



# Comparison of Recipient Outcomes After Kidney Transplantation: In-House Versus Imported Deceased Donors

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## ABSTRACT

**Background.** Increased cold ischemia time in cadaveric kidney transplants has been associated with a high rate of delayed graft function (DGF), and even with graft survival. Kidney transplantation using in-house donors reduces cold preservation time. The purpose of this study was to compare the clinical outcomes after transplantation in house and externally.

**Methods.** We retrospectively reviewed the medical records of donors and recipients of 135 deceased-donor kidney transplantations performed in our center from March 2009 to March 2016.

**Results.** Among the 135 deceased donors, 88 (65.2%) received the kidneys from in-house donors. Median cold ischemia time of transplantation from in-house donors was shorter than for imported donors (180.00 vs 300.00 min;  $P < .001$ ). The risks of DGF and slow graft function were increased among the imported versus in-house donors. Imported kidney was independently associated with greater odds of DGF in multivariate regression analysis (odds ratio, 4.165;  $P = .038$ ). However, the renal function of recipients at 1, 3, 5, and 7 years after transplantation was not significantly different between the 2 groups.

**Conclusions.** Transplantation with in-house donor kidneys was significantly associated with a decreased incidence of DGF, but long-term graft function and survival were similar compared with imported donor kidneys.

**D**ECEASED-DONOR kidneys are usually accompanied by an immediate renal ischemic event due to cold ischemia time (CIT) [1]. CIT refers to the time between initial cold perfusion during organ retrieval and the start of the surgical procedure for blood vessel anastomosis to the recipient. It plays a crucial role in the success of deceased-donor kidney transplantation (DDKT). The association between prolonged CIT and adverse graft and patient outcomes is well established in kidney transplantation from deceased donors [1,2].

Allocation of deceased-donor kidneys in Korea is strictly regulated by the Korean Network for Organ Sharing. In kidney grafts imported from outside of the local hospital, CIT is prolonged owing to the time required to transport the organ to the accepting center. The aim of the present study

was to compare the clinical outcomes of imported versus in-house grafts in patients undergoing DDKT.

## METHODS

### Study Population

We retrospectively analyzed the medical records of the donors and recipients for the 135 DDKT procedures performed at the Korea University Anam Hospital from March 2009 to March 2016. The study received full approval from the Korea University Anam

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**Table 1. Baseline Characteristics of Donors and Recipients**

Characteristic	In-House (n = 88)	Imported (n = 47)	P Value
Donor age (y)	46.50	55.00	.047
Donor sex male	69 (78.4)	18 (64.3)	.133
Peak creatinine (mg/dL)	1.90	2.20	.182
Final creatinine (mg/dL)	1.67	1.60	.323
Underlying illness of donors			
Hypertension	24 (27.9)	14 (31.1)	.701
Diabetes	11 (12.8)	10 (22.2)	.162
AKI donor	45 (64.3)	17 (54.8)	.368
Recipient age (y)	49.50	53.00	.662
Recipient sex male	54 (61.4)	31 (66.0)	.599
Donor – recipient BMI (kg/m <sup>2</sup> )	-1.10	-4.20	.003
HLA mismatch			<.005
≤3	24 (27.2)	16 (36.4)	
4	36 (40.9)	14 (31.8)	
5	28 (31.9)	14 (31.8)	
Cold ischemia time (min)	180	300	<.001

Note. Data are expressed as median or n (%).  
Abbreviations: AKI, acute kidney injury; BMI, body mass index.

Hospital’s Institutional Review Board, which waived the need for informed consent because the study did not infringe on patient privacy or health status.

**Data Collection and Definitions**

Based on medical records, the following variables of recipient data were assessed: age, sex, height, weight, history of hypertension or diabetes, and initial, peak, and final serum creatinine (sCr) levels. We also collected data from the medical records of recipients on immunosuppressant use, sCr, and history of dialysis. Estimated glomerular filtration rate (eGFR) was calculated from sCr values with the use of the Modification of Diet in Renal Disease formula [3]. Acute kidney injury (AKI) was defined according to the Kidney Disease Improving Global Outcomes staging [4] or as an increase of 1.5 mg/dL above initial sCr level for patients without recorded baseline renal status.

Based on recipient data for graft function in the immediate postoperative period, delayed graft function (DGF) was defined as dialysis requirement during the 1st week after transplantation, slow graft function (SGF) as a serum creatinine level of 3.0 mg/dL at post-transplantation day 5 without the need for dialysis, and immediate graft function as absence of DGF or SGF [5]. Graft biopsy results were reviewed, and cases reported as acute rejection were defined as biopsy-proven acute rejection, regardless of the type of rejection.

**Statistical Analysis**

The numeric data of the 2 groups were compared with the use of the Student *t* test or the Mann-Whitney test. Categorical data were compared with the use of the chi-square test or Fisher exact test, as appropriate. Multiple logistic models were used for analyzing prognostic factors for outcome. All statistical analyses were performed with the use of SPSS software version 21.0 (Chicago, Ill, USA). A *P* value < .05 was considered to be statistically significant.

**RESULTS**

**Baseline Characteristics**

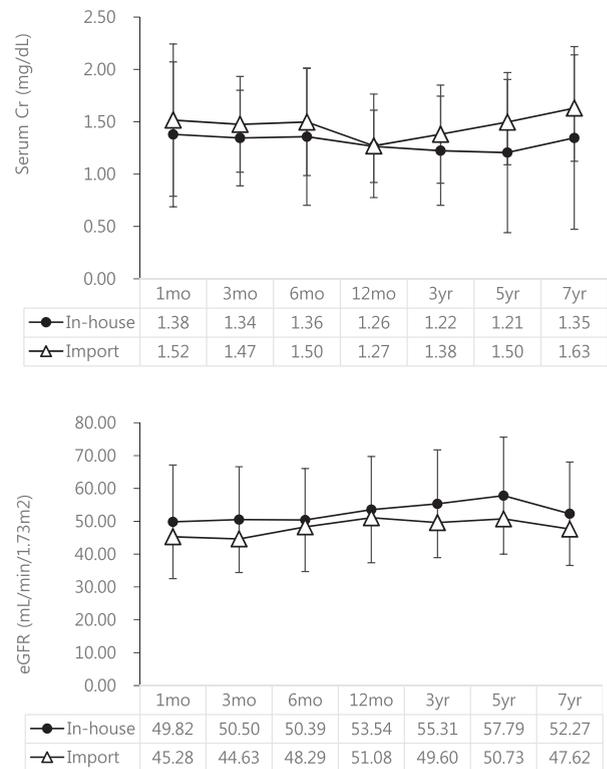
A total of 88 and 47 patients received kidney transplantations from in-house and imported kidney donors,

**Table 2. Clinical Outcomes Following In-House and Imported Donor Kidney Transplantation, n (%)**

Outcome	In-House (n = 88)	Imported (n = 47)	P Value
Acute rejection			.168
ACMR	10 (11.4)	8 (17.0)	
AAMR	8 (9.1)	5 (10.6)	
ACMR + AAMR	7 (8.0)	6 (12.8)	
Graft function			.011
Intermediate graft function	44 (70.4)	18 (41.4)	
Slow graft function	17 (21.1)	9 (31.0)	
Delayed graft function	6 (8.5)	8 (27.6)	
Graft failure	7 (8.0)	5 (10.6)	.602

Abbreviations: ACMR, acute cell-mediated rejection; AAMR, acute antibody-mediated rejection.

respectively. Their peak and final sCr levels before graft harvest were 1.90 mg/dL and 1.67 mg/dL versus 2.20 mg/dL and 1.60 mg/dL, respectively (Table 1). The proportion of patients with AKI diagnosis, and the severity of AKI as defined by KDIGO staging were not different according to donor location. No significant differences were observed in donors’ age or underlying illness. However, compared with in-house donor kidneys, imported kidneys had significantly longer CITs (median 180 min vs. 300 min; *P* < .001). The 2



**Fig 1.** Differences in renal function between in-house and imported donor groups at 1, 3, 5, and 7 years after transplantation. Abbreviations: Cr, creatinine; eGFR, estimated glomerular filtration rate.

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