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Researchers Gain Better Understanding of Interaction of Human Immune System with HIV

Findings report on the early development of anti-HIV neutralizing antibodies

SEATTLE, WA , Jan. 13, 2011 – Today, scientists announced discoveries that are relevant to better understanding of the interaction of the human immune system with HIV and which could potentially guide the development of effective immunization protocols. These new findings are bringing scientists closer to an effective HIV vaccine. Researchers from Seattle Biomedical Research Institute (Seattle BioMed), Vanderbilt University and the Ragon Institute of MGH, MIT and Harvard report findings showing new evidence about broadly-reactive neutralizing antibodies, which block HIV infection.

According to author Leo Stamatatos, Ph.D., director of the Viral Vaccines Program at Seattle BioMed, a major stumbling block in the development of an effective vaccine against HIV is the inability to elicit, by immunization, broadly reactive neutralizing antibodies (NAbs). These antibodies bind to the surface of HIV and prevent it from attaching itself to a cell and infecting it. However, a fraction of people infected with HIV develop broadly neutralizing antibodies (bNAbs) capable of preventing cell-infection by diverse HIV isolates, which are the type of antibodies researchers wish to elicit by vaccination.

“We’ve found that the people who develop broadly-reactive neutralizing antibodies – which are about 30% of those infected – tend to have a healthier immune system that differs from others who don’t develop those antibodies,” Stamatatos explained, saying that these antibodies target only a few regions of HIV which is good from the standpoint of vaccine development. “It gives us less to target,” he said.

Larry Corey, M.D., president and director of the Fred Hutchinson Cancer Research Center, said that these studies of natural HIV infection continue to provide important new directions for potential vaccine design. “The demonstration that anti-CD4-binding site antibodies are key participants for broadly reactive neutralization, provides increasing evidence of the importance for designing immunogens that elicit such responses,” he said. Juliana McElrath, M.D., Ph.D., co-director of the Vaccine and Infectious Disease Division at the Fred Hutchison Cancer Center added, "This study provides new insights into kinetics and specificities of broadly reactive neutralizing antibody activities that emerge following natural infection, discovered only through the availability of stored specimens and comprehensive antibody analyses from longitudinal studies following primary HIV-1 infection.”

In addition, the new findings show that these antibodies are generated much sooner than previously thought, in some cases as soon as a year after infection. “These studies provide a strong rationale to begin teasing out the early immunological signals that allow some individuals, but not others, to mount broadly reactive neutralizing antibody responses,” adds co-author Galit Alter, Ph.D., a Ragon Institute investigator based at Massachusetts General Hospital. This provides new hope that an HIV vaccine will induce protective antibodies.”

“Now we know that these broadly-reactive neutralizing antibodies don’t develop simply by chance and we can work to understand what makes this 30% of the HIV-infected population different,” Stamatatos explained. By understanding that, we can hopefully use that information to design new immunogens and immunization protocols that can mimic the early events that lead to the development of such antibodies during natural infection.”

Marcus Altfeld, Ph.D. of the Ragon Institute, also an author of the paper, said, "The result from these studies also highlight the value of biological samples collected from well-characterized cohorts of individuals identified during Acute HIV-1 infection, who are followed prospectively to study immune responses to HIV-1 over time and identify the underlying mechanisms that lead to protective immune responses”.

ABOUT SEATTLE BIOMEDICAL RESEARCH INSTITUTE:

Seattle BioMed is the largest independent, non-profit organization in the US focused solely on infectious disease research. Our research is the foundation for new drugs, vaccines and diagnostics that benefit those who need our help most: the 14 million who will otherwise die each year from infectious diseases, including malaria, HIV/AIDS and tuberculosis. Founded in 1976, Seattle BioMed has nearly 350 staff members. By partnering with key collaborators around the globe, we strive to make discoveries that will save lives sooner. For more information, visit www.seattlebiomed.org.

ABOUT THE RAGON INSTITUTE:

The Ragon Institute of MGH, MIT and Harvard was established in 2009 with a gift from the Philip T. and Susan M. Ragon Foundation, creating a collaborative scientific mission among these institutions to harness the immune system to combat and cure human diseases. The primary initial focus of the institute is to contribute to the development of an effective AIDS vaccine. The Ragon Institute draws scientists and engineers from diverse backgrounds and area of expertise across the Harvard and MIT communities and throughout the world, in order to apply the full arsenal of scientific knowledge to understanding mechanisms of immune control and immune failure and apply these advances to directly benefit patients. For further information, visit www.ragoninstitute.org