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Gates Foundation Funds Major New Collaboration to Accelerate HIV Vaccine Development

Global network of 16 research teams to tackle critical vaccine design challenges

SEATTLE – The Bill & Melinda Gates Foundation today announced 16 grants totaling \$287 million to create an international network of highly collaborative research consortia focused on accelerating the pace of HIV vaccine development.

The grants will support a range of innovative approaches for designing an effective HIV vaccine, and bring together more than 165 investigators from 19 countries to tackle some of the biggest scientific challenges facing the field.

Eleven consortia will focus on vaccine discovery, applying new scientific knowledge and cutting-edge research techniques to create and evaluate novel vaccine candidates. These consortia will be linked to five central laboratories and data analysis facilities, enabling investigators to openly share data and compare results, and allowing the most promising vaccine approaches to be quickly prioritized for further development.

“An HIV vaccine is our best long-term hope for controlling the global AIDS epidemic, but it has proven to be a tremendously difficult scientific challenge,” said Dr. José Esparza, senior advisor on HIV vaccines for the Gates Foundation. “We have all been frustrated by the slow pace of progress in HIV vaccine development, yet breakthroughs are achievable if we aggressively pursue scientific leads and work together in new ways.”

To date, most HIV vaccine research has been conducted by small teams of investigators working independently. While important research gains have been made, there is growing recognition that these efforts need to be supported by new large-scale, collaborative projects that can produce definitive answers to complex scientific questions.

Grants Establish Vaccine Discovery Consortia, Central Facilities

The grants announced today, known collectively as the Collaboration for AIDS Vaccine Discovery, will support the following:

- *Vaccine discovery consortia:* Eleven vaccine discovery consortia will pursue a broad range of innovative strategies for designing vaccine candidates to trigger immune responses believed to be critical for protection against HIV.

The consortia will focus on overcoming two of the biggest scientific obstacles currently facing the field: designing vaccine candidates capable of eliciting effective neutralizing antibodies to HIV, and improving current vaccine candidates so they elicit stronger and more durable protective cellular immune responses.

- *Central facilities:* Five central facilities will be established, including three laboratory networks for measuring the immune responses elicited by vaccine candidates, a research specimen repository, and a data and statistical management center.

As a condition for receiving funding, the newly-funded vaccine discovery consortia have agreed to use the central facilities to test vaccine candidates, share information with other investigators, and compare results using standardized benchmarks.

“These projects bring a new level of creativity and intensity to bear on major scientific challenges facing HIV vaccine development,” said Dr. Nicholas Hellmann, acting director of the Gates Foundation’s HIV, TB, and Reproductive Health program. “Some of the vaccine concepts that will be pursued have been talked about for years, but have never been adequately studied. If successful, they could lead to entirely new paradigms for HIV vaccine development.”

“These grants signal an exciting move toward greater cooperation, coordination, and transparency among vaccine scientists,” said Mitchell Warren, executive director of the AIDS Vaccine Advocacy Coalition (AVAC). “AIDS vaccine advocates have long said that this type of work is critical to accelerating work in the field, and this is an energizing time.”

In addition, the grantees are developing global access plans to help ensure that their discoveries will be accessible and affordable for developing countries, where the vast majority of new HIV infections occur.

Range of Novel HIV Vaccine Approaches Supported

The grants announced today support a range of novel approaches for developing an effective HIV vaccine. (See accompanying backgrounder for grant details.) Examples of the grants include:

- *Advancing progress on neutralizing antibodies:* Virtually all licensed vaccines for other diseases are believed to work by causing the immune system to produce neutralizing antibodies that bind to vulnerable regions on the infection-causing agent. One research consortium will isolate a large number of antibodies from humans and animals – including llamas – screen them for the ability to neutralize HIV, and “work backwards” from the best antibodies to design new vaccine candidates. (*Lead investigator: Robin Weiss, University College London*)
- *Using computational biology to create novel vaccine designs:* One research consortium will use state-of-the-art computer design techniques to create synthetic molecules to trigger antibodies against HIV. To help provide the massive computing power necessary for this project, the consortium will partner with the Rosetta@home project, which allows individuals around the world to donate their personal computer’s idle time to run research calculations over the Internet. (*Lead investigator: Leo Stamatos, Seattle Biomedical Research Institute*)
- *Addressing challenges in eliciting cellular immunity:* An effective HIV vaccine may also need to elicit cellular, or T-cell, immunity. One potential approach for eliciting cellular immunity is to modify other viruses so they carry pieces of HIV capable of inducing an immune response (but not capable of causing disease). One research consortium will focus on a number of novel vectors, or “carrier” viruses, that have been identified as promising for an HIV vaccine but have never been tested in clinical trials. (*Lead investigator: Timothy Zamb, International AIDS Vaccine Initiative*)

- *Improving vectors that elicit cellular immunity:* The use of poxviruses as vaccine vectors is supported by extensive pre-clinical and clinical experience, and one of the projects will try to significantly improve the ability of poxvirus vectors to stimulate cellular immune responses. The consortium will focus on making improvements to three poxvirus vectors that have been used in HIV vaccines, including a modified version of the vaccinia virus that was successfully used to eradicate smallpox. (*Lead investigator: Giuseppe Pantaleo, Centre Hospitalier Universitaire Vaudois*)
- *Harnessing dendritic cells:* The immune system's dendritic cells are believed to play an important role in enhancing both cellular immunity and neutralizing antibodies. One research consortium will design vaccine candidates with molecules that bind to the surface of dendritic cells, and study the use of chemicals called glycolipids, which activate immune cells that stimulate dendritic cells. (*Lead investigator: David Ho, Aaron Diamond AIDS Research Center, The Rockefeller University*)
- *Standardizing and improving laboratory tests:* Laboratory tests used to assess vaccine candidates are often not comparable due to variations in techniques and materials, severely hampering decisions about which candidates to pursue for further testing. One grant will establish an international network of laboratories to standardize procedures for evaluating neutralizing antibody responses elicited by HIV vaccine candidates. (*Lead investigator: David Montefiori, Duke University*)

In total, the 16 grants support more than 165 investigators in 19 countries: Australia, Austria, Belgium, Cameroon, Canada, Denmark, France, Germany, India, Japan, the Netherlands, South Africa, Spain, Sweden, Switzerland, Uganda, the United Kingdom, the United States, and Zambia.

Grants Address Key Research Gaps Identified by Global HIV Vaccine Enterprise; Additional Funding Still Needed

The Gates Foundation grants help address research priorities identified by the Global HIV Vaccine Enterprise, an alliance of researchers, funders, and advocates from academia, governmental and non-governmental organizations, and private industry in developing and developed countries dedicated to implementing a shared scientific plan to accelerate HIV vaccine development. The Enterprise's scientific plan prioritizes vaccine discovery and laboratory standardization as two of the top issues facing the vaccine field.

The foundation grants complement other contributions in support of the Enterprise scientific plan, including:

- *Switzerland:* The Government of Switzerland has pledged to support the establishment of a vaccine institute in Lausanne that will contribute to the implementation of the Enterprise scientific plan.
- *Germany:* The Fraunhofer Society and the Ministry of Economic Affairs of Saarland in Germany have committed a total of \$1.7 million to support the Enterprise scientific plan.
- *U.S.:* Last year the U.S. National Institute of Allergy and Infectious Diseases (NIAID) pledged more than \$300 million to support the Center for HIV/AIDS Vaccine Immunology (CHAVI), which is addressing other priorities in the Enterprise plan.

Yet resources for HIV vaccine development still fall significantly short of need. According to an analysis co-sponsored by the AVAC, International AIDS Vaccine Initiative, UNAIDS, and other

groups, an estimated \$682 million is spent annually on HIV vaccine development, while fully implementing the Enterprise scientific plan would require nearly double this amount – an estimated \$1.2 billion annually.

“The Global HIV Vaccine Enterprise provides a forum for researchers and donors to work together on one of the most important challenges of our time,” said Dr. Mark Walport, director of the Wellcome Trust and a member of the Enterprise Coordinating Committee. “By clearly identifying funding gaps, the Enterprise is helping donors ensure that resources are used most effectively.”

Other priorities in the Enterprise scientific plan include developing improved vaccine manufacturing processes, establishing greater clinical trials capacity in developing countries, improving regulatory capacity for approving clinical trials and assessing trial results, and developing intellectual property arrangements that facilitate global access to new technologies.

“As researchers make progress in designing promising new vaccine candidates, it is essential that sufficient capacity is in place to manufacture these vaccines, test them in clinical trials, and conduct timely reviews of the results,” said Dr. Barton Haynes, professor of medicine at Duke University Medical Center who is principal investigator of NIAID’s CHAVI, and also the lead investigator on one of the Gates Foundation grants announced today. “The grants funded by the Gates Foundation will complement the efforts of CHAVI.”

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About the Bill & Melinda Gates Foundation: Guided by the belief that every life has equal value, the Bill & Melinda Gates Foundation works to reduce inequities and improve lives around the world. In developing countries, it focuses on improving health, reducing extreme poverty, and increasing access to technology in public libraries. In the United States, the foundation seeks to ensure that all people have access to a great education and to technology in public libraries. In its local region, it focuses on improving the lives of low-income families. Based in Seattle, the foundation is led by Chief Executive Patty Stonesifer and Co-Chairs William H. Gates Sr., Bill Gates, and Melinda French Gates.

On the Internet:

www.gatesfoundation.org

www.hivvaccineenterprise.org