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The impact of ischemic lesions in the donor kidney, donor age, recipient age and HLA (A, B, C, DR, DQ) matching on clinical course after kidney grafting

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It is generally accepted that HLA matching improves graft survival [1]. However, there is no consensus on whether this improvement is reflected on daily clinical course. Clinical course after renal transplantation depends on many factors, such as donor age, recipient age, ischemic score in the kidney [2], and HLA matching [3]. The relative contribution of these factors is unknown. Because management of the recipients in the various centers differs considerably, only a single centre study would reveal the relative contribution of all these factors. Therefore, in our centre we studied the influence of these parameters on the clinical course after renal allografting.

Key words: Kidney transplantation – Ischemic lesions – Donor age – Recipient age – HLA matching

Patients and methods

We included in our study 169 transfused consecutive recipients of a renal allograft with a follow-up of at least 1 year, transplanted between December 1983 and August 1990 under the auspices of Eurotransplant. All patients were given cyclosporine and low dose prednisolone as basic immunosuppression. Antirejection treatment consisted of a 10 day course of rabbit ATG. Subsequent rejections were treated with 500–1000 mg methylprednisolone on 3 alternative days. The recipient characteristics were as follows: mean age 45 years (range 16–72 years, 29% > 55 years), 77% first transplant, 17% second, gender: male 67%. The donor characteristics were as follows: mean age 35 years (range 1–69 years, 32% > 45 years, 14% > 55 years), mean ischemic score 1.9 (range 0–8, 0 = 36%, 1 or 2 = 32%, others = 32%), mean CIT 30.5 h (sd 8.48).

The following parameters were studied: 1 year graft and patient survival, 1 year creatinine clearance, the occurrence of an acute rejection (within 6 months of grafting), duration of hospitalization, need for dialysis, and duration of dialysis dependency. Rejection was diagnosed on clinical grounds and in most instances was confirmed by a biopsy. Statistical analysis was performed with SPSS/PC + (version 3.1) using ANOVA, paired *t*-test and multiple regression.

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Results

The 1 year patient and graft was survival 94% and 79% respectively. Of the predictors (donor age, recipient age, ischaemic score and HLA A, B, C, DR and DQ matching), only donor age over 45 years influenced graft survival significantly: donor > 45 years 69% graft survival, donor ≤ 45 years 83% graft survival. There was a highly significant influence of various HLA matches on the occurrence of an acute rejection (Table I) e.g. only 1 out of 22 (5%) HLA A + B + DR identical grafts needed antirejection treatment. No influence of rejection frequenty could be shown for HLA A, B, A + B or C matching. Recipients *without* an acute rejection ($n = 121$) had a significantly shorter duration of hospitalization than recipients

Table I. Influence of HLA matching on the occurrence of acute rejection

Number of mismatches		*n*	%	acute rejection
DR	= 0	102	30	$P < 0.01$
	> 0	94	47	
DQ	= 0	134	34	$P < 0.02$
	> 0	51	55	
B + DR	= 0	34	18	$P < 0.05$
	= 1	67	40	
	≥ 2	94	44	
B + DQ	= 0	34	18	$P < 0.02$
	= 1	92	42	
	≥ 2	59	42	
A + B + DR	= 0	22	5	$P < 0.001$
	= 1	46	52	
	≥ 2	127	39	ns
A + B + DQ	= 0	21	5	$P < 0.001$
	= 1	47	51	
	≥ 2	127	38	ns

with an acute rejection ($n = 75$): 26.4 versus 35.7 days, $P = 0.000$. However, there was no difference between these groups in creatinine clearance (49.6 versus 50.9 ml/min) and in graft survival (82 % versus 74 %).

None of the predictors had a correlation with need for dialysis or duration of dialysis dependency. In recipients with a functioning kidney graft at 1 year the ischemic score in the donor kidney correlated with the duration of hospitalization (ANOVA $P = 0.005$). In multiple regression, only the ischemic score correlated with the duration of hospitalization (hospital stay = 25.0 + 1.56 × ischemic score, beta = 0.24, $P = 0.006$). The 1 year creatinine clearance correlated with donor age and recipient age, but not with ischemic score nor with HLA matching (Creatinine clearance = 85.4 − 0.457 × donor age − 0.362 × recipient age; multiple r = − 0.43, $P = 0.000$; donor age r = − 0.29, $P = 0.002$; recipient age r = − 0.18, $P = 0.03$).

Discussion and conclusion

1) Of the factors studied only donor age influenced graft survival. Recipients of a kidney from a donor > 45 years had a significantly lower 1 year graft survival compared to recipients of a kidney from a donor ≤ 45 years.
2) By matching for HLA A + B + DR the occurrence of acute rejection could be decreased to 5 %. The same held for matching for HLA A + B + DQ. Because of the high linkage disequilibrium between HLA DR and HLA DQ and the small number of recipients, no prediction could be made about the relative contribution of both loci.
3) Less acute rejection would be of great benefit for the recipient. This was reflected in a significant shorter duration of hospitalization (9 days) for recipients without an acute rejection compared to recipients with an acute rejection.
4) A high ischemic score in the donor kidney resulted in a significantly longer duration of hospitalization.
5) Creatinine clearance at 1 year after grafting was influenced by donor and recipient age, but not by the occurrence of acute rejection, HLA matching or by the ischemic score.

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