Chapter 4

ET Kidney Allocation System (ETKAS)
# Change record

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<td>20-06-2013</td>
<td>J. de Boer</td>
<td>3.1</td>
<td>Added Hungary as new memberstate</td>
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<tr>
<td>08-03-2013</td>
<td>J. de Boer</td>
<td>3.0</td>
<td>Textual adjustments, NHB→DCD</td>
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<td>31-01-2013</td>
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<td>2.0</td>
<td>Bonus for transplant candidates having donated one of their own kidneys added (§ 4.2.2.10; R-KAC01.12) Exception on the no serum-no offer rule for HU recipients for whom the unacceptable antigens are entered. (§ 4.2.4.2)</td>
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<td>1.9</td>
<td>Change policy on donors aged ≥75 years (§ 4.2.9.3)</td>
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<td>23-02-2011</td>
<td>J. de Boer</td>
<td>1.8</td>
<td>Erratum pediatric status: proof of maturation (§ 4.2.2.4.1) Return waiting time after living donor transplant (§ 4.2.3.1) Kidney after liver transplant (§ 4.2.2.9)</td>
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<td>1.7</td>
<td>HU Audit procedure adapted (§ 4.1.1.2) Definition of maintenance dialysis added (§4.2.2.3) Adapted pediatric status and pediatric bonus (§ 4.2.2.1) Audit procedure proof of maturation added (§ 4.2.2.4.1) Adaptation definition return of waiting time (§ 4.2.3) Adaptation ABO blood group rules (§4.2.4) Adaptation of the ESP scheme for Germany (§ 4.2.7) ESDP allocation scheme added (§ 4.2.7.3)</td>
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<td>18-09-2009</td>
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<td>1.6</td>
<td>Simplified overview pediatric bonus (4.2.2.4). Added Priority for Kidney-non renal candidate recipients within AM program (4.2.6) Added Regional Kidney Exchange Balance Austria (4.2.2.7)</td>
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<td>J. de Boer</td>
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<td>Adaptation of point assignment for waiting time (4.2.2.3) and Distance (4.2.2.5) according to RKAC01.08</td>
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The Eurotransplant Manual contains the rules and regulations for the implementation and specification of national legislation and national guidelines for waiting list management, organ procurement and allocation. It has been prepared with the best of knowledge and the utmost care. In case of discrepancies between the content of this manual and national binding provisions, the following applies:

- Insofar, as provisions about the acceptance of organ recipients to the waiting list are concerned, this manual has only an informative character. Only the national provisions which are applicable for the transplant centers are relevant and legally binding.
- For the allocation of organs only the national provisions are legally binding. The display of the allocation provisions in this Manual are based on these legally binding national provisions. As far as necessary, they have been specified by Eurotransplant in this Manual. Deviations from such specifying Eurotransplant provisions cannot be considered as a breach of the national provisions as long as the latter are not violated. Eurotransplant cannot be held liable for a potentially wrongful description in this Manual of procedures, in connection with the organ allocation, as long as the actual allocation follows national provisions.

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ETKAS - urgency codes

Urgency codes are used to classify transplant candidates on the waiting list and to prioritize recipients in the kidney match and allocation procedure. The urgency codes combine the aspects of transplantability, medical urgency and the most recent level of allo-sensitization in ENIS.

### Urgency codes used in ETKAS

<table>
<thead>
<tr>
<th>Urgency code</th>
<th>Transplantability</th>
<th>Medical urgency</th>
<th>allo-sensitization (%PRA*1)</th>
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<td>High Urgency</td>
<td>yes</td>
<td>urgent</td>
</tr>
<tr>
<td>T</td>
<td>Transplantable</td>
<td>yes</td>
<td>normal</td>
</tr>
<tr>
<td>I</td>
<td>Immunized</td>
<td>yes</td>
<td>normal</td>
</tr>
<tr>
<td>HI</td>
<td>Highly Immunized</td>
<td>yes</td>
<td>normal</td>
</tr>
<tr>
<td>NT</td>
<td>Not Transplantable</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>

### 4.1.1 High Urgency (HU)

Inclusion criteria:
- imminent lack of access for either hemodialysis or peritoneal dialysis;
- severe (uremic) polyneuropathy,
- inability to cope with dialysis with a high risk for suicide;
- severe bladder problems (hematuria, cystitis etc.) due to kidney graft failure after simultaneous kidney + pancreas transplantation, provided that the pancreas graft is bladder-drained and functioning adequately.

#### 4.1.1.1 Deviant national regulations

**Germany**

In Germany recipients are eligible for HU only if their life is either already in danger or that the underlying reason for requesting the HU status will inevitably lead to a life threatening situation:
- imminent lack of access for either hemodialysis or peritoneal dialysis;
- inability to cope with dialysis with a high risk for suicide;

or in case of:
- severe bladder problems (hematuria, cystitis etc.) due to kidney graft failure after simultaneous kidney + pancreas transplantation, provided that the pancreas graft is bladder-drained and functioning adequately.

### 4.1.2 HU audit

A transplant center must send a letter of motivation for the recipient’s high urgent request in English to ET, including a report from one, in case of inability to cope with dialysis, two competent specialist(s) in the field of the indication concerned. For submitting a high urgent request the HU request form kidney (see Forms at [www.eurotransplant.org](http://www.eurotransplant.org))

---

1 Percentage of panel reactive allo-antibodies (%PRA) in recipient's most recent screening (excluding auto-antibodies); %PRA must be tested according to ET standard operating procedures.
should be used
In case of a high risk for suicide, the ET Medical Staff then evaluates the request according to the standard criteria. All other requests will be evaluated by two members of the Eurotransplant Kidney Advisory committee. In case there is no unanimous decision, a third member of the Eurotransplant Kidney Advisory committee will be consulted for a final decision. Only after approval the urgency HU will be granted and the urgency will be changed in ENIS.

A remote center cannot assign urgency HU in ENIS. However, the transplant center should place the recipient in any lower urgency other than HU if the status of a recipient improves or remove the candidate from the waiting list if he deteriorates beyond transplantability. Recipients in HU status who become (temporarily) not transplantable have to be reported as NT. If these recipients become transplantable again a new HU request has to be sent to Eurotransplant.

No further stratification is made with regard to the %PRA level.
Please Note: the required HLA mismatch criteria is not taken into account when the recipient has the HU status

4.1.2.1.1 Deviant national regulations

Germany
All requests will be evaluated by two members of the Eurotransplant Kidney Advisory committee. In case there is no unanimous decision, a third member of the Eurotransplant Kidney Advisory committee will be consulted for a final decision. Only after approval the urgency HU will be granted and the urgency will be changed in ENIS.

4.1.3 Highly Immunized (HI)
These are recipients with an end-stage renal disease who are transplantable and who have a PRA range of ≥ 85%.

4.1.4 Immunized (I)
These are recipients with an end-stage renal disease who are transplantable and who have a PRA range of ≥ 6% to < 85%.

4.1.5 Transplantable (T)
These are recipients with an end-stage renal disease who are transplantable and who have a PRA range of <6%.

4.1.6 Not Transplantable (NT)
Recipients temporarily not transplantable should be placed in urgency NT.
4.2 ETKAS - general

4.2.1 Point score system

The selection of potential recipients is based on medical urgency, %PRA level, HLA-A, -B, -DR matching between donor and recipient, AB0 blood group rules, waiting time and donor region.

Selected potential recipients are ranked with the help of a point score system. The point score is calculated for all recipients, including 000-mismatched recipients. The recipient with the highest point score is ranked on top and receives the first offer. All following offers, firm or back up, are made in descending order.

Combined transplantations of a kidney and a non-renal organ have priority over all categories of kidney-only transplantations, i.e. these combined transplantations precede transplant candidates from the AM and ESP programs and/or those with a 000 HLA-A, B, DR mismatch.

In case of a HLA fully homozygous donor (see 4.2.2.1.3), 000 HLA-A, B, DR mismatch recipients are ranked from fully homozygous to fully heterozygous. Within each group, recipients are ranked according to their point score.

4.2.2 Scoring factors

4.2.2.1 HLA-Typing

The HLA match program only concerns the HLA-A, -B and -DR loci.

The HLA-C and -DQ antigens, as well as the public antigens of the HLA-B and -DR loci are disregarded in HLA mismatch calculation program.

4.2.2.1.1 Conversion of HLA-A and -B typing

The HLA-A and -B typing of the donor and the recipients is converted to a match HLA-typing by the HLA broad match phenotype reduction program (see table 4.4.1).

If present, split HLA-antigens are converted to their respective broad HLA antigen.

4.2.2.1.2 Conversion of HLA-DR typing

- If a donor with HLA-DR broad antigens is reported to ET without splits, recipients will be selected on broad antigen level;
- If a donor with HLA-DR split antigens is reported to ET, recipients will be selected on split antigen level. The only exclusion to this rule concerns split antigens DR17/DR18, because they are difficult to distinguish. If a donor has HLA-DR 17 or 18, he will be matched on broad DR3 antigen level.

4.2.2.1.3 Calculation of HLA mismatches

The HLA mismatch program calculates HLA-antigen mismatches for HLA-A and -B based on broad antigens only, i.e. HLA-mismatches are not calculated on split HLA-antigens. HLA-antigen mismatches for HLA-DR are calculated based on split HLA
antigens. Mismatches are defined as donor HLA-antigens that are different from the recipient's own HLA-antigens.

The converted HLA-typing is only accepted by the HLA-mismatch calculation program in the presence of at least 1 HLA-antigen on each of the three HLA-loci (HLA-A, HLA-B and HLA-DR).

In case only 1 HLA-antigen is identified, the donor or the recipient is assumed to be 'homozygous' for that locus (i.e. homologous chromosomes are presumed to code for identical antigens at that locus). Therefore, in case the donor has only 1 HLA-antigen on an HLA-locus, only 1 mismatch can occur on that locus.

In case there are 2 identical broad HLA-A or -B or split HLA-DR antigens on one locus, the presence of only 1 HLA-antigen will be assumed for the calculation; therefore, only 1 mismatch can occur on that locus.

4.2.2.1.4 Point assignment

The number of mismatches on the loci HLA-A, HLA-B and HLA-DR is added according to the following formula:

\[
= 400 \times \left[1 - \left(\sum \text{broad HLA-A, -B, split HLA-DR mismatches} / 6\right)\right]
\]

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<th>Number of HLA-A, -B, -DR mismatches</th>
<th>Number of points</th>
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<tr>
<td>0</td>
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<tr>
<td>1</td>
<td>333.33</td>
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<td>4</td>
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</tr>
<tr>
<td>5</td>
<td>66.67</td>
</tr>
<tr>
<td>6</td>
<td>0.00</td>
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</table>

4.2.2.1.5 HLA-bonus for paediatric recipients

For pediatric transplant candidates (see § 4.2.2.4), the points for HLA-antigen mismatch are doubled.

4.2.2.2 Mismatch Probability (MMP)

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 AB0 blood group rules and PRA screening.

4.2.2.2.1 MMP for 0 or 1 HLA mismatch

The broad/split HLA-antigen frequencies, necessary for the calculation of the 0 and 1 HLA MMP, have been calculated on the ETRL Database (see table 4.4.2).

The MMP for 0 and 1 HLA is determined at the moment of listing on the kidney waiting list. The lower the calculated value for 0 + 1 HLA-MMP (MMP0 + MMP1), the higher the chance of finding a donor with 0 or 1 HLA-mismatches within the Eurotransplant pool.
4.2.2.2.2 AB0 blood group

AB0 blood group frequencies have been calculated on the CTS Database for a Caucasian donor population in the period 1988-1995 (see table 4.4.3).

4.2.2.2.3 PRA screening

The %PRA screening is the most recently entered in ENIS and must not be out-dated (see § 4.2.2.2.3.1). Screenings should be updated every 3 months.

A higher %PRA indicates a lower chance of finding a donor with a negative cross-match.

In the event of a possible sensitization between regular %PRA screening dates, additional %PRA screenings should be performed according to the ETRL guidelines.

4.2.2.2.3.1 Outdated screening

Outdated screenings are those with a sample date older than 150 days (i.e. \( \geq 5 \) months) at time of matching. **Recipients with outdated screening are not selected in matching procedures.**

4.2.2.2.4 MMP formulas

All variables are equal to the **broad** HLA-A and –B and **split** HLA-DR frequencies in table 4.4.2.

MMP = \( 100 \times \frac{(1-(\text{AB0-match frequency}) \times (1-(\%PRA /100))) \times (\text{MMP0} + \text{MMP1}))^{1000}}{1000} \)

\[
\text{MMP0} = (a_1+a_2)^2 \times (b_1+b_2)^2 \times (d_1+d_2)^2
\]

\[
\text{MMP1} = \text{MMP0} \times \frac{((2^2(a_1+a_2)(1 - a_1 - a_2)) - a_1^2 - a_2^2 + \Sigma (\text{all HLA-A Ag frequencies}^2)) / ((a_1+a_2)^2) + (2^2(b_1+b_2)(1 - b_1 - b_2)) - b_1^2 - b_2^2 + \Sigma (\text{all HLA-B Ag frequencies}^2)) / ((b_1+b_2)^2) + (2^2(d_1+d_2)(1 - d_1 - d_2)) - d_1^2 - d_2^2 + \Sigma (\text{all HLA-DR Ag frequencies}^2)) / ((d_1+d_2)^2))}{(a_1+a_2)^2}
\]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency of</th>
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<tr>
<td>a1</td>
<td>1(^{st}) HLA-A antigen</td>
</tr>
<tr>
<td>a2</td>
<td>2(^{nd}) HLA-A antigen</td>
</tr>
<tr>
<td>b1</td>
<td>1(^{st}) HLA-B antigen</td>
</tr>
<tr>
<td>b2</td>
<td>2(^{nd}) HLA-B antigen</td>
</tr>
<tr>
<td>dr1</td>
<td>1(^{st}) HLA-DR antigen</td>
</tr>
<tr>
<td>dr2</td>
<td>2(^{nd}) HLA-DR antigen</td>
</tr>
</tbody>
</table>

Parameters a1 - dr2 are derived from the match HLA-typing used for the calculation of the HLA-mismatches.

4.2.2.3 Waiting time

Upon registration on the kidney waiting list, the recipient’s date of onset of maintenance dialysis\(^2\) or date of re-institution of maintenance dialysis after a previous kidney transplantation is counted as the first day for the calculation of the waiting time.

\(^2\)Maintenance dialysis is defined as dialysis not being interrupted for more than 3 months (i.e. 91 days)
In eligible cases, waiting time includes the waiting time accumulated before transplantation of a kidney graft that failed within 90 days after transplantation. (see 4.2.3).

The points for waiting time equal 33.3 per year waiting time (i.e. 0.091 points per day waiting).

There is no limit on the time accumulated on the waiting list, thus, waiting time points can be accrued unrestrictedly.

4.2.2.3.1 Pre-emptive transplant candidates

Pre-emptive transplant candidates can be registered on the kidney waiting list in an active urgency but receive no points for waiting time, as they have not yet started their dialysis.

4.2.2.3.2 Return of waiting time

A recipient who is re-registered for a kidney transplant with one or more immediate previous kidney transplantations having failed, requiring maintenance dialysis within 3 months after the transplantation is eligible for the return of waiting time.

This return of waiting time will automatically be calculated

The amount of waiting time returned equals the number of days accumulated from the date of:
- start of dialysis and no previous transplant, or
- re-institution of dialysis after the last successful transplant, i.e. graft function >90 days.

4.2.2.3.2.1 Deviant national regulations

Austria, Croatia, Hungary, Luxembourg, The Netherlands, Slovenia

A recipient who is re-registered for a kidney transplant with one or more immediate previous living donor kidney transplantations having failed, requiring maintenance dialysis, is eligible for the return of waiting time.

The amount of waiting time returned equals the number of days accumulated from the date of
- start of dialysis and no previous transplant, or
- re-institution of dialysis after the last successful transplant, i.e. graft function >90 days, until the living donor transplant

The return of waiting time is done manually on a monthly basis.

4.2.2.4 Pediatric bonus

A transplant candidate is defined pediatric if:
1. dialysis started before the 16th birthday or
2. registration on the waiting list was before the 16th birthday and dialysis started before the 17th birthday or
3. Recipient is proven to be in maturation

Each paediatric transplant candidate is assigned a pediatric bonus of 100 points:
For pediatric transplant candidates the points for HLA-antigen mismatch are doubled.

4.2.2.4.1 Delivering and auditing proof of maturation

A transplant center must send a completed Kidney extended pediatric status request form (see Forms at www.eurotransplant.org) including a report from a competent radiologist or pediatric endocrinologist on an X-ray of the left hand; not older than 3 months (calculated from date of onset of maintenance dialysis or, in case of pre-emptive listing calculated from date of registration on the waiting list). The request will be evaluated by two members of the Eurotransplant Kidney Advisory committee. In case there is no unanimous decision, a third member of the Eurotransplant Kidney Advisory committee will be consulted for a final decision. Proof of maturation should be only delivered when the onset of maintenance dialysis is after the 17th birthday or the recipient is registered on the kidney waiting list after the 16th birthday while not being on dialysis yet.

After the proof of maturation has been accepted the pediatric status is granted:

- Until the first successful transplant in case the recipient is on maintenance dialysis or
- for 1 year calculated from date of registration on the waiting list in case the recipient is not on maintenance dialysis. If maintenance dialysis starts within the first year after registration on the waiting list, the pediatric status will be extended until the first successful transplant.

When maintenance dialysis does not start within one year after registration, the pediatric status will be lost, but can be re-installed when the recipient is still proven to be in maturation at time of onset of maintenance dialysis. The pediatric status will then be granted until the first successful transplant.

4.2.2.5 Distance between donor center and transplant center.

<table>
<thead>
<tr>
<th></th>
<th>Austria</th>
<th>Belgium / Luxemburg</th>
<th>Croatia</th>
<th>Germany</th>
<th>Hungary</th>
<th>The Netherlands</th>
<th>Slovenia</th>
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<tbody>
<tr>
<td>Local and equivalent</td>
<td>200</td>
<td>200</td>
<td></td>
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<td>200</td>
<td>100</td>
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</tr>
<tr>
<td>Regional</td>
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<td>300</td>
<td>100</td>
<td>300</td>
<td>300</td>
<td>100</td>
</tr>
</tbody>
</table>

Local Recipients from the same center as the donor receive a bonus. Equivalent to a local status are recipients from collaborating transplant programs (regional or national).

Regional One or more transplant centers in the same region of the donor center. Such a region can consist of one or more transplant programs. In Germany the seven regions are consistent with the seven donor regions defined by the organ procurement organization Deutsche Stiftung Organtransplantation (DSO).

National All transplant programs in the same country (but outside the region) of the donor center.

International All transplant programs outside the country of the donor center.
4.2.2.6 National Kidney Exchange Balance

Once every day, for the period of the immediate previous 365 days, the difference between the number of kidneys procured, exchanged between each ET country and transplanted, is calculated.

* **Export**, i.e. a negative balance, is defined as:
  kidneys procured in a country > kidneys transplanted in that country.
* **Import**, i.e. a positive balance, is defined as:
  kidneys procured in a country < kidneys transplanted in that country.

No immediate compensation exists for exchanging kidneys together with non-renal organ(s) from one donor for transplantation into one recipient, however the calculation of kidneys exchanged includes kidneys exchanged together with non-renal organs.

The point assignment depends on the range of national balance values and is assigned only to resident transplant candidates.

National Balance Points = (highest import balance – recipient country balance) x 10

4.2.2.7 Regional Kidney Exchange Balance (Austria only)

In addition to the National Kidney Exchange Balance, the difference between the number of kidneys procured and exchanged for transplantation between each Austrian center/region and all other (including Austrian) ET centers/regions over the preceding 365 days is calculated once every day.

In case of an Austrian donor resident recipients from the Austrian centers/regions receive additional balance points according to the following formula:

Regional Balance Points\(^4\) = 0.25xAustrian National Balance - Regional Balance

4.2.2.8 High Urgency

Transplant candidates with urgency code HU receive a bonus of 500 points.

4.2.2.9 Kidney after liver transplant

In addition to the option of performing a simultaneous liver-kidney transplant the option of transplanting first the liver and the kidney at a later time (i.e. a kidney-after-liver transplant) is possible in selected cases. In particular this option is preferred in case of a hepatorenal syndrome.

In case of a kidney-after-liver transplant, the recipient gets 500 extra points in the kidney allocation system (ETKAS) during the period of 90 to 360 days after the liver-only transplant, provided that:

1. the recipient was registered (active or NT) on the kidney waiting list at time of the liver transplant
2. the creatinine clearance is <15ml/min (sample date between 87 and 360 days after the liver transplant)

This bonus (i.e. 500 points) expires either at time of the kidney transplant or at the end of the bonus period (i.e. 360 days after the liver transplant).

---

\(^3\) Belgium and Luxemburg are considered as one country

\(^4\) Please note the Regional Balance Points can be negative, which means a deduction of the total pointscore
4.2.2.10 Bonus for transplant candidates having donated one of their own kidneys

Transplant candidates suffering from end stage renal disease after having donated one of their own kidneys are eligible for pre-emptive listing on the kidney waiting list. Upon registration on the waiting list the recipient will be granted a once-only allocation bonus of 500 points.

In exceptional cases, upon request of the transplant center, this bonus can be granted a second time. Each request for a repeated bonus should be well motivated and will be evaluated by all ETKAC members.

4.2.2.10.1 Deviant national regulations

Germany

Granting this bonus has not yet been accepted by the German national authorities.

4.2.3 AB0 blood group rules

AB0-incompatible kidney transplants from post mortem donors are not allowed.

4.2.3.1 AM program

<table>
<thead>
<tr>
<th>Donor blood group</th>
<th>Eligible recipients</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A and AB</td>
</tr>
<tr>
<td>B</td>
<td>B and AB</td>
</tr>
<tr>
<td>AB</td>
<td>AB</td>
</tr>
<tr>
<td>O</td>
<td>A, B, AB and O</td>
</tr>
</tbody>
</table>

4.2.3.2 ESP, ESDP, ETKAS

<table>
<thead>
<tr>
<th>Donor blood group</th>
<th>Eligible recipients</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>AB</td>
<td>AB</td>
</tr>
<tr>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

4.2.4 Prospective cross-match

4.2.4.1 Prospective preliminary cross-match

Donor tissue typing laboratories are obliged to perform cross-matches as ordered by either ET (non-German) countries or the DSO (Germany).

In case of a positive preliminary cross-match, no kidney offer will be made to a recipient or the conditional offer is withdrawn.

4.2.4.2 No serum available for preliminary cross-match

If a preliminary cross-match cannot be performed because no serum is available, no kidney offer will be made to a recipient, or the conditional offer is withdrawn, except in
case of a HU recipient for whom unacceptable antigens are entered into the system.

4.2.5 Acceptable Mismatch (AM) program

The Acceptable Mismatch (AM) program aims at allocating organs to recipients who are immunologically compromised because of current and/or historical HLA-sensitization.

The program identifies HLA-A, -B, -DR mismatches not resulting in a positive cross match by checking against which HLA-A, -B, -DR antigens the recipient has not yet reacted with allo-antibodies.

Recipients selected by this program have priority over ETKAS-selected recipients. Within the AM program, recipients awaiting a combined kidney-non renal transplant have priority over kidney only candidate recipients.

4.2.5.1 Inclusion criteria

These criteria can be found in Chapter 10 Histocompatibility (§ 10.3).

4.2.5.2 Minimum requirements for organ offers

The AM program is run for every post-mortem kidney donor with a known HLA typing to select potentially cross-match negative AM recipients.

4.2.5.3 Contact with immunologist from the ETRL

All eligible AM-recipients are presented to and discussed with an ETRL immunologist prior to a kidney offer.

4.2.5.3.1 Effect of judgment by ETRL immunologist

In case a recipient is selected through:
- the AM program, then the judgment of the ETRL immunologist is binding. If the judgment is negative, then no offer is made for this recipient. If the judgment is positive, an offer is made for this recipient. No prospective cross match is performed.
- ETKAS, then the judgment of the ETRL immunologist is not binding. If the judgment is negative, then this will be communicated to the recipient center leaving the decision to accept or decline the offer to the responsible transplant physician.

4.2.6 Eurotransplant Senior Program (ESP/ESDP)

The Eurotransplant Senior Program (ESP) allocates kidneys from post-mortem donors ≥65 years old to recipients ≥65 years without the use of a donor HLA typing. The ESP aims at a cold ischaemic period (CIP) that is as short as possible.

4.2.6.1 No allocation via ESP possible

Kidneys from an ESP donor that cannot be allocated locally or regionally are allocated through the regular kidney allocation (ETKAS) after reporting of the HLA typing.
4.2.6.2 National allocation rules

4.2.6.2.1 Austria, Belgium/Luxembourg

In Austria, Belgium/Luxembourg and Slovenia, kidneys from ESP donors are allocated to ESP recipients from the reporting center’s local waiting list.

4.2.6.2.2 Germany

In Germany, kidneys from ESP donors are allocated to ESP recipients from the corresponding region (see 4.2.2.5) as defined by the organ procurement organization Deutsche Stiftung Organtransplantation (DSO). Kidneys from ESP donors are first allocated to ESP recipients registered within the same sub-region as the donor and then to ESP recipients registered within the other subregions.

4.2.6.2.2.1 Choice of allocation scheme

In Germany recipients aged 65 years or older have to choose for either being included in the ESP/ESDP or the ETKAS program. These programs are mutually exclusive.

4.2.6.2.3 The Netherlands, Croatia, Slovenia

In the Netherlands, Croatia and Slovenia, kidneys from ESP donors are allocated to ESP recipients according to the national waiting list.

In the Netherlands, ESP donor kidneys are only allocated to never-immunized recipients awaiting a first kidney transplant.

4.2.6.3 The ESDP study protocol

In conjunction with the ESDP study protocol, one kidney from an ESP donor is allocated to an ESP recipient with a 0 HLA DR mismatch while the other donor kidney is allocated irrespective of the HLA matching (see the ESP study protocol at www.eurotransplant.org).

4.2.7 Donation after cardiocirculatory death (DCD) kidneys

Kidneys from donation after cardiocirculatory death donors (DCD) are allocated according to the same algorithm as for donation after brain death (DBD) kidneys.

4.2.7.1 Deviant national regulations

4.2.7.1.1 Germany, Croatia

According to the German law on transplantation, organs from donation after cardiocirculatory death donors (DCD) must not be procured and/or transplanted in Germany. Consequently, DCD organs from outside Germany must neither be allocated nor transplanted in Germany. In addition DCD organs will not be procured and/or transplanted in Croatia.

4.2.7.1.2 The Netherlands

DCD kidneys may only be allocated through ET after the cardiac arrest has occurred.
4.2.8 Donors <5 years and en-bloc procurement\(^5\)

Transplant coordinators (TC) are advised to contact ET as soon as possible if they have a donor younger than 5 years. The donor procedure should be discussed together with the ET medical officer.

4.2.8.1 Donors <2 years

From donors under the age of 2 years the kidneys must be procured en-bloc.

4.2.8.2 Donors between 2 and 5 years

From donors between 2 and 5 years of age it is recommended to procure the kidneys en-bloc.

In this case the final decision is up to the accepting transplant center. The TC should seek the earliest possible contact with the accepting center to evaluate whether particular needs with regard to the potential recipient are requested. This includes e.g. anatomical variances, need for en-bloc, additional vessels and length of vessels/urethers. The TC will also check which team will procure the kidneys and whether they have the expertise. When no recipient is found within Eurotransplant, ET will, upon request, contact other European Organ Exchange Organizations (OEO) to ask whether suitable recipients are available.

4.2.8.3 Donors aged ≥75 years

In case of rescue allocation for a donor ≥75 years of age, the transplant center is offered the opportunity to transplant both kidneys into one recipient. In all other cases, a single kidney transplant is preferred

4.3 ETKAS – allocation algorithms

4.3.1 Donors < 16 years of age

First, to AM program recipients (pediatric & adult)

then, to zero (000) HLA-A, -B and -DR mismatch recipients (pediatric & adult), in case of a HLA fully homozygous donor (see 4.2.2.1.3) recipients are ranked from fully homozygous to fully heterozygous. Within each group recipients are ranked according to their point score.

then, to recipients having the pediatric status, ranked according to their point score.

then, to all other HI, I, T and HU recipients ranked according to their point score.

\(^5\) Discussed and confirmed by the ET Kidney Advisory Committee (ETKAC) in December 2004.
4.3.1.1 Flowchart 1 – Donor < 16 years

**Pediatric donor**
Kidney only

Recipient in AM program

Yes, then

AB0 compatible

No, then

AB0 Identical

000 MM

Donor fully homozygous

Yes, then

Ranked from fully homozygous to heterozygous

No, then

Ranked according to point score

Status Pediatric ranked according to point score

All other recipients ranked according to point score
4.3.2 Donors ≥ 16 years and < 65 years of age

First, to AM program recipients

then, to zero (000) HLA-A, -B and -DR mismatch recipients
in case of a HLA fully homozygous donor (see 4.2.2.1.3): recipients are ranked from fully homozygous to fully heterozygous. Within each group recipients are ranked according to their point score.

then, to HI, I, T and HU recipients ranked according to their point score.

4.3.2.1 Flowchart 2 – Donor ≥ 16 years and < 65 years
4.3.3 Donor aged ≥ 65 years

4.3.3.1 Eurotransplant Senior program (ESP)

First to recipients aged ≥ 65 years:

locally in Austria, Belgium/Luxembourg, center offer.
regionally in Germany first in the sub-region of the donor; recipient-oriented (first HU then elective), then in all other sub-regions, recipient oriented (first HU then elective).
nationally in the Netherlands Croatia and Slovenia recipient-oriented (first HU then elective)

then, according to the ETKAS scheme (see § 4.3.2)

4.3.3.2 Eurotransplant Senior DR-compatible program (ESDP)

First to recipients aged ≥ 65 years:

locally in Austria, Belgium; center offer. Then nationally (first HU then elective)
regionally in Germany in the sub-region of the donor; recipient-oriented (first HU then elective), then in all other sub-regions, recipient oriented (first HU then elective), then nationally (first HU then elective)
nationally in the Netherlands: recipient-oriented (first HU then elective), then nationally (first HU then elective)

then, according to the ETKAS scheme (see § 4.3.2)
4.3.3.3 Flowchart 3 – Donor ≥ 65 years

Senior donor
Kidney only

ESP

Austria
Belgium/
Luxembourg

Locally;
First HU
Then
According to
dialysis time

Croatia
Netherlands
Slovenia

Nationally;
First HU
Then
According to
dialysis time

Germany

Within sub
region;
First HU
Then
According to
dialysis time
Then
Within region
First HU
Then
According to
dialysis time

ETKAS
(see donor >= 16 years and < 65 years)

ESDP

Austria
Belgium

Locally;
First HU
Then
According to
dialysis time

Netherlands

Nationally;
First HU
Then
According to
dialysis time

Germany

Within sub
region;
First HU
Then
According to
dialysis time
Then
Within region
First HU
Then
According to
dialysis time

Then
Nationally
First HU
Then
According to
dialysis time
### 4.3.4 Conversion of *split* HLA-antigen to *broad* HLA-antigen

<table>
<thead>
<tr>
<th>Conversion of <em>split</em> HLA-antigen to <em>broad</em> HLA-antigen, as used in the HLA broad match phenotype reduction program</th>
</tr>
</thead>
<tbody>
<tr>
<td>A23 • A9</td>
</tr>
<tr>
<td>A24 • A9</td>
</tr>
<tr>
<td>A2403 • A9</td>
</tr>
<tr>
<td>A25 • A10</td>
</tr>
<tr>
<td>A26 • A10</td>
</tr>
<tr>
<td>A34 • A10</td>
</tr>
<tr>
<td>A66 • A10</td>
</tr>
<tr>
<td>A29 • A19</td>
</tr>
<tr>
<td>A30 • A19</td>
</tr>
<tr>
<td>A31 • A19</td>
</tr>
<tr>
<td>A32 • A19</td>
</tr>
<tr>
<td>A33 • A19</td>
</tr>
<tr>
<td>A74 • A19</td>
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<tr>
<td>A68 • A28</td>
</tr>
<tr>
<td>A69 • A28</td>
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</table>
### 4.3.5 HLA antigen frequency

<table>
<thead>
<tr>
<th>HLA antigen frequencies</th>
<th>HLA-A</th>
<th>HLA-B</th>
<th>HLA-B</th>
<th>HLA-DR <em>broad</em></th>
<th>HLA-DR <em>split</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>0.1581</td>
<td>B5</td>
<td>0.0697</td>
<td>B41 0.0089</td>
<td>DR1 0.1139</td>
</tr>
<tr>
<td>A2</td>
<td>0.2992</td>
<td>B7</td>
<td>0.1340</td>
<td>B42 0.0004</td>
<td>DR2 0.1677</td>
</tr>
<tr>
<td>A3</td>
<td>0.1622</td>
<td>B8</td>
<td>0.1090</td>
<td>B46 0.0002</td>
<td>DR15 0.1443</td>
</tr>
<tr>
<td>A9</td>
<td>0.1197</td>
<td>B12</td>
<td>0.1302</td>
<td>B47 0.0029</td>
<td>DR16 0.0186</td>
</tr>
<tr>
<td>A10</td>
<td>0.0556</td>
<td>B13</td>
<td>0.0308</td>
<td>B48 0.0002</td>
<td>DR3 0.1142</td>
</tr>
<tr>
<td>A11</td>
<td>0.0525</td>
<td>B14</td>
<td>0.0234</td>
<td>B53 0.0033</td>
<td>DR4 0.1426</td>
</tr>
<tr>
<td>A19</td>
<td>0.1269</td>
<td>B15</td>
<td>0.0869</td>
<td>B59 0.0001</td>
<td>DR5 0.1423</td>
</tr>
<tr>
<td>A28</td>
<td>0.0444</td>
<td>B16</td>
<td>0.0429</td>
<td>B67 0.0001</td>
<td>DR11 0.1219</td>
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<tr>
<td>A36</td>
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<td>B17</td>
<td>0.0434</td>
<td>B70 0.0031</td>
<td>DR12 0.0203</td>
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<td>A43</td>
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<td>B18</td>
<td>0.0531</td>
<td>B73 0.0003</td>
<td>DR6 0.1663</td>
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<td>A203</td>
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<td>0.0217</td>
<td>B703 0.0001</td>
<td>DR13 0.1353</td>
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<td>B22</td>
<td>0.0254</td>
<td>B78 0.0001</td>
<td>DR14 0.0285</td>
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<tr>
<td>A80</td>
<td>0.0001</td>
<td>B27</td>
<td>0.0442</td>
<td>B81 0.0001</td>
<td>DR7 0.1225</td>
</tr>
<tr>
<td>B35</td>
<td>0.0972</td>
<td>B2708</td>
<td>0.0001</td>
<td>DR8 0.0354</td>
<td>DR8 0.0354</td>
</tr>
<tr>
<td>B37</td>
<td>0.0154</td>
<td>B82</td>
<td>0.0001</td>
<td>DR9 0.0110</td>
<td>DR9 0.0110</td>
</tr>
<tr>
<td>B40</td>
<td>0.0723</td>
<td>B83</td>
<td>0.0001</td>
<td>DR10 0.0082</td>
<td>DR10 0.0082</td>
</tr>
</tbody>
</table>

### 4.3.6 AB0 blood group frequency

<table>
<thead>
<tr>
<th>AB0 blood group frequencies</th>
<th>Recipient's blood group</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB0-0</td>
<td></td>
<td>0.440</td>
</tr>
<tr>
<td>AB0-A</td>
<td></td>
<td>0.423</td>
</tr>
<tr>
<td>AB0-B</td>
<td></td>
<td>0.102</td>
</tr>
<tr>
<td>AB0-AB</td>
<td></td>
<td>0.036</td>
</tr>
</tbody>
</table>
### 4.3.7 German ESP (sub)regions

<table>
<thead>
<tr>
<th>DSO region</th>
<th>ESP sub region</th>
<th>Transplant centers</th>
<th>ET center code</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBWOR</td>
<td>OZ Stuttgart</td>
<td>Heidelberg, Mannheim, Stuttgart, Tübingen</td>
<td>GHBTP, GMATP, GSTTP, GTUTP</td>
</tr>
<tr>
<td></td>
<td>OS Freiburg</td>
<td>Freiburg</td>
<td>GFRTP</td>
</tr>
<tr>
<td>GBYOR</td>
<td>OZ München</td>
<td>Augsburg, München, Rechts der Isar, München, Grosshadern, Regensburg</td>
<td>GAUTP, GMHTP, GMLTP, GRBTP</td>
</tr>
<tr>
<td></td>
<td>OS Erlangen</td>
<td>Nürnberg, Würzburg</td>
<td>GNBT, GWZTP</td>
</tr>
<tr>
<td>GMIOR</td>
<td>OZ Mainz</td>
<td>Frankfurt am Main, Mainz</td>
<td>GFMTP, GMZTP</td>
</tr>
<tr>
<td></td>
<td>OS Homburg</td>
<td>Homburg-Saar, Kaiserslautern</td>
<td>GHSTP, GKSTP</td>
</tr>
<tr>
<td></td>
<td>OS Marburg</td>
<td>Fulda, Giessen, Marburg</td>
<td>GFDT, GATP, GMRT</td>
</tr>
<tr>
<td>GNDOR</td>
<td>OZ Hannover</td>
<td>Bremen, Hannover, Hannoversch-Münden</td>
<td>GBMTP, GHOTP, GHMTP</td>
</tr>
<tr>
<td></td>
<td>OS Hamburg</td>
<td>Hamburg, Kiel, Lübeck</td>
<td>GHGT, GKITP, GLUTP</td>
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<tr>
<td>GNOOR</td>
<td>OZ Berlin</td>
<td>Berlin, UK B.-Franklin, Berlin, Charité</td>
<td>GBETP, GBCTP</td>
</tr>
<tr>
<td></td>
<td>OS Rostock</td>
<td>Rostock</td>
<td>GROT</td>
</tr>
<tr>
<td>GNWOR</td>
<td>OZ Düsseldorf</td>
<td>Bochum, Düsseldorf, Essen</td>
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<td>OS Köln-Bonn</td>
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<td></td>
<td>OS Münster</td>
<td>Münster</td>
<td>GMNTP</td>
</tr>
<tr>
<td>GOSOR</td>
<td>OZ Leipzig</td>
<td>Dresden, Halle, Jena, Leipzig</td>
<td>GDRTP, GHATP, GJETP, GLPTP</td>
</tr>
</tbody>
</table>
4.4 Forms

All forms can be found and downloaded from the section ‘Forms’ of the Library of the member site at [www.eurotransplant.org](http://www.eurotransplant.org).