



## Update on Pediatric Human Immunodeficiency Virus Infection Paradigms in Treatment and Prevention

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### Keywords

• HIV • AIDS • Antiretroviral • Viral reservoir • PrEP • Pediatric • Perinatal

### Key points

- Potent antiretroviral therapy allows the control of viremia and improved prognosis; however despite treatment, HIV infection is associated with global immune activation and associated metabolic complications, including cardiovascular disease.
- Research is ongoing to find a cure for HIV, and potential strategies will require eradication of the latent viral reservoir.
- Prevention strategies to decrease behavioral transmission of HIV include the use of preexposure prophylaxis and the concept of treatment as prevention.

## INTRODUCTION

Since the first description of patients with an unusual acquired immunodeficiency in 1981, human immunodeficiency virus (HIV) has changed from a fatal diagnosis to a manageable chronic disease. Potent antiretroviral therapy (ART) has improved the life expectancy of those infected with HIV. Antiretroviral therapy also helps to prevent both perinatal and behavioral transmission of HIV. However, access to HIV testing and treatment is insufficient in many parts of the world. In addition, although ART can control HIV, it cannot eradicate the virus because of the development of latent reservoirs. Individuals infected with HIV also experience the consequences of chronic inflammation

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and immune activation, which include an increased risk for cardiovascular disease. Current research into HIV prevention and cure offers hope for the future.

## **EPIDEMIOLOGY OF HUMAN IMMUNODEFICIENCY VIRUS IN THE UNITED STATES**

At the end of 2013, an estimated 933,941 persons in the United States were living with diagnosed HIV infection, and approximately 50,000 new infections occur each year [1,2]. An estimated 2500 children less than 13 years of age are living with HIV in the United States; 174 children were newly diagnosed in 2014 [1,2]. Rates of perinatal transmission in the United States have declined more than 90% since the mid-1990s, because of the development of effective ART and other methods of preventing perinatal transmission. During 2008 to 2011, overall, only 3.1% of infants born to mothers infected with HIV acquired HIV. However, among mothers infected with HIV who did not receive ART, 13.3% of infants were infected with HIV [1]. These statistics show the importance of early testing and treatment of pregnant women.

Youth aged 13 to 24 years accounted for 21% of new HIV infections in the United States in 2013 [1]. Sexual contact is the most common route of transmission in youth. Male-to-male sexual contact and heterosexual contact accounted for 92% and 87% of new HIV infections among male and female youth, respectively, between 2010 and 2014 [1]. Intravenous drug use accounts for only 3% of new infections in youth. Men who have sex with men (MSM) are the population at highest risk of acquiring HIV, and rates of new HIV diagnoses among young MSM continue to increase. Between 2010 and 2014, new HIV infections increased 10% among MSM aged 13 to 24 years, and 27% among MSM aged 25 to 34 years, whereas numbers of new infections in older men (35–54 years) were stable or decreased (Fig. 1) [1]. The incidence of HIV infections in youth is highest in the southeastern United States, including District of Columbia, Louisiana, Maryland, Georgia, Mississippi, and Florida. Factors that contribute to increasing rates of new HIV infections in youth include inadequate education, low perception of risk, and behaviors such as substance use and low rates of condom use.

African Americans are disproportionately affected by HIV. African American infants consistently have the highest perinatal HIV acquisition rate in the United States, as high as 9.9 per 100,000 live births in 2009, compared with 1.7 and 0.1 per 100,000 live births in Hispanic/Latino and white infants, respectively [1]. Likewise, in youth, more than 55% of new HIV diagnoses have been in African Americans, compared with 20% in Hispanic/Latino youth, and 17% in white youth since 2009 [1]. Health and socioeconomic disparities in African American communities contribute to this increased risk of HIV [1].

Although the number of new HIV infections has remained stable since 1999, the annual number of people newly classified with AIDS in the United States has been steadily declining since 1993, reflecting the improved health of individuals infected with HIV following the introduction of combination ART in the mid-1990s [1,3]. Before effective ART was available, infants perinatally infected with HIV routinely developed AIDS in early childhood. New AIDS

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