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INVITED COMMENTARY

Marginal organ allocation: old and new REALity

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Since the first kidney transplantation in 1954 and introduction of systemic immunosuppression one decade later, kidney transplantation has been incredibly successful in reducing morbidity and mortality of patients suffering from end-stage kidney disease. Despite the fact that transplant procedures have increased every decade and all around the world, they were outpaced by the number of patients entered on transplant waiting lists about 20 years ago. Since then, waiting time for a kidney has increased in most regions of the world to the extent that organ shortage is now the most urgent problem in the field [1].

The pool of kidneys available for transplantation depends on two factors: the recruitment of organ donors (inflow) and the discard rate of available organs (outflow). The recruitment of organ donors involves on one side the promotion of living kidney donation. Although there has been a recent debate on the safety of this procedure, careful selection of donors reduces the risks to a very low and acceptable level [2]. Living donation is particularly important for the group of highly immunized patients for which standard allocation procedures from the list often lead to very long waiting times. Living donation offers the chance of finding immunologically compatible donors by implementing modern strategies such as ABO incompatible transplantation, pretransplant immunoadsorption, paired kidney donation, and combination of all these [3,4].

Beside living donation, the recruitment of deceased donors still represents the most important source of organs for transplantation. Unfortunately, the success of different countries in fulfilling this societal task is hugely different, showing high donation rates in some (such as Spain or Austria) and low donations rates in other European countries (such as Germany and Switzerland). Evaluating the reasons for these differences goes beyond the scope of this commentary. However, the observation of this fact has, for example, led to a "federal action plan" in Switzerland with multiple interventions on the medical, political as well as public level.

In this issue on Transplant International, Wahba *et al.* [5] report on the other option of increasing the organ donation pool, namely limiting the number of

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potentially transplantable organs, which are discarded due to reduced organ quality. The group analyzed all kidney transplantations from December 2012 until December 2014 in the region of North Rhine Westphalia, which involved 10 different transplant centers. Data for analysis were extracted from the Eurotransplant (ET) database. In the middle of the study period (December 2013), the ET system for rescue allocation (RA; [6]) changed from the old system (RAold), which allowed free and individual selection of the recipient for a marginal organ by the transplant physician on duty in each center, to a new system, which focused on a recipient-oriented allocation (REAL) proposed by ET followed by a competitive rescue allocation (RAnew), when REAL was unsuccessful. The aim of the study was (i) to report on the outcome of kidney transplantation after RA in general and (ii) to compare the outcome of RAold versus REAL+RAnew in terms of allograft survival.

The first reassuring observation is that the overall outcome of transplantation after RA is quite good with a 1-year graft survival of 87% and a decent allograft function (creatinine 1.8 mg/dl). However, the fact that delayed graft function was observed in 46% and acute rejection in 36% points to the fact, that these transplantations require more resources (post-transplant dialysis, hospitalization time) and are more expensive [7]. The authors do not provide any cost analysis, but we suppose that they will still favorably compare to the cost of patients staying on the waiting list and continuing maintenance dialysis. Furthermore mid- and long-term outcomes have to be analyzed. Large projects, such as the EU-funded EDITH project, aim to implement a mandatory outcome registry in kidney transplantation in order to compare outcome between centers and different countries. Risk adjustment for marginal organs will be of major importance to allow centers offering this therapeutic option to selected patients despite the fact of a probably reduced allograft survival.

The second interesting observation is the fact the acceptance of organs after an RA procedure showed important differences: overall 12% of kidneys were allocated by RA, but it ranged between 0% and 22% among the 10 participating centers. This observation clearly shows that information on outcome of transplantation after RA is of utmost importance and that transplant physicians on duty have to be well instructed on how to deal with such offers and how the select the optimal recipient.

The third observation is the comparison of the performance of the old and the new RA system within this defined region of Germany. The obvious advantages of the new system (REAL) include improved transparency of allocation based on objective criteria provided by ET and the support of less experience transplant physicians in choosing the right recipient for a marginal organ. The overall outcome (allograft survival and function after 1 year) was not different between the two periods. However, several data on the new allocation process raise concerns: the number of refusals before acceptance increased from 8 to 12, the days on ICU for the donors increased from 4 to 8, and the waiting time of recipients increased from 5.7 to 6.5 years. The number of transplants analyzed (49 in RAold, 64 in REAL+RAnew, only 19 in REAL) may have been too small to detect differences in outcome caused by these unfavorable facts of prolonging RA procedures.

In conclusion, the study by Whaba clearly adds to the information on, but also confidence in transplantation of marginal organs. However, two important limitations have still to be mentioned: (i) This is a study on immunologically low-risk recipients (74% had not detectable antibodies); given the high rate of DGF and acute rejection reported in this study, the outcome might be substantially worse with highly sensitized patients, and we would therefore be reluctant of including more of these recipients [8], who instead should be offered other options (see above). (ii) This study gives no detailed information on which organs can be accepted and which ones finally should be discarded. Further analyses of larger registries looking at individual characteristics of marginal organs (which go far beyond the standard SCD/ECD categorization) and their impact on long-term transplant outcomes are urgently needed.

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Conflict of interests

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