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Table S1. Baseline characteristics of the patients who were excluded from the analyses compared with those who were included in the analyses.

Characteristics	Excluded (n=41,856)	Included (n=93,782)
male, %	62	61
Age, median (25th, 75th)	53 (43,62)	53 (42,62)
Race, %		
White	51	52
Black	26	26
Hispanic	15	15
Other	8	8
Recipient BMI, median (25th, 75th)	27.3 (23.8, 31.4)	27.6 (24.1, 31.8)
Diabetes, %	34	34
Preemptive, %	17	20
Peak PRA, %		
Missing	18	21
≤10	64	60
11-30	7	6
> 30	11	12
HLA-ABDR zero mismatch, %	9	8
HLA-DR mismatch, %		
0	18	19
1	46	48
2	35	33
CMV serostatus, %		
D^+/R^-	17	17
D^+/R^+	41	41
D^-/R^+	24	23
D^-/R^-	16	17
Donor age, median (25th, 75th)	42 (28, 52)	42 (29, 51)
Male donors, %	54	51
Donor race, %		
White	69	69
Black	13	13
Hispanic	15	14
Other	4	4
Donor hypertension, %	20	19
Donor type (living), %	31	40
Transplant year, %		
2005-2008	64	29
2009-2011	24	33
2012-2014	12	37
Induction therapy, %		
Thymoglobulin	43	48
Alemtuzumab	11	14
Basiliximab	21	21
Other induction	11	5
No induction	18	15
Maintenance therapy, %		
Tacrolimus	80	89
Cyclosporine	10	5
Mycophenolic acid	94	94
Azathioprine	0.7	0.3
Sirolimus	6	3
Steroids	66	65
Delayed graft function	20	16

Table S2a. The effect of the incremental number of HLA-DQ mismatches and death-censored graft survival in living donor kidney transplant recipients and deceased donor kidney transplant recipients with cold ischemic time of 17 hours or less

	Unadjusted			Adjusted Model*		
	Incidence	Hazard ratio	P	Incidence	Hazard ratio	P
DCGS						
0 DQ MM	1522/16536	Reference		1522/16536	Reference	
1 DQ MM	4280/36217	1.36 (1.28-1.44)	<0.001	4280/36217	1.17 (1.09-1.26)	<0.001
2 DQ MM	1724/14432	1.42 (1.32-1.52)	<0.001	1724/14432	1.15 (1.06-1.25)	0.001
1 DQ MM vs. 2 DQ MM						
1 DQ MM	4280/36217	Reference		4280/36217	Reference	
2 DQ MM	1724/14432	1.04 (0.99-1.10)	0.14	1724/14432	0.99 (0.94-1.05)	0.74

Table S2b. The effect of the incremental number of HLA-DQ mismatches and cumulative incidence of acute rejection at 1-year in living donor kidney transplant recipients and deceased donor kidney transplant recipients with cold ischemic time of 17 hours or less

	Unadjusted			Adjusted model*		
	Incidence	Odd ratio	P	Incidence	Odd ratio	P
Acute rejection						
0 DQ MM	1161/16564	Reference		1161/16564	Reference	
1 DQ MM	3720/36299	1.51 (1.41-1.62)	<0.001	3720/36299	1.22 (1.12-1.32)	<0.001
2 DQ MM	1630/14465	1.68 (1.56-1.82)	<0.001	1630/14465	1.32 (1.20-1.44)	<0.001
1 DQ MM vs. 2 DQ MM						
1 DQ MM	3720/36299	Reference		3720/36299	Reference	
2 DQ MM	1630/14465	1.11 (1.05-1.18)	0.001	1630/14465	1.10 (1.03-1.17)	0.004

*Adjusted for HLA-DR, HLA-A, HLA-B mismatches, race/ethnicity, gender, BMI, preemptive, PRA, diabetes, donor age, race/ethnicity, gender, donor hypertension, CMV serostatus, immunosuppression, transplant periods, and transplant type.

Table S3. Interaction tests between HLA-DQ mismatches and HLA-DR mismatches and subsequent subgroup analysis based on HLA-DR mismatches in living donor kidney transplant recipients and deceased donor kidney transplant recipients with cold ischemic time of 17 hours or less

	Adjusted Model*		
DCGS	**Incidence**	**Hazard ratio**	**P**
0 DQ MM	*1522/16536*	*Reference*	
1-2 DQ MM[a]	6004/50649	1.16 (1.08-1.24)	<0.001
Acute rejection	**Incidence**	**Odd ratio**	**P**
0 DQ MM	*1161/16564*	*Reference*	
1-2 DQ MM[b]	5350/50764	1.18 (1.09-1.28)	<0.001
0 DQ MM + 0 DR MM	*515/9553*	*Reference*	
1-2 DQ MM + 0 DR MM	241/2933	1.35 (1.14-1.60)	0.001
0 DQ MM + 1-2 DR MM	*646/7011*	*Reference*	
1-2 DQ MM + 1-2 DR MM	5109/47831	1.16 (1.07-1.27)	0.001

[*]Adjusted for HLA-DR, HLA-A, HLA-B mismatches, race/ethnicity, gender, BMI, preemptive, PRA, diabetes, donor age, race/ethnicity, gender, donor hypertension, CMV serostatus, immunosuppression, transplant periods, and transplant type.
[a]P-value for interaction between HLA-DQ mismatches and HLA-DR mismatches = 0.11
[b]P-value for interaction between HLA-DQ mismatches and HLA-DR mismatches = 0.01

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Table S4.1. Sensitivity analysis of Cox regression model for death-censored graft survival between recipients with HLA-DQ matched vs. HLA-DQ mismatched kidneys

	Unadjusted		+HLA-ABDR[a]		+Recipient Factors[b]		+Donor Factors[c]		+Transplant Factors[d]	
	Hazard ratio	P	Hazard ratio	P	Hazard ratio	P		P		P
Living + Deceased with CIT ≤ 17 hours	1.35 (1.29-1.41)	<0.001	1.08 (1.03-1.15)	0.004	1.09 (1.04-1.16)	0.001	1.10 (1.04-1.16)	0.001	1.09 (1.03-1.15)	0.002
Living only	1.35 (1.25-1.46)	<0.001	1.14 (1.03-1.25)	0.01	1.17 (1.06-1.29)	0.002	1.17 (1.06-1.29)	0.002	1.18 (1.07-1.30)	0.001
Deceased only	1.29 (1.22-1.36)	<0.001	1.03 (0.96-1.10)	0.38	1.04 (0.97-1.11)	0.29	1.04 (0.97-1.11)	0.24	1.05 (0.98-1.12)	0.18
Deceased with CIT ≤ 17 hours	1.30 (1.20-1.42)	<0.001	1.10 (1.00-1.21)	0.05	1.12 (1.02-1.23)	0.02	1.12 (1.02-1.24)	0.02	1.12 (1.02-1.23)	0.02
Deceased with CIT > 17 hours	1.27 (1.17-1.38)	<0.001	0.95 (0.86-1.05)	0.32	0.95 (0.86-1.05)	0.32	0.95 (0.86-1.05)	0.30	0.97 (0.88-1.06)	0.49
Deceased with CIT > 17 hours, excluding zero HLA-ABDR mismatch*	1.08 (0.99-1.19)	0.09	0.94 (0.85-1.04)	0.20	0.94 (0.85-1.04)	0.25	0.94 (0.85-1.04)	0.25	0.96 (0.86-1.06)	0.40

Table S4.2. Sensitivity analysis of logistic regression model for cumulative incidence of rejection at 1-year after transplant between recipients with HLA-DQ matched vs. HLA-DQ mismatched kidneys

	Unadjusted		+HLA-ABDR[a]		+Recipient Factors[b]		+Donor Factors[c]		+Transplant Factors[d]	
	Hazard ratio	P	Hazard ratio	P	Hazard ratio	P		P		P
Living + Deceased with CIT ≤ 17 hours	1.51 (1.43-1.60)	<0.001	1.13 (1.05-1.20)	<0.001	1.14 (1.06-1.22)	<0.001	1.14 (1.07-1.22)	<0.001	1.15 (1.07-1.23)	<0.001
Living only	1.66 (1.53-1.81)	<0.001	1.12 (1.01-1.25)	0.03	1.13 (1.01-1.25)	0.03	1.13 (1.01-1.25)	0.03	1.14 (1.03-1.27)	0.02
Deceased only	1.41 (1.31-1.51)	<0.001	1.11 (1.02-1.21)	0.01	1.12 (1.03-1.22)	0.008	1.12 (1.03-1.22)	0.008	1.13 (1.03-1.23)	0.006
Deceased with CIT ≤ 17 hours	1.42 (1.28-1.58)	<0.001	1.18 (1.05-1.33)	0.006	1.20 (1.06-1.35)	0.003	1.20 (1.06-1.35)	0.003	1.20 (1.06-1.35)	0.003
Deceased with CIT > 17 hours	1.38 (1.24-1.53)	<0.001	1.03 (0.91-1.17)	0.59	1.04 (0.92-1.18)	0.56	1.04 (0.92-1.18)	0.56	1.05 (0.92-1.19)	0.46
Deceased with CIT > 17 hours, excluding zero HLA-ABDR mismatch*	1.17 (1.04-1.32)	0.009	0.98 (0.86-1.12)	0.79	0.99 (0.87-1.13)	0.88	0.99 (0.87-1.13)	0.85	0.99 (0.87-1.14)	0.96

[a] Adjusted for HLA-DR, HLA-A, and HLA-B mismatches.
[b] Adjusted for all of the above plus recipient race/ethnicity, gender, BMI, preemptive, PRA, and diabetes.
[c] Adjusted for all of the above plus donor age, race/ethnicity, gender, donor hypertension, and expanded criteria donor (for deceased donor kidney transplant only).
[d] Adjusted for all of the above plus CMV serostatus, induction therapy, immunosuppression therapy upon discharge, and transplant periods.
*2,698 out of 25,309 (11%) deceased kidney donor recipients with cold ischemic time > 17 hours had zero HLA-ABDR mismatches and were excluded.