HIV and AIDS prevention—Progress and the challenges ahead

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At least 2 million people worldwide will be infected with HIV this year, driving the need for better HIV prevention strategies to slow the global pandemic. A better understanding of how to prevent HIV transmission using antiviral drugs led to approval of the first oral pill for HIV prevention, and microbicides delivered as topical gels or via intravaginal rings are in clinical testing and have yielded both positive and negative results. The complex factors involved in the sexual transmission of HIV, the urgent need for new preventive approaches, and the most promising methods currently in development are examined in a special issue of *AIDS Research and Human Retroviruses*, a peer-reviewed journal published by Mary Ann Liebert, Inc, publishers.

Guest Editor Patrick Kiser, University of Utah, Salt Lake City, and coauthors Pedro Mesquita and Betsy Herold, Albert Einstein College of Medicine, New York, NY, provide an overview of the scientific and developmental gaps in the field of drug discovery, formulation, and delivery to prevent sexual transmission of HIV. In the article "A Perspective on Progress and Gaps in HIV Prevention Science," they review the prophylactic agents in development and their advantages and limitations, and they present recommendations for future research directions. "The advances we are seeing today are exciting and justify a continued focus on the science and technologies that can make a difference in this public health crisis," says Dr. Kiser.

Peter Anton and coauthors, David Geffen School of Medicine at UCLA and the School of Public Health (Los Angeles, CA), University of

Pittsburgh and Medical School (PA), University of North Carolina, Chapel Hill, Johns Hopkins University School of Medicine (Baltimore, MD), Alpha StatConsult (Damascus, MD), Columbia University (New York, NY), and CONRAD (Arlington, VA), compared the oral and topical administration of the microbicide tenofovir, given as a pill or rectal gel. A mucosal tissue sample was removed from each participant and exposed to HIV to assess if treatment prevented infection. While the patients preferred the oral drug, one-time rectal exposure to the microbicide led to 6-10 times greater drug concentrations in the sampled tissue, and this correlates with reduced infectibility.

The methods and materials used to administer microbicidal drugs can affect whether or not they will be effective. Meropi Aravantinou et al. (Population Council and Rockefeller University, New York, NY; Tulane University, Covington, LA; National Cancer Institute, Frederick, MD) demonstrate this in the article "The Nonnucleoside Reverse Transcription Inhibitor MIV-160 Delivered from an Intravaginal Ring, But Not from a Carrageenan Gel, Protects Against Simian/Human Immunodeficiency Virus-RT Infection."

Line Vibholm and colleagues from Aarhus University and Aarhus University Hospital, Denmark, present the results of a study designed to evaluate in a female mouse model the effects of a topical gel containing 1% tenofovir, a microbicide previously shown to reduce substantially the transmission of both HIV and herpes simplex virus (HSV). In "Antiviral and Immunological Effects of Tenofovir Microbicide in Vaginal Herpes Simplex Virus 2 Infection," the authors provide data to support the suitability of this model for testing future microbicidal drug candidates.

"It is currently an exciting time in HIV prevention science research, with progress on multiple fronts," says Thomas Hope, PhD, Editor-in-Chief of AIDS *Research and Human Retroviruses* and Professor of Cell and Molecular Biology at the Feinberg School of Medicine, Northwestern

University, Chicago, IL. "We are proud to feature this work in the special issue and, in the future, to report critical advances to bring the field closer to the goal of decreasing the rate of HIV transmission around the world."

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