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HIV: Current Research

Opinion Article

Evaluating the Extensive Analysis of Antiretroviral Therapy

Risa Josh*

Department of Medicine and Health Science, University of Michigan Ann Arbor, USA

DESCRIPTION

Antiretroviral therapy (ART) revolutionized the management of HIV/AIDS since its introduction in the mid-1990s. By suppressing viral replication, ART effectively extends the lives of individuals infected with HIV and transforms HIV infection from a fatal condition into a chronic, manageable disease. This comprehensive overview delves into the mechanisms, types, benefits, challenges, and future prospects of antiretroviral therapy. Human Immunodeficiency Virus (HIV) is a retrovirus that attacks the immune system, particularly CD4+ T cells, leading to immune deficiency. Acquired Immuno Deficiency Syndrome (AIDS) is the advanced stage of HIV infection, characterized by a severely compromised immune system, leaving individuals vulnerable to opportunistic infections and malignancies. Antiretroviral drugs target various stages of the HIV life cycle, inhibiting viral replication. These drugs fall into several classes, including Nucleoside Reverse Transcriptase Inhibitors (NRTIs), Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs), Protease Inhibitors (PIs), Integrase Inhibitors (INSTIs), and entry/fusion inhibitors. By interfering with viral replication, ART helps to maintain low viral loads and preserves immune function.

Antiretroviral therapy is typically administered as combination therapy, known as Highly Active Antiretroviral Therapy (HAART) or Combination Antiretroviral Therapy (cART). HAART involves the simultaneous use of drugs from different classes to maximize effectiveness, reduce the risk of drug resistance, and minimize side effects. The choice of regimen depends on factors such as viral load, drug resistance testing, comorbidities, and drug interactions. Prolonged survival in ART significantly reduces HIV-related morbidity and mortality, allowing individuals to live longer, healthier lives. Improved quality of life By suppressing viral replication and restoring immune function, ART helps prevent opportunistic infections and improves overall well-being. Effective ART reduces viral load, lowering the risk of HIV transmission to uninfected partners, particularly when combined with other prevention strategies like Pre-Exposure Prophylaxis (PrEP). Prevention of mother-to-child transmission in ART during pregnancy and breastfeeding significantly reduces the risk of vertical transmission, enabling HIV-positive mothers to give birth to HIV-negative infants. Delayed disease progression early initiation of ART delays the progression of HIV infection to AIDS and reduces the incidence of AIDS-related complications.

Strict adherence to ART is essential for optimal viral suppression and prevention of drug resistance. However, factors such as pill burden, side effects, stigma, and socioeconomic barriers can hinder adherence. Drug resistance is HIV can develop resistance to antiretroviral drugs through mutations, compromising treatment effectiveness. Regular viral load monitoring and resistance testing are crucial for detecting and managing resistance. Side effects of Antiretroviral drugs can cause various side effects, including gastrointestinal disturbances, metabolic abnormalities, lipodystrophy, and drug interactions. Switching to alternative regimens may be necessary to mitigate side effects. Access to ART remains limited in resource-limited settings due to factors such as high drug costs, inadequate healthcare infrastructure, and supply chain challenges. Efforts to improve access through generic drug production, international partnerships, and funding initiatives are ongoing. Long-acting injectable and implantable antiretroviral formulations offer the potential for less frequent dosing and improved adherence. Novel drug targets Ongoing research explores novel drug targets and therapeutic strategies, including latency-reversing agents, immune-based therapies, and gene editing techniques like CRISPR/Cas9. HIV cure research is Intensified efforts in HIV cure research aim to achieve sustained viral remission or eradication through approaches such as viral reservoir targeting, immune activation, and stem cell transplantation. Integration of ART services with other healthcare interventions, such as tuberculosis treatment, sexual and reproductive health services, and mental health support, can improve overall health outcomes for people living with HIV.

CONCLUSION

Antiretroviral therapy has transformed the landscape of HIV/AIDS by offering effective treatment and prevention strategies. Despite challenges such as adherence, drug resistance, and access

Correspondence to: Risa Josh, Department of Medicine and Health Science, University of Michigan Ann Arbor, USA, E-mail: rj.joshr@med.edu

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barriers, ongoing research and advocacy efforts continue to enhance the effectiveness, accessibility, and affordability of ART. With continued innovation and collaboration, the goal of ending the HIV/AIDS epidemic remains within reach.