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HIV and AIDS Research

By Sally Robertson, BSc

In the United States, 50,000 people are infected with HIV every single year and current estimates suggests that around 1.1 million individuals in the US and 34 million globally are living with HIV infection.

National Institute of Health and HIV Research

In the US, the responsibility for HIV research mainly lies with the National Institutes of Health (NIH), the world's largest public funder of HIV and AIDS research. The NIH supports and conducts basic, clinical and translational medical research to explore the causes, treatment approaches, and possible cures for both common and rare diseases.

Scientists supported by NIH are focused on investigating the pathogenesis of HIV, developing new HIV/AIDS therapies and developing methods for HIV prevention.

National Institute of Allergy and Infectious Disease and HIV/AIDS Research

HIV and AIDS research is conducted across many of the agency's 27 institutes and centers, with one of the main ones being the National Institute of Allergy and Infectious Disease (NIAID). This institute is dedicated to research aimed at bringing HIV and AIDS to an end.

Through the research conducted at their laboratories and clinics as well as their clinical trial sites, medical centers and universities around the world, NIAID is endeavouring to understand the pathology of HIV, develop tools to prevent infection, and develop more effective HIV treatments and eventually find a cure.

NIAID supports a basic research program that investigates the basic biology of HIV, the body's immune response to infection, and potential approaches to prevention and treatment. The major areas of this basic research program are described in further detail below.

HIV Pathogenesis Research

The NIAID supports a number of investigations into HIV pathogenesis across a range of areas.

Its major goals include:

- Establishing the structure and function of viral genes and proteins, as well as their mechanism of action
- Determining how these genes and proteins interact with host cell genes and proteins to enable viral entry and then replication within cells
- Characterizing the immune system's response to HIV during infection in important sites such as the lymph nodes and gut and the role this plays in how disease becomes established and progresses
- Understanding host factors that control the transmission and replication of HIV, how infection is established and how disease progresses
- Elucidating the mechanisms by which the virus is transmitted and disease established, particularly the mechanisms behind mucosal transmission
- Characterizing the factors that control the persistent hiding of HIV in cells and tissues (HIV reservoirs)

HIV-Targeted Interventions Research

New treatment strategies are needed to help improve the outcomes of therapy for individuals with HIV. The key goals include:

- The identification and validation of viral and cellular targets that are essential for HIV replication
- The assessment of approaches to inhibit HIV *in vitro*, in animal models and early stage studies in humans
- The targeting of agents and their delivery to infected cells *in vivo*
- Promotion of the identification of immune-based antiviral agents that may suppress or eliminate HIV
- The identification of agents that can reverse latency
- The discovery, development and assessment of cell therapy and gene therapy strategies

Finding a Cure for HIV/AIDS

Finding a cure for HIV and AIDS is a top priority for NIAID. A large number of investigations the NIAID supports involve ways of determining how HIV reservoirs are created and then maintained, as well as how these reservoirs can be controlled or eliminated.

The main goals of these investigations are:

- Locating and characterizing HIV reservoirs in regions throughout the body
- Investigating the effects of interventions on these HIV hideouts such as early stage antiretroviral therapy, immunomodulatory strategies, cell and gene therapy, chemotherapy and transplantation
- The development of methods for measuring and examining HIV latency
- Determining which HIV reservoirs enable viral rebound once anti-retrovirals are no longer taken
- Exploring approaches that may enable removal of the latent reservoir and a solution to curing HIV and AIDS
- Exploring methods that may allow viral rebound to be controlled so that disease remission is sustained

Reviewed by Susha Cheriyedath, MSc

Sources

- https://www.aids.gov/federal-resources/hiv-aids-programs/research/
- https://www.niaid.nih.gov/topics/hivaids/Pages/Default.aspx

Further Reading

- What Causes AIDS?
- What is HIV/AIDS?
- AIDS Symptoms
- AIDS Pathophysiology
- AIDS Treatment
- AIDS Prognosis
- Living with HIV
- History of AIDS
- AIDS Stigma
- HIV Risks
- AIDS Transmission
- When Does HIV Become AIDS?
- HIV-1 and HIV-2: What's the Difference?
- HIV Care During Pregnancy
- HIV and Blood Transfusions
- HIV and Steroids
- HIV and Organ Transplants
- HIV in Pregnancy and During Breastfeeding

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