



cultural, and economic changes and female-controlled prevention, such as microbicides.

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## **Impact of HIV on Women in the United States**

In the United States, AIDS was first reported in women in 1981 (1), and the percentage of AIDS cases in women has continued to increase, accounting for an estimated 26% of new AIDS diagnoses in 2002 (2). Since 1998, deaths among women with AIDS in the United States have remained stable at an estimated 4,000 (2).

### **Epidemiologic Features of HIV in Women, United States**

Data from 29 states with confidential name-based HIV reporting since 1998 were used to describe the status of HIV disease among women from 1999 through 2002. HIV diagnoses were defined as diagnoses of HIV infection regardless of AIDS diagnosis status. This diagnosis includes persons with a diagnosis of HIV infection only, HIV infection and later AIDS diagnosis, or concurrent diagnoses of HIV infection and AIDS.

From 1999 through 2002, an estimated 101,872 HIV diagnoses were reported from 29 states: 72,007 (70.7%) in men and 29,865 (29.3%) in women. Among women, 71.9% were non-Hispanic blacks, 18.2% were non-Hispanic whites, 8.4% were Hispanics, 0.6% were American Indian/Alaska Natives, and 0.4% were Asian/Pacific Islanders. The two principal modes of HIV exposure for women were heterosexual contact and injection drug use, accounting for 77.7% and 20.5% of diagnoses among women, respectively. Women were diagnosed with HIV at younger ages than men. For the 4-year period, 31.3% of women with HIV were in the 13- to 29-year age group compared with 19.9% of men in the same age group. HIV diagnosis rates were consistently higher among non-Hispanic black women compared with women from other racial and ethnic groups for all 4 years.

### **Prevention Strategies for Women**

In 2003, the Centers for Disease Control and Prevention (CDC) introduced the Advancing HIV Prevention (AHP) initiative (3). AHP aims to reduce barriers to early diagnosis of HIV infection, increase access to quality medical care and treatment, and provide ongoing prevention services for persons living with HIV. AHP incorporates four priority strategies: make voluntary HIV testing a routine part of medical care, implement new models for diagnosing HIV infections outside of the medical settings, prevent new infections by working with persons diagnosed with HIV and their partners, and decrease perinatal transmission.

### **Clinical Care of Women with HIV**

HIV-infected women may be at increased risk for medical problems and metabolic changes. Studies have shown that HIV-positive women were more likely to develop genital warts and cervical intraepithelial neoplasia (4) and were at increased risk for viral infections (5). According to one study, HIV-positive women were 80% more likely to be anemic than HIV-positive men (6). Compared with HIV-negative controls, women with HIV were more likely to have elevated triglycerides and insulin levels (7) and decreased bone mineral density (8).

Determining when to initiate antiretroviral therapy for HIV-infected women is based on CD4+ T cell count (9). Because no gender difference exists for initiating or applying antiretroviral drug regimens, the guidelines for treating women are the same as those for treating men. Overall, drug efficacy does not differ by gender in randomized clinical trials.

For many reasons, women with HIV may avoid HIV testing and care. Often, women may be stigmatized and endure discrimination because of their HIV status. Women are often the primary caregivers for other family members, which may lead to avoiding or delaying testing and care. Economic dependence on a spouse or significant other may also play a role in whether a woman seeks testing and care. Mistrust of the healthcare system may also exist. Depression or domestic violence may also affect a woman's ability to seek needed care for HIV infection.

### **Incorporating HIV Prevention into Medical Care**

In 2003, CDC, the Health Resources and Services Administration, National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America issued recommendations to assist clinicians in integrating HIV prevention into primary care for HIV-infected persons. Providers are encouraged to deliver brief prevention messages during primary care visits, screen for HIV risk behaviors and sexually transmitted disease, pro-

vide HIV behavioral risk-reduction messages, and facilitate partner notification and counseling (10).

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## References

- Centers for Disease Control and Prevention. Follow-up on Kaposi's sarcoma and Pneumocystis pneumonia. *MMWR Morb Mortal Wkly Rep.* 1981;30:409–10.
- Centers for Disease Control and Prevention. HIV AIDS Surveill Rep. 2002;14:1–40.
- Centers for Disease Control and Prevention. Advancing HIV prevention: new strategies for a changing epidemic—United States, 2003. *MMWR Morb Mortal Wkly Rep.* 2003;52:329–32.
- Massad LS, Silverberg M, Springer G, Evans C, Passaro DJ, Strickler HD, et al. Genital expression of human papillomavirus infections in women with HIV: predicting incidence of vulvar warts and vulvar neoplasia and the course of grade 1 cervical intraepithelial neoplasia. In: Program and abstracts of the 11th Conference on Retroviruses and Opportunistic Infections; February 8–11, 2004; San Francisco, California. Abstract 150. [cited 2004 Apr 5]. Available from <http://www.retroconference.org/2004/cd/Abstract/150.htm>
- Stover CT, Smith DK, Schmid DS, Pellett PE, Stewart JA, Klein RS, et al. Prevalence of and risk factors for viral infections among human immunodeficiency virus (HIV)-infected and high-risk HIV-uninfected women. *J Infect Dis.* 2003;187:1388–96.
- Mildvan D, Creagh T, Anemia Prevalence Study Group. Anemia more prevalent in women and African Americans with HIV/AIDS. In: Program and abstracts of the 1st IAS Conference on HIV Pathogenesis and Treatment; July 7–11, 2001; Buenos Aires, Argentina. Abstract 319. [cited 2004 Apr 5]. Available from [http://www.ias.se/abstract/show.asp?abstract\\_id=319](http://www.ias.se/abstract/show.asp?abstract_id=319)
- Currier JS, Grunfeld C, Saag MS, Shevitz AH, van der Horst CM, Veronese F. Losses and gains—insights from the preliminary results of the Fat Redistribution and Metabolic in HIV Infection Study (FRAM). Presented at: Satellite symposium at the 2nd IAS Conference on HIV Pathogenesis and Treatment; July 25 2003; Paris, France.
- Anastos K, Hessel N. The association of bone mineral density with HIV infection and antiretroviral treatment in women. In: Program and abstracts of the 11th Conference on Retroviruses and Opportunistic Infections; February 8–11, 2004; San Francisco, California. Abstract 744. [cited 2004 Apr 5]. Available from <http://www.retroconference.org/2004/cd/Abstract/744.htm>
- Guidelines for the use of antiretroviral agents in HIV-infected adults and adolescents: recommendations of the Panel on Clinical Practices for Treatment of HIV. [cited 2004 Apr 5]. Available from [http://aidsinfo.nih.gov/guidelines/adult/AA\\_032304.html](http://aidsinfo.nih.gov/guidelines/adult/AA_032304.html)
- Centers for Disease Control and Prevention. Incorporating HIV prevention into the medical care of persons living with HIV: recommendations of CDC, the Health Resources and Services Administration, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. *MMWR Recomm Rep.* 2003;52(RR-12):1–24.

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## Human Papillomavirus and Cervical Cancer

Though cervical cancer is highly curable when detected early, it remains one of the leading causes of cancer death in women worldwide. Early detection is effective because the precursor lesions evolve slowly into invasive cancer, typically over a period of >10 years. These precursor lesions (dysplasias or cervical intraepithelial neoplasias [CIN]) are detected with cervical cytology screening, the Pap smear. In every country where a Pap smear screening program has been introduced, rates of cervical cancer have been substantially reduced. The discovery that human papillomaviruses (HPV) are etiologically linked with cervical cancer has led to efforts to apply this knowledge to improve cervical cancer screening and to potentially prevent cervical cancer through vaccination.

### HPV and Cervical Cancer

HPV is not a single virus but a family of closely related viruses, each designated as a type, numbered in order of discovery. Typing is based on nucleic acid sequencing. More than 100 HPV types are known to exist, and at least 30 can be detected in the anogenital tract. No simple in vitro culture methods are available for identifying it, and serologic testing is insensitive. Techniques for identifying the virus are based on nucleic acid detection, either direct hybridization or after amplification. HPV types associated with malignancies are referred to as high-risk types, and those associated with warts (condylomas) are rarely found in cancers and are called low-risk types.

Sexual transmission is the dominant mechanism for acquiring genital HPV. Infection is usually transient and not associated with symptoms. An estimated 80% of sexually active women have been exposed. Studies have detected HPV in 90% of cancers worldwide, and plausible biologic mechanisms can explain oncogenesis. The magnitude of the risk association between HPV and cervical cancer is greater than that for smoking and lung cancer. However, infection alone is insufficient to cause cancer, and additional factors are required for neoplasia.

### HPV Vaccination as a Prevention Strategy

One investigational quadrivalent vaccine includes types 6, 11, 16, and 18. HPV-16 and HPV-18 (high-risk types) are found in 25% of all CIN I lesions and 70% of CIN II/III and anogenital cancers. HPV-6 and HPV-11 (low-risk types) are found in 25% of CIN I lesions and 90% of anogenital warts. Therefore a prophylactic vaccine against these four types would substantially reduce HPV-related disease.

Vaccine candidates have been evaluated in animal models of papillomavirus infection. The L1 protein of HPV is