



AIDS Researchers Isolate New Potent and Broadly Effective Antibodies Against HIV Discovery provides new directions for AIDS vaccine design

NEW YORK, NY, LA JOLLA and SOUTH SAN FRANCISCO, CA, SEATTLE, WA, August 17, 2011 — A team of researchers at and associated with the International AIDS Vaccine Initiative (IAVI), The Scripps Research Institute, the biotechnology company Theraclone Sciences and Monogram Biosciences Inc., a LabCorp company, report in the current issue of *Nature* the isolation of 17 novel antibodies capable of neutralizing a broad spectrum of variants of HIV, the virus that causes AIDS.

The new antibodies, large protein molecules that bind to pathogens and flag them for destruction, were isolated from blood serum samples collected in a continuing global search for broadly neutralizing antibodies (bNAbs) launched by IAVI. They should provide researchers with a new set of targets for the design of vaccine candidates that can elicit similar antibodies to protect people from contracting HIV. Some of the bNAbs blocked HIV infection of cells as much as 10 to 100 times as potently as previously discovered bNAbs.

“Most antiviral vaccines depend on stimulating the antibody response to work effectively,” said Dennis Burton, a professor of immunology and microbial science and director of the IAVI Neutralizing Antibody Center at The Scripps Research Institute in La Jolla, Calif. Professor Burton, one of the senior authors of the study, is also a member of the Ragon Institute, in Cambridge, Mass. “Because of HIV’s remarkable variability, an effective HIV vaccine will probably have to elicit broadly neutralizing antibodies. This is why we expect that these new antibodies will prove to be valuable assets to the field of AIDS vaccine research.”

Only a minority of people who are HIV-positive begin to produce bNAbs after several years of infection. Animal studies suggest that such antibodies could block HIV infection if they were elicited by a preventive vaccine. Researchers prize bNAbs because their structural and biochemical analysis can reveal how to achieve a preventive vaccine. Specifically, scientists expect that they can use information about how bNAbs bind to HIV to construct immunogens—the active ingredients of vaccines—that elicit similar antibodies. The potency of bNAbs matter because a highly potent antibody could confer such protection at relatively low levels.

“Solving the neutralizing antibody problem is perhaps the greatest challenge facing the field today,” said IAVI’s chief scientific officer, Wayne Koff. “IAVI concluded many years ago that unlocking the information stored in bNAbs was going to be essential to the fulfillment of our mission—ensuring the design and development of broadly effective AIDS vaccines. This is why we support several laboratories around the world that are designing novel vaccine candidates on the basis of what we’re learning from such antibodies. We have no doubt that these new bNAbs will contribute a great deal to our own immunogen design efforts and, we hope, those of other researchers working on AIDS vaccines.”

In that regard, the new bNAbs are encouraging. Many of them bind hitherto unknown molecular structures, or epitopes, on the surface of HIV. This means that they could significantly broaden the target options researchers have in designing vaccines to elicit similar antibodies.

How the antibodies were discovered

The 17 new bNAbs described in the current *Nature* report were isolated from four HIV-positive individuals. The effort, sponsored by IAVI, is unprecedented in scale and distinguished by its emphasis on identifying antibodies that neutralize subtypes of HIV circulating primarily in developing countries. It had previously yielded three potent bNAbs, two of which, PG9 and PG16, were isolated by this research team in 2009 and described in the journal *Science*. Another bNAb was subsequently isolated from these samples by researchers at the Vaccine Research Center of the National Institutes of Health, who have also discovered a set of bNAbs from separate blood samples using an entirely different approach.

Both the previous and current studies used Theraclone Science's highly sensitive I-STAR™ technology to isolate the antibodies. The new crop of bNAbs, like PG9 and PG16, was rescued from cell cultures derived from single antibody-producing B cells used for antibody discovery and development. Theraclone Sciences Executive Chair and Interim CEO, Steven Gillis commented, "We're delighted that I-STAR has provided essential support in identifying bNAbs that will contribute to advancing AIDS vaccine development. In this project, and in our own infectious disease and cancer programs, the I-STAR platform continues to demonstrate a remarkably powerful ability to isolate rare antibodies with unique properties. Theraclone values these collaborative opportunities in which I-STAR can be used to help improve treatment for critical diseases."

Monogram Biosciences, which also participated in the discovery of PG9 and PG16, conducted the neutralization assays essential to isolating the new bNAbs. The serum samples from which they were isolated represent the top 1% of all such samples gathered by IAVI and its partners, in terms of the number of HIV variants they neutralize and the potency with which they do so.

"Monogram has developed a highly skilled scientific team capable of taking on a variety of biomedical challenges," said Chris Petropoulos, Vice President, Laboratory Corporation of America Holdings, Research and Development, Monogram Biosciences. "Their expertise and innovation has been invaluable to the discovery of these new antibodies. This research illustrates the important role different sectors of the research and health care community can play in supporting global health initiatives."

The analysis of the new antibodies also hints at how future vaccines ought to be formulated to maximize their effectiveness. On the basis of their analyses, the authors of the report conclude that AIDS vaccine candidates that seek to effectively harness the antibody response should probably attempt to elicit certain combinations of bNAbs if they are to provide truly comprehensive protection from HIV.

The published study on the 17 new bNAbs is available online at www.nature.com

ABOUT IAVI

The International AIDS Vaccine Initiative (IAVI) is a global not-for-profit organization whose mission is to ensure the development of safe, effective, accessible, preventive HIV vaccines for use throughout the world. Founded in 1996, IAVI works with partners in 25 countries to research, design and develop AIDS vaccine candidates. In addition, IAVI conducts policy analyses and serves as an advocate for the AIDS vaccine field. IAVI supports a comprehensive approach to addressing HIV and AIDS that balances the expansion and strengthening of existing HIV-prevention and treatment programs with targeted investments in the design and development of new tools to prevent HIV. IAVI is dedicated to ensuring that a future AIDS vaccine will be available and accessible to all who need it. IAVI relies on the generous donations from governments, private individuals, corporations and foundations to carry out its mission. For more information, see www.iavi.org.

ABOUT THE SCRIPPS RESEARCH INSTITUTE

The Scripps Research Institute is one of the world's largest independent, non-profit biomedical research organizations. Scripps Research is internationally recognized for its discoveries in immunology, molecular and cellular biology, chemistry, neuroscience, and vaccine development, as well

as for its insights into autoimmune, cardiovascular, and infectious disease. Headquartered in La Jolla, California, the institute also includes a campus in Jupiter, Florida, where scientists focus on drug discovery and technology development in addition to basic biomedical science. Scripps Research currently employs about 3,000 scientists, staff, postdoctoral fellows, and graduate students on its two campuses. The institute's graduate program, which awards Ph.D. degrees in biology and chemistry, is ranked among the top ten such programs in the nation. For more information, see www.scripps.edu

ABOUT THERACLONE SCIENCES

Theraclone Sciences is a Seattle-based, discovery-stage biotechnology company focused on the development of novel therapeutic antibodies for the treatment of infectious disease, inflammation and cancer. The company's technology harnesses the power of the human immune system to identify rare, naturally evolved antibodies from the blood cells of immunologically relevant human subjects. Human monoclonal antibodies can be rapidly isolated using the I-STAR™ discovery platform and scaled for industrial production. Such human antibody drug candidates may be uniquely safe and relevant to combating disease across broad patient populations. Theraclone is a privately held company with venture investment from ARCH Venture Partners, Canaan Partners, Healthcare Ventures, Amgen Ventures, MPM Capital, and Alexandria Real Estate Investment. For additional information, please visit www.theraclone-sciences.com.

ABOUT LABORATORY CORPORATION OF AMERICA

Laboratory Corporation of America® Holdings, an S&P 500 company, is a pioneer in commercializing new diagnostic technologies and the first in its industry to embrace genomic testing. With annual revenues of \$5.0 billion in 2010, over 31,000 employees worldwide, and more than 220,000 clients, LabCorp offers a broad test menu ranging from routine blood analyses to reproductive genetics to DNA sequencing. LabCorp furthers its scientific expertise and innovative clinical testing technology with its Centers of Excellence: The Center for Molecular Biology and Pathology, National Genetics Institute, ViroMed Laboratories, Inc., The Center for Esoteric Testing, Litholink Corporation, Genzyme Genetics^{SM*}, DIANON Systems, Inc., US LABS, Monogram Biosciences, Inc., and Esoterix and its Colorado Coagulation, Endocrine Sciences, and Cytometry Associates laboratories. LabCorp conducts clinical trials testing through its Esoterix Clinical Trials Services division. LabCorp clients include physicians, government agencies, managed care organizations, hospitals, clinical labs, and pharmaceutical companies. To learn more about our organization, visit our Web site at: www.labcorp.com.

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Contacts:

IAMI

Lauren Wesolowski - lwesolowski@iavi.org, 212-328-7420

Sara Levy - slevy@iavi.org, 212-328-7415

The Scripps Research Institute

Mika Ono - mikaono@scripps.edu, 858-784-2052

Theraclone Sciences

Jacqui Miller - jmiller@macbiocom.com 781-235-3060

Doug MacDougall - dmacdougall@macbiocom.com

Laboratory Corporation of America

Steve Anderson - stephen.anderson@labcorp.com, 336-436-5274