OPEN ACCESS Freely available online

HIV: Current Research

ISSN: 2572-0805

Commentary

Advancements of Immune-Based Therapies for HIV/AIDS and Challenges

Thomas Goldstein*

Department of Infectious Diseases, University of Melbourne, Melbourne, Australia

DESCRIPTION

Human Immunodeficiency Virus (HIV) infection remains one of the most significant global health challenges, with approximately 38 million people living with HIV worldwide. Despite remarkable progress in Anti-Retroviral Therapy (ART), there is still no cure for HIV/AIDS. However, immune-based therapies have emerged as a promising approach to complement ART, aiming to enhance the immune response against HIV and achieve long-term control or eradication of the virus. In this review, we discuss various immune-based therapies for HIV/AIDS, their mechanisms of action, clinical outcomes, challenges, and future prospects. Therapeutic vaccines aim to stimulate the immune system to recognize and eliminate HIV-infected cells. Numerous vaccine candidates have been developed, including protein-based vaccines, DNA vaccines, viral vector vaccines, and dendritic cell vaccines. While early clinical trials showed modest efficacy in reducing viral load or delaying disease progression, significant challenges remain, such as achieving broad and durable immune responses across diverse HIV strains. Passive immunization involves the administration of preformed antibodies targeting specific components of the HIV virus. Monoclonal antibodies, Broadly Neutralizing Antibodies (bNAbs), and antibody combinations have demonstrated potent antiviral activity in preclinical and clinical studies. However, the high cost of production, the emergence of resistant viral variants, and the need for frequent administration pose challenges to widespread implementation.

Immune Checkpoint Inhibitors Immune Checkpoint Inhibitors (ICIs) target regulatory pathways that dampen immune responses, such as PD-1/PD-L1 and CTLA-4, to enhance T cell-mediated immune surveillance against HIV-infected cells. Early-phase clinical trials have shown encouraging results, with some patients achieving prolonged viral suppression and immune restoration. However, concerns regarding immune-related adverse events and potential reactivation of latent HIV reservoirs warrant further investigation. Therapeutic antibodies targeting immune cells apart from targeting the virus directly, therapeutic antibodies can modulate immune cell function to enhance antiviral immunity. For instance, antibodies targeting immune checkpoints, co-stimulatory molecules, or cytokines involved in T cell activation have shown potential in preclinical models and early clinical trials. Combining these antibodies with other immune-based therapies or ART may offer synergistic benefits in controlling HIV replication and preventing disease progression. Cell-based therapies involve the manipulation and infusion of immune cells to enhance their antiviral activity against HIV. Strategies include adoptive transfer of genetically modified T cells expressing HIV-specific receptors or Chimeric Antigen Receptors (CARs), as well as stem cell transplantation with gene editing to confer HIV resistance. While these approaches hold promise, challenges such as off-target effects, long-term persistence of modified cells, and immune rejection need to be addressed.

Challenges and limitations despite the progress in immune-based therapies for HIV/AIDS, several challenges hinder their widespread implementation and efficacy. viral diversity in HIV exhibits high genetic diversity, leading to the emergence of resistant viral strains that evade immune recognition. Latent reservoirs are HIV establishes long-lived reservoirs of latently infected cells, which remain unaffected by immune-based therapies and contribute to viral persistence. Prolonged antigen exposure during chronic HIV infection leads to T cell exhaustion and dysfunction, limiting the effectiveness of immune interventions. Immune-based therapies may trigger immune-related adverse events, including autoimmune reactions and cytokine release syndrome. The high cost of immune-based therapies poses barriers to access, particularly in resource-limited settings where the HIV burden is highest.

Future directions to overcome these challenges and maximize the potential of immune-based therapies for HIV/AIDS, several strategies can be pursued combining multiple immune-based approaches with complementary mechanisms of action could enhance antiviral immunity and overcome resistance. Tailoring treatment strategies based on individual immune profiles and viral characteristics may improve therapeutic outcomes and

Correspondence to: Thomas Goldstein, Department of Infectious Diseases, University of Melbourne, Melbourne, Australia, E-mail: tomas23@goldstein.tg.edu

Received: 01-Mar-2024, Manuscript No. HICR-24-30317; **Editor assigned:** 04-Mar-2024, PreQC No. HICR-24-30317 (PQ); **Reviewed:** 20-Mar-2024, QC No. HICR-24-30317; **Revised:** 27-Mar-2024, Manuscript No. HICR-24-30317 (R); **Published:** 03-Apr-2024, DOI: 10.35248/2572-0805.24.9.254

Citation: Goldstein T (2024) Advancements of Immune-Based Therapies for HIV/AIDS and Challenges. HIV Curr Res. 9:254.

minimize adverse events. Developing novel strategies to target and eliminate latent HIV reservoirs, such as latency-reversing agents combined with immune-based interventions, holds promise for achieving HIV remission or cure. Enhanced delivery systems are advancements in drug delivery technologies, such as nanoparticle-based carriers or gene therapy vectors, could improve the efficacy and durability of immune-based therapies. Promoting international collaboration and ensuring equitable access to immune-based therapies are essential for addressing the global HIV/AIDS pandemic.g approach to complement existing antiretroviral strategies for HIV/AIDS pandemic.

CONCLUSION

Immune-based therapies represent a promising approach to complement existing antiretroviral strategies for HIV/AIDS treatment. While significant progress has been made, challenges such as viral diversity, reservoir persistence, and safety concerns persist. Continued research efforts, along with collaborative initiatives and innovative approaches, are needed to realize the full potential of immune-based therapies in achieving sustained viral suppression, immune restoration, and ultimately, a functional cure for HIV/AIDS.