

Pediatric HIV Treatment: Advances and Challenges in Therapeutic Science

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Abstract

Pediatric HIV remains a significant global health challenge, particularly in particularly in low-resource settings. Despite remarkable progress in prevention, diagnosis, and treatment, children living with HIV face unique unique hurdles that demand tailored therapeutic approaches. As science science advances, so does the hope for more effective, accessible, and child- and child-friendly treatments—but persistent gaps continue to hinder progress.

Keywords: Viral transmissibility • Latent reservoir eradication • Immunotherapy • Therapeutic vaccines

Introduction

According to UNAIDS, approximately 1.5 million children under the age of 15 are living with HIV globally. Early Infant Diagnosis (EID) is essential for initiating timely treatment. However, diagnosing HIV in infants is complicated by the presence of maternal antibodies, which can interfere with standard serological tests. Virologic testing—such as HIV DNA or RNA PCR—is required, typically within the first 4 to 6 weeks of life. While prevention of MTCT (PMTCT) programs have significantly reduced new infections, disparities in access and implementation mean that many children still acquire HIV during birth or breastfeeding [1].

The World Health Organization recommends immediate initiation of ART in all HIV-positive infants, regardless of clinical status. Unfortunately, these tests are often unavailable or unavailable or delayed in low-resource settings, leading to missed missed opportunities for early intervention. Most of these cases are cases are concentrated in sub-Saharan Africa, where mother-to-mother-to-child transmission (MTCT) remains a major route of

of infection. Research into HIV cure strategies, including gene editing editing and immune modulation, may one day offer hope for children children born with HIV. Until then, optimizing current therapies and and delivery systems remains the priority. Early ART significantly reduces mortality, limits viral reservoir establishment, and improves improves long-term outcomes. [2].

Dolutegravir (DTG), an integrase inhibitor, has emerged as a preferred first-line agent for children due to its potency, safety profile, and low risk of resistance. Research has shown that DTG-based regimens outperform older treatments in terms of viral suppression and tolerability [3].

Innovative administration strategies—such as long-acting injectables and nanoformulations—are being explored to reduce dosing frequency and improve adherence. These approaches could be transformative, especially for adolescents who struggle with daily pill regimens [4].

Children living with HIV face not only medical but also psychological and developmental challenges. Pediatric HIV treatment has come a long way, but the journey is far from over. Advances in diagnostics, drug formulations, and care models offer hope—but only if they reach the children who need them most. Bridging the gap between innovation and access, and addressing the unique needs of children, is essential to ending pediatric AIDS. Stigma, disclosure issues, and the burden of chronic illness can affect mental health and social integration. Adolescents, in particular, require age-appropriate counseling and support to navigate treatment and identity development [5].

Conclusion

UNAIDS has set ambitious goals: 95% of children living with HIV should know their status, 95% of those diagnosed should receive ART, and 95% of those on ART should achieve viral suppression. While some countries—particularly in Eastern and Southern Africa—have made significant strides, others lag behind due to limited resources and political will.

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