OPTN/UNOS Histocompatibility Committee

Proposal to Update the Human Leukocyte Antigen (HLA) Equivalency Tables

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Executive Summary

Policy 4.7: *HLA Antigen Values and Split Equivalences*, states; “The Histocompatibility Committee must review and recommend any changes needed to the tables on or before June 1 of each year.” The Board of Directors approved the most recent updates to the Equivalency Tables in November 2013. Since that time, additional equivalencies have been proposed which should be incorporated into the tables in policy. This proposal also adds alleles to the Human Leukocyte Antigen (HLA) dropdown options in UNet^{SM} to increase access to transplant for sensitized candidates. The Histocompatibility Committee (the Committee) also proposes updating references to these HLA loci in policy to HLA-DPB1, HLA-DQA1, and HLA-DQB1 to distinguish them from other similar HLA loci.

Is the sponsoring Committee requesting specific feedback or input about the proposal?

The Committee is requesting that members review this policy for accuracy and completeness.

Proposal to Update the Human Leukocyte Antigen (HLA) Equivalency Tables

Affected Policies: Policies *2.11.A: Required Information for Deceased Kidney Donors; 2.11.B: Required Information for Deceased Liver Donors; 2.11.C: Required Information for Deceased Heart Donors; 2.11.D: Required Information for Deceased Lung Donors; 2.11.E: Required Information for Deceased Pancreas Donors; 4.1.A: Requirements for Performing and Reporting HLA Typing; 4.2.A: Deceased Donor HLA Typing; 4.9: Reference Tables of HLA Antigen Values and Split Equivalences; 13.5.A: HLA Typing Requirements for OPTN KPD Candidates; and 13.5.C: HLA Typing Requirements for OPTN KPD Donors*

Sponsoring Committee: Histocompatibility Committee

Public Comment Period: August 14 – October 14, 2015

What problem will this proposal solve?

Policy 4.7: *HLA Antigen Values and Split Equivalences*, states; "The Histocompatibility Committee must review and recommend any changes needed to the tables on or before June 1 of each year." The Board of Directors approved the most recent updates to the Equivalency Tables in November 2013. Since that time, additional equivalencies have been proposed which should be incorporated into the tables in policy.

This proposal also adds additional alleles (subtypes) to the HLA antigen dropdown options in UNet^{SM} to increase access to transplant for sensitized candidates and improve identification of zero antigen mismatches.[1] Current dropdowns are unnecessarily disadvantaging candidates who have antibodies against some but not all alleles in a single antigen group. For these patients, members currently can only list corresponding antigens (inclusive of all alleles in the group) as unacceptable antigens, excluding candidates from a broader donor pool than necessary. In addition, candidates with an allele specific antibody that is in the same antigen group as their own allele cannot have the unacceptable allele or the antigen listed. (e.g., candidate type: B*44:02; unacceptable allele, B*44:03).

Additionally, current policy references HLA-DPB, HLA-DQA, and HLA-DQB. This terminology is not medically accurate nomenclature. Therefore, the Committee also proposes updating references to these HLA loci in policy to HLA-DPB1, HLA-DQA1, and HLA-DQB1 to distinguish them from other closely related loci.

Why should you support this proposal?

Updating the equivalency tables ensures that advances in HLA typing and the frequencies of antigens reported for donors as well as antigens and unacceptable antigens reported for candidates are correctly reflected in policy. This increases access for many candidates on the waitlist by creating opportunities for candidates to receive appropriate offers, because compatible donors will not be excluded based on outdated or broad HLA typing constraints of prior equivalency tables.

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[1] See OPTN/UNOS Policy 1.2: Definitions for "Zero antigen mismatch". http://optn.transplant.hrsa.gov/ContentDocuments/OPTN_Policies.pdf#nameddest=Policy_01

This proposal also significantly reduces the risk of shipping kidneys nationally and regionally to a candidate who has an allele (subtype) specific antibody, which would not be known until the donor material was received and either expanded typing of the donor or a positive crossmatch was obtained. This should result in less organ wastage and fewer transplants into patients other than the intended recipient.

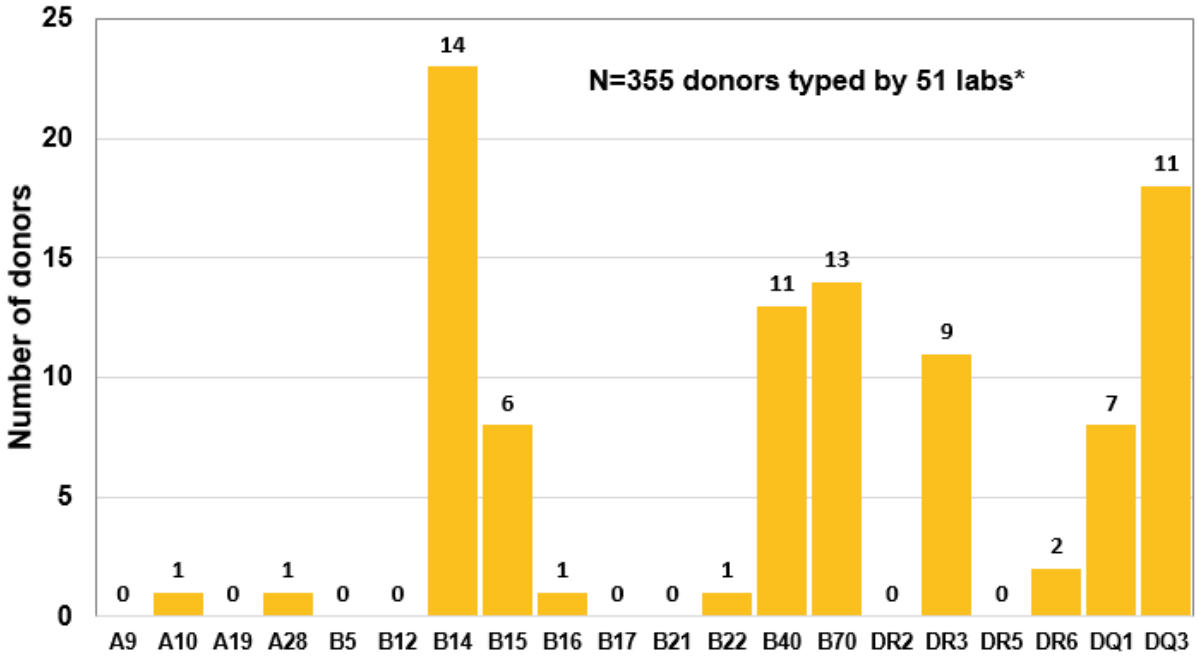
How was this proposal developed?

The Committee members reviewed the current version of the HLA Equivalency Tables and made independent suggestions for updates based upon what current testing methods can clearly distinguish and what Committee members are commonly seeing in practice in their labs. The Committee members then compared their suggestions and agreed to the priorities for updating the tables. A unanimous vote from the Committee was obtained for the approval of the updated tables.

How well does this proposal address the problem statement?

The Committee first focused on Tables 4-3, 4-4, and 4-5 in Policy 4.9: *Reference Tables of HLA Antigen Values and Split Equivalences*, which are used to determine 0-ABDR and DR mismatches between candidates and donors for kidney and pancreas/kidney-pancreas allocation. The Committee reviewed data regarding the frequencies of antigens reported for deceased donors and kidney, pancreas, and kidney-pancreas candidates to determine how often broad antigens are reported (Exhibit A).

Figure 1. Broad antigens reported for deceased donors (2013-2014)



*** C3 was reported by 33 labs for 264 donors.**
Note: Labels show the number of labs for each broad antigen.

The Committee found that broad antigens were reported for only 355 donors out of more than 16,000 donors (about 2.2%). In general, listing a broad antigen means that the actual antigen present has not been defined. For example, B70 has been subdivided into either B71 or B72. There is no longer an antigen known as B70. Therefore, certain broad antigen equivalencies will be changed in the tables (e.g., in the Matching table, B70 will no longer be equivalent to B71 or B72 but only to itself whereas in the Unacceptable table, B70 will be equivalent to itself and to B71 and B72 to prevent accidental offers to a

candidate because centers are unaware of the equivalences). The changes to the Matching and Unacceptable antigen equivalency tables for certain broad antigens will have a beneficial impact on candidates with the subtypes (e.g. B71 and B72) reported as their HLA due to more compatible donor offers. Candidates that are reported with the broad antigens (e.g. B70) will simply need to be retyped. For example, for a 0-ABDR mismatch offer, a candidate's B70 will remain equivalent to a donor's B70 (i.e., undefined), but will no longer be equivalent to a donor's B71 or B72. There were only 14 deceased donors in 2013-2014 with B70 reported, compared to 283 and 407 deceased donors with B71 and B72, respectively. Both donors and candidates with broad antigens listed are expected to decrease now that molecular typing is required for all donors and the subtypes can be well defined.

The Committee decided to leave some existing broad antigens in the tables, effectively allowing them to remain in the HLA dropdowns in UNet^{SM}, so members will be able to report values in cases of rare alleles that may not have any closer serological equivalents.

The Committee also proposed deleting A210, B1304, B3901, B3902, B5103, B7801 and B8201 because either solid phase antibody testing cannot identify an antibody to the allele or the allele designation is not necessary. Only 35 deceased donors recovered in 2013-2014, and only 172 registrations on the waiting list on June 19, 2015, had any of these antigens reported.

The Committee also determined it is important to clarify the tables by removing asterisks that are currently in policy and adding more common alleles to the tables.

The Committee also proposes updating the nomenclature of HLA-DPB, HLA-DQA, and HLA-DQB to HLA-DPB1, HLA-DQA1, and HLA-DQB1. These labels more accurately reflect the nomenclature used in the HLA community. For example, there are two DQA loci: DQA1 and DQA2. The Committee is only concerned with DQA1. The same is true for DQB1 and DPB1. The Committee proposes changes to these loci first to coincide with current programming efforts in UNet^{SM}.

Which populations are impacted by this proposal?

All candidates are positively impacted by this proposal. There will be more opportunity for zero mismatch offers. It will also improve allocation due to improved antigen definition, more accurate virtual crossmatching, and fewer unexpected positive crossmatches. It will also better ensure that regional or national sharing for very high CPRA candidates will result in transplant into the intended recipient. Additionally, it will greatly facilitate the virtual crossmatching for the OPTN/UNOS KPD program.

How does this proposal support the OPTN Strategic Plan?

1. *Increase the number of transplants:* This proposal potentially increases the number of transplants by improving the efficiency of the allocation and decreasing futile shipments of organs for sensitized patients. The Committee hypothesizes that decreasing futile shipments of organs will decrease the number of discarded organs.

2. *Improve equity in access to transplants:* This proposal improves equity in access to transplant by allowing members to enter more specific data. Current dropdowns are unnecessarily disadvantaging candidates who have antibodies against some but not all alleles in a single antigen group. For these patients, members currently can only list corresponding antigens (inclusive of all alleles in the group) as unacceptable antigens, excluding candidates from a broader donor pool than necessary. For highly sensitized candidates, the allocation will more likely be to the intended compatible candidate. Once more specific options are available, hospitals can list the appropriate unacceptable antigens or alleles and increase access to transplant for those patients.

3. *Improve waitlisted patient, living donor, and transplant recipient outcomes:* This proposal helps improve transplant recipient outcomes because a higher degree of specificity in the equivalency tables will result in better compatibility and should decrease the probability of post-transplant rejection. By more efficiently allocating the organ to the candidate most likely to have a negative crossmatch, it reduces the cold ischemia time on the organ, which increases the likelihood of a better outcome.

4. *Promote living donor and transplant recipient safety:* This proposal helps improve transplant recipient safety by reducing or eliminating loss of organs due to futile shipments that result in unexpected positive crossmatches and subsequent unacceptable cold ischemia times.

5. *Promote the efficient management of the OPTN:* There is no impact to this goal.

How will the sponsoring Committee evaluate whether this proposal was successful post implementation?

The Histocompatibility Committee will evaluate changes in unacceptable antigen reporting and resulting CPRA values due to revisions of unacceptable antigen equivalences immediately after the implementation compared to values immediately prior to the implementation. The policy will continue to be evaluated 1 and 2 years post-implementation.

The Committee's hypothesis is that more accurate typing will result in improved allocation due to better virtual crossmatching and increase transplants to the intended recipients. The following questions, and any others subsequently requested by the Committee, will guide the evaluation of the proposal after implementation:

1. Are members reporting donor HLA and unacceptable antigens for newly added values?
2. Has the proposal decreased reporting of broad antigens for kidney, kidney-pancreas and pancreas registrations on the waiting list?
3. Has the proposal affected the number of zero-HLA mismatch deceased donor kidney, kidney-pancreas and pancreas transplants?
4. Has the proposal affected the number of zero and one HLA-DR mismatch deceased donor kidney transplants?
5. Has the reporting of unacceptable antigens on the waiting list increased after implementation?
6. Have the number of organ offers refused due to a positive crossmatch changed after implementation?
7. Have the number of organs not transplanted into the intended recipient changed after implementation?
8. Was there a change in CPRA values amongst kidney, kidney-pancreas, and pancreas registrations on the waiting list?

The following metrics, and any other subsequently requested by the Committee, will be compared before and after the implementation to evaluate the proposal:

1. Deceased donor HLA frequencies reported prior to allocation.
2. HLA and unacceptable antigen frequencies of kidney, kidney-pancreas and pancreas registrations on the waiting list.
3. The number and percentage of zero-HLA mismatch deceased donor kidney, kidney-pancreas, and pancreas transplants and graft survival for recipients of those transplants.
4. The number and percentage of zero and one DR-HLA mismatch deceased donor kidney transplants and graft survival for recipients of those transplants.
5. The number and percentage of offers refused due to a positive crossmatch.

6. The number of organs not transplanted the intended recipient.
7. Change in CPRA values for kidney, kidney-pancreas and pancreas registrations on the day of implementation (will be done immediately after the implementation).

How will the OPTN implement this proposal?

IT will update UNet[SM] with the proposed HLA-A, B, Bw4, Bw6, C, DR, and DQB1 equivalences that are used for matching purposes, screening based on unacceptable antigens, and for calculating CPRA. UNOS IT provides cost estimates for each public comment proposal that will require programming to implement. The estimates can be small (108-419 hrs.), medium (420-749 hrs.), large (750-1,649 hrs.), very large (1,650-3,999), or enterprise (4,000-8,000). The IT estimate for this proposal is large.

The OPTN will educate the public on any policy or system changes through Policy Notices (and/or System Notices). This proposal will also be monitored for potential instructional opportunities, in order to give members, professionals and the transplant community an avenue to gain information, ask questions, and modify processes, if necessary.

How will members implement this proposal?

All OPTN members will need to familiarize themselves with these changes. Transplant programs may need to request updated HLA typing using molecular methods for existing candidates who may be disadvantaged by the changes to the HLA Matching Equivalences tables, especially for any candidate who has a 'broad' antigen listed in their reported HLA type. Labs in particular will be required to assign antigens less broadly to candidates than has been the practice in the past. Members may also need to review and modify unacceptable antigens reported for candidates with antibodies against alleles that are being added.

Will this proposal require members to submit additional data?

This proposal does not require collection of any additional data fields. However, this proposal may change how a candidate's HLA antigens and unacceptable antigens (currently collected) are entered on the waiting list:

- This proposal may decrease the number of kidney, kidney-pancreas, and pancreas candidates with broad HLA antigens reported on the waiting list. Proposed changes give centers an incentive to type candidates using molecular methods and to define their types more specifically to improve their opportunity for transplant.
- This proposal may result in increased reporting of some unacceptable antigens on the waiting list and will give members an opportunity to report more specific data.

How will members be evaluated for compliance with this proposal?

The proposed language does not change any member compliance requirements, so there will be no need to evaluate member compliance with the proposal.

Policy or Bylaw Language

Proposed new language is underlined and (example) and language that is proposed for removal is struck through (~~example~~).

2.11 Required Deceased Donor Information

2.11.A Required Information for Deceased Kidney Donors

The host OPO must provide *all* the following additional information for all deceased donor kidney offers:

1. Date of admission for the current hospitalization
2. Donor name
3. Donor ID
4. Ethnicity
5. Relevant past medical or social history
6. Current history of abdominal injuries and operations
7. Current history of average blood pressure, hypotensive episodes, average urine output, and oliguria
8. Current medication and transfusion history
9. Anatomical description, including number of blood vessels, ureters, and approximate length of each
10. Human leukocyte antigen (HLA) information as follows: A, B, Bw4, Bw6, C, DR, DR51, DR52, DR53, DQA1, DQB1, and DPB1 antigens prior to organ offers.
11. Indications of sepsis
12. Injuries to or abnormalities of the blood
13. Assurance that final blood and urine cultures are pending
14. Final urinalysis
15. Final blood urea nitrogen (BUN) and creatinine
16. Recovery blood pressure and urine output information
17. Recovery medications
18. Type of recovery procedure, flush solution and method, and flush storage solution
19. Warm ischemia time and organ flush characteristics

2.11.B Required Information for Deceased Liver Donors

The host OPO must provide *all* the following additional information for all deceased donor liver offers:

1. Donor name
2. Donor ID
3. Ethnicity
4. Height
5. Weight
6. Vital signs, including blood pressure, heart rate and temperature
7. Social history, including drug use
8. History of treatment in hospital including current medications, vasopressors, and hydration
9. Current history of hypotensive episodes, urine output, and oliguria
10. Indications of sepsis
11. Aspartate aminotransferase (AST)
12. Bilirubin (direct)
13. Other laboratory tests within the past 12 hours including:
    a. Alanine aminotransferase (ALT)
    b. Alkaline phosphatase
    c. Total bilirubin
    d. Creatinine

e. Hemoglobin (hgb) and hemocrit (hct)
f. International normalized ration (INR) or Prothrombin (PT) if INR is not available, and partial thromboplastin time (PTT)
g. White blood cell count (WBC)

14. Human leukocyte antigen (HLA) typing if requested by the transplant hospital, including A, B, Bw4, Bw6, C, DR, DR51, DR52, DR53, DQA1, DQB1, and DPB1 antigens in the timeframe specified by the transplant program

If a transplant program requests HLA typing for a deceased liver donor, it must communicate this request to the OPO and the OPO must provide the HLA information listed above. The transplant program must document requests for donor HLA typing, including the turnaround time specified for reporting the donor HLA typing results. The OPO must document HLA typing provided to the requesting transplant program.

2.11.C Required Information for Deceased Heart Donors

The host OPO must provide *all* the following additional information for all deceased donor heart offers:

1. Height
2. Weight
3. Vital signs, including blood pressure, heart rate, and temperature
4. History of treatment in hospital including vasopressors and hydration
5. Cardiopulmonary, social, and drug activity histories
6. Details of any documented cardiac arrest or hypotensive episodes
7. 12-lead interpreted electrocardiogram
8. Arterial blood gas results and ventilator settings
9. Cardiology consult or echocardiogram, if the hospital has the facilities
10. Human leukocyte antigen (HLA) typing if requested by the transplant hospital, including A, B, Bw4, Bw6, C, DR, DR51, DR52, DR53, DQA1, DQB1, and DPB1 antigens prior to the final organ acceptance
11. Toxoplasma antibody (Ab) test result or an appropriate donor sample sent with the heart for testing at the transplant hospital

For heart deceased donors, if a transplant program requires donor HLA typing prior to submitting a final organ acceptance, it must communicate this request to the OPO and document the request. The OPO must provide the HLA information required in the list above and document that the information was provided to the transplant program.

The heart recovery team must have the opportunity to speak directly with the responsible ICU personnel or the onsite donor coordinator in order to obtain current information about the deceased donor's physiology.

2.11.D Required Information for Deceased Lung Donors

The host OPO must provide *all* the following additional information for all deceased lung donor offers:

1. Height
2. Weight
3. Vital signs, including blood pressure, heart rate, and temperature
4. History of medical treatment in hospital including vasopressors and hydration
5. Smoking history
6. Cardiopulmonary, social, and drug activity histories
7. Arterial blood gases and ventilator settings on 5 cm/H_20/PEEP including PO_2/FiO_2 ratio and preferably 100% FiO_2, within 2 hours prior to the offer
8. Bronchoscopy results

9. Chest x-ray interpreted by a radiologist or qualified physician within 3 hours prior to the offer
10. Details of any documented cardiac arrest or hypotensive episodes
11. Sputum gram stain, with description of sputum
12. Electrocardiogram
13. Echocardiogram, if the OPO has the facilities
14. HLA typing if requested by the transplant hospital, including A, B, Bw4, Bw6, C, DR, DR51, DR52, DR53, DQA1, DQB1, and DPB1 antigens prior to final organ acceptance

If the host OPO cannot perform a bronchoscopy, it must document that it is unable to provide bronchoscopy results and the receiving transplant hospital may perform it. The lung recovery team may perform a confirmatory bronchoscopy provided unreasonable delays are avoided and deceased donor stability and the time limitations in *Policy 5.5.B: Time Limit for Acceptance* are maintained.

For lung deceased donors, if a transplant hospital requires donor HLA typing prior to submitting a final organ acceptance, it must communicate this request to the OPO and document the request. The OPO must provide the HLA information required in the list above and document that the information was provided to the transplant program.

The lung recovery team must have the opportunity to speak directly with the responsible ICU personnel or the onsite OPO donor coordinator in order to obtain current information about the deceased donor's physiology.

2.11.E Required Information for Deceased Pancreas Donors

The host OPO must provide *all* the following additional information for all deceased donor pancreas offers:

1. Donor name
2. Donor ID
3. Ethnicity
4. Weight
5. Date of admission for the current hospitalization
6. Alcohol use (if known)
7. Current history of abdominal injuries and operations including pancreatic trauma
8. Current history of average blood pressure, hypotensive episodes, cardiac arrest, average urine output, and oliguria
9. Current medication and transfusion history
10. Pertinent past medical or social history including pancreatitis
11. Familial history of diabetes
12. Insulin protocol
13. Indications of sepsis
14. Serum amylase
15. Serum lipase
16. HLA information as follows: A, B, Bw4, Bw6, C, DR, DR51, DR52, DR53, DQA1, DQB1, and DPB1 antigens prior to organ offers.

4.1 HLA Typing

4.1.A Requirements for Performing and Reporting HLA Typing

Laboratories must do *all* of the following:

1. Perform HLA typing on all potential transplant recipients and donors when requested by a physician or other authorized individuals.
2. Ensure that all HLA typing is accurately determined and report HLA typing results to the OPO or Transplant Program according to the turnaround time specified in the written agreement between the laboratory and any affiliated OPO or transplant program.
3. Report serological split level and molecular typing results to the OPO for all required HLA types according to ~~Table 4.1 *HLA Typing Requirements for Deceased Donors*~~ Policy 2.11: *Required Deceased Donor Information*, whenever the lab performs HLA typing on deceased kidney, kidney-pancreas, and pancreas donors.
4. Report HLA typing results to the Transplant Program for all required HLA types, according to Table 4.~~2~~1 *HLA Typing Requirements for Candidates,* whenever the laboratory performs HLA typing on candidates.

~~Table 4.1 shows HLA types required to be reported for deceased donors.~~

~~Table 4.1: HLA Typing Requirements for Deceased Donors~~

~~Organ~~	~~A~~	~~B~~	~~Bw4~~	~~Bw6~~	~~C~~	~~DR~~	~~DR51~~	~~DR52~~	~~DR53~~	~~DPB~~	~~DQB~~
~~Kidney~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~
~~Pancreas~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~
~~Kidney-Pancreas~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~
~~Heart*~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~
~~Lung*~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~	~~●~~

~~* For deceased heart and lung donors, if a transplant hospital requires donor HLA typing prior to submitting a final organ acceptance, it must communicate this request to the OPO and document this request. The OPO must provide the HLA information required in the table above and document that the information was provided to the transplant program. The transplant hospital may request HLA-DPB typing, but the OPO need only provide it if its affiliated laboratory performs related testing.~~

Table 4.~~2~~1 shows HLA types required to be reported for candidates.

Table 4.~~2~~1: HLA Typing Requirements for Candidates

Organ	A	B	Bw4	Bw6	DR
Kidney alone	●	●	●	●	●
Pancreas alone	●	●	●	●	●

Organ	A	B	Bw4	Bw6	DR
Kidney-Pancreas	●	●	●	●	●

4.2 Requirements for Performing and Reporting HLA Typing

Laboratories must ensure that all HLA typing is accurately determined and report HLA typing results to the OPO or Transplant Program according to the turnaround time specified in the written agreement between the laboratory and any affiliated OPO or transplant program.

4.2.A Deceased Donor HLA Typing

If the laboratory performs HLA typing on a deceased donor, the laboratory must perform molecular typing and report results at the level of serological splits to the OPO for all required HLA types on deceased donors according to Table 4-~~3~~2 Deceased Donor HLA Typing Requirements.

Table 4-~~3~~2 below provides the requirements of HLA typing of HLA A, B, Bw4, Bw6, C, DR, DR51, DR52, DR53, DQA1, DQB1, and DPB1 antigens.

Table 4-~~3~~2: Deceased Donor HLA Typing Requirements

If a Laboratory Performs HLA Typing on a:	Then the Laboratory Must Report Results to the OPO at the Following Times:
Deceased Kidney, Kidney-Pancreas, or Pancreas Donor	Prior to organ offers
Deceased Heart, Heart-Lung, or Lung Donor	Prior to final acceptance, if required by the transplant program
Deceased Liver Donor	Within the period specified by the transplant program

4.9 Reference Tables of HLA Antigen Values and Split Equivalences

Tables 4-3, 4-4, and *4-5*, show ~~patient~~candidate-donor antigen combinations and whether they are mismatches. For each candidate antigen, the donor antigens that are not mismatched are listed below. All other combinations are considered mismatches. ~~Antigens with an * indicate an allele that may not have a World Health Organization (WHO) approved serologic specificity. Antigens given **99 means the patient locus was not tested.~~

204 **Table 4-3 HLA A Matching Antigen Equivalences**

Patient A Locus Antigen	Equivalent Donor Antigens
1	1
2	2, 0201, 0202, 0203, 0205, 0206
0201	0201, 2
0202	0202, 2
0203	0203, 2
0205	0205, 2
0206	0206, 2
3	3
9	9
10	10
11	11, 1101, 1102
1101	1101, 11
1102	1102, 11
19	19
23	23
24	24, 2402, 2403
2402	2402, 24
2403	2403, 24
25	25
26	26
28	28
29	29, 2901, 2902
2901	2901, 29
2902	2902, 29
30	30, 3001, 3002
3001	3001, 30
3002	3002, 30
31	31
32	32
33	33, 3301, 3303
3301	3301, 33
3303	3303, 33
34	34
3401	3401, 34
3402	3402, 34
36	36
43	43
66	66, ~~*~~6601, ~~*~~6602
6601	6601, 66
6602	6602, 66
68	68, 6801, 6802
6801	6801, 68
6802	6802, 68
69	69
74	74
80	80
~~203~~	~~203, 2~~
~~210~~	~~210, 2~~
~~2403~~	~~2403, 24~~
~~*6601~~	~~*6601, 66~~
~~*6602~~	~~*6602, 66~~
~~** 99~~	~~(No equivalent)~~

205

206 **Table 4-4: HLA B Matching Antigen Equivalences**

Patient B Locus Antigen	Equivalent Donor Antigens
5	5
7	7~~, 703~~
0703	0703, 7
8	8, 0802, 0803
0802	0802, 8
0803	0803, 8
0804	0804
12	12
13	13, 1301, 1302
1301	1301, 13
1302	1302, 13
14	14
1401	1401
1402	1402
15	15
1502	1502, 75
1511	1511, 75
16	16
17	17
18	18
21	21
22	22
27	27
2708	2708
35	35
37	37
38	38

Patient B Locus Antigen	Equivalent Donor Antigens
39	39, ~~3901,~~ 3902, ~~*~~3905
3905	3905, 39
40	40~~, 61~~
4001	4001, 60
4002	4002, 61
4005	4005, 50
4006	4006, 61
41	41
42	42
44	44, 4402, 4403
4402	4402, 44
4403	4403, 44
4415	4415, 45
45	45, 4415
46	46
47	47
48	48
49	49
50	50, 4005
51	51, 5101, 5102~~, 5103~~
5101	5101, 51

Patient B Locus Antigen	Equivalent Donor Antigens
5102	5102, 51
52	52
53	53
54	54
55	55
56	56
57	57, 5701, 5703
5701	5701, 57
5703	5703, 57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
67	67
70	70~~, 71, 72~~
71	71~~, 70~~
72	72~~, 70~~
73	73

Patient B Locus Antigen	Equivalent Donor Antigens
75	75, 1502, 1511 ~~15~~
76	76~~, 15~~
77	77~~, 15~~
78	78
81	81
82	82~~, *8201~~
~~703~~	~~703,7~~
~~*0804~~	~~*0804, 8~~
~~*1304~~	~~*1304, 15, 21, 49, 50~~
~~2708~~	~~2708, 27~~
~~3901~~	~~3901, 39~~
~~3902~~	~~3902, 39~~
~~*3905~~	~~*3905, 39~~
~~4005~~	~~4005, 50~~
~~5101~~	~~5101, 51~~
~~5102~~	~~5102, 51, 53~~
~~5103~~	~~5103, 51~~
~~7801~~	~~7801~~
~~*8201~~	~~*8201, 82~~
~~** 99~~	~~(No equivalent)~~

209

Table 4-5: HLA DR Matching Antigen Equivalence

Patient DR Locus Antigen	Equivalent Donor Antigens
1	1, ~~103~~
0101	0101, 1
0102	0102, 1
103	103
2	2
3	3
0301	0301, 17
0302	0302, 18
4	4
0401	0401, 4
0402	0402, 4
0403	0403, 4
0404	0404, 4
0405	0405, 4
0407	0407, 4
5	5
6	6
7	7
8	8
9	9
0901	0901, 9
0902	0902, 9
10	10
11	11
1101	1101, 11
1104	1104, 11

Patient DR Locus Antigen	Equivalent Donor Antigens
12	12
1201	1201, 12
1202	1202, 12
13	13, 1301, 1303
1301	1301, 13
1303	1303, 13
14	14, 1401, 1402, 1403, 1404, 1454
1401	1401, 14
1402	1402, 14
1403	1403
1404	1404
1454	1454, 14
15	15
1501	1501, 15
1502	1502, 15
1503	1503, 15
16	16
1601	1601, 16
1602	1602, 16
17	17
18	18
~~103~~	~~103, 1~~
~~1403~~	~~1403, 14, 6~~
~~1404~~	~~1404, 14, 6~~

Patient DR Locus Antigen	Equivalent Donor Antigens
~~** 99~~	~~(No equivalent)~~

210

~~*** Indicates an allele; may not have a WHO-approved serologic specificity**~~

~~**** Code 99 means not tested**~~

Examples of how "Matching Antigen Equivalences" works:

If the ~~patient~~candidate types as ~~has~~ B70: Only d~~D~~onors that type as~~with~~ B70~~, B71, and B72~~ are considered ~~not mis~~matched.

If the~~ patient~~candidate types as~~has~~ B71 or B72: Only d~~D~~onors that type as~~with~~ B71 and B72~~0~~, respectively, are considered ~~not mis~~matched. ~~Donors with B72 are considered mismatched.~~

Tables 4-6, 4-7, 4-8, 4-9, 4-10, 4-11, 4-12 and *4-13*, show candidate-donor unacceptable antigen combinations. For each candidate antigen, the donor antigens that are unacceptable are listed below.

Table 4-6: HLA A Unacceptable Antigen Equivalences

Patient Unacceptable A Locus Antigen	Donor Equivalent Antigens
1	1
2	2, 0201, 0202, 0203, 0205, 0206 ~~210~~
0201	0201
0202	0202
0203	0203
0205	0205
0206	0206
3	3
9	9, 23, 24, 2402, 2403
10	10, 25, 26, 34, 3401, 3402, 66, ~~*~~6601, ~~*~~6602, 43

Patient Unacceptable A Locus Antigen	Donor Equivalent Antigens
11	11, 1101, 1102
1101	1101
1102	1102
19	19, 29, 2901, 2902, 30, 3001, 3002, 31, 32, 33, 3301, 3303, 74
23	23
24	24, 2402, 2403
2402	2402
2403	2403
25	25
26	26
28	28, 68, 69

Patient Unacceptable A Locus Antigen	Donor Equivalent Antigens
29	29, 2901, 2902
2901	2901
2902	2902
30	30, 3001, 3002
3001	3001
3002	3002
31	31
32	32
33	33, 3301, 3303
3301	3301
3303	3303
34	34
3401	3401
3402	3402

Patient Unacceptable A Locus Antigen	Donor Equivalent Antigens
36	36
43	43
66	66, *6601, *6602
6601	6601
6602	6602

Patient Unacceptable A Locus Antigen	Donor Equivalent Antigens
68	68, 6801, 6802
6801	6801
6802	6802
69	69
74	74

Patient Unacceptable A Locus Antigen	Donor Equivalent Antigens
80	80
~~203~~	~~203~~
~~210~~	~~210~~
~~2403~~	~~2403~~
~~*6601~~	~~*6601~~
~~*6602~~	~~*6602~~

225

226

227 **Table 4-7 HLA B Unacceptable Antigen Equivalences**

Patient Unacceptable B Locus Antigen	Donor Equivalent Antigens
5	5, 51, 5101, 5102, ~~5103,~~ 52~~, 78~~
7	7~~, 703,~~
703	703
8	8, 0802, 0803
0802	0802, 8
0803	0803, 8
0804	0804
12	12, 44, 4402, 4403, 4415, 45
13	13, 1301, 1302
1301	1301

Patient Unacceptable B Locus Antigen	Donor Equivalent Antigens
1302	1302
14	14, 64, 65
1401	1401
1402	1402
15	15, 62, 63, 75, 76, 77
1501	1501
1502	1502
1503	1503
1510	1510
1511	1511
1512	1512
1513	1513
1516	1516

Patient Unacceptable B Locus Antigen	Donor Equivalent Antigens
16	16, 38, 39
17	17, 57, 5701, 5702, 58
18	18
21	21, 49, 50, 4005
22	22, 54, 55, 56
27	27, 2708
2708	2708
35	35
37	37
38	38
39	39~~, 3901, 3902, *3905~~

Patient Unacceptable B Locus Antigen	Donor Equivalent Antigens
3905	3905
40	40, 60, 61
4001	4001, 60
4002	4002
4005	4005, 50
4006	4006
41	41
42	42
44	44, 4402, 4403
4402	4402
4403	4403
4415	4415, 45
45	45, 4415
46	46
47	47
48	48
49	49
50	50, 4005
51	51, 5101, 5102 ~~5103~~
5101	5101
5102	5102
52	52
53	53
54	54
55	55

Patient Unacceptable B Locus Antigen	Donor Equivalent Antigens
56	56
57	57, 5701, 5703
5701	5701
5703	5703
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
67	67
70	70, 71, 72
71	71
72	72
73	73
75	75
76	76
77	77
78	78
81	81
82	82, ~~*8201~~
~~703~~	~~703~~
~~*0804~~	~~*0804~~

Patient Unacceptable B Locus Antigen	Donor Equivalent Antigens
~~*1304~~	~~*1304~~
~~2708~~	~~2708~~
~~3901~~	~~3901~~
~~3902~~	~~3902~~
~~*3905~~	~~*3905~~
~~4005~~	~~4005, 50~~
~~5102~~	~~5102~~
~~5103~~	~~5103~~
~~7801~~	~~7801, 78~~
~~*8201~~	~~*8201, 82~~
Bw4	Bw4, 0802, 0803, 0804, 5, 13, 1301, 1302, 1513, 1516, 17, 27, 37, 38, 44, 4402, 4403, 4415, 47, 49, 51, 5101, 5102, 52, 53, 57, 5701, 5703, 58, 59, 63, 77

18

Patient Unacceptable B Locus Antigen	Donor Equivalent Antigens
Bw6	Bw6, 7, 8, 14, 1401, 1402,1501, 1502, 1503, 1510, 1511, 1512,18, 22, 2708, 35, 39, 3905, 40, 4002, 4006, 41, 42, 45, 48, 50, *4005, 54, 55, 56, 60, 61, 62, 64, 65, 67, 70, 71, 72, 75, 76, 78, 81, 82

228

229

230 **Table 4-8: HLA C Unacceptable Antigen Equivalences**

Patient Unacceptable C Locus Antigen	Donor Equivalent Antigens
w01	w01
w02	w02
w03	w03, w09, w10
w04	w04
w05	w05

Patient Unacceptable C Locus Antigen	Donor Equivalent Antigens
w06	w06
w07	w07
w08	w08
w09	w09
w10	w10
*12	*12

Patient Unacceptable C Locus Antigen	Donor Equivalent Antigens
*14	*14
*15	*15
*16	*16
*17	*17
*18	*18

231

232

Table 4-9: HLA DR Unacceptable Antigen Equivalences

Patient Unacceptable DR Locus Antigen	Donor Equivalent Antigens
1	1, 0101, 0102
0101	0101
0102	0102
103	103
2	2, 15, 1501, 1502, 1503, 16, 1601, 1602
3	3, 17, 18
0301	0301, 17
0302	0302, 18
4	4, 0401, 0402, 0403, 0404, 0405
0401	0401
0402	0402
0403	0403
0404	0404
0405	0405
0407	0407
5	5, 11, 1101, 1102, 12, 1201, 1202
6	6, 13, 1303, 14, 1401, 1402, 1403, 1404, 1454
7	7
8	8
9	9, 0901, 0902
0901	0901
0902	0902
10	10
11	11, 1101, 1104
1101	1101
1104	1104
12	12, 1201, 1202
1201	1201
1202	1202
13	13, 1303
1301	1301
1303	1303
14	14, 1401, 1402, 1403, 1404, 1454
1401	1401
1402	1402
1403	1403
1404	1404
1454	1454
15	15, 1501, 1502, 1503
1501	1501
1502	1502
1503	1503
16	16, 1601, 1602
1601	1601
1602	1602
17	17
18	18
~~103~~	~~103~~
~~1403~~	~~1403~~
~~1404~~	~~1404~~
~~51*~~	~~51~~
~~52*~~	~~52~~
~~53*~~	~~53~~

Table 4-10: HLA DR51 Unacceptable Antigen Equivalences

Patient Unacceptable DR51 Locus Antigen	Donor Equivalent Antigens
5*0101	5*0101

Patient Unacceptable DR51 Locus Antigen	Donor Equivalent Antigens
5*0202	5*0202
51	51

Table 4-11: HLA DR52 Unacceptable Antigen Equivalences

Patient Unacceptable DR52 Locus Antigen	Donor Equivalent Antigens
3*0101	3*0101
3*0202	3*0202
3*0301	3*0301
52	52

Table 4-12: HLA DR53 Unacceptable Antigen Equivalences

Patient Unacceptable DR 53 Locus Antigen	Donor Equivalent Antigens
4*0101	4*0101
4*0103	4*0103
53	53

Table 4-10~~3~~: HLA DQB1 Unacceptable Antigen Equivalences

Patient Unacceptable DQB1 Locus Antigen	Donor Equivalent Antigens
1	1, 5, 6
2	2
3	3, 7, 8, 9
0301	0301, 7
0302	0302, 8
0303	0303, 9
0319	0319, 7
4	4

Patient Unacceptable DQB1 Locus Antigen	Donor Equivalent Antigens
5	5, 0501, 0502~~, 1~~
0501	0501
0502	0502
6	6~~, 1~~,0601, 0602, 0603, 0604, 0609
0601	0601
0602	0602

Patient Unacceptable DQB1 Locus Antigen	Donor Equivalent Antigens
0603	0603
0604	0604
0609	0609
7	7, 3, 0301, 0319
8	8, 3, 0302
9	9, 3, 0303

~~* Indicates an allele; may not have a WHO-approved serologic specificity~~

21

***** Please refer to the end of this section for information**

Examples of how "Unacceptable Antigen Equivalences" works:

If a ~~patient~~candidate has B70 listed as an "unacceptable antigen": Donors typed as ~~B70,~~ B71~~, and~~ or B72 are considered unacceptable. ~~Donors typed as B73 and B75 are considered acceptable.~~

Table 4-14: Additional Unacceptable Antigen Equivalences to be used in the Calculated Panel Reactive Antibody (CPRA) Only

Locus	Patient Unacceptable Antigen	Unacceptable DR antigen equivalences used for CPRA calculation
DR51	5*0101	2, 15, 16
	5*0202	2, 15, 16
	51	2, 15, 16
DR52	3*0101	3, 5, 6, 11, 12, 13, 14, 17, 18
	3*0202	3, 5, 6, 11, 12, 13, 14, 17, 18
	3*0301	3, 5, 6, 11, 12, 13, 14, 17, 18
	52	3, 5, 6, 11, 12, 13, 14, 17, 18
DR53	4*0101	4, 7, 9
	4*0103	4, 7, 9
	53	4, 7, 9

~~**Additional Unacceptable Antigen Equivalences to be used in the Calculated PRA Only**:~~

~~DR51 should also include DR2, DR15, DR16.~~
~~DR52 should also include DR3, DR5, DR6, DR11, DR12, DR13, DR14, DR17, DR18.~~
~~DR53 should also include DR4, DR7, DR9.~~

13.5 OPTN KPD Histocompatibility Testing

13.5.A HLA Typing Requirements for OPTN KPD Candidates

Before a candidate can appear on an OPTN KPD match run, the paired candidate's transplant hospital is responsible for reporting to the OPTN Contractor serological split level molecular typing results for *all* of the following:

- HLA-A
- HLA-B
- HLA-Bw4
- HLA-Bw6

22

- HLA-DR

If the candidate has unacceptable antigens listed for any of the following HLA types, then the paired candidate's transplant hospital is responsible for reporting to the OPTN Contractor serological split level molecular typing results for the corresponding HLA type before the candidate can appear on an OPTN KPD match run:

- HLA-C
- HLA-DR51
- HLA-DR52
- HLA-DR53
- HLA-DPB1
- HLA-DQA1
- HLA-DQB1

13.5.C HLA Typing Requirements for OPTN KPD Donors

Before a donor can appear on an OPTN KPD match run, the donor's transplant hospital is responsible for reporting to the OPTN Contractor serological split level molecular typing results for *all* of the following:

- HLA-A
- HLA-B
- HLA-Bw4
- HLA-Bw6
- HLA-C
- HLA-DR
- HLA-DR51
- HLA-DR52
- HLA-DR53
- HLA-DPB1
- HLA-DQA1
- HLA-DQB1

#

FINAL REPORT

Equivalency Tables Update Subcommittee of the OPTN Histocompatibility Committee
Descriptive Data Request

HLA Frequencies: Deceased Donors and Kidney, Pancreas and Kidney-Pancreas Waiting List Registrations

Prepared for:
Equivalency Tables Update Subcommittee of the Histocompatibility Committee Conference Call,
March 2, 2015

By:
Anna Y Kucheryavaya, MS
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Table of Contents

BACKGROUND/PURPOSE

Equivalency Tables Update Subcommittee was formed to review and recommend any changes need to HLA equivalency tables, as required by OPTN Policy 4.7 *HLA Antigen Values and Split Equivalences*.

During the February 19th conference call, the subcommittee discussed the upcoming addition of HLA-DQA and DPB fields to DonorNet® (donor HLA) and Waitlist[SM] (unacceptable antigens) later this year. The subcommittee members agreed that it is important to develop new equivalences and educate the community on reporting those loci.

The committee also discussed a path forward for reviewing existing HLA equivalences in Policy 4.8 *Reference Tables for HLA Antigen Values and Split Equivalences*. To facilitate the review process, the subcommittee requested the following data:

- Deceased donor HLA antigens frequencies.
- Kidney, kidney-pancreas and pancreas candidate HLA frequencies.

Donor HLA frequencies will be used to determine frequencies of reporting parent antigens vs. splits and recommend if any equivalences need to be added or deleted. Candidate HLA frequencies will inform subcommittee members about the potential impact of changes on waiting list candidates.

STRATEGIC PLAN GOAL OR COMMITTEE PROJECT ADDRESSED

Review and recommend any changes need to HLA equivalency tables, as required by OPTN Policy 4.7 *HLA Antigen Values and Split Equivalences*.

COMMITTEE REQUEST

The subcommittee requested:

- HLA-A, B, Bw4, Bw6, C, DR, DR51, DR52, DR53, and DQB frequencies reported in DonorNet® for deceased donors recovered since January 1, 2013;
- HLA-A, B, Bw4, Bw6, C, DR, DR51, DR52, DR53, and DQB frequencies for waiting list kidney, kidney-pancreas and pancreas registrations, overall and for active registrations.

DATA AND METHODS

Data Sources:

All results are based on OPTN data as of February 20, 2015. Data are subject to change based on future data submission or correction.

Cohort:

Donor HLA frequencies are based on the most recent HLA, which was used for allocation, reported for deceased donors in DonorNet®.

Waiting list registrations are limited to kidney, pancreas and kidney-pancreas registrations. A patient who is waiting at more than one center and/or for more than one organ would have multiple registrations.

RESULTS

Table 1. HLA-A frequencies for donors and registrations on the waiting list

HLA-A	Deceased donors 2013 - 2014		Kidney, pancreas, kidney-pancreas registrations waiting on 02/20/2015			
			All		Active	
	N	%	N	%	N	%
1	3,846	23.5	19,311	17.2	11,157	16.7
2	7,627	46.6	46,617	41.5	27,611	41.4
3	3,666	22.4	19,759	17.6	11,612	17.4
9	0	0.0	3	0.0	1	0.0
10	1	0.0	22	0.0	19	0.0
11	1,763	10.8	11,371	10.1	6,953	10.4
19	0	0.0	3	0.0	1	0.0
23	1,088	6.7	11,300	10.1	6,628	9.9
24	2,712	16.6	19,253	17.2	11,749	17.6
25	480	2.9	2,346	2.1	1,387	2.1
26	836	5.1	5,617	5.0	3,380	5.1
28	1	0.0	487	0.4	188	0.3
29	1,172	7.2	7,198	6.4	4,259	6.4
30	1,414	8.6	14,868	13.2	8,686	13.0
31	940	5.7	5,990	5.3	3,637	5.5
32	994	6.1	5,055	4.5	3,107	4.7
33	843	5.2	9,342	8.3	5,610	8.4
34	268	1.6	4,156	3.7	2,450	3.7
36	165	1.0	2,346	2.1	1,308	2.0
43	2	0.0	11	0.0	6	0.0
66	239	1.5	2,525	2.2	1,479	2.2
68	1,876	11.5	14,910	13.3	9,010	13.5
69	48	0.3	320	0.3	166	0.2
74	318	1.9	4,599	4.1	2,571	3.9
80	56	0.3	665	0.6	414	0.6
203	9	0.1	144	0.1	104	0.2
210	0	0.0	2	0.0	0	0.0
2403	9	0.1	64	0.1	32	0.0
6601	8	0.0	95	0.1	56	0.1
6602	2	0.0	73	0.1	45	0.1
Total*	**16,360**	**100.0**	**112,253**	**100.0**	**66,656**	**100.0**

*All donors/registrations with at least one antigen reported at this locus

Table 2. HLA-B frequencies for donors and registrations on the waiting list

HLA-B	Deceased donors 2013 - 2014		Kidney, pancreas, kidney-pancreas registrations waiting on 02/20/2015			
			All		Active	
	N	%	N	%	N	%
5	0	0.0	14	0.0	4	0.0
7	3,391	20.7	17,568	15.7	10,293	15.4
8	2,736	16.7	14,326	12.8	8,080	12.1
12	0	0.0	6	0.0	3	0.0
13	612	3.7	4,128	3.7	2,560	3.8
14	23	0.1	607	0.5	285	0.4
15	8	0.0	143	0.1	66	0.1
16	1	0.0	6	0.0	2	0.0
17	0	0.0	12	0.0	4	0.0
18	1,265	7.7	8,585	7.6	5,020	7.5
21	0	0.0	3	0.0	2	0.0
22	1	0.0	2	0.0	2	0.0
27	1,101	6.7	5,777	5.1	3,448	5.2
35	2,939	18.0	20,427	18.2	12,354	18.5
37	393	2.4	1,915	1.7	1,180	1.8
38	499	3.1	4,135	3.7	2,609	3.9
39	855	5.2	6,705	6.0	4,161	6.2
40	13	0.1	144	0.1	78	0.1
41	315	1.9	2,365	2.1	1,409	2.1
42	397	2.4	4,974	4.4	2,807	4.2
44	3,724	22.8	19,139	17.0	11,333	17.0
45	479	2.9	5,451	4.9	3,180	4.8
46	53	0.3	1,149	1.0	752	1.1
47	74	0.5	449	0.4	274	0.4
48	181	1.1	1,907	1.7	1,205	1.8
49	641	3.9	4,822	4.3	2,865	4.3
50	310	1.9	2,577	2.3	1,550	2.3
51	1,525	9.3	9,589	8.5	5,781	8.7
52	396	2.4	3,722	3.3	2,210	3.3
53	727	4.4	10,196	9.1	5,925	8.9
54	21	0.1	364	0.3	244	0.4
55	472	2.9	2,574	2.3	1,543	2.3
56	213	1.3	1,139	1.0	650	1.0
57	1,199	7.3	7,264	6.5	4,204	6.3

HLA-B	Deceased donors 2013 - 2014		Kidney, pancreas, kidney-pancreas registrations waiting on 02/20/2015			
			All		Active	
	N	%	N	%	N	%
58	661	4.0	8,072	7.2	4,841	7.3
59	2	0.0	36	0.0	27	0.0
60	1,393	8.5	7,374	6.6	4,369	6.6
61	686	4.2	5,645	5.0	3,534	5.3
62	1,734	10.6	8,716	7.8	5,097	7.6
63	246	1.5	2,596	2.3	1,550	2.3
64	328	2.0	1,635	1.5	1,017	1.5
65	795	4.9	5,335	4.8	3,246	4.9
67	2	0.0	47	0.0	30	0.0
70	14	0.1	548	0.5	248	0.4
71	283	1.7	3,311	2.9	1,958	2.9
72	407	2.5	4,960	4.4	2,896	4.3
73	12	0.1	115	0.1	72	0.1
75	64	0.4	1,465	1.3	937	1.4
76	7	0.0	74	0.1	43	0.1
77	5	0.0	175	0.2	110	0.2
78	72	0.4	827	0.7	479	0.7
81	111	0.7	1,642	1.5	934	1.4
82	11	0.1	242	0.2	151	0.2
703	0	0.0	1	0.0	1	0.0
2708	3	0.0	4	0.0	2	0.0
3901	27	0.2	110	0.1	76	0.1
3902	8	0.0	22	0.0	15	0.0
3905	1	0.0	17	0.0	3	0.0
4005	21	0.1	332	0.3	211	0.3
5102	11	0.1	113	0.1	61	0.1
7801	0	0.0	6	0.0	3	0.0
8201	0	0.0	18	0.0	7	0.0
Total*	**16,359**	**100.0**	**112,253**	**100.0**	**66,656**	**100.0**

*All donors/registrations with at least one antigen reported at this locus

Table 3. HLA-C frequencies for donors and registrations on the waiting list

HLA-C	Deceased donors 2013 - 2014		Kidney, pancreas, kidney-pancreas registrations waiting on 02/20/2015			
			All		Active	
	N	%	N	%	N	%
1	1,197	7.3	5,189	6.5	3,125	6.6
2	1,519	9.3	8,468	10.6	4,982	10.5
3	264	1.6	1,819	2.3	879	1.9
4	3,880	23.7	22,983	28.8	13,671	28.9
5	2,303	14.1	7,709	9.7	4,547	9.6
6	2,689	16.4	12,333	15.5	7,352	15.5
7	7,929	48.5	34,480	43.3	20,447	43.2
8	1,453	8.9	8,314	10.4	4,977	10.5
9	1,350	8.3	4,350	5.5	2,616	5.5
10	2,498	15.3	11,858	14.9	7,147	15.1
12	1,441	8.8	6,372	8.0	3,945	8.3
13	0	0.0	5	0.0	4	0.0
14	453	2.8	2,336	2.9	1,474	3.1
15	877	5.4	4,423	5.5	2,668	5.6
16	1,559	9.5	8,643	10.8	5,179	10.9
17	652	4.0	5,132	6.4	2,967	6.3
18	189	1.2	1,861	2.3	1,045	2.2
Total*	**16,349**	**100.0**	**79,703**	**100.0**	**47,304**	**100.0**

*All donors/registrations with at least one antigen reported at this locus

Table 4. HLA-DR frequencies for donors and registrations on the waiting list

HLA-DR	Deceased donors 2013 - 2014		Kidney, pancreas, kidney-pancreas registrations waiting on 02/20/2015			
			All		Active	
	N	%	N	%	N	%
1	2,741	16.8	15,050	13.4	8,978	13.5
2	0	0.0	49	0.0	19	0.0
3	11	0.1	445	0.4	148	0.2
4	4,937	30.2	29,659	26.4	17,478	26.2
5	0	0.0	9	0.0	3	0.0
6	2	0.0	36	0.0	12	0.0
7	3,608	22.1	20,663	18.4	12,238	18.4
8	1,503	9.2	13,458	12.0	8,096	12.1
9	475	2.9	5,554	4.9	3,356	5.0
10	392	2.4	3,461	3.1	2,134	3.2
11	2,928	17.9	21,635	19.3	12,999	19.5
12	727	4.4	7,272	6.5	4,362	6.5
13	3,763	23.0	25,863	23.0	15,233	22.9
14	1,093	6.7	9,112	8.1	5,604	8.4
15	4,084	25.0	25,623	22.8	15,221	22.8
16	570	3.5	4,463	4.0	2,719	4.1
17	3,125	19.1	20,244	18.0	11,603	17.4
18	440	2.7	5,216	4.6	3,088	4.6
103	308	1.9	1,267	1.1	770	1.2
1403	0	0.0	6	0.0	6	0.0
1404	7	0.0	58	0.1	39	0.1
Total*	**16,357**	**100.0**	**112,253**	**100.0**	**66,656**	**100.0**

*All donors/registrations with at least one antigen reported at this locus

Table 5. HLA-DQB frequencies for donors and registrations on the waiting list

HLA-DQB	Deceased donors 2013 - 2014		Kidney, pancreas, kidney-pancreas registrations waiting on 02/20/2015			
			All		Active	
	N	%	N	%	N	%
1	8	0.0	1,795	2.1	878	1.7
2	5,881	36.0	31,828	36.4	18,429	35.7
3	18	0.1	1,212	1.4	523	1.0
4	1,601	9.8	10,771	12.3	6,420	12.4
5	4,978	30.4	26,723	30.5	16,081	31.2
6	6,775	41.4	32,285	36.9	19,012	36.9
7	5,676	34.7	29,218	33.4	17,473	33.9
8	3,409	20.8	17,283	19.7	10,152	19.7
9	1,296	7.9	5,168	5.9	3,078	6.0
Total*	**16,355**	**100.0**	**87,546**	**100.0**	**51,569**	**100.0**

*All donors/registrations with at least one antigen reported at this locus

Table 6. HLA-Bw4, Bw6, DR51, DR52 and DR53 frequencies for donors and registrations on the waiting list

Field	Value	Deceased donors 2013 - 2014		Kidney, pancreas, kidney-pancreas registrations waiting on 02/20/2015			
				All		Active	
		N	%	N	%	N	%
Bw4	Positive	9,914	60.6	68,417	61.2	40,797	61.3
	Negative	6,440	39.4	43,440	38.8	25,753	38.7
	All Reported	**16,354**	**100.0**	**111,857**	**100.0**	**66,550**	**100.0**
Bw6	Positive	13,990	85.5	94,557	84.5	56,142	84.4
	Negative	2,365	14.5	17,292	15.5	10,405	15.6
	All Reported	**16,355**	**100.0**	**111,849**	**100.0**	**66,547**	**100.0**
DR51	Positive	4,522	27.7	20,578	28.3	12,361	27.7
	Negative	11,799	72.3	52,224	71.7	32,189	72.3
	All Reported	**16,321**	**100.0**	**72,802**	**100.0**	**44,550**	**100.0**
DR52	Positive	10,173	62.3	53,746	70.1	32,074	69.1
	Negative	6,156	37.7	22,917	29.9	14,358	30.9
	All Reported	**16,329**	**100.0**	**76,663**	**100.0**	**46,432**	**100.0**
DR53	Positive	7,635	46.8	35,001	47.2	20,939	46.3
	Negative	8,688	53.2	39,144	52.8	24,315	53.7
	All Reported	**16,323**	**100.0**	**74,145**	**100.0**	**45,254**	**100.0**