

Chapter 4

Kidney

(ETKAS and ESP)

Change record

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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 patients 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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4.1 Introduction kidney allocation

4.1.1 General

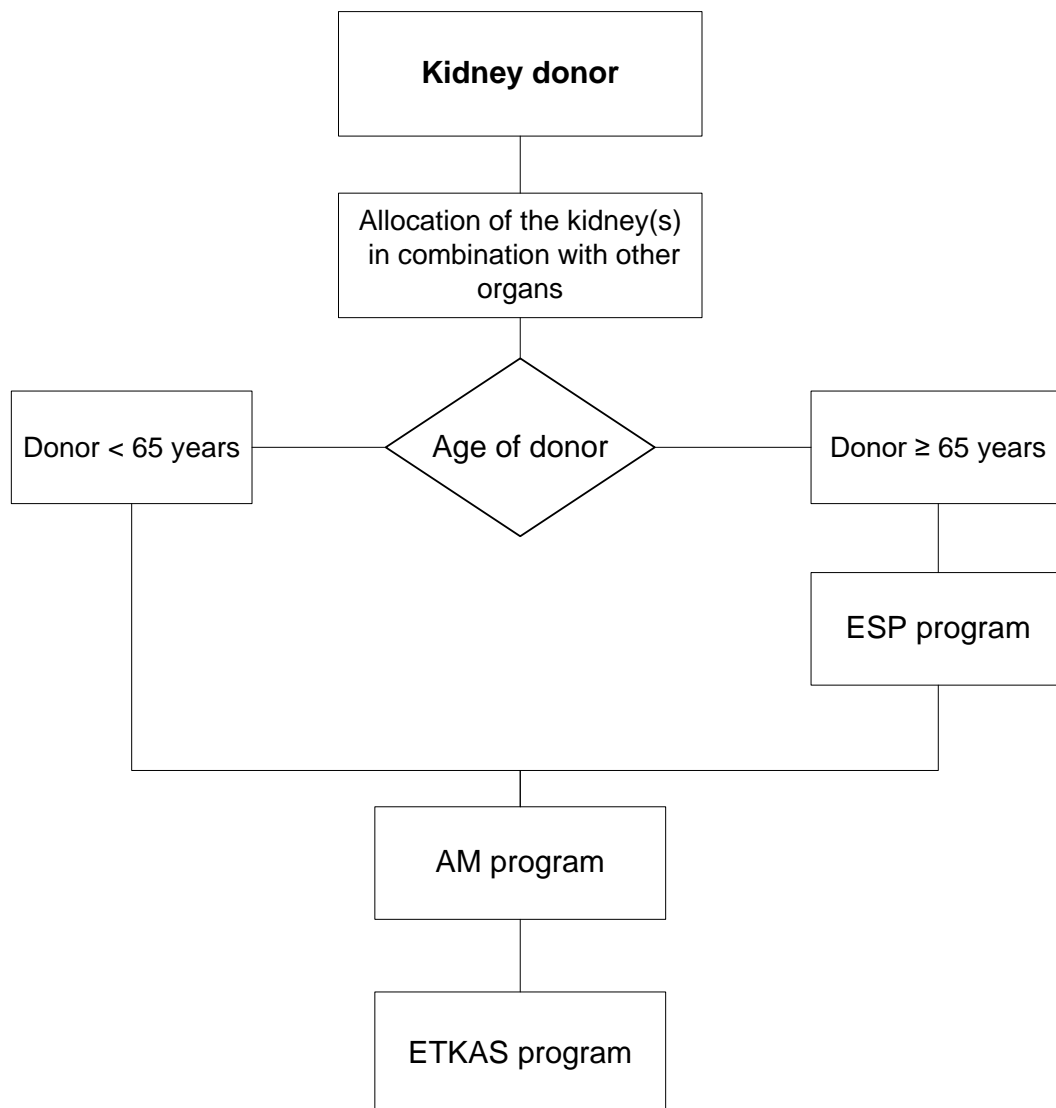
This chapter contains information concerning the allocation of kidneys within Eurotransplant (ET). First, a flowchart of the general kidney allocation is presented. Additionally, kidney allocation related definitions are explained. In the following paragraphs, more information about the urgency codes, blood group rules, acceptable mismatch (AM) program, point score system, the allocation algorithms of the ETKAS and ESP allocation can be found.

For general information concerning kidney patient registration or reporting of donors to Eurotransplant, please see Chapters 2 The Recipient and 9 The Donor of the ET Manual respectively.

Definitions can be found via the following link [Definitions](#).

4.1.2 Flowchart kidney allocation

The flowchart below shows the general scheme of the kidney allocation.



4.2 Kidney - urgency codes

A patient for a kidney is a person who has an end-stage renal disease. The urgency codes are used to classify patients on the waiting list and to prioritize these patients on the match list. The urgency codes represent the aspects of transplantability, medical urgency and the most recent level of allo-sensitization¹ in ENIS (see Table 1).

| Urgency codes used in Kidney allocation | | | | | | |
|---|--------------------|-------------------|-----------------|--|------|----|
| Urgency code | | Transplantability | Medical urgency | allo-sensitization: virtual PRA (vPRA) | | |
| HU | High Urgency | yes | urgent | 0-100 | | |
| T | Transplantable | yes | normal | no | vPRA | 0 |
| I | Immunized | yes | normal | yes | vPRA | >0 |
| NT | Not Transplantable | no | no | | | |
| R | Removed | no | no | | | |

Table 1, Urgency codes

4.2.1 High urgency (HU) Kidney status

In specific medical situations a HU status can be requested. Below you will find the inclusion criteria. A different set of HU inclusion criteria are present for Germany and non-German countries.

4.2.1.1 All countries; HU inclusion criteria

- Imminent lack of access for either hemodialysis or peritoneal dialysis.
- 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, the pancreas graft is bladder-drained and functioning adequately.

4.2.1.2 Non-German countries; additional HU inclusion criterion.

- Severe (uremic) polyneuropathy

4.2.1.3 Change in the clinical situation of a patient with HU status

If the clinical situation of a patient improves, the transplant center should place the patient in any lower urgency status. Patients in HU status who become (temporarily) not transplantable have to be reported as NT. If these patients become transplantable again, a new HU request has to be sent to Eurotransplant.

4.2.2 HU status request

For more information on the request for HU kidney, please see [Kidney – high urgency request](#).

¹ R-TTAC01.10: In order to have a uniform and reliable parameter for sensitization in ET, the v-PRA value (based on the phenotype frequency of the unacceptable mismatches) will replace the %-PRA value.

4.3 General information on the allocation of kidneys

In ([Flowchart kidney allocation](#)) the flowchart can be found about the general allocation order. The first step in this figure is that kidneys are offered to patients in need for a combined organ transplant including kidney. These patients will get the offer of the combined organs via the leading organ (For further information concerning this subject, please see Chapter 3 Allocation General of the ET Manual). The kidney only allocation can be started if one or both kidneys are still available. If the donor is < 65 years old, the AM + ETKAS match is started. In case of a donor ≥ 65 years old, the ESP match will be generated.

4.3.1 AB0 blood group rules

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

4.3.1.1 AM program

| Donor blood group | Eligible patients |
|-------------------|-------------------|
| A | A and AB |
| B | B and AB |
| AB | AB |
| O | A, B, AB and O |

Table 2, Blood group rules in AM program

4.3.1.2 ESP, ETKAS

| Donor blood group | Eligible patients |
|-------------------|-------------------|
| A | A |
| B | B |
| AB | AB |
| O | O |

Table 3, Blood group rules ETKAS-ESP program

4.3.2 Donation after cardiocirculatory death (DCD) kidneys

4.3.2.1 DCD type II²

Kidneys of DCD type II donors are allocated according to the following scheme:

Donors <65 years (HLA typing must be performed)

1. 000 MM (national only)
2. Donor center offer
3. Extended allocation (EA) – first line extended (national)
4. Second line rescue (international)

Donors ≥65 years

1. Donor center offer
2. Extended allocation (EA) – first line extended (national)
3. First line rescue
4. Second line rescue (international)

²R-KAC05.14 – allocation DCD type II; board approval, Jan 2015

4.3.2.2 DCD type III

Kidneys for donation after cardiocirculatory death (DCD) type III are allocated according to the same algorithm as for kidney donation after brain death (DBD) in the countries in which it is legal and ethical allowed.

For further information concerning this subject, please see Chapter 9 of the ET manual.

4.3.3 Acceptable Mismatch (AM) program

The Acceptable Mismatch (AM) program aims to allocate organs to patients who are immunologically compromised because of current and/or historical HLA-sensitization, to increase their chances on an organ.

The program identifies HLA mismatches that most likely will not result in a positive cross match. The Eurotransplant Reference Laboratory (ERTL) will check the HLA antigens to which the patient has not yet reacted to with allo-antibodies and therefore might be acceptable for the patient.

Patients selected by this program have priority over ETKAS-selected patients. Within the AM program, patients awaiting a combined kidney-non renal transplant have priority over kidney only patients. Thereafter patients that have HU kidney status will be prioritized above non-HU kidney only patients. For more information see Chapter 10 Histocompatibility and in the background information, see [Acceptable Mismatch \(AM\) program – background information](#).

4.3.4 Eurotransplant Kidney allocation system (ETKAS – donors < 65 years)

The selection of potential patients is based on ABO blood group rules. The ranking of these patients is based on age, medical urgency, mismatch probability, HLA-A, -B, -DR matching between donor and patient, waiting time and donor region.

Selected potential patients are ranked according of a point score system. The patient with the highest score is ranked on top and receives the first offer. The score is calculated for all patients, including 000-mismatched (MM) patients in order to rank the 000-mismatched patients among each other.

For detailed information of the point score system, see [ETKAS - Point score system](#). For detailed information of the allocation scheme see [ETKAS – allocation algorithms](#)

4.3.5 Eurotransplant Senior Program (ESP - donors ≥ 65 years)

The aim of the ESP is to decrease the cold ischemic period (CIP) of the kidney. Therefore, the Eurotransplant Senior Program (ESP) allocates kidneys from post-mortem donors ≥ 65 years old to patients of ≥65 years without the use of a donor HLA typing (excl. Netherlands, Belgium/Luxembourg and Hungary; the match is there generated after reporting of the HLA). The patients are selected locally, regionally or national and ranked based on urgency and waiting time (dialysis time). Immunized patients are included in the ESP –match list. In case the donor HLA typing is present before the ESP match is generated, unacceptable antigens are taken into account. For detailed national ESP allocation rules see [National allocation rules in the ESP](#) For detailed information concerning the allocation scheme, see [ESP allocation algorithms \(Donor aged ≥ 65 years\)](#).

4.3.5.1 No allocation via ESP possible

Kidneys from an ESP donor that are not medically declined to start EA and cannot be

allocated locally or regionally will be allocated through the regular kidney allocation (ETKAS) after reporting of the HLA typing.

4.3.6 Choice of allocation program in Germany

In Germany, patients that are 65 years or older have to choose for either being included in the ESP or the (AM+) ETKAS program. These programs are mutually exclusive.

4.3.7 Donors ≤ 5 years and en-bloc procurement

4.3.7.1 Donors < 2 years

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

4.3.7.2 Donors ≥ 2 and ≤ 5 years

From donors ≥ 2 and ≤ 5 years old it is recommended to procure the kidneys en-bloc. For further information concerning the procurement of the kidneys, please see Chapter 9 The Donor of the ET manual.

4.3.8 Donors aged ≥ 65 years, logistic reason to start rescue

P-KAC05.19 – Logistic reason to start rescue of kidneys from ESP donors³

Rescue allocation of kidneys from donors ≥ 65 years can be started if the organ has not been accepted for any patient within 5 hours after procurement or declined > 5 centers.

4.3.9 Donors aged ≥ 75 years

Only in case of a rescue allocation for a donor ≥ 75 years old, the transplant center has the possibility to transplant both kidneys into one patient. In all other cases a single kidney transplant is preferred, but en bloc transplantation might be possible based on the quality of the kidneys.

4.3.10 Marginal kidneys

The following kidneys are marginal kidneys, therefore direct deviation of the normal allocation is acceptable to prevent loss of these organs:

1. A transplanted kidney with a good function which has to be taken out of the living recipient/donor. This kidney can be offered to the center where the living recipient/donor is located.
2. Kidneys of donors ≤ 5 years of age⁴. These organs will first be offered to only one transplant center via the match list. This center can decide to transplant one or both kidneys.

4.3.11 decision time in the recipient-oriented rescue allocation of kidneys

In non-German countries the decision time in the recipient-oriented rescue allocation is 60 minutes. In Germany the decision time is 30 minutes.⁵

³ P-KAC05.19 – Logistic reason to start rescue of kidneys from ESP donors; board approval, May 2019

⁴ P-KAC01.17 – Allocation of kidneys of donors ≤ 5 years of age; board approval, Oct. 2017

⁵ P-KAC02.18 – Decision time in the recipient-oriented rescue allocation (EA) of kidneys, Jan 2019

4.3.12 Prospective cross-match

4.3.12.1 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 patient or a conditional offer is withdrawn.

4.3.12.2 No serum available for preliminary cross-match

If a preliminary cross-match cannot be performed because no serum is available, no kidney offer can be made to a patient or the conditional offer is withdrawn, except in case of an immunized (for definitions, see [Definitions](#)) HU patient for whom unacceptable antigens are entered into the system.

4.3.13 HLA-Typing

For more information on HLA typing, see [HLA-Typing](#) and Chapter 10 Histocompatibility Testing of the ET Manual.

4.4 ETKAS - Point score system

This paragraph will describe information concerning the point score system for generating the match list for kidney patients.

For background information on the point score system see

For the allocation scheme, [ETKAS – allocation algorithms](#)

4.4.1 000 MM

After the AM patients first the patients with a 000-MM are ranked according to their point score.

4.4.2 Point assignment HLA

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

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

| Number of HLA-A, -B, -DR mismatches | Number of points |
|-------------------------------------|------------------|
| 0 | 400.00 |
| 1 | 333.33 |
| 2 | 266.67 |
| 3 | 200.00 |
| 4 | 133.33 |
| 5 | 66.67 |
| 6 | 0.00 |

4.4.2.1 HLA-bonus for pediatric patients

For pediatric patients, the points for HLA-antigen mismatch are doubled (see [Pediatric bonus](#)).

4.4.3 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 *split* DR mismatches based on 1000 kidneys offered, taking into account ABO blood group rules and vPRA. Patients receive between 0-100 MMPs. Detailed information, see [Mismatch Probability \(MMP\) detailed information](#).

4.4.4 Waiting time

Upon registration on the kidney waiting list, the initial date of start of maintenance dialysis (no interruption of dialysis > 90 days) of the patient is counted. For patients that are re-registered the date of re-institution of maintenance dialysis after previous kidney transplantation is counted as the first day for the calculation (start of the waiting time). Per year waiting time, 33.3 points are given (i.e. 0.091 points per day waiting). Waiting time points can be accrued unrestrictedly.

4.4.4.1 Pre-emptive patients

It is possible to register pre-emptive patients on the active Eurotransplant kidney waiting list. These patients do not receive points for waiting time. Please be aware that there might be different national rules concerning the registration of pre-emptive patients on the waiting list.

4.4.4.2 Return of waiting time

The following patients qualify for waiting time return:

1. Patients with kidney failure within 90 days after transplantation (all countries).
2. Patients with kidney failure within 1 year after transplantation (non German countries).
3. Patients with kidney failure after transplantation of a kidney of a living donor (non German countries).

For detailed information, see [Waiting time – return waiting time](#).

4.4.5 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. Patient is proven to be in maturation.

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

Delivering and auditing proof of maturation, see [Pediatric bonus - Delivering and auditing proof of maturation](#).

4.4.6 Distance between donor center and transplant center

| | Austria | Belgium / Luxemburg | Croatia | Germany | Hungary | The Netherlands | Slovenia |
|---------------------|---------|------------------------|---------|---------|---------|--------------------|----------|
| Local Equivalent | 200 | 200 (also eq) | | | | | 100 |
| Regional | | | | 200 | | | 100 |
| National | 100 | 100 | 300 | 100 | 300 | 300 | 100 |

The total amount of points given to national patients is composed from national points plus, if applicable, the local or regional points.

4.4.7 National and regional Kidney Exchange Balance

The following balances are calculated in the point score

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

-Regional Balance Points⁶ = 0.25x (Austrian National Balance - Regional Balance)

For detailed information, see [National Kidney Exchange Balance – detailed information](#)

4.4.8 High Urgency

Patients for which the HU status is approved will receive a bonus of 500 points.

Please Note: the required HLA mismatch criteria is not taken into account when the patient has the HU status.

4.4.9 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 is possible in selected cases (i.e. a kidney-after-liver transplant).

Patients fulfilling the criteria will receive 500 bonus points.

Criteria, see [Kidney after liver transplant – detailed information](#).

4.4.10 Bonus for patients having donated one of their own kidneys

Patients suffering from end stage renal disease after having donated one of their own kidneys will be granted once-only an allocation bonus of 500 points upon registration on the waiting list

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.

4.4.10.1 Deviant national regulations; Germany

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

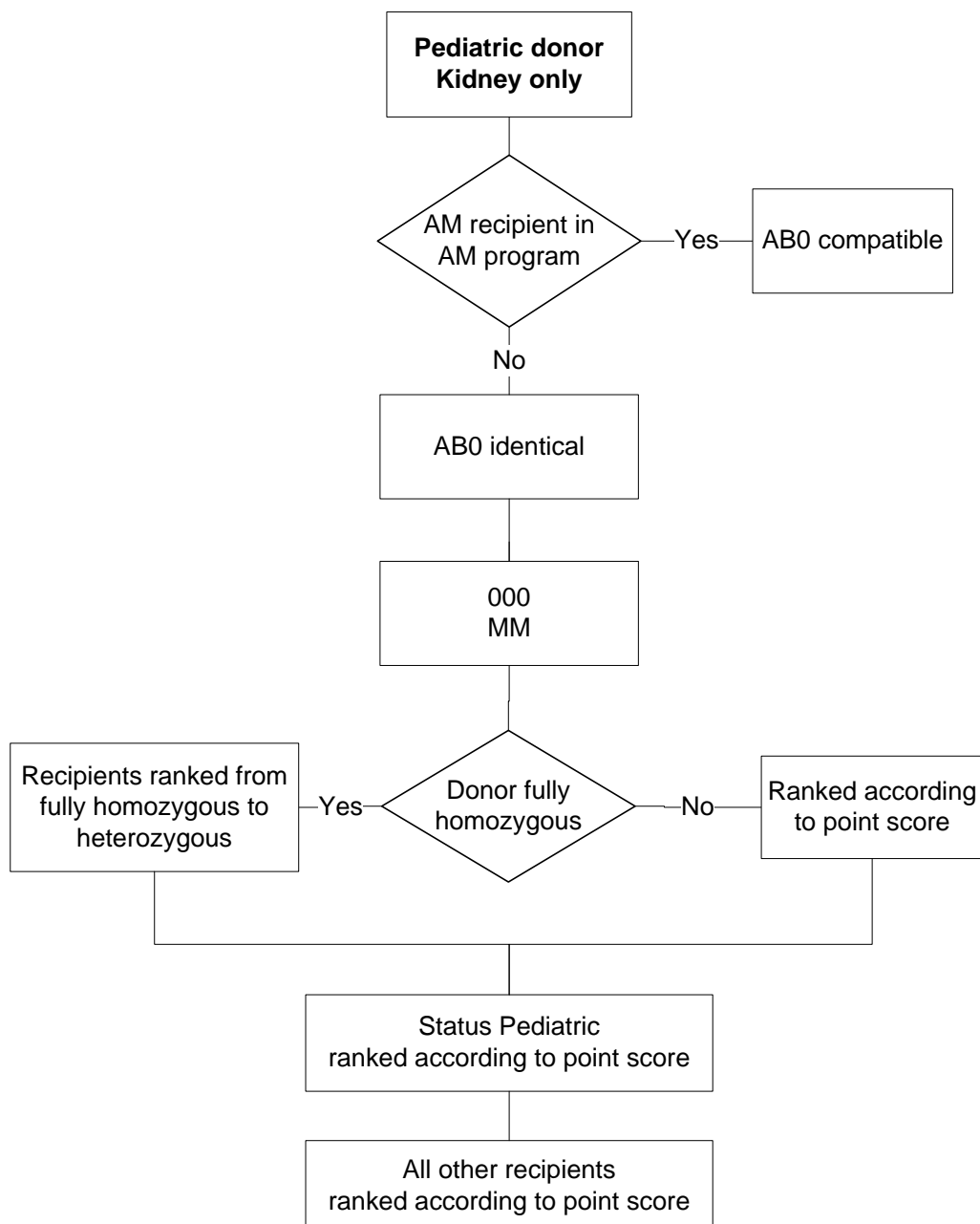
⁶ Please note the Regional Balance Points can be negative, which means a deduction of the total pointscore

4.5 ETKAS – allocation algorithms

4.5.1 Donors < 16 years old

First, to AM program patients (pediatric & adult)
 then, to zero (000) HLA-A, -B and -DR mismatch patients (pediatric & adult)
 in case of a HLA fully homozygous donor patients are ranked from fully homozygous to fully heterozygous. Within each group, patients are ranked according to their point score.
 then, to patients having the pediatric status, ranked according to their point score.
 then, to all other I, T and HU patients ranked according to their point score.

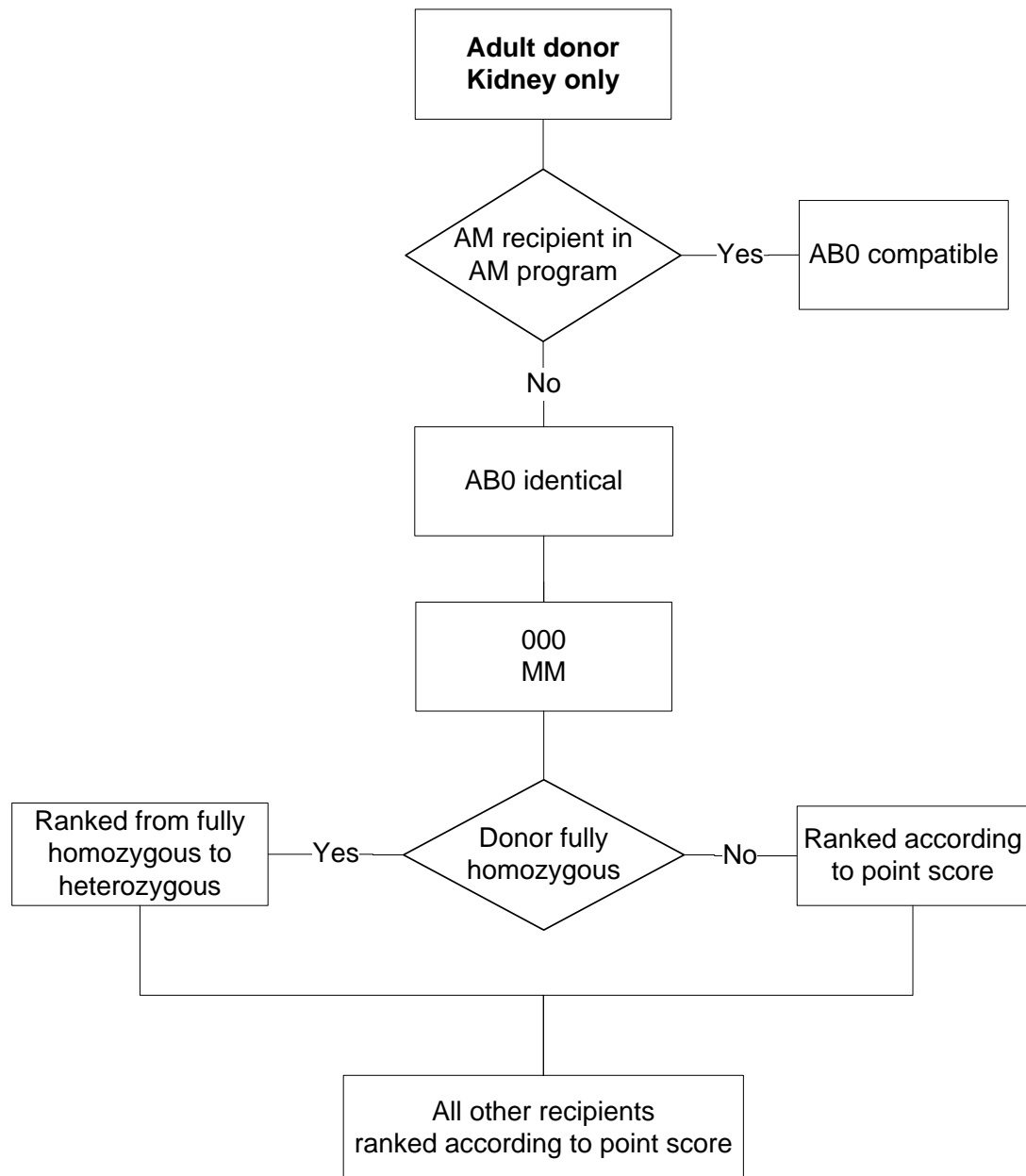
4.5.2 Flowchart 1 – Donor < 16 years



4.5.3 Donors \geq 16 years and $<$ 65 years of age

First, to AM program patients
 then, to zero (000) HLA-A, -B and -DR mismatch patients
 in case of a HLA fully homozygous donor (see [Fully homozygous](#)): patients are ranked from fully homozygous to fully heterozygous. Within each group patients are ranked according to their point score.
 then, to I, T and HU patients ranked according to their point score.

4.5.4 Flowchart 2 – Donor \geq 16 years and $<$ 65 years



4.6 ESP allocation algorithms (Donor aged \geq 65 years)

4.6.1 Eurotransplant Senior program (ESP)

First, a patient oriented allocation to local, regional or national patients aged \geq 65 years; first HU then elective ranked on waiting time (=dialysis time):

Austria

→ Locally or equivalent

Germany

→ First subregion (see [German ESP \(sub\) regions](#)) then other subregions within that coordination region in Germany

Hungary

→ Region of the donor before all other regions

The Netherlands Croatia and Slovenia

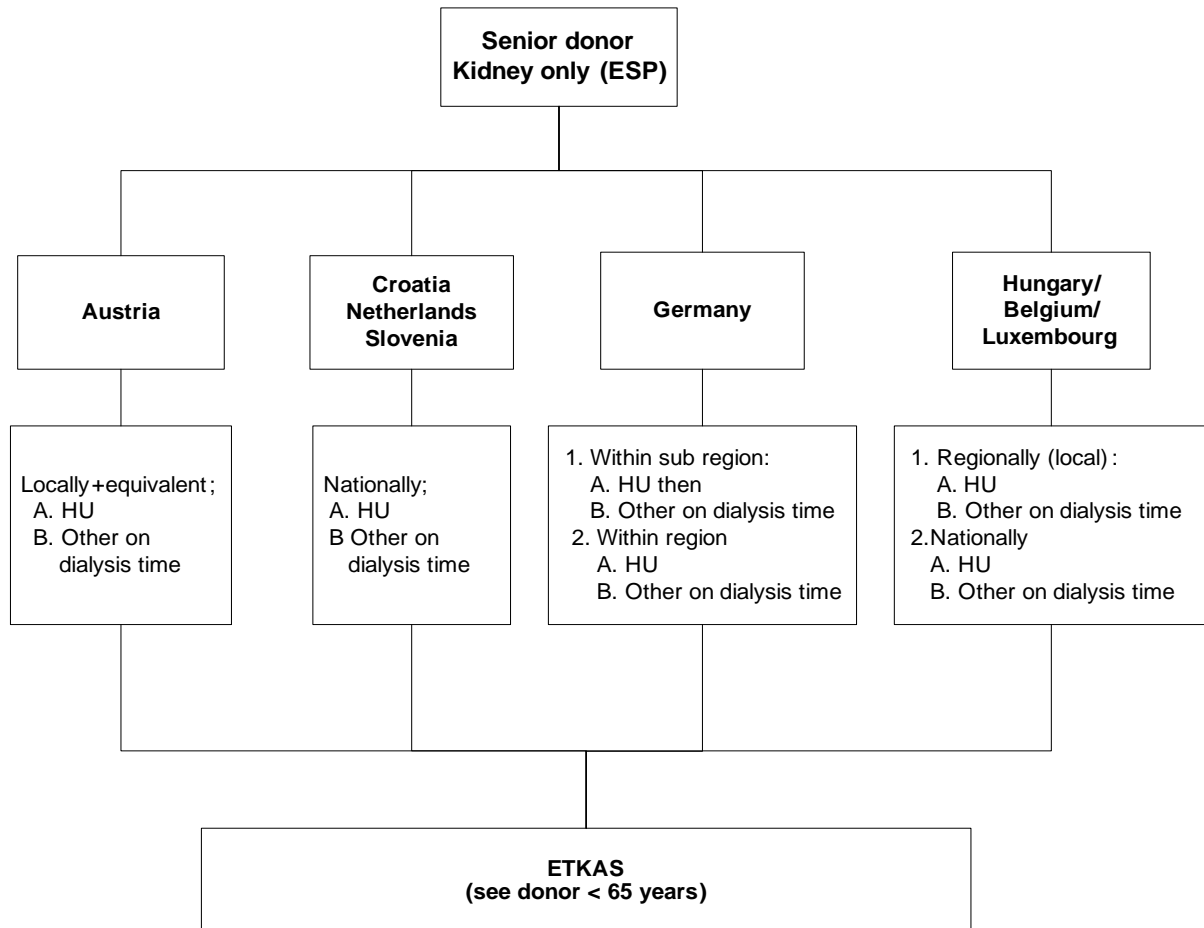
→ Nationally

Belgium/Luxembourg

→ Local center of the donor before all other centers

then, according to the ETKAS scheme (if not medically declined, see Paragraph [ETKAS – allocation algorithms](#))

4.6.2 Flowchart 3 – Donor ≥ 65 years



4.7 Background information on the kidney allocation

4.7.1 Definitions

Below, definitions related to the kidney allocation can be found. For the definitions concerning the urgency codes, please see [Kidney - urgency codes](#) urgency codes.

4.7.1.1 Maintenance dialysis

The dialysis has not been interrupted for more than 90 days.

4.7.1.2 Fully homozygous

Inheritance of two identical HLA antigens at each polymorphic locus.

4.7.1.3 Fully heterozygous

Inheritance of two different HLA antigens at each polymorphic locus.

4.7.1.4 Full house identical

The donor and patient have both 6 different HLA antigens of which all antigens are the same, e.g.:

| | |
|----------------|----------------------|
| Donor typing | A1 A2 B7 B8 DR1 DR13 |
| Patient typing | A1 A2 B7 B8 DR1 DR13 |

4.7.1.5 Zero mismatch identical

The donor and patient have the same amount of HLA antigens but less than 6, of which all antigens are the same, e.g.:

| | |
|----------------|-------------------|
| Donor typing | A1 A2 B7 B8 DR1 - |
| Patient typing | A1 A2 B7 B8 DR1 - |

4.7.1.6 Zero mismatch compatible

The donor has less HLA antigens than the patient, but the patient has all of the donor HLA antigens, e.g.:

| | |
|----------------|----------------------|
| Donor typing | A1 - B7 B8 DR1 - |
| Patient typing | A1 A2 B7 B8 DR1 DR13 |

4.7.1.7 Outdated screening

Outdated screenings are those HLA-specific antibody screening results that are older than 180 days at time of matching. Patients with outdated screening are not selected in matching procedures.

4.7.1.8 Local(ly)

Patients from the same center as the donor center.

4.7.1.9 Equivalent-local(ly)

Equivalent to a local status are patients from collaborating transplant programs (regional or national).

4.7.1.10 Regional(ly)

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

4.7.1.11 National(ly)

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

4.7.1.12 International

All transplant programs outside the country of the donor center.

4.7.1.13 Export

i.e. a negative balance, is defined as: kidneys procured in a country > kidneys transplanted in that country.

4.7.1.14 Import

i.e. a positive balance, is defined as: kidneys procured in a country < kidneys transplanted in that country.

4.7.1.15 Transplantable (T)

Elective patients who are transplantable and have a vPRA of 0%.

4.7.1.16 High Urgency (HU) patients

Patients who are according to the criteria and/or accepted by the international ETKAC audit approved for a high urgent status.

4.7.1.17 Immunized (I) patients

Patients who are transplantable and have a vPRA of >0%.

4.7.1.18 Not Transplantable (NT) patients

Patients temporarily not transplantable should be placed in urgency NT.

4.7.1.19 Removed (Urgency R)

A patient should be removed (Urgency R) from the waiting list if the patient is deteriorated beyond transplantability.

4.7.1.20 Pre-emptive patients

Patients that are listed on the waiting list but have not yet started their dialysis.

4.8 Kidney – high urgency request

4.8.1 HU status request

A remote center cannot assign a HU status in ENIS, but they have to send a request to Eurotransplant. For requesting a HU status for a patient, the form “Kidney High Urgency form” should be used (see Forms at www.eurotransplant.org). Please be aware that only HU requests are taken into account in case the patient is placed on an active urgency status.

The Urgency form must be send to Eurotransplant (urgency@eurotransplant.org) and has to be accompanied by an English letter of motivation and additional medical reports. Depending on the HU inclusion criterion related to the patient, a report from one or two competent specialist(s) in the field of the indication must be included (see form). Additionally, information concerning a consideration of a living donor should be

added.

4.8.2 HU audit

The HU request will initially be evaluated by two members of the Eurotransplant Kidney Advisory committee. In case of a split decision, a third member of the Eurotransplant Kidney Advisory committee will be consulted for a final judgment. Only after approval, the HU status will be granted and the urgency will be changed in ENIS by the Eurotransplant waiting list officer.

Doctors involved in the audit procedure should follow the “Kidney audit procedure” which is published on the ET member site (see library→ manuals→ Eurotransplant manual→kidney audit procedure).

4.8.2.1 Objection

If the HU request is declined by the audit and the requesting center does not agree with the auditors’ decision, only one objection can be send. The requesting center should indicate that the auditors overlooked information or provide additional information that is of importance for the decision of the auditors. The objection has to be submitted to Eurotransplant within 5 working days after the initial decline of the request. The objection letter should be written in English and also summarizes other information (e.g. letters of specialists). The objection will be discussed in the next ETKAC meeting for the final decision.

4.9 General background information

4.9.1 HLA-Typing

The HLA match program is only based on 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 from HLA mismatch calculation program.

4.9.1.1 Conversion of HLA-A and –B typing

The HLA broad match phenotype reduction program converts the HLA-A and -B from *split* HLA-antigen to *broad* HLA-antigen for matching the donor with the patients (see [Conversion of split HLA-antigen to broad HLA-antigen](#)).

4.9.1.2 Conversion of HLA-DR typing

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

4.9.1.3 Calculation of HLA mismatches

The *HLA mismatch program* calculates HLA-antigen mismatches for HLA-A and -B based on **broad** antigens only. 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 patients 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. For HLA-A and –B, the broad is leading. For HLA-DR, the split is leading.

In case only 1 HLA-antigen is identified (on the A-, B- or DR-locus), the donor or the patient is assumed to be 'homozygous' for that locus (i.e. homologous chromosomes are presumed to code for identical antigens at that locus).

Calculation for homozygous locus of a donor:

| | | |
|----------------|-----|----|
| Donor typing | A1 | - |
| Patient typing | A28 | A2 |

In this case only 1 mismatch is calculated.

In case there are 2 identical antigens on one locus, so only on A-, B- or DR-locus, only 1 mismatch is calculated

Calculation for 2 identical antigens on 1 locus of a donor:

| | | |
|----------------|-----|----|
| Donor typing | A9 | A9 |
| Patient typing | A28 | A2 |

Calculation: Only 1 mismatch is calculated

4.9.2 Acceptable Mismatch (AM) program – background information

For more information, see Chapter 10 Histocompatibility Testing in the ET Manual.

4.9.2.1 Inclusion criteria

The criteria can be found in Chapter 10 Histocompatibility (§ 10.3) in the ET Manual.

4.9.2.2 Minimum requirements for organ offers

The AM program will run for every ETKAS match of a post-mortem kidney donor with a known HLA typing. The program selects potentially cross-match negative AM patients.

4.9.2.3 Contact with immunologist from the ETRL

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

4.9.2.3.1 Effect of judgment by ETRL immunologist

In case an immunized patient is selected through:

- The AM program: The judgment of the ETRL immunologist is binding. If the judgment is negative, then **no** offer is made for this patient. If the judgment is positive, an offer is made for this patient. No prospective cross match is performed.
- The ETKAS-match list; The judgment of the ETRL immunologist is not binding. If the judgment is negative, then this will be communicated to the patients center and the decision to accept or decline the offer will be left to the responsible transplant physician.

4.9.3 ESP - donors ≥ 65 years - background information

4.9.3.1 National allocation rules in the ESP

4.9.3.1.1 Austria

In Austria kidneys from ESP donors are allocated to ESP patients from the reporting center's local waiting list (=donor or equivalent center).

4.9.3.1.2 Germany

In Germany, kidneys from ESP donors are allocated to ESP patients from the corresponding region. These regions are defined by the organ procurement organization Deutsche Stiftung Organtransplantation (DSO) ([German ESP \(sub\) regions](#)). Kidneys from ESP donors are first allocated to ESP patients registered within the same sub-region as the donor and then to ESP patients registered within the other sub-regions within that coordination region in Germany

4.9.3.1.3 Hungary

In Hungary, the ESP match can only be generated in case the HLA of the donor is known. Kidneys from ESP donors are first allocated to local ESP patients registered within the same region (= donor center, HBSTP, HDBTP, HSZTP or HPCTP) as the donor and then to ESP patients registered nationally.

4.9.3.1.4 The Netherlands,

In the Netherlands, the ESP match can only be generated in case the HLA of the donor is known. The kidneys from ESP donors are allocated to ESP patients according to the national waiting list.

4.9.3.1.5 Croatia, Slovenia

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

4.9.3.1.6 Belgium/Luxembourg

The ESP match can only be generated in case the HLA of the donor is known. In Belgium, kidneys from ESP donors are first allocated to local ESP patients (= donor center) as the donor and then to ESP patients registered nationally.

4.10 ETKAS - Point score system - background information

This paragraph will describe detailed information concerning the point score system for generating the match list for kidney patients. For the allocation scheme, see [ETKAS – allocation algorithms](#).

4.10.1 Mismatch Probability (MMP) detailed information

Mismatch Probability is a calculation of the probability of receiving a kidney offer with 0 and 1 *broad* HLA-A, -B or *split* DR mismatches based on 1000 kidneys offered, taking into account ABO blood group rules and vPRA. Patients receive between 0-100 MMPs.

4.10.1.1 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 ([HLA antigen frequency](#)).

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.

4.10.1.2 Antibody screening

The antibody screening is recently entered in ENIS and must not be outdated (see [Outdated screening](#)). Screenings should be updated every 180 days. If a possible sensitization can take place between regular antibody screening dates, additional antibody screenings should be performed according to the ETRL guidelines.

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

4.10.1.3 MMP formulas

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

$$\text{MMP} = 100 \times (1 - (\text{ABO-match frequency} \times (1 - (\text{vPRA} / 100))) \times (\text{MMP0} + \text{MMP1}))^{1000}$$

$$\text{MMP0} = (a1+a2)^2 * (b1+b2)^2 * (dr1+dr2)^2$$

$$\begin{aligned} \text{MMP1} = & \text{MMP0} \times \\ & (((2*(a1+a2)*(1 - a1 - a2)) - a1^2 - a2^2 + \Sigma (\text{all HLA-A Ag frequencies}^2)) / ((a1+a2)^2)) + \\ & (((2*(b1+b2)*(1 - b1 - b2)) - b1^2 - b2^2 + \Sigma (\text{all HLA-B Ag frequencies}^2)) / ((b1+b2)^2)) + \\ & (((2*(dr1+dr2)*(1 - dr1 - dr2)) - dr1^2 - dr2^2 + \Sigma (\text{all HLA-DR Ag frequencies}^2)) / ((dr1+dr2)^2)) \end{aligned}$$

| Parameter | Frequency of |
|-----------|--------------------------------|
| a1 | 1 st HLA-A antigen |
| a2 | 2 nd HLA-A antigen |
| b1 | 1 st HLA-B antigen |
| b2 | 2 nd HLA-B antigen |
| dr1 | 1 st HLA-DR antigen |
| dr2 | 2 nd HLA-DR antigen |

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

4.10.2 Waiting time – return waiting time

4.10.2.1 All countries

When a recipient is re-registered for a kidney transplant with one or more (immediate) previous kidney transplantations having failed, requiring maintenance dialysis within 90 days after the transplantation, the recipient is eligible for the return of waiting time.

This return of waiting time will automatically be calculated based on the time between the failed kidney transplant and the start (re-)institution of dialysis before this transplant.

4.10.2.2 Non-German countries

4.10.2.2.1 Dialysis dependency within 1 year after transplantation⁷

Return of waiting time will be granted in case a recipient requires maintenance of dialysis within 1 year after the kidney transplantation. The percentage of waiting time points will differ dependent on the date the maintenance of dialysis is started in relation to the transplant date.

1. 100 % waiting time return if maintenance of dialysis starts 0 to 90 days after the kidney transplant;
2. 75 % waiting time return if maintenance of dialysis starts 91 to 180 days after the kidney transplant;
3. 50 % waiting time return if maintenance of dialysis starts 181 to 270 days after the kidney transplant
4. 25 % waiting time return if maintenance of dialysis starts 271 to 1 year after the kidney transplant.

Recipients that require maintenance of dialysis exceeding 1 year after the kidney transplant do not receive any return of waiting time.

4.10.2.2.2 Dialysis dependency after transplantation of a kidney from living donor

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 return of waiting time is done manually on a three month basis, or earlier on request of the transplant center

4.10.2.3 Total number of waiting time

The amount of waiting time equals the number of days from the date of

1. Start of dialysis and **no** previous transplant, *or*
Re-institution of dialysis after the last successful transplant.
2. Number of waiting time return based on the rules described in 4.10.2 Waiting time – return waiting time.

4.10.3 Pediatric bonus - Delivering and auditing proof of maturation

A transplant center must send a completed Kidney patient in maturation form including a report from a competent radiologist or pediatric endocrinologist on an X-ray of the left hand (see Forms at www.eurotransplant.org).

This report must not be older than 3 months at time of “proof of maturation” was requested.

The request will be evaluated by two members of the ETKAC. In case there is no unanimous decision, a third member of the ETKAC will be consulted for a final decision. Proof of maturation should be only requested when the onset of

⁷ R-KAC01.14 Return of waiting time; Board approval Sept. 2014

maintenance dialysis is after the 17th birthday or the patient is registered on the kidney waiting list after the 16th birthday and not yet being on dialysis.

After the proof of maturation has been accepted, the pediatric status is granted. The status is granted until:

1. The first successful transplant, in case the patient is on maintenance dialysis.
2. The first successful transplant, in case the maintenance dialysis starts within the first year after registration on the waiting list.
3. For 1 year calculated from date of registration on the waiting list, in case the patient is not on maintenance dialysis.

The pediatric status can be re-installed when the patient 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.

4.10.4 National Kidney Exchange Balance – detailed information

As of April 1, 2019 the balance in het ETKAS system will be calculated as according to the following policy:

P-KAC06.17 – Donor categories and balance calculation⁸

Kidneys from deceased donors are classified according to donor age categories;

1. Donor age 0-15 years;
2. Donor age 16-49 years;
3. Donor age 50-64 years;
4. Donor age ≥ 65 years.

These categories will be used in the calculation of the national balances to be used for the balancing factor in ETKAS. The balances increase over time starting at 0 on April 1, 2019.

Once every day, as of April 1, 2019, the difference between the number of kidneys procured, exchanged between each ET country⁹ and transplanted, is calculated.

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

National Balance Points:

1. donor age 0-15 = (highest import balance donor age 0-15 – recipient country balance donor age 0-15) x 30
2. donor age 16-49 = (highest import balance donor age 16-49 – recipient country balance donor age 16-49) x 30
3. donor age 50-64 = (highest import balance donor age 50-64 – recipient country balance donor age 50-64) x 30
4. donor age ≥ 65 = (highest import balance donor age ≥ 65 – recipient country balance donor age ≥ 65) x 30

4.10.4.1 Deviant rules; Austria Regional Kidney Exchange Balance

In addition to the National Kidney Exchange Balance, the difference between the number of kidneys procured and exchanged for transplantation between each

⁸ P-KAC06.17- Donor categories and balance calculation; Board approval Oct. 2018

⁹ Belgium and Luxemburg are considered as one country

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, patients from the Austrian centers/regions receive additional balance points according to the following formula:

$$\text{Regional Balance Points}^{10} = 0.25x (\text{Austrian National Balance} - \text{Regional Balance})$$

4.10.5 Kidney after liver transplant – detailed information

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 is possible in selected cases (i.e. a kidney-after-liver transplant). In particular, this option is preferred in patients with hepato-renal syndrome.

In case of a kidney-after-liver transplant, the patient 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 patient was registered (active or NT) on the kidney waiting list at time of the liver transplant.
2. The creatinin clearance is <15ml/min (sample date between 87 and 360 days after the liver transplant).

This bonus will be automatically rewarded if the patient is entered in a transplantable status and the above conditions are met and entered. The 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).

¹⁰ Please note the Regional Balance Points can be negative, which means a deduction of the total point score

4.11 Tables

4.11.1 Conversion of *split* HLA-antigen to *broad* HLA-antigen

| Conversion of <i>split</i> HLA-antigen to <i>broad</i> HLA-antigen, as used in the HLA broad match phenotype reduction program | | | | | | | | | |
|---|-----|------|------|------|-----|------|-----|-----|-----|
| A23 | A9 | B51 | B5 | DR15 | DR2 | Cw9 | Cw3 | DQ5 | DQ1 |
| A24 | | B52 | | DR16 | | Cw10 | | DQ6 | |
| A25 | A10 | B44 | B12 | DR17 | DR3 | | | DQ7 | DQ3 |
| A26 | | B45 | | DR18 | | | | DQ8 | |
| A34 | | B64 | DR11 | DR5 | | | DQ9 | | |
| A66 | B65 | DR12 | | | | | | | |
| A29 | A19 | B62 | B15 | DR13 | DR6 | | | | |
| A30 | | B63 | | DR14 | | | | | |
| A31 | | B75 | | | | | | | |
| A32 | | B76 | | | | | | | |
| A33 | | B77 | | | | | | | |
| A74 | A28 | B38 | B16 | | | | | | |
| A68 | | B39 | | | | | | | |
| A69 | | B57 | B17 | | | | | | |
| | | B58 | | | | | | | |
| | | B49 | B21 | | | | | | |
| | B50 | | | | | | | | |
| | B54 | B22 | | | | | | | |
| | B55 | | | | | | | | |
| | B56 | | | | | | | | |
| | B60 | B40 | | | | | | | |
| | B61 | | | | | | | | |
| | B71 | B70 | | | | | | | |
| | B72 | | | | | | | | |

4.11.2 HLA antigen frequency

HLA gen frequencies 2014 excl. HLA-A -B splits

| HLA-A | 2014 | HLA-B | 2014 | HLA-DR | 2014 |
|-------|--------|-------|--------|--------|--------|
| A1 | 0,1534 | B5 | 0,0738 | DR1 | 0,1151 |
| A2 | 0,3007 | B7 | 0,1227 | DR2 | 0,1645 |
| A3 | 0,1490 | B8 | 0,1025 | DR15 | 0,1277 |
| A9 | 0,1138 | B12 | 0,1217 | DR16 | 0,0368 |
| A10 | 0,0642 | B13 | 0,0322 | DR3 | 0,1114 |
| A11 | 0,0555 | B14 | 0,0236 | DR17 | 0,1112 |
| A19 | 0,1195 | B15 | 0,0758 | DR18 | 0,0002 |
| A28 | 0,0441 | B70 | 0,0023 | DR4 | 0,1328 |
| A36 | 0,0001 | B16 | 0,0454 | DR5 | 0,1463 |
| A43 | 0,0001 | B17 | 0,0453 | DR11 | 0,1261 |
| A203 | 0,0001 | B18 | 0,0540 | DR12 | 0,0202 |
| A210 | 0,0001 | B21 | 0,0232 | DR6 | 0,1639 |
| A80 | 0,0001 | B22 | 0,0252 | DR13 | 0,1314 |
| | | B27 | 0,0483 | DR14 | 0,0325 |
| | | B35 | 0,1027 | DR7 | 0,1164 |
| | | B37 | 0,0140 | DR8 | 0,0312 |
| | | B40 | 0,0684 | DR9 | 0,0087 |
| | | B41 | 0,0111 | DR10 | 0,0096 |
| | | B42 | 0,0004 | | |
| | | B46 | 0,0002 | | |
| | | B47 | 0,0034 | | |
| | | B48 | 0,0008 | | |
| | | B53 | 0,0027 | | |
| | | B59 | 0,0001 | | |
| | | B67 | 0,0002 | | |
| | | B73 | 0,0002 | | |
| | | B703 | 0,0001 | | |
| | | B78 | 0,0002 | | |
| | | B81 | 0,0001 | | |
| | | B2708 | 0,0001 | | |
| | | B82 | 0,0001 | | |
| | | B83 | 0,0001 | | |

4.11.3 German ESP (sub) regions

| Coordination region | ESP sub region | Transplant centers | ET center code |
|----------------------------|-----------------------|--|-------------------------------------|
| GBWOR | OZ Stuttgart | Heidelberg Mannheim Stuttgart Tübingen | GHBTTP GMATP GSTTP GTUTP |
| | OS Freiburg | Freiburg | GFRTTP |
| GBYOR | OZ München | Augsburg München, Rechts der Isar München, Grosshadern Regensburg | GAUTP GMHTP GMLTP GRBTTP |
| | OS Erlangen | Nürnberg Würzburg | GNBTTP GWZTP |
| GMIOR | OZ Mainz | Frankfurt am Main Mainz | GFMTTP GMZTP |
| | OS Homburg | Homburg-Saar Kaiserslautern | GHSTTP GKSTTP |
| | OS Marburg | Fulda Giessen Marburg | GFDTP GGITP GMRTTP |
| GNDOR | OZ Hannover | Bremen Hannover Hannoversch-Münden | GBMTTP GHOTTP GHMTTP |
| | OS Hamburg | Hamburg Kiel Lübeck | GHGTTP GKITP GLUTP |
| GNOOR | OZ Berlin | Berlin, UK B.-Franklin Berlin, Charité | GBETTP GBCTTP |
| | OS Rostock | Rostock | GROTP |
| GNWOR | OZ Düsseldorf | Bochum Düsseldorf Essen | GBBTTP GDUTP GESTTP |
| | OS Köln-Bonn | Aachen Bonn Köln, Lindenthal Köln, Merheim | GAKTTP GBOTTP GKLTTP GKMTP |
| | OS Münster | Münster | GMNTTP |
| GOSOR | OZ Leipzig | Dresden Halle Jena Leipzig | GDRTP GHATTP GJETTP GLPTTP |

4.12 Forms

All forms can be found and downloaded from the section 'Forms' of the Library of the member site at www.eurotransplant.org.

4.13 Pending recommendations

| Number | Description | Date approval board | Status |
|------------|--|---------------------|--|
| R-KAC03.10 | Waiting time return after living transplantation | May 2010 | Implemented Non-German countries, pending implementation Germany |
| R-KAC01.12 | 500 bonus points for kidney failure after living kidney donation | May 2012 | Implemented Non-German countries, not authorized Germany |
| R-KAC02.14 | Allocation of kidneys from donors >65 years | Sept. 2014 | Pending implementation |
| R-KAC03.14 | Interruption of dialysis | Jan 2015 | Declined in Germany, will be implemented in the countries that accepted the recommendation |
| R-KAC01.16 | Prioritization for KALT patients on the ESP match list | Jan 2016 | Pending implementation |
| R-KAC03.16 | Kidney-after-other organ transplantation (KAOO) bonus | Sept. 2016 | Pending implementation |
| R-KAC04.16 | Regulation for transplantation after a positive cross match result | Jan 2016 | Pending authorization Germany |
| R-KAC02.17 | Blood group rules in kidney allocation | Oct. 2017 | Pending implementation |
| R-KAC03.17 | Return waiting time | Oct. 2017 | Pending implementation |
| R-KAC04.17 | Pediatric waiting list registration | Oct. 2017 | Implemented excl. the change of audit procedure on maturation and max age for pediatric status Pending authorization in more than 1 country |
| P-KAC02.18 | Decision time in the EA of kidneys | Oct. 2018 | Implemented Non-German countries, Pending authorization Germany |
| R-KAC01.19 | Indications for High Urgent kidney transplantation | Jan. 2019 | Pending implementation |
| R-KAC01.20 | Mandatory recipient items | | Discussion board |
| R-KAC02.20 | Compensation via audit procedure in special cases | | Discussion board |
| R-KAC02.20 | Prioritization of HU and KAOO patients on the ESP match list | | Discussion board, recommendation will replace R-KAC01.16 |
| R-KAC02.20 | Exclusion of AM and immunized patients from EA and rescue allocation | | Discussion board |

