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Scientific Hero: Dr. James E. K. Hildreth

Valerie Montgomery Rice, MD and

Dean and Executive Vice President, Morehouse School of Medicine, 720 Westview Drive, SW,
Atlanta, GA 30310

Kermit G. Payne

President and CEO, The 1Joshua Group, LLC, 1513 East Cleveland Avenue, Building 100-B,
Suite 202, Atlanta, GA 30344-6947

Abstract

Research and administrative contributions influence scientific advances aimed at eliminating health disparities.

According to the World Health Organization's figures for 2011, more than 34 million people worldwide are living with HIV. Work being conducted by Dr. James E. K. Hildreth could significantly affect the spread of the virus. Dr Hildreth's research and personal commitment have contributed to elevating training programs and research that significantly benefit both the scientific and health care communities.

Dr Hildreth, Dean of the College of Biological Sciences at the University of California—Davis, was awarded the 2012 Frederick C. Greenwood Award for his scientific contributions and meritorious service directly affecting disadvantaged and underserved ethnic minority populations. Acknowledged as a master teacher who provides mentoring and support for a comprehensive spectrum of students on numerous university campuses, Dr. Hildreth has consistently excelled in academic, executive, and administrative achievements that have contributed to recent scientific advances aimed at eliminating health disparities.

While on the faculty at Johns Hopkins School of Medicine, Hildreth and his research team made an important discovery related to HIV, the virus that causes AIDS. The team found that cholesterol is required for HIV's entry into cells, and that removing this lipid from a cell's membrane can block infection. Hildreth's team has used this discovery as the basis for developing a topical microbicide—or, chemical condom—to block the transmission of the virus. The topical microbicide is being designed to be an odorless, undetectable vaginal cream that destroys the AIDS virus and holds promise for stopping the transmission of the disease. In the absence of a vaccine, topical microbicides will be very important for women, especially those in Africa who “have no way of protecting themselves from HIV transmission, as well as Black women in the United States who are disproportionately affected by the disease ... Women will have the same power and choice as men who can choose to abstain from sex or use a condom,” Hildreth said.

Hildreth describes HIV as “a thief that steals proteins and lipids from the host.” After discovering that HIV requires cholesterol, Hildreth has found that the introduction of a

sugar, betacyclodextrin, that sequesters the lipid, is detrimental to the replication abilities of HIV. Often used in pharmaceuticals to make drug delivery more efficient, betacyclodextrin is well tolerated by the body, but can deplete the amount of cholesterol in cells. Dr. Hildreth indicates in his presentations that “the loss of cholesterol makes the cell permeable; however, unlike the virus, the cell is able to repair itself. Removing as little as 10% of cholesterol is enough to cause the virus to die.” Dr. Hildreth’s laboratory is currently working to exploit the critical requirement for cholesterol in HIV biology as a platform for therapeutic and prophylactic approaches to limit HIV spread. The team is also working towards approval to begin testing the use of an intravenous betacyclodextrin treatment on human patients. His research on HIV and AIDS, which he began in 1986, has focused on blocking HIV infection by learning how it gets into cells. He has published numerous scientific articles and holds several patents based on his research.

Hildreth has been affiliated with several prestigious universities, beginning at Harvard University, where he graduated *magna cum laude* in chemistry in 1979. He then went to Oxford University in England as a Rhodes Scholar, the first African American recipient from his home state of Arkansas, where he earned his doctorate in immunology in 1982. Five years later, he earned his medical degree at Johns Hopkins School of Medicine in Baltimore. After graduation, he became a full-time faculty member, as well as becoming the first African American in the 125-year history of that institution, to earn full professorship with tenure in the basic sciences. Hildreth is a member of the Institute of Medicine, part of the National Academy of Sciences.

In 2005, Dr. Hildreth moved to Nashville, Tennessee, where he joined the Meharry Medical College faculty, with joint appointments in the departments of Internal Medicine, and Microbiology and Immunology. While at Meharry, Dr Hildreth served as Director of Meharry’s Center for AIDS Health Disparities Research and the Center for Translational Research and Associate Director of the Vanderbilt-Meharry Center for AIDS Research. In addition, Hildreth held an appointment as an adjunct professor of pharmacology and molecular sciences at the Johns Hopkins University School of Medicine.

An internationally known AIDS researcher, Dr Hildreth received the 2012 Johns Hopkins University Alumni Association’s Knowledge for the World Award, an honor given to alumni who have brought credit to the university and their profession in the international arena through their professional achievements or humanitarian service.

According to Dr. Edward D. Miller, former dean and previous chief executive officer at Johns Hopkins School of Medicine, “James Hildreth is truly making a difference in efforts to eliminate AIDS across the world. His headline-making discoveries and continuing research strongly influence HIV treatment and prevention. His mother once told her son: ‘Your circumstances do not limit your possibilities.’ James has lived by that motto to become one of the most influential HIV researchers in the world.”

James E. K. Hildreth, PhD, MD, Dean of College of Biological Sciences, Professor of Molecular and Cellular Biology, and Internal Medicine, University of California, Davis, Member, Institute Of Medicine.