

## *At-a-Glance*

- **Proposal to Update HLA Equivalences Tables**
- **Affected/Proposed Policy:** UNOS Policy 3 Appendix A
- **Histocompatibility Committee**
- The purpose of this proposal is to update the tables in Appendix 3A to reflect changes in HLA typing practice and to improve the utility of the unacceptable antigens. Appendix 3A includes 2 tables, one listing HLA antigen designations that should be considered equivalent for purposes of matching kidney candidates and donors for the HLA-A,-B, and -DR antigens (HLA Antigen Values and Split Equivalences) and a second for determining which donor HLA antigens are unacceptable based on the unacceptable HLA-antigens listed for a sensitized candidate (HLA A, B, C, DR, and DQ Unacceptable Antigen Equivalences).
- **Affected Groups:**
  - Lab Directors/Supervisors
  - Organ Recipients
  - Organ Candidates
  - Living Donors
  - Lab Data Coordinator
  - Transplant Coordinators
  - Individuals who enter PRA data

## **Proposal to Update HLA Equivalences Tables**

**Affected Policy:** UNOS Policy 3 Appendix A

### **Histocompatibility Committee**

#### **Summary and Goals of the Proposal:**

The purpose of this proposal is to update the tables in Appendix 3A to reflect changes in HLA typing practice and to improve the utility of the unacceptable antigens.

Appendix 3A includes 2 tables:

- A table listing HLA antigen designations that should be considered equivalent for purposes of matching kidney candidates and donors for the HLA-A,-B, and –DR antigens (HLA Antigen Values and Split Equivalences);
- A table to determine which donor HLA antigens are unacceptable based on the unacceptable HLA-antigens listed for a sensitized candidate (HLA A, B, C, DR, and DQ Unacceptable Antigen Equivalences).

#### **Background and Significance of the Proposal:**

The HLA Antigen Values and Split Equivalences table was created to resolve apparent differences in HLA typing results which occur between laboratories that should be considered equivalent. Generally these differences occur at the level of HLA antigen splits – two or more closely structured HLA antigens which together comprise a parent antigen. For example, HLA-A28 (parent antigen) has been “split” to yield two related antigens (splits): HLA-A68 and HLA-A69. With current technology, all laboratories can identify the splits of many parent antigens, so both donors and recipients are typed and listed in UNet<sup>SM</sup> with the split antigen instead of the parent antigen. However, many laboratories still have difficulty identifying certain splits, particularly when typing deceased donors without the ability to perform confirmatory testing. In the example of HLA-A28 above, HLA-A68 is the most common split of HLA-A28 (representing 98% of the A28 donor typings) and can be reproducibly identified by most laboratories, but HLA-A69 cannot. The laboratory might report HLA-A28 when it cannot distinguish between A68 and A69. Thus, a candidate typed as HLA-A68 would be considered a match for a donor with HLA-A68 or with HLA-A28, but a candidate typed as A69 would only match a donor typed as A69. The purpose of the HLA antigens and split equivalences table is to provide a mechanism to consider certain combinations of split equivalents as an antigen match for each candidate. It takes into account the fact that a listed donor antigen has a certain possibility of being the same HLA antigen and is a true match for the candidate.

The purpose of the unacceptable antigen equivalences table is to facilitate listing unacceptable antigens that would exclude candidates from match runs with donors whose HLA types include the candidate’s unacceptable antigens or their equivalents. Unacceptable antigens are those for which a candidate has made antibodies, which can result in positive crossmatches or an incompatible match. If a laboratory lists a parent HLA antigen as unacceptable, all splits of that antigen would also be considered unacceptable. The screening of candidates from all match runs for which a candidate could be incompatible provides an additional measure of safety for sensitized candidates (those who have antibodies to HLA antigens) who should not be considered for some donors.

The Histocompatibility Committee must review and update these tables every 2 years to reflect changes in HLA typing practice and improve the utility of the unacceptable antigens. The ability of HLA

laboratories to identify the correct splits of parent HLA antigens continues to improve and periodic updating of these tables is necessary to reflect current capabilities.

*Alternatives:*

We could continue to use the current Appendix 3A. The Committee feels that these tables require updating since they do not reflect current technology in HLA laboratories. If laboratories continue to use these equivalents, they could possibly disadvantage some patients by incorrectly assigning match points. The use of these equivalents could also affect patient safety by resulting in an unexpected offer of an incompatible organ.

*Strengths and weaknesses:*

Accurate equivalence tables are essential to accurately allocate organs that include HLA as a factor in its allocation algorithm.

*Intended Consequences:*

- The updated tables will improve the efficiency of organ allocation.
- As HLA typing accuracy and precision has improved, HLA match points will not be based on discrepant typing for allocation.
- Sensitized patients should not be offered predictably incompatible donor organs because unnecessary HLA equivalent antigens are considered acceptable.
- Sensitized patients will have increased access to transplantation as the application of the unacceptable antigen equivalents will allow them to be considered for donor organs with which they have a higher probability of having a negative crossmatch.

**Supporting Evidence and/or Modeling:**

The Histocompatibility Committee formed a subcommittee to update Appendix A “HLA Antigen Values and Split Equivalences” to Policy 3 at its July 2009 meeting. This subcommittee requested the frequencies for A, B, Bw4, BW6, CW, DR, DR51, DR52, DR53 and DQ reported for active kidney registrations on the waiting list. Results were based on active kidney registrations on the waiting list as of November 6, 2009. **Exhibit A** provides the antigen frequencies at A, B, DR, CW, and DQ loci. It also shows antigen frequencies reported at Bw4, Bw6, DR51, DR52 and DR53 loci.

The subcommittee also requested data on donor HLA antigen frequencies. **Exhibit B** shows the donor frequencies for A, B, Bw4, BW6, CW, DR, DR51, DR52, DR53 and DQ. These frequencies were reported on donor histocompatibility forms submitted for deceased donors from January 1, 2007 through December 31, 2008.

The subcommittee reviewed these tables and suggested changes to Appendix 3A. Both Equivalence Tables are based upon the frequencies of parent and split antigen assignments that laboratories reported to the OPTN for deceased donors and renal waitlist candidates. The subcommittee used additional data from the UCLA Cell Exchange to determine which split antigens can be defined by >90% of laboratories and which splits still are problematic. Antigen/split equivalents were removed when >90% of laboratories can correctly identify the split antigen and when the parent antigen is rarely listed. Parent/split equivalents are also removed from the unacceptable antigen table when parent antigens are no longer listed for deceased donors.

If the HLA laboratory identifies the candidate’s HLA antibody as being reactive with only one split of a parent HLA antigen, the transplant center may not want to eliminate the candidate from match runs for donors with the other split. Removing HLA antigen/split equivalents from the unacceptable antigen

table allows each transplant center and its HLA laboratory to determine only those specific donor antigens it wishes to consider incompatible. At the same time, the transplant center can maintain a level of safety for those patients who have antibodies to antigens which are not well defined.

The Committee added equivalences to the unacceptable antigens table so that when a broadly sensitized patient has antibodies directed against all splits of a parent antigen or against a public antigen specificity such as Bw4 or Bw6, labs have the option of entering a broad or public unacceptable antigen to block offers from donors with any of the HLA antigens within the group. The full Committee approved these changes in February 2010.

**Expected Impact on Program Goals, Strategic Plan, and Adherence to OPTN Final Rule:**

The revision of Appendix 3A is important to achieving the “Best Use” program goal. Maximizing the use of deceased donor kidneys and reducing wastage of these organs is dependent on the timely and efficient placement of organs. The time the histocompatibility laboratory and the OPO spend crossmatching patients who have a predictably positive crossmatch add significantly to the overall time to allocate deceased donor kidneys. This can result in organs that are not used because the cold ischemic time is too long.

The application of Appendix 3A is also critical to “Patient Safety”. Accurate unacceptable antigen equivalents reduce the chance that a sensitized patient might receive a graft that is at risk for hyperacute or early antibody-mediated rejection.

**Additional Data Collection:**

No additional data collection is required.

**Expected Implementation Plan:**

The updated version of Appendix 3A will replace the current version in the policies once the programming is complete and we have notified the members.

**Communication and Education Plan:**

We will inform the transplant community of the update to the HLA Equivalence Tables in Appendix 3A of the policies through the UNOS *Update* Magazine, the UNOS member electronic newsletter and the ASHI Quarterly. We will also post these tables on the OPTN website and distributed them by e-mail. Members can also get information and copies of the tables at the regional meetings.

Communication Activities			
Type of Communication	Audience(s)	Delivery Method(s)	Timeframe
Publication of Tables	Lab Directors, Lab Supervisors, Data Coordinators, OPOs	1. "UNOS Update" 2. "ASHI Quarterly" 3. Member e-newsletter	
Internet link	As above	UNOS website	
Presentation Handouts of tables	As above and Transplant Programs	Regional Meetings	
Email Tables	As above	Link on the member e-newsletter	

**Monitoring and Evaluation:**

The Committee will continue to monitor the frequencies of HLA antigens entered on the waitlist, match runs and the donor histocompatibility forms to determine whether further changes or updates to Appendix 3A are required.

**Policy or Bylaw Proposal:** (follows)

## Appendix 3A

### HLA Antigen Values and Split Equivalences (revisions 2010)

HLA A, B, and DR Matching Antigen Equivalences					
PATIENT A LOCUS ANTIGEN	EQUIVALENT DONOR ANTIGEN(S)	PATIENT B LOCUS ANTIGEN	EQUIVALENT DONOR ANTIGEN(S)	PATIENT DR LOCUS ANTIGEN	EQUIVALENT DONOR ANTIGEN(S)
1	1	5	5,52,53,78	1	1,103
2	2,203,240	7	7,703	2	2,15,16
3	3	8	8	3	3,17,18
9	9	12	12	4	4
10	10,26,34,66,*6601,*6602	13	13	5	5,11,12
11	11	14	14,64,65	6	6,13,14,1403,1404
19	19,74	15	15,75,76,77,*1304	7	7
23	23	16	16,*3905	8	8
24	24,2403	17	17,58	9	9
25	25	18	18	10	10
26	26,*6604	21	21,4005,*1304	11	11,5
28	28,68,69	22	22,54,*8204	12	12,5
29	29	27	27	13	13,6
30	30	35	35	14	14,6,1403,1404
31	31	37	37	15	15,2
32	32	38	38	16	16,2,15
33	33	39	39,3901,3902,*3905	17	17,3,18
34	34,*6602	40	40,60,61,84	18	18,3,17
36	36	41	41	103	103,1
43	43	42	42	1403	1403,14,6
66	66,*6601,*6602,10	44	44	1404	1404,14,6
68	68,28	45	45	** 99	(No equivalent)
69	69,28	46	46		
74	74,19	47	47		
80	80	48	48		
203	203,2	49	49		
210	210,2	50	50,4005		
2403	2403,24	51	51,5102,5103		
*6601	*6601,66,10,26	52	52,5		
*6602	*6602,66,10,34	53	53,5,5102		
** 99	(No equivalent)	54	54,22		
		55	55		
		56	56		
		57	57		
		58	58		
		59	59		
		60	40,60		
		61	61,40		
		62	62		
		63	63		
		64	64,14		
		65	65,14		
		67	67		
		70	70,71,72		
		71	71,70		
		72	72,70		
		73	73		
		75	75,15		
		76	76,15		
		77	77,15		
		78	78,5		
		81	81,7,40,60,61,48		
		82	82,*8201		
		703	703,7		
		*0804	*0804,8		
		*1304	*1304,15,21,49,50		
		2708	2708,27,7		
		3901	3901,39		
		3902	3902,39		

		*3905	*3905,16,39		
		4005	4005,24,50		
		5102	5102,51,53		
		5103	5103,51		
		*8201	*8201,82,45,22,54,55,56		
		** 99	(No equivalent)		

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

\*\* Code 99 means not tested

Examples of how "Antigen Equivalences" works:

If patient has B60: Donors with B60 are considered not mismatched.

If patient has B61: Donors with B61 or B40 are considered not mismatched. Donors with B60 are considered mismatched.

**HLA A, B, C, DR, and DQ Unacceptable Antigen Equivalences**

<b>PATIENT'S UNACCEPT-ABLE A LOCUS ANTIGEN</b>	<b>DONOR EQUIVALENT ANTIGEN(S)</b>	<b>PATIENT'S UNACCEPT-ABLE B LOCUS ANTIGEN</b>	<b>DONOR EQUIVALENT ANTIGEN(S)</b>	<b>PATIENT'S UNACCEPT-ABLE C LOCUS ANTIGEN</b>	<b>DONOR EQUIVALENT ANTIGEN(S)</b>
1	1	5	5,51,5102,5103,52,78	1	1
2	2,203,210	7	7,703,2708	2	2
3	3	8	8,*0804	3	3,9,10
9	9,23,24,2403	12	12,44,45	4	4
10	10,25,26,34,66,*6601,*6602	13	13	5	5
11	11	14	14,64,65	6	6
19	19,29,30,31,32,33,74	15	15,62,63,75,76,77	7	7
23	23	16	16,38,39	8	8
24	24,2403	17	17,57,58	9	9
25	25	18	18	10	10
26	26	21	21,49,50,4005	*12	*12
28	28,68,69	22	22,54,55,56	*13	*13
29	29	27	27,2708	*14	*14
30	30	35	35	*15	*15
31	31	37	37	*16	*16
32	32	38	38	*17	*17
33	33	39	39,3901,3902,*3905	*18	*18
34	34	40	40,60,61		
36	36	41	41		
43	43	42	42		
66	66,*6601,*6602	44	44		
68	68	45	45		
69	69	46	46		
74	74	47	47		
80	80	48	48		
203	203	49	49		
210	210	50	50,4005		
2403	2403	51	51,5102,5103		
*6601	*6601	52	52		
*6602	*6602	53	53,5102		
		54	54		
		55	55		
		56	56		
		57	57		
		58	58		
		59	59,*0804		
		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		
		*1304	*1304		
		2708	2708		
		3901	3901		
		3902	3902		
		*3905	*3905		
		4005	4005		
		5102	5102		
		5103	5103		
		*8201	*8201		
		Bw4	Bw4 (see below)		



		Bw6	Bw6(see below)		
HLA A, B, C, DR, and DQ Unacceptable Antigen Equivalences (continued)					
PATIENT'S UNACCEPTABLE DR LOCUS ANTIGEN	DONOR EQUIVALENT ANTIGEN(S)	PATIENT'S UNACCEPTABLE DQ LOCUS ANTIGEN	DONOR EQUIVALENT ANTIGEN(S)		
1	1,103	1	1,5,6		
2	2,15,16	2	2		
3	3,17,18	3	3,7,8,9		
4	4	4	4		
5	5,11,12	5	5		
6	6,13,14,1403,1404	6	6		
7	7	7	7		
8	8	8	8		
9	9	9	9		
10	10				
11	11				
12	12				
13	13				
14	14,1403,1404				
15	15				
16	16				
17	17				
18	18				
103	103				
1403	1403				
1404	1404				
51*	51,2,15,16				
52*	52,3,5,6,11,12,13,14,17,18				
53*	53,4,7,9				

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

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

Example of how "Unacceptable Antigen Equivalences" works:

If a patient has B40 listed as an "unacceptable antigen": Donors typed as B40, B60, or B61 are considered unacceptable.

If a patient has B60 and B61 listed as "unacceptable antigens": Donors typed as B60 or B61 are considered unacceptable. Donors typed as B40 are considered acceptable.

Therefore, if a patient has antibodies to all splits of a broad antigen, enter the broad antigen as well as the splits as unacceptable antigens, or enter only the broad antigen as an unacceptable antigen.

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

Bw4 should exclude B5,B13, B17, B27, B37, B38, B44,B47,B49, B51,B52,B53, B57,B58, B59,B63,B77,Bw4.

Bw6 should exclude

B7,B8,B14,B18,B22,B35,B39,B40,B41,B42,B45,B46,B48,B50,(B\*4005),B54,B55,B56,B60,B61,B62,B64,B65,B67,B70,B71,B72,B73 ,B75,B76,B78,B81,Bw6

DR51 should also exclude DR2,DR15,DR16.

DR52 should also exclude DR3,DR5,DR6,DR11,DR12,DR13,DR14,DR17,DR18.

DR53 should also exclude DR4,DR7,DR9.

Table 1. Antigens Entered at A Locus for Active Kidney Registrations on the Waiting List, 11/06/2009

A Locus Antigen	N	%
1	9,381	16.5
2	23,341	41.0
3	9,907	17.4
9	1	0.0
10	18	0.0
11	6,036	10.6
19	8	0.0
23	5,796	10.2
24	9,948	17.5
25	1,183	2.1
26	2,924	5.1
28	1,271	2.2
29	3,602	6.3
30	7,533	13.2
31	3,146	5.5
32	2,744	4.8
33	4,782	8.4
34	2,171	3.8
36	1,131	2.0
43	5	0.0
66	1,259	2.2
68	6,378	11.2
69	157	0.3
74	2,266	4.0
80	317	0.6
203	25	0.0
210	1	0.0
2403	13	0.0
6601	45	0.1
6602	39	0.1
All registrations with at least one antigen entered at A locus	56,907	100.0

Table 2. Antigens Entered at B Locus for Active Kidney Registrations on the Waiting List, 11/06/2009

<b>B Locus Antigen</b>	<b>N</b>	<b>%</b>
5	32	0.1
7	8,847	15.5
8	6,914	12.1
12	12	0.0
13	2,037	3.6
14	1,099	1.9
15	166	0.3
16	8	0.0
17	36	0.1
18	4,385	7.7
21	5	0.0
22	10	0.0
27	3,031	5.3
35	10,275	18.1
37	1,000	1.8
38	2,088	3.7
39	3,399	6.0
40	145	0.3
41	1,242	2.2
42	2,481	4.4
44	9,677	17.0
45	2,643	4.6
46	563	1.0
47	226	0.4
48	974	1.7
49	2,524	4.4
50	1,283	2.3
51	4,943	8.7
52	1,878	3.3
53	5,129	9.0
54	224	0.4
55	1,412	2.5
56	595	1.0
57	3,691	6.5
58	4,031	7.1

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<b>B Locus Antigen</b>	<b>N</b>	<b>%</b>
59	21	0.0
60	3,820	6.7
61	2,734	4.8
62	4,328	7.6
63	1,333	2.3
64	590	1.0
65	2,202	3.9
67	34	0.1
70	925	1.6
71	1,324	2.3
72	2,194	3.9
73	69	0.1
75	794	1.4
76	45	0.1
77	85	0.1
78	400	0.7
81	723	1.3
82	77	0.1
703	1	0.0
2708	5	0.0
3901	10	0.0
3902	1	0.0
3905	16	0.0
4005	154	0.3
5102	61	0.1
5103	1	0.0
7801	7	0.0
8201	25	0.0
All registrations with at least one antigen entered at B locus	56,906	100.0

Table 3. Antigens Entered at DR Locus for Active Kidney Registrations on the Waiting List, 11/06/2009

DR Locus Antigen	N	%
1	7,761	13.6
2	147	0.3
3	1,284	2.3
4	14,678	25.8
5	70	0.1
6	151	0.3
7	10,474	18.4
8	6,816	12.0
9	2,759	4.8
10	1,766	3.1
11	11,256	19.8
12	3,699	6.5
13	12,996	22.8
14	4,496	7.9
15	13,137	23.1
16	2,122	3.7
17	9,100	16.0
18	2,407	4.2
103	636	1.1
1403	2	0.0
1404	8	0.0
All registrations with at least one antigen entered at DR locus	56,905	100.0

**Table 4. Antigens Entered at CW Locus for Active Kidney Registrations on the Waiting List, 11/06/2009**

<b>CW Locus Antigen</b>	<b>N</b>	<b>%</b>
1	1,869	6.6
2	3,246	11.5
3	2,391	8.5
4	8,181	29.0
5	2,746	9.7
6	4,652	16.5
7	12,018	42.6
8	2,791	9.9
9	1,131	4.0
10	2,792	9.9
12	1,742	6.2
13	2	0.0
14	707	2.5
15	1,206	4.3
16	2,287	8.1
17	1,606	5.7
18	501	1.8
All registrations with at least one antigen entered at CW locus	28,242	100.0

**Table 5. Antigens Entered at DQ Locus for Active Kidney Registrations on the Waiting List, 11/06/2009**

<b>DQ Locus Antigen</b>	<b>N</b>	<b>%</b>
1	2,341	6.4
2	13,111	36.1
3	2,641	7.3
4	4,474	12.3
5	9,997	27.5
6	12,852	35.4
7	11,070	30.5
8	5,931	16.3
9	1,835	5.1
All registrations with at least one antigen entered at DQ locus	36,335	100.0

**Table 6. Antigens Entered at BW4, BW6, DR51, DR52, DR53 Loci  
Active Kidney Registrations on the Waiting List, 11/06/2009**

	<b>Bw4</b>		<b>Bw6</b>		<b>DR51</b>		<b>DR52</b>		<b>DR53</b>	
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
<b>Positive</b>	34,507	61.4	47,031	83.7	8,332	29.0	21,807	70.9	14,167	48.1
<b>Negative</b>	21,655	38.6	9,127	16.3	20,438	71.0	8,952	29.1	15,302	51.9
<b>Total</b>	56,162	100.0	56,158	100.0	28,770	100.0	30,759	100.0	29,469	100.0

**Table 1. HLA Typing Methods Reported on Donor Histocompatibility Forms  
Deceased Donors Recovered from January 1, 2007 through December 31, 2008**

	Typing Method						All Typing Methods	
	Serology		DNA		Both			
	N	%	N	%	N	%	N	%
<b>Class I</b>	3,946	25.4	7,185	46.2	4,426	28.5	15,557	100.0
<b>Class II</b>	2,970	19.1	9,040	58.1	3,547	22.8	15,557	100.0



**Table 2. Antigens Entered at A Locus on Donor Histocompatibility Forms  
By Typing Method  
Deceased Donors Recovered from January 1, 2007 through December 31, 2008**

A Locus Antigen	Typing Method						All Typing Methods	
	Serology		DNA		Both			
	N	%	N	%	N	%	N	%
1	935	23.7	1,625	22.6	1,017	23.0	3,577	23.0
2	1,893	48.0	3,465	48.2	2,142	48.4	7,500	48.2
3	944	23.9	1,575	21.9	984	22.2	3,503	22.5
9	0	0.0	1	0.0	0	0.0	1	0.0
10	5	0.1	1	0.0	0	0.0	6	0.0
11	410	10.4	776	10.8	461	10.4	1,647	10.6
19	3	0.1	0	0.0	1	0.0	4	0.0
23	252	6.4	487	6.8	269	6.1	1,008	6.5
24	644	16.3	1,163	16.2	760	17.2	2,567	16.5
25	110	2.8	189	2.6	137	3.1	436	2.8
26	197	5.0	363	5.1	246	5.6	806	5.2
28	150	3.8	18	0.3	20	0.5	188	1.2
29	311	7.9	531	7.4	295	6.7	1,137	7.3
30	321	8.1	639	8.9	339	7.7	1,299	8.3
31	206	5.2	366	5.1	260	5.9	832	5.3
32	231	5.9	369	5.1	262	5.9	862	5.5
33	214	5.4	368	5.1	213	4.8	795	5.1
34	41	1.0	138	1.9	64	1.4	243	1.6
36	28	0.7	67	0.9	38	0.9	133	0.9
66	41	1.0	119	1.7	56	1.3	216	1.4
68	269	6.8	822	11.4	483	10.9	1,574	10.1
69	4	0.1	15	0.2	13	0.3	32	0.2
74	68	1.7	157	2.2	72	1.6	297	1.9
80	10	0.3	16	0.2	15	0.3	41	0.3
203	0	0.0	2	0.0	0	0.0	2	0.0
210	0	0.0	1	0.0	0	0.0	1	0.0
2403	2	0.1	1	0.0	0	0.0	3	0.0
6601	5	0.1	5	0.1	8	0.2	18	0.1
6602	6	0.2	1	0.0	1	0.0	8	0.1
All donors with at least one antigen reported at A locus	3,946	100.0	7,185	100.0	4,426	100.0	15,557	100.0

**Table 3. Antigens Entered at B Locus on Donor Histocompatibility Forms  
By Typing Method  
Deceased Donors Recovered from January 1, 2007 through December 31, 2008**

B Locus Antigen	Typing Method						All Typing Methods	
	Serology		DNA		Both			
	N	%	N	%	N	%	N	%
5	0	0.0	1	0.0	0	0.0	1	0.0
7	854	21.6	1,503	20.9	976	22.1	3,333	21.4
8	647	16.4	1,146	15.9	746	16.9	2,539	16.3
13	160	4.1	273	3.8	158	3.6	591	3.8
14	181	4.6	38	0.5	85	1.9	304	2.0
15	6	0.2	13	0.2	6	0.1	25	0.2
17	10	0.3	0	0.0	0	0.0	10	0.1
18	343	8.7	559	7.8	358	8.1	1,260	8.1
21	4	0.1	1	0.0	0	0.0	5	0.0
22	3	0.1	1	0.0	0	0.0	4	0.0
27	279	7.1	490	6.8	303	6.8	1,072	6.9
35	654	16.6	1,300	18.1	783	17.7	2,737	17.6
37	105	2.7	164	2.3	94	2.1	363	2.3
38	120	3.0	213	3.0	131	3.0	464	3.0
39	161	4.1	357	5.0	277	6.3	795	5.1
40	29	0.7	18	0.3	3	0.1	50	0.3
41	76	1.9	110	1.5	77	1.7	263	1.7
42	84	2.1	191	2.7	85	1.9	360	2.3
44	967	24.5	1,672	23.3	1,029	23.2	3,668	23.6
45	111	2.8	240	3.3	123	2.8	474	3.0
46	6	0.2	25	0.3	14	0.3	45	0.3
47	16	0.4	38	0.5	19	0.4	73	0.5
48	21	0.5	61	0.8	34	0.8	116	0.7
49	148	3.8	252	3.5	142	3.2	542	3.5
50	100	2.5	142	2.0	103	2.3	345	2.2
51	359	9.1	688	9.6	452	10.2	1,499	9.6
52	81	2.1	188	2.6	108	2.4	377	2.4
53	156	4.0	343	4.8	162	3.7	661	4.2
54	3	0.1	12	0.2	12	0.3	27	0.2
55	106	2.7	171	2.4	129	2.9	406	2.6
56	56	1.4	69	1.0	60	1.4	185	1.2
57	289	7.3	498	6.9	273	6.2	1,060	6.8

B Locus Antigen	Typing Method						All Typing Methods	
	Serology		DNA		Both			
	N	%	N	%	N	%	N	%
58	160	4.1	346	4.8	179	4.0	685	4.4
59	2	0.1	3	0.0	0	0.0	5	0.0
60	374	9.5	572	8.0	381	8.6	1,327	8.5
61	105	2.7	321	4.5	220	5.0	646	4.2
62	425	10.8	749	10.4	441	10.0	1,615	10.4
63	65	1.6	103	1.4	55	1.2	223	1.4
64	22	0.6	126	1.8	62	1.4	210	1.3
65	77	2.0	316	4.4	177	4.0	570	3.7
67	0	0.0	1	0.0	3	0.1	4	0.0
70	86	2.2	30	0.4	45	1.0	161	1.0
71	22	0.6	99	1.4	47	1.1	168	1.1
72	48	1.2	163	2.3	65	1.5	276	1.8
73	0	0.0	5	0.1	5	0.1	10	0.1
75	13	0.3	42	0.6	20	0.5	75	0.5
76	1	0.0	1	0.0	2	0.0	4	0.0
77	3	0.1	2	0.0	0	0.0	5	0.0
78	11	0.3	33	0.5	17	0.4	61	0.4
81	14	0.4	59	0.8	25	0.6	98	0.6
82	1	0.0	9	0.1	5	0.1	15	0.1
703	1	0.0	0	0.0	0	0.0	1	0.0
2708	1	0.0	0	0.0	0	0.0	1	0.0
3901	0	0.0	1	0.0	0	0.0	1	0.0
3905	1	0.0	0	0.0	0	0.0	1	0.0
4005	1	0.0	14	0.2	10	0.2	25	0.2
5102	1	0.0	3	0.0	5	0.1	9	0.1
8201	2	0.1	2	0.0	0	0.0	4	0.0
All donors with at least one antigen reported at B locus	3,946	100.0	7,185	100.0	4,426	100.0	15,557	100.0

**Table 4. Antigens Entered at DR Locus on Donor Histocompatibility Forms  
By Typing Method  
Deceased Donors Recovered from January 1, 2007 through December 31, 2008**

DR Locus Antigen	Typing Method						All Typing Methods	
	Serology		DNA		Both			
	N	%	N	%	N	%	N	%
1	521	17.5	1,542	17.1	635	17.9	2,698	17.3
2	68	2.3	1	0.0	4	0.1	73	0.5
3	151	5.1	85	0.9	33	0.9	269	1.7
4	857	28.9	2,663	29.5	1,058	29.8	4,578	29.4
5	1	0.0	1	0.0	2	0.1	4	0.0
6	11	0.4	1	0.0	1	0.0	13	0.1
7	721	24.3	1,896	21.0	739	20.8	3,356	21.6
8	229	7.7	865	9.6	330	9.3	1,424	9.2
9	78	2.6	295	3.3	112	3.2	485	3.1
10	77	2.6	211	2.3	91	2.6	379	2.4
11	541	18.2	1,628	18.0	618	17.4	2,787	17.9
12	146	4.9	400	4.4	149	4.2	695	4.5
13	661	22.3	2,020	22.3	810	22.8	3,491	22.4
14	173	5.8	632	7.0	245	6.9	1,050	6.7
15	669	22.5	2,355	26.1	887	25.0	3,911	25.1
16	73	2.5	332	3.7	133	3.7	538	3.5
17	463	15.6	1,691	18.7	628	17.7	2,782	17.9
18	57	1.9	209	2.3	93	2.6	359	2.3
103	45	1.5	166	1.8	61	1.7	272	1.7
1403	0	0.0	1	0.0	0	0.0	1	0.0
1404	2	0.1	4	0.0	2	0.1	8	0.1
All donors with at least one antigen reported at DR locus	2,970	100.0	9,040	100.0	3,547	100.0	15,557	100.0

**Table 5. Antigens Entered at CW Locus on Donor Histocompatibility Forms  
By Typing Method  
Deceased Donors Recovered from January 1, 2007 through December 31, 2008**

CW Locus Antigen	Typing Method						All Typing Methods	
	Serology		DNA		Both			
	N	%	N	%	N	%	N	%
1	220	6.7	364	6.5	211	6.9	795	6.6
2	332	10.1	534	9.5	310	10.1	1,176	9.8
3	666	20.2	226	4.0	309	10.1	1,201	10.0
4	746	22.6	1,360	24.2	699	22.8	2,805	23.4
5	450	13.6	833	14.8	386	12.6	1,669	13.9
6	651	19.7	937	16.7	476	15.6	2,064	17.2
7	1,637	49.6	2,699	48.0	1,538	50.3	5,874	49.0
8	222	6.7	477	8.5	264	8.6	963	8.0
9	91	2.8	368	6.5	176	5.8	635	5.3
10	83	2.5	800	14.2	259	8.5	1,142	9.5
12	24	0.7	443	7.9	250	8.2	717	6.0
14	1	0.0	148	2.6	65	2.1	214	1.8
15	19	0.6	294	5.2	179	5.8	492	4.1
16	26	0.8	537	9.6	273	8.9	836	7.0
17	78	2.4	213	3.8	96	3.1	387	3.2
18	12	0.4	74	1.3	15	0.5	101	0.8
All donors with at least one antigen reported at CW locus	3,301	100.0	5,623	100.0	3,060	100.0	11,984	100.0

**Table 6. Antigens Entered at DQ Locus on Donor Histocompatibility Forms  
By Typing Method  
Deceased Donors Recovered from January 1, 2007 through December 31, 2008**

DQ Locus Antigen	Typing Method						All Typing Methods	
	Serology		DNA		Both			
	N	%	N	%	N	%	N	%
1	1,296	43.9	75	0.9	223	7.0	1,594	10.7
2	1,130	38.3	3,113	35.9	1,134	35.3	5,377	36.3
3	662	22.4	400	4.6	193	6.0	1,255	8.5
4	224	7.6	831	9.6	313	9.8	1,368	9.2
5	246	8.3	2,677	30.9	858	26.7	3,781	25.5
6	410	13.9	3,573	41.2	1,190	37.1	5,173	34.9
7	749	25.4	2,752	31.7	1,024	31.9	4,525	30.5
8	252	8.5	1,609	18.6	592	18.5	2,453	16.5
9	98	3.3	588	6.8	180	5.6	866	5.8
All donors with at least one antigen reported at DQ locus	2,952	100.0	8,669	100.0	3,208	100.0	14,829	100.0

**Table 7. Antigens Entered at BW4, BW6, DR51, DR52, DR53 Loci  
on Donor Histocompatibility Forms by Typing Method  
Deceased Donors Recovered from January 1, 2007 through December 31, 2008**

Typing Method		Bw4		Bw6		DR51		DR52		DR53	
		N	%	N	%	N	%	N	%	N	%
Serology	Positive	2,472	62.6	3,354	85.0	783	26.6	1,875	63.6	1,461	49.6
	Negative	1,474	37.4	592	15.0	2,162	73.4	1,072	36.4	1,483	50.4
	Total	3,946	100.0	3,946	100.0	2,945	100.0	2,947	100.0	2,944	100.0
DNA	Positive	4,430	61.7	6,091	84.8	2,572	29.1	5,476	62.0	4,181	47.4
	Negative	2,755	38.3	1,093	15.2	6,258	70.9	3,356	38.0	4,642	52.6
	Total	7,185	100.0	7,184	100.0	8,830	100.0	8,832	100.0	8,823	100.0
Both	Positive	2,632	59.5	3,796	85.8	990	28.2	2,149	61.3	1,677	47.8
	Negative	1,794	40.5	630	14.2	2,516	71.8	1,358	38.7	1,830	52.2
	Total	4,426	100.0	4,426	100.0	3,506	100.0	3,507	100.0	3,507	100.0
All Typing Methods	Positive	9,534	61.3	13,241	85.1	4,345	28.4	9,500	62.1	7,319	47.9
	Negative	6,023	38.7	2,315	14.9	10,936	71.6	5,786	37.9	7,955	52.1
	Total	15,557	100.0	15,556	100.0	15,281	100.0	15,286	100.0	15,274	100.0