PURPOSE

This document outlines the underlying principles of assigning Donor Specific Antibodies (DSA) for recipients and donors in OrganMatch.

PRINCIPLE

The target of an antibody is the epitope. Anti-HLA DSA target specific epitopes in the polymorphic regions of HLA antigens. The epitope does not correlate with a single HLA molecule or HLA name. The epitope may be unique for a particular HLA allele (private epitope) or may be shared among many different HLA's (public epitope).

HLA-antibody epitopes are defined as the specific sequence of amino acid residues that are critical for antibody binding. In the core of this antibody footprint is an area of one or a few polymorphic residues that maybe unique to one HLA molecule or are shared by a group of HLA alleles.

The Luminex Single Antigen Bead assay is a tool to identify and define HLA antibodies, and the beads on the panel are representative of the target epitopes. This is a semi-quantitative test which identifies the presence, the relative strength and the specificity of HLA antibodies.

Alleles are represented at the genomic level (DNA Sequence) and serotypes (antigen group) are represented at the protein level.

SPECIFIC DSA ASSIGNMENT IN ORGANMATCH

In OrganMatch, the assignment of Specific DSA can be categorised into key scenarios. The scenarios will be the default assignment within OrganMatch. Modification of the assignment can be performed by the scientist on review of the DSA.

Scenario 1a:

Donor HLA entered as a one - field result AND matches the 1st field of the recipient antibody

This scenario is used

- when the donor typing is entered as a one field result
- The recipient antibody (1st field) matches the donor typing at the 1st field
- There are no known serological differences within the antigen group
- The recipient HLA and recipient antibody are not self or from the same antigen group

OrganMatch will compare the Donor HLA to the recipient antibody and if they match they will be assigned SPECIFIC.

If there is no match, the recipient antibody will not appear in the DSA table

Examples:

Donor Typing HLA	Recipient Antibodies	DSA category
A*02	A*02:01, A*02:03 A*11:01	Specific Not assigned DSA

Scenario 1b:

Donor HLA entered as a two -field result AND matches the 1st field of the recipient antibody – when there no known serological differences

This scenario is used

- when the donor HLA typing is entered as a two-field result because the typing has been performed at a higher resolution
- The recipient antibody matches the donor typing at the 1st field
- There is NO known serological differences within the antigen group
- The recipient HLA and recipient antibody is not self or from the same antigen group

Example:

Donor Typing HLA	Recipient Antibodies	DSA category
A*02:01	A*02:01, A*02:03	Specific Specific

Scenario 2:

Donor HLA typing entered as a two-field result as there are known serological differences in the same antigen group

This scenario is used

- when the donor typing is entered as a two-field result and there is known serological difference within the antigen group

In this case OrganMatch will check the DSA exception table. If the combinations of Donor HLA and recipient antibody is found in the DSA the category (specific or not assigned as DSA) will be assigned as per the DSA exception table.

Antigen groups covered in this scenario are as follows as these donor typings would be entered as a 2 field HLA typing - see donor Typing in the HLA Tables below.

	Antigen Group
HLA - B	**B14 (B64, B65)** **B15 (B62, B63, B70, B71, B72, B75, B76, B77)** **B40 (B60, B61)**
HLA - C	Cw3 (Cw9, Cw10)
HLA - DRB1	DR1 and DR103 DR3 (DR17, DR18)
HLA - DQB1	DQ3 (DQ7, DQ8, DQ9)

Example:

Donor Typing HLA	**Recipient Antibodies**	**DSA category**
DQB1*03:01	DQB1*03:01 DQB1*03:02 DQB1*03:03 DQB1*03:19	Specific Not assigned as DSA Not assigned as DSA Specific
DPB1*04:01	DPB1*04:02	Not assigned as DSA

Scenario 3:

Donor HLA typing entered as a one or two field result but does not match the recipient antibody but it is known to be of the same antigen family or epitype (DPB1)

This scenario is used

- when the donor typing is entered as a one or two field result
- Recipient antibody is not the same at 1st field

In this case OrganMatch will check the DSA exception table. If the combinations of Donor HLA and recipient antibody is found in the DSA the category (specific or not assigned as DSA) will be assigned as per the DSA exception table.

Example:

Donor Typing HLA	Recipient Antibodies	DSA category
DPB1*105:01	DPB1*04:02	Specific
DPB1*04:01	DPB1*04:02	Not assigned as DSA
B*45	B*45:01 B*50:02 B*50:01	Specific Specific Not assigned as DSA

Key: # Single Antigen bead panels

Immucor/OLI – standard panel
OLI only – standard panel
OLI Supplementary panel
Immucor only
OLI – Explex (but not on OLI supp panel)

TABLE 1: ASSIGNMENT OF SPECIFIC DSA

HLA – A

WHO assigned Antigen Group	Associated split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
A1		A*01:01	1636	A*01, *01:xx
		A*01:02	1	
A2		A*02:01	2436	A*02, *02:XX
		A*02:02	10	
	A203	A*02:03	35	
		A*02:05	88	
		A*02:06	51	
		A*02:07	79	
	A210	A*02:10	1	
		A*02:18	0	
A3		A*03:01	1190	A*03, *03:XX, A*32:04
		A*03:02	19	
A11		A*11:01	764	A*11, A*11:XX

WHO assigned Antigen Group	Associated split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
		A*11:02	14	
A9	A23	A*23:01	165	A*23, A*23:XX
	A24	A*24:02	877	A*24, A24*XX
		A*24:03	18	
A10	A25	A*25:01	183	A*25, A*25:XX
	A26	A*26:01	221	A*26, A*26:XX except A*26:09
		A*26:02	1	
		A*26:03	18	
	A34	A*34:01	49	A*34, A*34:XX, A*26:09
		A*34:02	19	
	A66	A*66:01	29	A*66, A*66:XX
		A*66:02	1	
A19	A29	A*29:01	33	A*29, A*29:XX
		A*29:02	369	
	A30	A*30:01	109	A*30, A*30:XX
		A*30:02	110	
	A31	A*31:01	256	A*31, A*31:XX
	A32	A*32:01	348	A*32, A*32:XX (except A*32:04)
	A33	A*33:01	56	A*33, A*33:XX
		A*33:03	103	
	A74	A*74:01	2	A*74, A*74:XX
A36		A*36:01	0	A*36, A*36:XX
A43		A*43:01	0	A*43, A*43:XX
A28	A68	A*68:01	316	A*68, A*68:XX
		A*68:02	76	
	A69	A*69:01	8	A*69, A*69:XX
A80		A*80:01	1	A*80, A*80:XX

HLA – B

WHO assigned Antigen Group	Associated split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
B7		B*07:02	1222	B*07, B*07:XX
		B*07:14	0	
	B703	B*07:03	1	
B8		B*08:01	1253	B*08, B*08:XX
B13		B*13:02	186	B*13, B*13:XX
		B*13:01	41	
B14	**B64**	B*14:01	152	B*14:01, B*14:XX (except B*14:02)
	B65	B*14:02	317	B*14:02, B*14:XX (except B*14:01)
B15	**B62**	B*15:01	734	B*15, B*15:01, B*15:04, B*15:05, B*15:06, B*15:07, B*15:20, B*15:24, B*15:25, B*15:27, B*15:28, B*15:30, B*15:32, B*15:33, B*15:34, B*15:35, B*15:38, B*15:39, B*15:40, *B*15:42*
		B*15:04	1	B*15, B*15:01, B*15:04, B*15:05, B*15:06, B*15:07, B*15:20, B*15:24, B*15:25, B*15:27, B*15:28, B*15:30, B*15:32, B*15:33, B*15:34, B*15:35, B*15:38, B*15:39, B*15:40
		B*15:06		B*15, B*15:01, B*15:04, B*15:05, B*15:06, B*15:07, B*15:20, B*15:24, B*15:25, B*15:27, B*15:28, B*15:30, B*15:32, B*15:33, B*15:34, B*15:35, B*15:38, B*15:39, B*15:40
		B*15:07	6	B*15, B*15:01, B*15:04, B*15:05, B*15:06, B*15:07, B*15:20, B*15:24, B*15:25, B*15:27, B*15:28, B*15:30, B*15:32, B*15:33, B*15:34, B*15:35, B*15:38, B*15:39, B*15:40
B15	**B62**	B*15:27	5	B*15, B*15:01, B*15:04, B*15:05, B*15:06, B*15:07, B*15:20, B*15:24, B*15:25, B*15:27, B*15:28, B*15:30, B*15:32, B*15:33, B*15:34, B*15:35, B*15:38, B*15:39, B*15:40, *B*15:42*

WHO assigned Antigen Group	Associated split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
		B*15:20	0	B*15, B*15:01, B*15:04, B*15:05, B*15:06, B*15:07, B*15:20, B*15:24, B*15:25, B*15:27, B*15:28, B*15:30, B*15:32, B*15:33, B*15:34, B*15:35, B*15:38, B*15:39, B*15:40, *B*15:42*
		B*15:24	4	B*15, B*15:01, B*15:04, B*15:05, B*15:06, B*15:07, B*15:20, B*15:24, B*15:25, B*15:27, B*15:28, B*15:30, B*15:32, B*15:33, B*15:34, B*15:35, B*15:38, B*15:39, B*15:40, B*15:42
	B75	B*15:02	59	B*15:02, B*15:08, B*15:11, B*15:15, B*15:21, B*15:31
		B*15:11	3	B*15:02, B*15:08, B*15:11, B*15:15, B*15:21, B*15:31
		B*15:21	21	B*15:02, B*15:08,B*15:11,B*15:15, B*15:21, B*15:31
	B76	B*15:12	3	B*15:12, B*15:14, B*15:19
	B77	B*15:13	4	B*15:13
	B63	B*15:16	12	B*15:16, B*15:17
		B*15:17	49	B*15:16, B*15:17
B70	**B72**	B*15:03	6	B*15:03
	B71	B*15:10	10	B*15:10, B*15:18
		B*15:18	47	
B18		B*18:01	400	B*18, B*18:XX
B27		B*27:05	373	B*27, B*27:XX (except for B*27:08)
		B*27:03	0	
		B*27:04	16	
		B*27:06	6	
	B2708	B*27:08	0	B*27:08
B35		B*35:01	447	B*35, B35:XX
		B*35:02	51	
		B*35:03	160	
		B*35:08	37	
		B*35:12	0	

WHO assigned Antigen Group	Associated split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
B37		B*37:01	143	B*37, B*37:XX
B16	**B38**	B*38:01	124	B*38, B*38:XX
		B*38:02	33	
	B39	B*39:01	105	B*39, B*39:XX
		B*39:06	60	
		B*39:04	0	
		B*39:05	0	
		B*39:13	0	
		B*39:02	0	
B40	**B60**	B*40:01	772	B*40, B*40:01 , B*40:XX (except B*40:02, B*40:03, B*40:06, B*40:05)
	B61	B*40:02	177	B*40:02, B*40:06
		B*40:06	48	
		B*40:04	1	
		B*40:03	1	
	B4005	B*40:05	0	B*40:05, B*50
B41		B*41:01	45	B*41, B*41:XX
		B*41:02	31	
B42		B*42:01	2	B*42, B*42:XX
		B*42:02	4	
B12	**B44**	B*44:02	1005	B*44, B*44:XX
		B*44:03	577	
	B45	B*45:01	61	B*45, B*45:XX, B*50:02
B46		B*46:01	59	B*46, B*46:XX
B47		B*47:01	27	B*47, B*47:XX
B48		B*48:01	17	B*48, B*48:XX
		B*48:02	0	

WHO assigned Antigen Group	Associated split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
B21	B49	B*49:01	122	B*49, B*49:XX
	B50	B*50:01	93	B*50: B*50:XX, (except B*50:02) B*40:05
		B*50:02	2	B*50:02, B*45
B5	B51	B*51:01	461	B*51, B*51:XX
		B*51:02	7	
	B52	B*52:01	103	B*52, B*52:XX
B53	B53	B*53:01	41	B*53, B*53:XX
B22	B54	B*54:01	14	B*54, B*54:XX
	B55	B*55:01	183	B*55, B*55:XX
		B*55:02	29	
		B*55:04	1	
	B56	B*56:01	71	B*56, B*56:XX
		B*56:03	1	
B17	B57	B*57:01	397	B*57, B*57:XX
		B*57:03	5	
	B58	B*58:01	93	B*58, B*58:XX
		B*59:01	0	B*59, B*59:XX
B67		B*67:01	2	B*67 B*67:XX
B73		B*73:01	3	B*73, B*73:XX
B78		B*78:01	2	B*78, B*78:XX
B81		B*81:01	1	B*81, B*81:XX
B82		B*82:01	0	B*82, B*82:XX
		B*82:02	0	

HLA – C

WHO assigned Antigen Group	Associated split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
Cw1		C*01:02	392	C*01, C*01:XX
		C*01:03	2	
Cw2		C*02:02	276	C*02, C*02:XX
		C*02:10	2	
Cw3	**Cw9**	C*03:03	540	C*03, C*03:XX (except C*03:02, C*03:04)
	Cw10	C*03:02	62	C*03:02, C*03:04
		C*03:04	727	
Cw4		C*04:01	746	C*04, C*04:XX
		C*04:03	37	
Cw5		C*05:01	838	C*05, C*05:XX, C*08:10
Cw6		C*06:02	707	C*06, C*06:XX
Cw7		C*07:01	1399	C*07, C*07:XX
		C*07:02	1305	
		C*07:04	163	
Cw8		C*08:01	57	C*08, C*08:XX (except C*08:10)
		C*08:02	802	
		C*08:03	4	
		C*08:04	1	
Cw12		C*12:02	110	C*12, C*12:XX
		C*12:03	335	
Cw14		C*14:02	93	C*14, C*14:XX
		C*14:03	3	
Cw15		C*15:02	203	C*15, C*15:XX
		C*15:05	27	
Cw16		C*16:01	334	C*16, C*16:XX
		C*16:02	30	

WHO assigned Antigen Group	Associated split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
Cw17		C*17:01	40	C*17, C*17:XX
		C*17:03	18	
Cw18		C*18:01	1	C*18, C*18:XX
		C*18:02	1	

HLA – DRB1

WHO assigned Antigen Group	Associated split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
DR1		DRB1*01:01	858	DRB1*01, DRB1*01:XX (except DRB1*01:03)
		DRB1*01:02	102	
	DR103	DRB1*01:03	226	DRB1*01:03
DR2	**DR15**	DRB1*15:01	1443	DRB1*15, DRB1*15:XX
		DRB1*15:02	168	
		DRB1*15:03	5	
	DR16	DRB1*16:01	106	DRB1*16, DRB1*16:XX
		DRB1*16:02	38	
DR3	**DR17**	DRB1*03:01	1609	DRB1*03, DRB1*03:01, DRB1*03:xx (except DRB1*03:02, DRB1*03:03)
	DR18	DRB1*03:03	0	DRB1*03:02 , DRB1*03:03 (except DRB1*03:01)
		DRB1*03:02	3	
DR4		DRB1*04:01	1145	DRB1*04, DRB1*04:XX
		DRB1*04:02	63	
		DRB1*04:03	127	
		DRB1*04:04	468	
		DRB1*04:05	121	
		DRB1*04:06	18	

WHO assigned Antigen Group	Associated split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
		DRB1*04:07	132	
		DRB1*04:10	5	
		DRB1*04:11	0	
DR7		DRB1*07:01	1370	DRB1*07, DRB1*07:XX
DR8		DRB1*08:01	215	DRB1*08, DRB1*08:XX
		DRB1*08:02	11	
		DRB1*08:03	79	
		DRB1*08:07	0	
DR9		DRB1*09:01	197	DRB1*09, DRB1*09:XX
		DRB1*09:02	0	
DR10		DRB1*10:01	104	DRB1*10, DRB1*10:XX
DR11		DRB1*11:01	511	DRB1*11, DRB1*11:XX
		DRB1*11:03	52	
		DRB1*11:04	255	
DR12		DRB1*12:01	189	DRB1*12, DRB1*12:XX
		DRB1*12:02	92	
DR13		DRB1*13:01	593	DRB1*13, DRB1*13:XX
		DRB1*13:02	437	
		DRB1*13:03	104	
		DRB1*13:05	9	
DR14		DRB1*14:54	170	DRB1*14, DRB1*14:XX
		DRB1*14:01	89	
		DRB1*14:02	9	
	DR1403	DRB1*14:03	2	
	DR1404	DRB1*14:04	45	
		DRB1*14:05	12	
		DRB1*14:06	2	

HLA – DRB3, DRB4, DRB5

WHO assigned Antigen Group	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing (xx denotes any number)
DR52	DRB3*01:01	1169	DRB3*01, DRB3*01:XX
	DRB3*02:01	7	DRB3*02, DRB3*02:XX
	DRB3*02:02	1232	
	DRB3*03:01	366	DRB3*03, DRB3*03:XX
DR53	DRB4*01:01	532	DRB4*01, DRB4*01:XX
	DRB4*01:03	1537	
DR51	DRB5*01:01	1062	DRB5*01, DRB5*01:XX
	DRB5*01:02	85	
	DRB5*02:02	75	DRB5*02, DRB5*02:XX

HLA – DQB1

WHO assigned Antigen Group	Associated or split	Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing
DQ1	DQ5	DQB1*05:01	1380	DQB1*05, DQB1*05:XX, DQB1*06:06
		DQB1*05:02	233	
		DQB1*05:03	393	
	DQ6	DQB1*06:01	210	
		DQB1*06:02	1638	DQB1*06, DQB1*06:XX (except DQB1*06:06)
		DQB1*06:03	696	
		DQB1*06:04	355	
		DQB1*06:09	126	
DQ2		DQB1*02:01	1702	DQB1*02, DQB1*02:XX
		DQB1*02:02	1128	
DQ3	DQ7	DQB1*03:01	2467	DQB1*03:01, DQB1*03:19, DQB1*03:XX (except DQB1*03:02, DQB1*03:03)
		DQB1*03:19	25	
	DQ8	DQB1*03:02	1505	DQB1*03:02 (except DQB1*03:01, DQB1*03:03 or DQB1*03:XX)
	DQ9	DQB1*03:03	754	DQB1*03:03 (except DQB1*03:01, DQB1*03:02 or DQB1*03:XX)
DQ4		DQB1*04:01	30	DQB1*04, DQB1*04:XX
		DQB1*04:02	319	

HLA – DQA1

Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing
DQA1*01:01	999	DQA1*01, DQA1*01:XX
DQA1*01:02	1915	
DQA1*01:03	697	
DQA1*02:01	1408	DQA1*02, DQA1*02:XX
DQA1*03:01	1099	DQA1*03, DQA1*03:XX
DQA1*03:02	209	
DQA1*03:03	703	
DQA1*04:01	211	DQA1*04, DQA1*04:XX
DQA1*05:01	1402	DQA1*05, DQA1*05:XX
DQA1*05:03	21	
DQA1*05:05	952	
DQA1*06:01	111	DQA1*06, DQA1*06:XX

HLA – DPB1

Antibody Represented by bead panels #	Count Aus donor pool (n=6050)	Donor Typing
DPB1*01:01/DPB1*11:01	828	DPB1*01:01
DPB1*02:01	1729	DPB1*02:01, DPB1*16:01, DPB1*414:01
DPB1*02:02	140	DPB1*02:02, DPB1*547:01
DPB1*03:01	1207	DPB1*03:01, DPB1*104:01, DPB1*104

DPB1*05:01	604	DPB1*05:01, DPB1*135:01
DPB1*06:01	298	DPB1*06:01
DPB1*04:01	4818	DPB1*04:01, DPB1*126:01, DPB1*350:01
DPB1*04:02	1410	DPB1*04:02, DPB1*105:01
DPB1*09:01	115	DPB1*09:01
DPB1*10:01	234	DPB1*10:01
DPB1*11:01	306	DPB1*11:01
DPB1*13:01	267	DPB1*13:01, DPB1*107:01
DPB1*14:01	202	DPB1*14:01
DPB1*15:01	101	DPB1*15:01
DPB1*17:01	175	DPB1*17:01
DPB1*18:01	4	DPB1*18:01
DPB1*19:01	81	DPB1*19:01
DPB1*20:01	77	DPB1*20:01
DPB1*23:01	75	DPB1*23:01
DPB1*28:01	5	DPB1*28:01, DPB1*296:01
DPB1*26:01	0	DPB1*26:01
DPB1*30:01	1	DPB1*30:01
DPB1*31:01	4	DPB1*31:01
DPB1*40:01	1	DPB1*40:01
DPB1*85:01	0	DPB1*85:01
DPB1*105:01	21	DPB1*105:01, DPB1*04:02
DPB1*107:01	2	DPB1*107:01, DPB1*13:01

HLA – DPA1

Antibody Represented by bead panels #	**Count Aus donor pool (n=6050)**	**Donor Typing**
DPA1*01:03	3776	DPA1*01, DPA1*01:XX
DPA1*01:04	32	

DPA1*01:05	5	
DPA1*02:01	956	DPA1*02, DPA1*02:XX
DPA1*02:02	323	
DPA1*03:01	6	DPA1*03, DPA1*03:XX
DPA1*04:01	13	DPA1*04, DPA1*04:XX

POTENTIAL DSA ASSIGNMENT IN ORGANMATCH

A patient has made antibodies to another allele of their own HLA type i.e. specific epitope target within a serotype/antigen group then the donor HLA type will be a potential antibody unless the allele is known.

Note: Patients will not generate antibodies against self-antigens. Many of the single allele-antibodies identified in SAB assays alone may not be real antibodies, especially in unsensitised patients. Epitope analysis and/or alternative testing methods should be used to distinguish the presence of antibodies in patient workups.

Example:

Donor Typing HLA	Recipient HLA	Recipient Antibodies	DSA category
A*11	A*11:01	A*11:02	Potential
DRB1*04	DRB1*04:02	DRB1*04:01	Potential
DQB1*06	DQB1*06:02	DQB1*06:03	Potential

CHANGE HISTORY

Version number	Effective date	Summary of change
1	05/01/2023	First version of document
2	07/03/2023	Additional changes to DPB1*02:01, and DQB1*06:06
3	Refer to footer	Additional changes to DPB1*03:01, DPB1*105:01, DPB1*107:01 and DPB1*23:01

ELECTRONIC SIGNATURE

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