

Advancing HIV-Positive Donor to HIV-Positive Recipient Kidney Transplantation: Current Evidence, Clinical Challenges, and the Path Toward Standard of Care

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Abstract

Kidney transplantation remains the preferred treatment for individuals with end-stage kidney disease, yet organ shortages continue to limit timely access to transplantation worldwide. For people living with HIV, advances in combination antiretroviral therapy have transformed HIV infection into a manageable chronic condition, allowing transplantation to become a safe and effective therapeutic option. The use of kidneys from HIV-positive donors for HIV-positive recipients has emerged as a promising strategy to expand the donor pool while maintaining favorable clinical outcomes. Early clinical studies and national transplant programs have demonstrated encouraging results, including acceptable graft survival, patient survival, and manageable rates of opportunistic infections when recipients are carefully selected and monitored. Nevertheless, broader implementation requires addressing several unresolved issues, including donor eligibility criteria, viral strain compatibility, antiretroviral drug interactions with immunosuppressive agents, long-term graft function, and the potential emergence of drug-resistant viral variants. Ethical considerations, informed consent, regulatory policies, and equitable organ allocation also remain integral components of program development. Ongoing advances in molecular diagnostics, viral monitoring, transplant immunology, and multidisciplinary clinical care are improving the safety and feasibility of HIV-positive donor kidney transplantation. As evidence continues to accumulate, this transplantation approach is increasingly positioned to transition from an innovative practice to an accepted component of routine transplant medicine. This review summarizes current clinical evidence, examines the biological and ethical challenges associated with HIV-positive donor to HIV-positive recipient kidney transplantation, and discusses future strategies that may facilitate its integration into standard clinical practice.

Keywords: HIV-positive donor transplantation, HIV-positive recipient, Kidney transplantation, End-stage kidney disease, Organ donation

INTRODUCTION

This was conducted using a structured narrative approach to evaluate the current landscape of HIV-positive donor to HIV-positive recipient kidney transplantation (1). Relevant peer-reviewed publications were identified from major biomedical databases, including PubMed, Scopus, Web of Science, Embase, and Google Scholar. Original research articles, prospective and

retrospective cohort studies, clinical trials, systematic reviews, consensus guidelines, and registry reports published in English between 2008 and 2026 were considered. Search terms included combinations of HIV-positive donor, kidney transplantation, HIV-positive recipient, HOPE Act, renal transplantation, antiretroviral therapy, immunosuppression, graft survival, and transplant outcomes. Duplicate publications, conference abstracts lacking complete data, editorials without clinical evidence, and studies unrelated to kidney transplantation were excluded (2).

Data extraction focused on donor and recipient selection criteria, transplantation protocols, perioperative management, immunosuppressive regimens, antiretroviral therapy optimization, graft function, patient survival, opportunistic infections, rejection episodes, viral control, and ethical or regulatory considerations. Findings from the selected studies were synthesized descriptively to identify consistent clinical trends, existing knowledge gaps, and future research priorities (3).

The reviewed literature demonstrates that kidney transplantation using organs from HIV-positive donors for carefully selected HIV-positive recipients has become an increasingly feasible therapeutic strategy. Most published cohorts reported patient survival exceeding 85–95% during intermediate follow-up periods, with graft survival rates comparable to those observed in HIV-negative donor transplantation after adjustment for recipient characteristics (4).

Successful transplantation depended heavily on sustained viral suppression before surgery, adequate CD4⁺ T-cell recovery, and strict adherence to antiretroviral therapy. Modern immunosuppressive protocols effectively prevented acute rejection while maintaining acceptable infection rates when combined with individualized antimicrobial prophylaxis (5).

Despite encouraging outcomes, several challenges remain. Drug-drug interactions between calcineurin inhibitors and antiretroviral medications frequently required therapeutic drug monitoring and dose modification. Episodes of acute rejection were reported more frequently than in the general transplant population, although most were successfully managed with timely intervention. Long-term concerns include the possibility of HIV superinfection, transmission of resistant viral variants, chronic allograft injury, and limited long-term follow-up beyond ten years (6).

Collectively, current evidence indicates that HIV-positive donor kidney transplantation can safely expand organ availability without compromising short- and intermediate-term clinical outcomes when performed within experienced multidisciplinary transplant programs (7).

The introduction of combination antiretroviral therapy fundamentally changed the prognosis of individuals living with HIV. Improved immune restoration significantly reduced opportunistic infections and increased life expectancy, allowing many patients to become suitable candidates for kidney transplantation. Concurrently, the growing demand for donor kidneys prompted exploration of alternative donor sources (8).

Legislative changes in several countries, particularly following the implementation of the HIV Organ Policy Equity (HOPE) framework in the United States, enabled clinical research involving transplantation between HIV-positive donors and recipients. Early pilot studies demonstrated encouraging graft function and patient survival, providing the foundation for expanding these transplant programs. Experience accumulated over the past decade suggests that HIV-positive donor transplantation is no

longer considered experimental in selected clinical settings but is progressively becoming an evidence-supported transplant option (9).

Successful HIV-positive donor transplantation depends on careful evaluation of viral and immunological characteristics in both donor and recipient. Candidates generally require sustained viral suppression, adequate immune recovery, and absence of uncontrolled opportunistic infections before transplantation (10).

Several biological factors influence transplant success. Viral subtype compatibility, potential transmission of resistant HIV strains, donor viral load, and recipient immune competence all contribute to post-transplant outcomes. Modern molecular diagnostic techniques enable detailed viral characterization before transplantation, improving donor-recipient matching and minimizing virological risks (11).

Equally important is the optimization of immunosuppressive therapy. Balancing prevention of graft rejection with preservation of immune function requires individualized treatment strategies. Therapeutic drug monitoring remains essential because protease inhibitors and pharmacokinetic boosters substantially alter the metabolism of calcineurin inhibitors and mTOR inhibitors (12) (Figure 1).

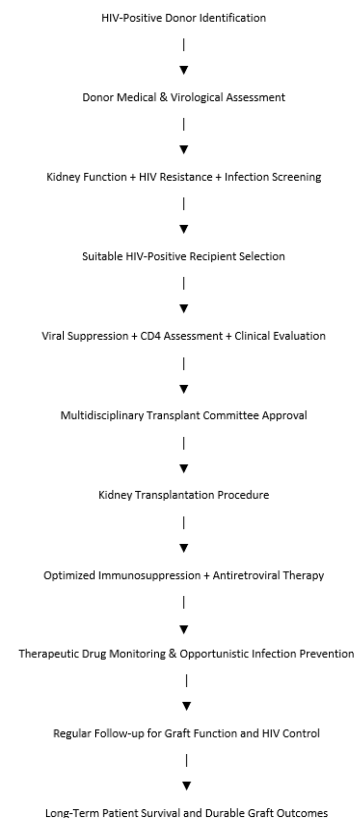


Figure 1: Clinical pathway illustrating the evaluation, transplantation process, immunological management, and long-term follow-up involved in HIV-positive donor to HIV-positive recipient kidney transplantation.

CLINICAL OUTCOMES AND SAFETY PROFILE

Accumulating clinical evidence supports favorable outcomes following HIV-positive donor kidney transplantation. Most studies report excellent short- and medium-term patient survival with stable renal function and acceptable graft longevity. Rates of opportunistic infections remain relatively low among recipients who maintain viral suppression and receive appropriate antimicrobial prophylaxis (13).

Acute rejection remains one of the principal clinical challenges. Higher rejection rates compared with HIV-negative transplant recipients have been observed in several cohorts, although improvements in induction therapy and maintenance immunosuppression continue to reduce this risk (14).

Long-term monitoring demonstrates sustained HIV viral suppression in the majority of recipients. Importantly, transplantation has been associated with substantial improvements in quality of life, functional independence, and survival compared with remaining on long-term dialysis (15) (Table 1).

ETHICAL, REGULATORY, AND HEALTH POLICY PERSPECTIVES

Expansion of HIV-positive donor transplantation requires careful consideration of ethical and regulatory issues. Informed consent remains central to clinical decision-making because recipients must understand both established benefits and remaining uncertainties (16).

National transplant policies continue to evolve as new clinical evidence becomes available. Regulatory agencies increasingly recognize that carefully selected HIV-positive donor transplantation can safely expand organ availability while maintaining acceptable clinical outcomes (17).

Health equity also represents an important consideration. Individuals living with HIV have historically experienced reduced access to transplantation despite significant improvements in long-term survival. Integrating HIV-positive donor transplantation into national transplant programs may reduce disparities while improving organ utilization and reducing waiting-list mortality (18).

Domain	Major Considerations	Clinical Significance
Donor Eligibility	Confirmed HIV infection, stable clinical status, acceptable kidney function, absence of uncontrolled opportunistic infections	Ensures donor organ quality and minimizes infectious risks
Recipient Selection	Sustained HIV viral suppression, CD4+ T-cell count >200 cells/ μ L, adherence to antiretroviral therapy, suitable transplant candidate	Improves post-transplant survival and graft function
Viral Assessment	HIV viral load, viral subtype characterization, drug-resistance testing	Reduces risk of resistant virus transmission and virological failure
Immunosuppressive Therapy	Individualized induction and maintenance regimens, therapeutic drug monitoring	Balances rejection prevention with immune preservation
Antiretroviral Therapy	Optimization of ART regimen before and after transplantation	Minimizes pharmacokinetic interactions and maintains viral suppression
Drug–Drug Interactions	Monitoring interactions between calcineurin inhibitors, mTOR inhibitors, and ART	Prevents toxicity and graft dysfunction
Infection Prevention	Opportunistic infection screening, antimicrobial prophylaxis, vaccination	Reduces infectious complications after transplantation
Rejection Surveillance	Serial serum creatinine, donor-specific antibodies, protocol biopsy when indicated	Enables early detection and treatment of rejection
Long-Term Monitoring	Renal function, HIV viral load, CD4 count, cardiovascular and metabolic health	Supports durable graft survival and patient longevity
Ethical and Regulatory Considerations	Informed consent, equitable organ allocation, compliance with national regulations	Facilitates safe and ethical implementation of HIV-positive donor transplantation

Table 1: Key Clinical Considerations for HIV-Positive Donor to HIV-Positive Recipient Kidney Transplantation

FUTURE DIRECTIONS AND EMERGING INNOVATIONS

Future research is expected to refine donor selection, optimize immunosuppressive protocols, and improve long-term graft preservation. Advances in genomic sequencing, viral resistance profiling, artificial intelligence-assisted donor evaluation, and precision immunology may further enhance transplant safety (19).

Machine perfusion technology, biomarker-guided rejection surveillance, immune cell profiling, and next-generation antiviral therapies are likely to improve long-term transplant outcomes. International multicenter registries will provide larger datasets that strengthen evidence regarding long-term patient survival and graft durability.

Continued collaboration among transplant surgeons, nephrologists, infectious disease specialists, immunologists, and public health authorities will be essential for developing standardized protocols that facilitate broader implementation worldwide. As clinical evidence continues to mature, HIV-positive donor to HIV-positive recipient kidney transplantation is increasingly positioned to become an established component of modern renal replacement therapy (20).

CONCLUSION

Kidney transplantation using organs from HIV-positive donors represents a significant advancement in transplant medicine and offers an effective strategy for addressing persistent organ shortages among individuals living with HIV. Contemporary evidence demonstrates that, with rigorous donor and recipient selection, optimized antiretroviral therapy, individualized immunosuppression, and comprehensive multidisciplinary follow-up, clinical outcomes are comparable to those achieved with conventional kidney transplantation. Although challenges related to viral resistance, drug interactions, long-term graft durability, and regulatory harmonization remain, ongoing scientific and clinical advances continue to strengthen the safety profile of this approach. Future large-scale prospective studies, standardized international guidelines, and long-term outcome registries will be critical for establishing uniform clinical practice. As experience expands across transplant centers, HIV-positive donors to HIV-positive recipient kidney transplantation is well positioned to transition from a specialized therapeutic option to an accepted standard of care, improving transplant accessibility and survival for people living with HIV and end-stage kidney disease.

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