatment,” added Prof Barre-Sinoussi.

4. Prof Philippe Kourilsky, formerly Director of Institut Pasteur and who is currently Chairman of A*STAR’s Singapore Immunology Network which co-organised the seminar, said, “HIV infection is an enormously important problem of public health worldwide. Knowledge gained from HIV research on which types of human immune cells react after a viral infection will be useful for developing HIV vaccines. Whilst there is a lot of ongoing work on developing preventive vaccines that are given to HIV-negative people to prevent them from getting infected, I believe it is equally important to develop HIV therapeutic vaccines to treat people who are already infected with HIV, to cure the disease.” New knowledge on how HIV infects and evades destruction by the host immune response can be a powerful tool for elucidating the complex relationship between viruses and hosts, not only in understanding the rampant spread of AIDS but also in new epidemics related to infectious diseases such dengue and influenza.

5. “We are very honoured to have such a distinguished scientist as Prof Barre-Sinoussi visit our research institutes at the Biopolis. We hope that our young scientists and students aspiring to embark on a career in science will be inspired by

³ Correlates of protection to a virus or other infectious pathogens refer to measurable signs that indicate a person is protected against becoming infected and/or developing a disease.

her relentless pursuit in finding a solution to the widespread AIDS epidemic and in turn be challenged to discover new cures to infectious diseases that pose global health problems,” said Prof Kourilsky.

6. The seminar by Prof Barre-Sinoussi, which was jointly organised by the Agency for Science, Technology and Research (A*STAR)’s Institute of Medical Biology (IMB) and Singapore Immunology Network (SIgN), attracted an audience of over one hundred including researchers from the research institutes and hospitals, clinicians, as well as university students from NUS and NTU.

7. According to global figures in a Nov 2009 report released by the Joint United Nations Programme on HIV/AIDS, AIDS continues to be a major global health priority – there were about 2.7 million new infections, around 2 million AIDS-related deaths and some 33.4 million people living with HIV in 2008. In Singapore, 456 residents were newly reported with HIV infection in 2008. This brought the total number of HIV-infected Singaporeans to 3,941 as of end 2008 (Source: Ministry of Health, Singapore)⁴.

AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH (A*STAR)

For queries and further clarification, please contact:

Wang Yunshi (Ms)

Corporate Communications

Agency for Science, Technology and Research (A*STAR)

Tel: (65) 6826 6443

Email: wang_yunshi@a-star.edu.sg

About the Institute of Medical Biology (IMB)

The Institute of Medical Biology is a member of the Agency for Science, Technology and Research (A*STAR). With its roots in the Centre for Molecular Medicine since 2004, it became the Institute of Medical Biology in 2007, with a mission to study mechanisms of human disease in order to discover new and effective therapeutic strategies for improved quality of life. IMB is developing internationally excellent research programmes working closely with clinical collaborators, targeting the challenging interface between basic science and clinical medicine, and aiming to promote increased and effective throughput of research from bench to bedside. Its growing portfolio of strategic research topics aims to promote translational research

⁴ The statistics for HIV infection in Singapore in 2009 have not been released.

on the mechanisms of human diseases with a cell to tissue emphasis that can help identify new therapeutic strategies for disease amelioration, cure and eradication. For more information about IMB, please visit www.imb.a-star.edu.sg.

About the Singapore Immunology Network (SIgN)

SIgN, officially inaugurated on 15 January 2008, is a research consortium under A*STAR's Biomedical Research Council. It is aimed at building on the strengths of the existing immunology research groups at A*STAR, as well as expanding and strengthening the immunology research expertise in Singapore. SIgN's objectives include coordinating basic, translational and clinical research needed to establish immunology as a core capability in Singapore. The major focus areas of research at SIgN are Infection and Inflammation, in which SIgN researchers investigate immune responses and regulation in disease-specific contexts. Through this, SIgN aims to build up a strong platform in basic human immunology research for better translation of research findings into clinical applications. SIgN also sets out to establish productive links with local initiatives within Biopolis and across Singapore, as well as to obtain international recognition as a leading immunology research hub while establishing relationships with the best institutions in the world.

For more information about SIgN, please visit www.sign.a-star.edu.sg.

About the Agency for Science, Technology and Research (A*STAR)

The Agency for Science, Technology and Research (A*STAR) is the lead agency for fostering world-class scientific research and talent for a vibrant knowledge-based and innovation-driven Singapore. A*STAR oversees 14 biomedical sciences, and physical sciences and engineering research institutes, and seven consortia & centre, which are located in Biopolis and Fusionopolis, as well as their immediate vicinity.

A*STAR supports Singapore's key economic clusters by providing intellectual, human and industrial capital to its partners in industry. It also supports extramural research in the universities, hospitals, research centres, and with other local and international partners.

For more information about A*STAR, please visit www.a-star.edu.sg.

ANNEX

Biography of Françoise Barre-Sinoussi

Françoise BARRÉ-SINOUSSE, PhD, is the Director of the “Regulation of Retroviral Infections” Unit, at the Institut Pasteur in Paris. She has been involved in retrovirology research since the early 1970s. She is recognised for her contributions to HIV/AIDS research, in particular as the first author of the publication that reported in 1983 the discovery of the cause of AIDS, a retrovirus, later named HIV. In 1988, she became head of her own laboratory at the Institut Pasteur and initiated research programmes on viral and host determinants of HIV/AIDS pathogenesis.

Between 1988 and 1998, she was involved with collaborative programmes on HIV vaccine research, using primate models. Today, the research programmes of her team focus on mechanisms required to protect against HIV/SIV infections and/or against early pathogenic signals induced by HIV/SIV.

Françoise BARRÉ-SINOUSSE is author and co-author of more than 200 original publications and of more than 120 articles in book reviews. She has been invited as a speaker more than 250 International meetings and/or conferences. She is a member of a number of scientific committees and societies in France and elsewhere. Since 2009, she has been a member of the National Academy of Science in France. She also received more than 10 national or international awards including the Nobel Prize for Physiology or Medicine in 2008 for her contributions to HIV/AIDS.

In addition to her research activities, Françoise BARRÉ-SINOUSSE is actively involved in promoting strong interactions between HIV/AIDS research and public health interventions in resource limited countries, particularly through the Institut Pasteur International Network and the coordination of the ANRS research programmes in Cambodia and Vietnam. She is also committed to training and technology transfer activities on site in Africa and Asia.