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Editorial Comment

Eurotransplant kidney allocation system (ETKAS): rationale and implementation

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The Eurotransplant Kidney Allocation System (ETKAS)

Eurotransplant, founded by Jon J. van Rood in 1967, was initially only a registry of renal transplant candidates with the primary aim to optimize HLA matching. The organization has expanded continuously since then, and the current mission statement includes such goals as

- the achievement of an optimal use of available donor organs
- the guarantee of a transparent and objective recipient selection system based on medical criteria
- the assessment of the importance of factors, which have the greatest influence on transplant results
- the scientific research to improve the results of transplantation
- the support of donor procurement to increase organ supply
- the promotion, support and coordination of organ transplantation in the broadest sense of terms.

Nevertheless, one of the major tasks of Eurotransplant has remained the allocation of donor organs, probably the most sensitive and fragile issue in medicine – next to triage. Currently, more than 12 000 patients with end stage renal disease are registered for kidney transplantation and approximately 3300 transplantations are performed per year. The allocation rules used currently (Eurotransplant Kidney Allocation System or ETKAS) are based on a consensus among the participating countries Austria, Belgium, Germany, Luxemburg, the Netherlands and Slovenia, representing a population close to 118 million. ETKAS was implemented in 1996 and has been refined continuously since then in order to shorten the average and maximum waiting times, adjust for rare HLA phenotypes and homozygosity, achieve a reasonable balanced kidney exchange rate among countries and guarantee an acceptable HLA match distribution and optimal overall transplant success rate.

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Organ allocation in ETKAS

All kidneys (including organs from non-heart-beating donors in all countries with the exception of Germany) procured in the Eurotransplant region are allocated using the algorithms delineated below. However, combined transplantations of a kidney and a non-renal organ have priority over all categories of kidney only transplantations.

Urgency codes and special programmes

Transplant candidates can be classified on the waiting list using urgency codes. These codes combine aspects of transplantatibility, (yes or no, i.e. not transplantable or NT), medical urgency, (high urgency or HU) and the most recent level of allosensitization (<6% of panel reactive allo-antibodies, transplantable or T, ≥6 but <85%, immunized or I, and >85%, highly immunized or HI). In order for a patient to be accepted by Eurotransplant as a candidate for HU, specific inclusion criteria have to be met (such as lack of access to either haemodialysis or peritoneal dialysis, severe neuropathy etc.).

Furthermore, candidates can be registered within special subprogrammes. The Acceptable Mismatch (AM) programme, which is run for every deceased kidney donor, includes patients with a history of a percentage of panel reactive antibodies ≥85% in two consecutive 3 monthly screenings. The patients do not necessarily need to be highly immunized at the time of organ matching. The programme identifies HLA-A, -B and -DR mismatches not resulting in a positive cross

match by identifying the HLA-A, -B and -DR antigens against which the recipient has not yet reacted with allo-antibodies. Further minimum requirements for organ allocation are sharing of one HLA-B and -DR antigen, no unacceptable donor antigens and repeated mismatches and a negative cross match result in currently sensitized AM patients.

The Eurotransplant Senior programme (ESP) allocates kidneys from ≥65-year-old deceased donors to ≥65-year-old recipients. In order to keep the cold ischaemia time as short as possible, no HLA typing is performed, and the organs are transplanted on a local (Austria, Belgium/Luxemburg, Slovenia), regional (Germany) or national (Netherlands) level. Kidneys are reported to ETKAS after HLA typing only if they cannot be allocated within ESP.

Blood group rules

AB0 incompatible kidney transplants are not allowed. Within the AM programme AB0 compatibility is mandatory (i.e. A to A and AB, B to B and AB, AB to AB and 0 to A, B and AB). Blood group 0 000 HLA mismatch grafts and organs within the ESP programme can be allocated to B and 0 recipients. For patients with ≥1 HLA mismatch blood group 0 kidneys are matched to blood group 0 recipients only.

ETKAS point score system

For kidneys that are not allocated via ESP, potential recipients are searched first within the AM programme. If no suitable candidate can be identified, the search continues by looking for patients with a complete HLA match. If several of these are available, they are ranked with the help of a point score system as are all others in case no 000 HLA match can be obtained. The patient with the highest point score is ranked on top and receives the first offer. If this offer is rejected all following offers are made in descending order. The number of points awarded is based on several variables, which include the urgency status, HLA match grade, mismatch probability, waiting time, a distance factor and the national balance. Transplant candidates with the urgency code HU receive a bonus of 500 points. Paediatric patients (<16 years old at the time of registration) receive a bonus according to their age at the time of registration (<6 years 100 points, ≥6–11 years 33.3 points and ≥11 and <16 years 66.6 points). Additionally, the points for HLA antigen matching are doubled for children. In general, each HLA-A, -B and -DR antigen shared is rewarded 66.67 points. The mismatch probability is a calculation of the probability of receiving a kidney offer with 0 and 1 broad HLA-A, -B or -DR mismatch based on 1000 kidneys offered taking into account the AB0 blood group rules and the PRA screening using data from the Collaborative Transplant Study database for a Caucasian donor population. Upon registration, the patients date of the first dialysis or date of re-institution of dialysis after a previous kidney transplantation is counted as the first day for the calculation of the waiting time. A patient, who is registered with the immediate previous kidney transplantation having failed within 3 months after transplantation is eligible for the return of waiting time. Per year waiting time in all countries, except Germany, 33.3 points can be acquired. The points for Germany are different (50) to compensate for the difference in points acquired for the regional bonus (see below). Pre-emptive transplant candidates can be registered, but receive no points for waiting time as they have not yet started dialysis. Local recipients (i.e. candidates from the center where the donor is from) receive a bonus of 100 points in Belgium/Luxemburg and Slovenia and 200 points in Austria. In Belgium/Luxemburg and Slovenia, a regional bonus (one or more transplant centers in the same region of the donor center) of 100 and in Germany of 200 points is appointed. Patients in Austria, Belgium/Luxemburg and Slovenia additionally receive 100 national points. All Dutch patients receive 300 national points. Thus all patients, except from Germany, receive a total of 300 points for local, regional and national points. The German patients (200 points) are therefore compensated via the waiting time with 50 points per year. Once every working day for the period of the immediately preceding 365 days, the difference between the number of kidneys procured and exchanged for transplantation in and between each country is calculated. A negative balance for a country is defined as more kidneys being procured than transplanted, a positive balance is the other way around. The national balance points are then calculated as the highest import balance minus the recipient country balance times 10.

Consequences of the Implementation of ETKAS

Before ETKAS was implemented in 1996, several goals were defined. The new system should shorten the average and especially maximum waiting time. Indeed, since then about 36% of the kidneys were transplanted into recipients with a waiting time of more than 5 years, a number twice as high as before 1996. Furthermore, a reasonably balanced kidney exchange rate among participating countries is maintained. Prior to the initiation of ETKAS in March 1996, Austria had a negative balance of 25 kidneys, Belgium and Luxemburg of 57 and the Netherlands of 42. Germany on the contrary had a positive balance of 136. On 11 March 2005, the corresponding numbers were only +6, −2, +4, and +11, respectively. Despite this, the HLA match distribution has remained stable (e.g., 22% 000 HLA mismatched patients) and the 1 and 3 year kidney graft survival is good. Finally, it turned out to be very successful for children.

Conflict of interest statement. None declared.

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