

# Human Immunodeficiency Virus Organ Transplantation



Alan J. Taege, MD

## KEYWORDS

- HIV • Organ transplantation • Hepatitis C virus • Organ rejection
- HIV positive to positive organ transplantation

## KEY POINTS

- HIV is a chronic disease associated with potential organ failure.
- Organ transplantation is a proven option for HIV patients with organ failure.
- Organ rejection rates remain high.
- Hepatitis C virus remains a challenge in HIV organ transplantation.
- HIV-positive donor to HIV-positive recipient transplantation offers potential future options.

## INTRODUCTION

The human immunodeficiency virus (HIV) epidemic remains a serious worldwide health problem with more than 35 million people infected. The last four decades have produced tremendous advances in the understanding of HIV and the development of highly active antiretroviral therapy (cART). The success of cART has made HIV a manageable chronic disease and allowed those afflicted to have a near normal lifespan. As a result, aging HIV patients face many of the same chronic health conditions and organ failure as the general population. Liver failure occurs at an accelerated rate for HIV patients because of HIV and hepatitis C. Consequently, chronic conditions outnumber opportunistic infections (OI) as a cause of death for HIV patients.

Organ transplantation is an accepted modality of therapy for organ failure in the general population and more recently in HIV patients. Unfortunately, donor organs are in short supply, whereas the list of those needing organs continues to expand. Currently there are more than 115,000 people listed on the United Network for Organ Sharing waiting list who need donor organs, but only approximately 10,000 transplants are performed annually from available donors, making the supply of organs a critical need.<sup>1</sup> It is unclear how many of the listed individuals are HIV positive because they are not specifically identified.

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Dr A.J. Taege: Gilead Community Speaker's bureau. Speaker Clinical Care Options (supported by Viiv grant).

Department of Infectious Disease, Cleveland Clinic, 9500 Euclid Avenue, Cleveland, OH 44195, USA

E-mail address: [taegea@ccf.org](mailto:taegea@ccf.org)

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This article provides an overview of the transplantation needs in the HIV population focusing on kidney and liver transplants with a brief history of HIV organ transplantation, critical information learned from early experience, and the developing (controversial) approach of transplanting HIV-positive organs into HIV-positive patients.

The pretreatment and early treatment era of the HIV epidemic were marked by death in a few short years from the time of diagnosis, most commonly from OI. With the advent of cART, OI were replaced by chronic conditions of aging and organ failure as leading causes of death. The most common organs failing are the kidney and liver. Renal failure in HIV is most commonly caused by HIV-associated nephropathy (HIVAN), immune complex disease, and thrombotic microangiopathy.<sup>2,3</sup> Diabetes mellitus and hypertension are becoming additional etiologies, similar to the general population. Liver failure is usually the result of hepatitis C virus (HCV); hepatitis B virus (HBV); and secondary hepatocellular carcinoma (HCC), alcohol abuse, and adverse effects of medications. The direct-acting agents (DAA) for HCV have replaced interferon and ribavirin with unprecedented success ushering in a new era for HCV-infected patients.

## EARLY YEARS

Organ transplantation was viewed unfavorably in the early years of the epidemic. HIV patients were excluded from consideration because of concerns of hastening disease progression by use of immune suppression, wasting scarce organs in patients with a terminal incurable disease and concerns about exposure of health care workers to the virus while working with HIV patients.<sup>4-6</sup>

Early attempts with organ transplantation in HIV patients, intentional and accidental, in the pre-cART era had poor results.<sup>7-12</sup> Interestingly, HIV did not affect the outcome of the transplanted organ.<sup>13</sup>

The cART era produced marked improvements in survival and life expectancy, quality of life, and decreases in OI.<sup>14,15</sup> Subsequently interest and efforts continued in HIV organ transplantation. Ethical concerns persisted along with reluctance by some to perform the necessary care culminating in the Sounding Board article published in the *New England Journal of Medicine* in 2002, which provided support for solid organ transplantation in HIV patients.<sup>16</sup>

## KIDNEY TRANSPLANTATION

HIV patients have an ongoing, increased risk of end-stage renal disease (ESRD) that is 2- to 20-fold higher than the general population even after the benefits of cART.<sup>17</sup> Today HIV patients comprise 1% to 1.5% of the US dialysis population resulting in a rate that is 3.2 times higher than the general population (4.5 for black patients) and will likely continue to rise.<sup>18</sup> ESRD is six-fold higher in black HIV patients than white HIV patients. The racial disparity of HIVAN and ESRD in black HIV patients has a genetic association with the Apo lipoprotein L 1 gene.<sup>17</sup> In addition to HIVAN, the cause of this racial disparity for ESRD in the black HIV population comes from the higher rates of diabetes mellitus and hypertension in the black population.<sup>19</sup> Once placed on dialysis, HIV patients have a significantly worse outcome with survival rates approximately one-third less than HIV-negative dialysis patients.<sup>20,21</sup> The cART era has fortunately resulted in a decreased occurrence of HIVAN<sup>22</sup> but excess ESRD persists in HIV patients.

A survival benefit of kidney transplantation over continuous dialysis was demonstrated for HIV-negative patients.<sup>23-26</sup> This has now been demonstrated in HIV kidney transplantation recipients.<sup>27</sup> Mortality was 79% lower at 5 years after kidney transplant

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