

## Accumulation of elderly ESRD patients with blood group O on the waiting list

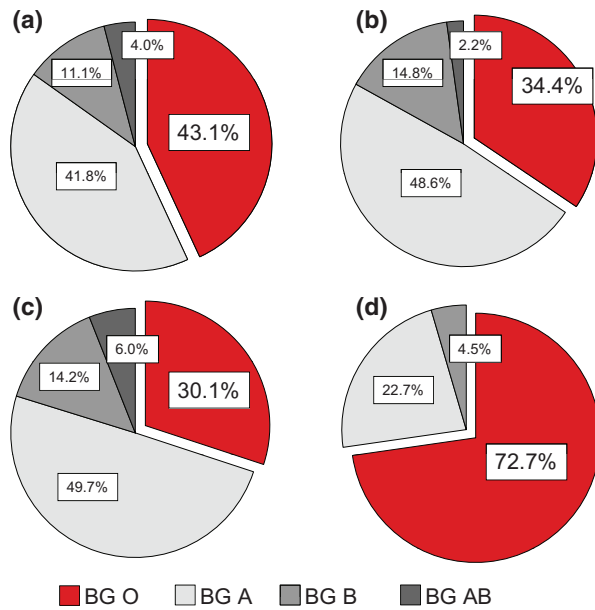
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End stage renal disease is associated with high morbidity and mortality which increase with age. It has been shown that renal transplantation improves life expectancy even in elderly patients [1]. The Eurotransplant Senior Program (ESP) was implemented on 1.1.1999 to meet the needs of an aging society. Other aspects of this program are an increasing number of organ offers from elderly deceased donors (organs, which may lead to inferior outcomes of the recipients when grafted onto young patients [2]), a shorter life expectancy of elderly patients (which makes it logical to allocate organs with a similar short life expectancy to these patients – ‘functional match’), and attempts to expand the deceased donor pool to prevent a further increase in waiting times. In their 5 years analysis of the ESP, Frei *et al.* found that graft and patient survival were not negatively affected and concluded that age matching of elderly donors and recipients is an effective allocation system [3]. ESP-allocation does not use human leukocyte antigen (HLA) matching but tries to keep cold ischemia time as short as possible [4]. Therefore, organs from donors aged  $\geq 65$  years are allocated to recipients aged  $\geq 65$  years within a narrow geographic region only by waiting time. According to ESP-blood group rules, kidneys have been allocated to elderly recipients as follows: A to A or AB, B to B or AB, AB to AB and O to O or B. In contrast to other countries, in Germany O-ESP-kidneys have been allocated to O-, A-, B- and AB-recipients [5], which allowed for a substantial transfer of O-kidneys to other blood groups. This contrast and the results of our analysis on the ‘blood group O problem’, in the regular Eurotransplant kidney allocation (ETKAS) [6] led us to investigate blood group specific differences in ESP-allocation in our center.

We performed a retrospective single center analysis using data from a web-based patient record system, TBase [7]. Data were retrieved from all elderly patients awaiting a first kidney graft at the age  $\geq 65$  years starting by the 1st of January 1999. End of observation was the 31st of December 2009 (waiting list) and 31st of December 2010 (follow-up). ‘Pure’ ESP-patients with start of renal replacement therapy (RRT) at  $\geq 65$  years and combined ETKAS/ESP-patients (start of RRT  $< 65$ ) were differenti-

ated for the calculation of waiting times. Endpoints were removal from or death on the waiting list and transplantation. Frequencies were compared using the chi-square test. Numerical values were tested by *t*-test. A *P*-value of less than 0.05 was considered to be statistically significant.

Between 1999 and 2009, 297 patients have been waitlisted in our center for first KTX within ESP. A total of 190 patients received a first kidney graft (seven with a living donor). Significantly, more patients died on the waitlist than after KTX (annual mortality rate 8.6 vs. 4.0 cases per 100 patient years, respectively, Log Rank:  $P < 0.00001$ ). The analysis of outcomes on the waiting list revealed that O-patients had a significantly higher rate of removal (38/128, 29.7% vs. 25/169, 14.8% in non-O-patients,  $P = 0.002$ ) and a highly significant lower chance of KTX (58/128, 45.3% vs. 132/169, 78.1% in non-O-patients,  $P < 0.001$ ). Next we analyzed waiting times from all 190 KTX. Patients who accumulated waiting time before reaching the ESP (65th birthday) had longer waiting times ( $57.1 \pm 22.1$  months for O-patients vs.  $50.3 \pm 22.4$  months in non-O-patients,  $P = 0.12$ ) than patients with start of RRT at age  $\geq 65$  ( $40.5 \pm 26.1$  months [O] vs.  $24.3 \pm 12.7$  months [non-O],  $P < 0.001$ ). Furthermore, we observed a highly significant lower rate of transplantation in O-patients with start of RRT  $\geq 65$  compared with patients with start of RRT  $< 65$  (17/58, 29.3% vs. 41/70, 58.6%,  $P < 0.001$ ). The transplantation rate of non-O-patients was not dependent on the age at initiation of RRT. To investigate the reason for the longer waiting times for O-recipients, we investigated the ABO-non-identical allocation of deceased donor kidneys. The proportion of patients with blood group O was only slightly higher among waitlisted patients (128/297 – 43.1%) than in deceased donors (63/183 – 34.4%). However, patients with blood group O received only 30.1% of all kidneys (55/183). A number of kidneys were transferred from O-, A- and B-donors to other (compatible) blood groups. This led to a ‘deficit’ of eight KTX in O-patients, whereas A-patients received in total +2, B-patients –1 and AB-patients +7 kidneys. As a result, at the end of the observation period, 72.7% of the remaining patients were non-grafted



**Figure 1** Accumulation of blood group O-recipients on the kidney waiting list: distribution of blood groups among waitlisted elderly patients (a) and deceased kidney donors for this WL population (b). The O-recipients did not receive all O-grafts (c) leading to their accumulation on the waiting list at the end of observation (d).

O-patients, who accumulated on the ESP-waiting list (Fig. 1).

In summary, today we are faced with a gross imbalance on the ESP-waiting list, threatening the goal of fair and equal access to deceased donor transplantation in this cohort. Patients with blood group O have longer waiting times, are more likely to die on the waiting list and have a lower chance for a deceased donor transplant. The only modifiable factor for longer waiting times of O-recipients is the transfer of blood group O organs to non-O-recipients. Given the fact that the distribution of blood groups among donors and recipients should be similar, the drain of O-kidneys necessarily leads to accumulation of O-recipients on the waiting list. To restore the balance, the issues associated with blood group O have been

discussed recently, with the result that Eurotransplant adapted ABO blood group rules by 26th November 2010 (only ABO-identical allocation in ETKAS and ESP).

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### Conflict of Interest

None.

### References

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