

HaploPrep™ Probe Book for HLA-DR



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Intended Use:

HaploPrep™ is intended for the separation of alleles into their haploid components for downstream analysis. This collection of probes for HLA-DR is designed to separate allele combinations that cause ambiguities, or for the characterization of new alleles.

Background:

HaploPrep™ or Haplotype-Specific Extraction (HSE) physically separates diploid genomic DNA into its haploid components. These components can then be separately analyzed by routine DNA typing methods that are currently used on standard diploid DNA. By separating the alleles, HaploPrep™ provides the advantage to individually analyze each gene.

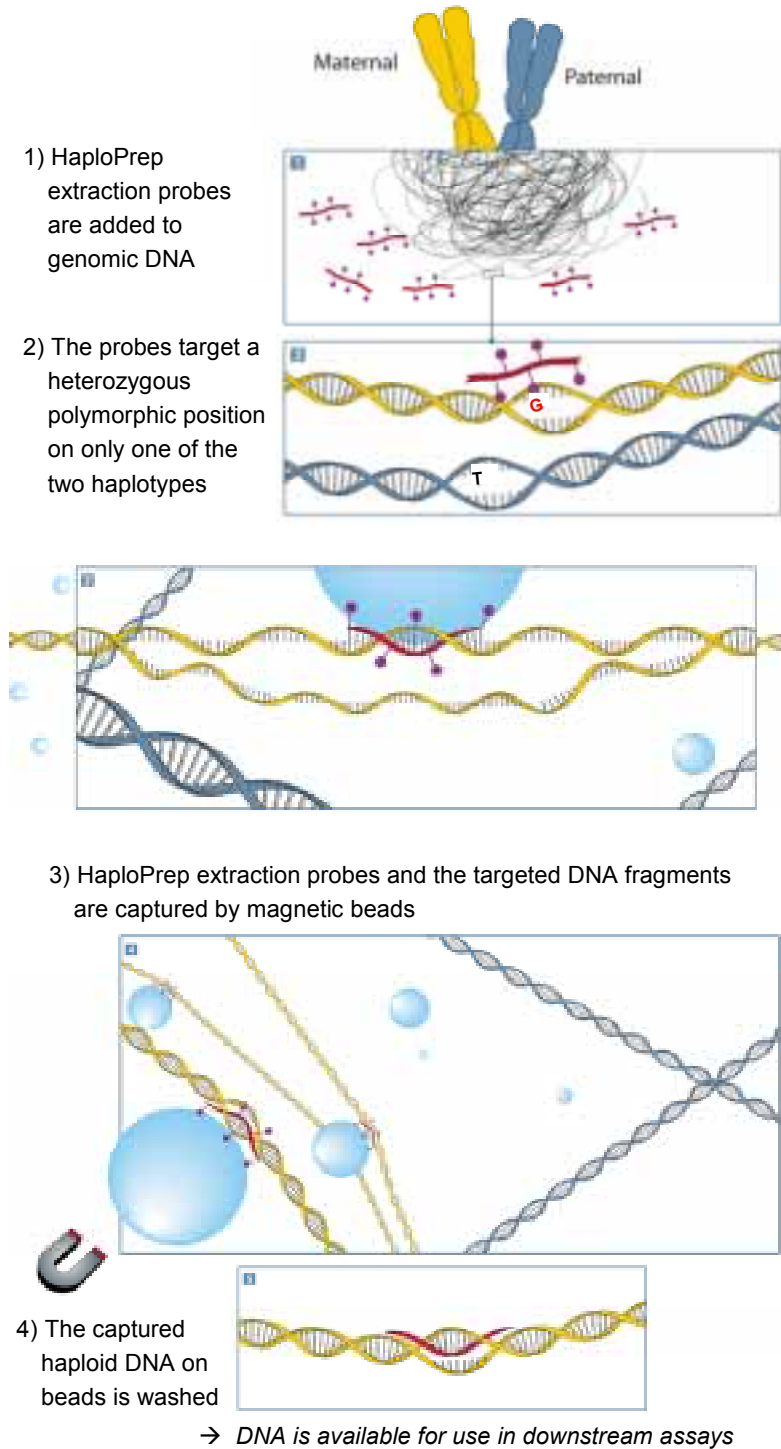
HSE has been tested with direct sequencing; forward sequence-specific oligonucleotide probes (SSO), reverse SSO, sequence-specific priming (SSP), homogeneous luminescent genotyping, and restriction fragment length polymorphism (RFLP) digests.

HSE technology for HLA is developed under a collaboration of GenoVision and Generation Biotech.

Patents pending US 09/735,099 and international applications.

Principle:

HSE separates DNA into its haploid components by exploiting the heterozygous differences between allele combinations. DNA is hybridized with specially designed probes, then magnetic beads capture the hybridized DNA fragments and the haploid component is purified, leaving the non-targeted allele in the solution.



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Probe Targets – Unique Sequence Elements

HLA-DR Probe #	Unique Sequence Element	Center Position	Exon
DR28G	GAGG <u>G</u> AGG	28	2
DR30C	TAC <u>T</u> C	30	2
DR37C	AAC <u>A</u> T	37	2
DR37G	CGG <u>G</u> T	36	2
DR38T2	AG <u>I</u> TT	37	2
DR39G	AGG <u>G</u> A	39	2
DR40A	ATA <u>A</u> G	40	2
DR42A	TTGA <u>A</u> TG	41	2
DR140T	GT <u>I</u> CC	140	2
DR170G	TAG <u>C</u> G (reversed)	170	2
DR173A	TG <u>A</u> GG (reversed)	173	2
DR174G	CTGC <u>G</u> GAGC (reversed)	174	2
DR210C	AGAC <u>G</u> A	210	2
DR220C	CC <u>C</u> TG (reversed)	220	2

How to Select Probes for Haplotype-Specific Extraction:

Selection of the appropriate probes is an important but complex process due to the highly polymorphic nature of HLA genes; therefore, the data and specificity of each probe is presented in several formats:

- The **Allele Level Chart** lists all alleles and their reactivity with the probes.
- The **Serology Group Chart** lists alleles in their serology groups. The probe which most effectively extracts the group is listed first. Exceptions are listed specifically indicating alleles within a group which are not captured, alleles that are weakly targeted, and alleles for which the sequence information is unknown.
- The **HLA-DR Probe Matrix Chart** lists the suggested probes to use with specified serology group combinations. The probes listed will capture most of the alleles within the serology group, except those probes that are listed in **bold**. These probes capture the most frequent alleles within the serology group but may capture both alleles.
- The **Probe Chart** lists the alleles targeted by the individual probes.

The low-resolution type must be known for a sample before using HSE. The principle of the extraction is to target a known heterozygous position. A sample that is a known homozygote cannot be separated.

The following examples of how to select HLA-B probes can be extrapolated to help select probes for any HLA loci:

- Refer to the **allele level chart** and find the allele you wish to target in the first column of the chart. Probes are listed on top of the chart in the first row. Probes which target an allele are designated by black cells. Grey cells indicate that the probe targets the allele weakly. If the intersecting cell is white, the probe does not target the allele.

- For example, if you wish to separate a sample with a low-resolution type of HLA-B*08xx and HLA-B*42xx, the allele level chart lists several probes which target most *08 alleles: B261C, B277A, B317T, B355C, and B539A. Closer inspection will show that the last 3 probes do not target several of the

Allele	B261C	B277A	B317T	B355C	B539A	B261C	B277A	B317T	B355C	B539A	B261C	B277A	B317T	B355C	B539A
HLA-B*0801															
HLA-B*0802															
HLA-B*0803															
HLA-B*0804															
HLA-B*0805															
HLA-B*0806															
HLA-B*0807															
HLA-B*0808															
HLA-B*0809															
HLA-B*0810															
HLA-B*0811															
HLA-B*0812															
HLA-B*0813															
HLA-B*0814															
HLA-B*0815															
HLA-B*0816															
HLA-B*0817															
HLA-B*0818															
HLA-B*0819															
HLA-B*0820															
HLA-B*0821															

more common *08 alleles. Probes B261C and B277A target most of the *08 alleles with few exceptions. Once you've found probes which target one allele, you must check to be certain they do not target the other allele. Probe B261C also targets HLA-B*42xx and therefore would not separate this combination; however, B277A would.

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- If a sample appears to have alleles in the same serology group refer to the **serology group chart**, and select probes that could separate alleles within the group.

[illegible]

- For example, there is an indication from initial typing that a sample consists of two different types of B*07: B*0701 and B*0703. HLA-B*0703 is listed as a non-targeted allele for probes B277G1, B277G2, and B48A (see column titled 'Alleles Not Targeted'). Since B*0701 is not listed as an unknown sequence comparison or weakly targeted allele for these probes, any of these probes will extract B*0701 from this sample.

- The **probe matrix chart** lists probes that will separate allele combinations from different serology groups. Find the serology group of one allele in the top row of the chart. The serology groups in this first row are referred to as Group One. Find the second serology group of the mixture in the first column down the left side of the chart. Serology groups in this column are referred to as Group Two. Probes which will target most of the alleles within serology Group One are designated by white intersecting cells in the matrix. Probes which target Group Two are designated by grey intersecting cells. **Any probe listed in bold may capture alleles from both groups and should be investigated in the allele level chart before using to separate a sample.**

- For example, a sample has a low-resolution type of HLA-B*07xx and HLA-B*44xx. If you select B7 from the top row (group one) and B44 from the first column (group two) of the chart, probes B277G1 and B277G2 are listed in white intersecting cells and will extract B7. Probes B277A and B261G are listed in grey intersecting cells and will extract B44; however, probes B277A and B261G are listed in **bold**, which mean these probes may capture some alleles in the B7 group – check the allele level chart before use.

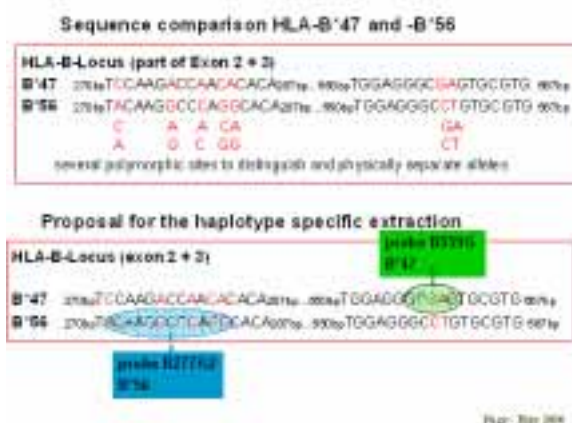
xly	B7	
B7		
B8	B559G	B277A
	B277G1	
	B277G2	
B13	B261C	B261G
	B277G1	
	B277G2	
B14	B559G	B277A
	B277G1	
	B277G2	
B40	B277G1	B277A
	B277G2	B261G
B41	B261C	B277A
	B559G	B539A
	B277G1	
B42	B559G	B539A
B44	B277G1	B277A
	B277G2	B261G

- Some samples may not have probes that will extract both alleles, but all low-resolution allele combinations will have a probe to extract one of the alleles, and a probe that will extract at least some of the alleles from the second allele group.
 - For example: If the sample has a low-resolution type of HLA-B*14xx and HLA-B*15xx, the matrix chart lists probe B559C if you select B14 from the top row (group one) and B15 from the first column (group two) of the chart. Probe B559C

will extract the B15 alleles. An empty cell indicates that there is no probe that will extract B14xx discretely from B15 alleles. However, if you refer to the Serology Group Chart, probe B261C will extract all of the B14 and will not extract the majority of B15 alleles: 15010101-150104, 1503-1507, 1512, 1514, ...1579. If it were determined that the sample had a HLA-B*1502, then probe B355C could be used to isolate the B14 allele.

- An alternative to using the charts included here, especially when choosing probes to separate samples with multiple possible allele combinations, would be to manually identify the polymorphic nucleotide positions and unique sequence elements between alleles which are targeted by HSE probes. Sequence alignment tools, available online from the European Bioinformatics Institute for the IMGT/HLA community at <http://www.ebi.ac.uk/imgt/hla/align.html>, can be used to align alleles, identify the polymorphic nucleotide positions and unique sequence elements between them, and match these to HSE probes.

- For example, the probe B559C targets polymorphic positions centered at the nucleotide position 559 (exon 3) that contain the target sequence GCGAG. A sample with low-resolution types HLA-B*47xx, HLA-B*56xx can be resolved.



Enter the alleles into the box for specific sequences requested as shown below.

HLA Sequence Database - IMGT/HLA Sequence Database

File Edit View Favorites Tools Help

IMGT/HLA Sequence Database

The latest version of the alignment tool now includes genomic sequences as well alignments of synonymously sequenced regions. Where discrepancies have arisen between reported sequences and those stored in the database, the original authors have been contacted where possible, and necessary amendments to published sequences have been incorporated into this alignment. Future sequencing very closely aimed at this list and the IMGT/HLA community would welcome any evidence that helps to maintain the accuracy of these sequence alignments.

Internet Explorer users should be aware that a bug has been reported in the Javascript that automatically refreshes stored alignment generation. This bug caused the assembly not, but does mean that you may have to refresh the page before performing further alignments, or are currently looking into this problem. Alternative browsers like Firefox, have no report of bugs with the Javascript.

IMGT/HLA Sequence Database Alignment Tool

Select Locus:	B	2004
Select the position to align:	Nucleotide - CDS	1999
Enter any specific coordinates requested:	47-56	1999
Enter the reference sequence:	B*01	1999
Select how you wish to view any mismatches:	Show mismatches between sequences	1999
Select how the alignment will be combined:	In Exons - synonymously sequenced in codons	1999
What allele discrepancy is in this region:	Only unsequenced alleles	1999
Select type of output:	Plain text, suited for cut & paste	1999
Perform alignment:	Align Sequences Now	1999

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The database will return sequence alignments showing mismatches between alleles as well as the exon nucleotide positions which correlate to HSE probes. Inspection of the mismatches aligned in this search reveals HLA-B*47xx matches the unique sequence element listed for HSE probe B559G while B56 alleles do not. HLA-B*56xx similarly matches HSE probe B277G2.

	510	520	530	540	550	560	570	580	590	600
D*4701.01	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*4701.02	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*4702	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*4703	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*4704	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*4705	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5601	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5602	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5603	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5604	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5605	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5606	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5607	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5608	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5609	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5610	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5611	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5612	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5613	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5614	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5615	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG
D*5616	CCGACGCAAG	TGGAGAGCGG	CCCGTGAAGC	GGAGGAGCGG	AGAGGCTAAC	TGGAGAGCGG	TGGCTCCGCA	GGAGGAGCGG	GGAGGAGCGG	GGAGGAGCGG

• HLA-DR Probe Matrix Chart:

	Allele One							
	DRB1*01		DRB1*03		DRB1*04		DRB1*07	
Allele Two	DRB1*01		DR30C	DR42A	DR37C	DR42A	DR40A	DR42A
			DR140T					
	DRB1*03	DR42A	DR30C		DR37C	DR30C	DR40A	DR30C
			DR140T			DR140T		DR140T
	DRB1*04	DR42A	DR37C	DR30C	DR37C		DR40A	DR37C
				DR140T				
	DRB1*07	DR42A	DR40A	DR30C	DR40A	DR37C	DR40A	
				DR140T				
	DRB1*08	DR42A	DR30C	DR140T	DR37G	DR37C	DR30C	DR40A
			DR37G		DR220C		DR37G	DR30C
			DR220C			DR220C		DR220C
	DRB1*09	DR42A	DR38T2	DR30C	DR38T2	DR37C	DR38T2	DR40A
				DR140T				
	DRB1*10	DR42A	DR28G	DR30C	DR28G	DR37C	DR28G	DR40A
				DR140T				
	DRB1*11	DR42A	DR173A		DR173A	DR37C	DR30C	DR40A
			DR30C				DR173A	DR30C
			DR140T				DR140T	DR140T
	DRB1*12	DR42A	DR37G		DR37G	DR37C	DR30C	DR40A
			DR30C				DR37G	DR30C
			DR140T				DR140T	DR140T
	DRB1*13	DR42A	DR30C		DR210C	DR37C	DR30C	DR40A
			DR140T				DR140T	DR140T
			DR210C				DR210C	DR210C
	DRB1*14	DR42A	DR30C	DR140T	DR174G	DR37C	DR30C	DR40A
	DRB1*15	DR42A	DR39G	DR30C	DR39G	DR37C	DR39G	DR40A
			DR140T				DR140T	DR140T
	DRB1*16	DR42A	DR39G	DR30C	DR39G	DR37C	DR39G	DR40A
				DR140T				
	DRB1*01		DRB1*03		DRB1*04		DRB1*07	

*Probes that are listed in **Italics** may capture both alleles. Refer to the HLA-DR Serology Group Chart and HLA-DR Allele Level Chart.

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HLA-DR Serology Group Chart: *(the most effective probes are listed first;
in terms of capturing the most alleles per serology group)*

Allele Group	Probe	Alleles not targeted	Alleles weakly targeted	Unknown
DRB1*01	DR42A			
	DR210C	DRB1*010101-010204, 0104-0112		
DRB1*03	DR30C			
	DR140T	DRB1*030201, 030202, 0303, 0306, 0316, 0317, 0326, 0327		
	DR173A	DRB1*030101-0307, 0309-0328		
	DR174G	DRB1*030101-0309, 0311-0328		
	DR170G	DRB1*030101-0311, 0313-0328		
DRB1*04	DR37C	DRB1*0434		DRB1*0413, 0414, 0417, 0420
	DR170G	DRB1*040101-0404, 0406-0408, 0413-0416, 0418-0423, 0425-0427, 0431-0444, 0446, 0447, 0449-0452		
	DR220C	DRB1*040101-0411, 0413-0417, 0419-0424, 0426-0430, 0432-0452		
	DR140T	DRB1*040101-0427, 0429-0434, 0436-0441, 0444-0452		
	DR210C	DRB1*040101, 040102, 040301-0413, 0415-0436, 0438-0452		
	DR28G	DRB1*040101-0412, 0415, 0416, 0418, 0419, 0421-0452		DRB1*0413, 0414, 0417, 0420
	DR30C	DRB1*040101-0412, 0415, 0416, 0418, 0419, 0421-0452		DRB1*0413, 0414, 0417, 0420
	DR37G	DRB1*040101-0413, 0415-0450		DRB1*0413, 0414, 0417, 0420
	DR38T2	DRB1*040101-0413, 0415-0450		DRB1*0413, 0414, 0417, 0420
DRB1*07	DR40A		DRB1*070102	
	DR174G	DRB1*070101-0705, 0707-0709		
DRB1*08	DR220C	DRB1*0805, 0818, 0824, 0825, 0829		
	DR30C			DRB1*080402
	DR37G	DRB1*0814, DRB1*0820	DRB1*0821	DRB1*080402
	DR170G	DRB1*080201-080203, 080401-080404, 0807-0809, 0811, 0813, 0815, 0820, 0821, 0824, 0825, 0828	DR*0819	
	DR140T	DRB1*080101-08016, 0818-0827, 0829		
	DR174G	DRB1*080101-0807, 0809-0814, 0816-0829	DRB1*0815	
	DR28G	DRB1*080101-080401, 080403-0829		DRB1*080402
	DR37C	DRB1*080101-080401, 080403-0829		DRB1*080402
	DR38T2	DRB1*080101-080401, 080403-0829		DRB1*080402
	DR39G	DRB1*080101-080401, 080403-0829		DRB1*080402
	DR40A	DRB1*080101-080401, 080403-0829		DRB1*080402
	DR42A	DRB1*080101-080401, 080403-0829		DRB1*080402
DRB1*09	DR38T2			
DRB1*10	DR28G			
	DR38T2		DRB1*100101, 100102	
DRB1*11	DR30C	DRB1*1122, 1130		DRB1*110801, 110802,
	DR140T	DRB1*1117, 1137, 1141, 1148, 1150, 1152		
	DR173A		DRB1*1131, 1133, 1135, 1138,	
	DR210C	DRB1*110101-110105, 110401-1110, 111201-1113, 1115, 1117-1119, 1122-1135, 1137-1139, 1142-1147, 1149-1154		
	DR220C	DRB1*110101-1122, 1124, 1126-1144, 1146-1154	DRB1*1132	
	DR37C	DRB1*110101-1121, 1123-1154		
	DR37G	DRB1*110101-110402, 110601-1154		
	DR28G	DRB1*110101-1107, 1109-1121, 1123-1154	DR*1122	DRB1*110801, 110802

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Allele Group	Probe	Alleles not targeted	Alleles weakly targeted	Unknown
DRB1*12	DR37G			
	DR30C			
	DR140T		DRB1*1211	
	DR173A	DRB1*120101-120302, 1205-1211		
DRB1*13	DR30C			
	DR140T	DRB1*130301-130302, 130701-0308, 1312, 1313, 1319, 1326, 1332, 1333, 1336-1338, 1340, 1347-1349, 1353, 1355, 1358, 1360, 1365		
	DR210C	DRB1*130301-130302, 1305-130702, 1309-131402, 1318, 1321, 1325, 1326, 1330, 1333, 1337, 1342, 1344, 1346, 1347, 1349, 1350, 1355, 1356, 1358, 1360, 1362, 1366	DR*130301, 130302, 1310, 1333, 1337, 1366	
	DR220C	DRB1*130101-1312, 131401-1317, 1319-1346, 1348-1354, 1356-1366		
	DR174G	DRB1*130101-1342, 1344, 1346-1366		
	DR170G	DRB1*130101-130202, 1305-1311, 131401-1320, 1322-1329, 1331, 1334-1337, 1339-1347, 1350-1354, 1356, 1357, 1359-1364		
	DR37G	DRB1*130101-1316, 1318-1366		
DRB1*14	DR30C	DRB1*1410, 1446	DRB1*1439	
	DR174G	1402-140302, 140501-1406, 1409, 1411-1415, 1417-1421, 1423, 1424, 1427, 1429, 1430, 1433, 1434, 1436, 1437, 1440-1448		
	DR220C	DRB1*140101-1402, 1404-1411, 1413, 1414, 1416-1426, 1428-1431-1439, 1441-1448		
	DR140T	DRB1*140101-1416, 1418-1420, 1422-1429, 1431, 1432, 1434, 1436-1441, 1443-1448		
	DR37G	DRB1*140101-140302, 140501-1410, 1412-1414, 1416-1427, 1429, 1430, 1432-1448		
	DR37C	DRB1*140101-1409, 1411-1448		
	DR170G	DRB1*140101-1412, 1414-1448		
	DR210C	DRB1*140101-1415, 1417-1448		
	DR28G	DRB1*140101-1410, 1412, 1414-1448		DRB1*1411, 1413
DRB1*15	DR39G			DRB1*150202
	DR140T	DRB1*1507, 1511		
	DR174G	DRB1*150101-150103, 150105, 150201, 150203-1515	DRB1*150104, 150202	
	DR170G	DRB1*150101-1511, 1513-1515		
	DR210C	DRB1*150101-1509, 1511-1515		
	DR28G	DRB1*150101-150201, 150203-1515		DRB1*150202
	DR30C	DRB1*150101-150201, 150203-1515		DRB1*150202
	DR37C	DRB1*150101-150201, 150203-1515		DRB1*150202
	DR37G	DRB1*150101-150201, 150203-1515		DRB1*150202
	DR42A	DRB1*150101-150201, 150203-1515		DRB1*150202
	DR38T2	DRB1*150101-150201, 150203-1515		DRB1*150202
DRB1*16	DR39G			
	DR220C	DRB1*160101-1603, 160501-1608		

HLA-DR Allele Level Chart:

Kit Probes	DR28G	DR30C	DR37C	DR37G	DR38T2	DR39G	DR40A	DR42A	¹ DR140T	² DR170G	³ DR173A	DR174G	DR210C	DR220C
DRB1*010101														
DRB1*010102														
DRB1*010103														
DRB1*010201														
DRB1*010202														
DRB1*010203														
DRB1*0103														
DRB1*0104														
DRB1*0105														
DRB1*0106														
DRB1*0107														
DRB1*0108														
DRB1*0109														
DRB1*0110														
DRB1*0111														
DRB1*0112														
DRB1*030101														
DRB1*030102														
DRB1*030201														
DRB1*030202														
DRB1*0303														
DRB1*0304														
DRB1*030501														
DRB1*030502														
DRB1*0306														
DRB1*0307														
DRB1*0308														
DRB1*0309														
DRB1*0310														
DRB1*0311														
DRB1*0312														
DRB1*0313														
DRB1*0314														
DRB1*0315														
DRB1*0316														
DRB1*0317														
DRB1*0318														
DRB1*0319														
DRB1*0320														
DRB1*0321														
DRB1*0322														
DRB1*0323														
DRB1*0324														
DRB1*0325														
DRB1*0326														
DRB1*0327														
DRB1*0328														
DRB1*040101														
DRB1*040102														
DRB1*0402														
DRB1*040301														
DRB1*040302														
DRB1*0404														
DRB1*040501														
DRB1*040502														
DRB1*040503														
DRB1*040504														
DRB1*0406														
DRB1*040701														
DRB1*040702														
DRB1*040703														
DRB1*0408														
DRB1*0409														
DRB1*0410														
DRB1*0411														
DRB1*0412														
DRB1*0413	?	?	?	?	?									

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Kit Probes	DR28G	DR30C	DR37C	DR37G	DR38T2	DR39G	DR40A	DR42A	¹ DR140T	² DR170G	³ DR173A	DR174G	DR210C	DR220C
DRB1*0414	?	?	?	?	?	?	?	?						
DRB1*0415														
DRB1*0416														
DRB1*0417	?	?	?	?	?	?								
DRB1*0418														
DRB1*0419														
DRB1*0420	?	?	?	?	?	?								
DRB1*0421														
DRB1*0422														
DRB1*0423														
DRB1*0424														
DRB1*0425														
DRB1*0426														
DRB1*0427														
DRB1*0428														
DRB1*0429														
DRB1*0430														
DRB1*0431														
DRB1*0432														
DRB1*0433														
DRB1*0434														
DRB1*0435														
DRB1*0436														
DRB1*0437														
DRB1*0438														
DRB1*0439														
DRB1*0440														
DRB1*0441														
DRB1*0442														
DRB1*0443														
DRB1*0444														
DRB1*0445														
DRB1*0446														
DRB1*0447														
DRB1*0448														
DRB1*0449														
DRB1*0450														
DRB1*0451														
DRB1*0452														
DRB1*070101														
DRB1*070102														
DRB1*0703														
DRB1*0704														
DRB1*0705														
DRB1*0706														
DRB1*0707														
DRB1*0708														
DRB1*0709														
DRB1*080101														
DRB1*080102														
DRB1*080201														
DRB1*080202														
DRB1*080203														
DRB1*080302														
DRB1*080401														
DRB1*080402	?	?	?	?	?	?	?	?						
DRB1*080403														
DRB1*080404														
DRB1*0805														
DRB1*0806														
DRB1*0807														
DRB1*0808														
DRB1*0809														
DRB1*0810														
DRB1*0811														
DRB1*0812														
DRB1*0813														
DRB1*0814														

Kit Probes	DR28G	DR30C	DR37C	DR37G	DR38T2	DR39G	DR40A	DR42A	¹ DR140T	² DR170G	³ DR173A	DR174G	DR210C	DR220C
DRB1*0815														
DRB1*0816														
DRB1*0817														
DRB1*0818														
DRB1*0819														
DRB1*0820														
DRB1*0821														
DRB1*0822														
DRB1*0823														
DRB1*0824														
DRB1*0825														
DRB1*0826														
DRB1*0827														
DRB1*0828														
DRB1*0829														
DRB1*090102														
DRB1*0902														
DRB1*0903														
DRB1*0904														
DRB1*100101														
DRB1*100102														
DRB1*110101														
DRB1*110102														
DRB1*110103														
DRB1*110104														
DRB1*110105														
DRB1*1102														
DRB1*1103														
DRB1*110401														
DRB1*110402														
DRB1*1105														
DRB1*110601														
DRB1*110602														
DRB1*1107														
DRB1*110801	?	?	?	?	?									
DRB1*110802	?	?	?	?	?									
DRB1*1109														
DRB1*1110														
DRB1*1111														
DRB1*111201														
DRB1*111202														
DRB1*1113														
DRB1*111401														
DRB1*111402														
DRB1*1115														
DRB1*1116														
DRB1*1117														
DRB1*1118														
DRB1*1119														
DRB1*1120														
DRB1*1121														
DRB1*1122														
DRB1*1123														
DRB1*1124														
DRB1*1125														
DRB1*1126														
DRB1*112701														
DRB1*112702														
DRB1*1128														
DRB1*1129														
DRB1*1130														
DRB1*1131														
DRB1*1132														
DRB1*1133														
DRB1*1134														
DRB1*1135														
DRB1*1136														
DRB1*1137														
DRB1*1138														

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Kit Probes	DR28G	DR30C	DR37C	DR37G	DR38T2	DR39G	DR40A	DR42A	¹ DR140T	² DR170G	³ DR173A	DR174G	DR210C	DR220C
DRB1*1139														
DRB1*1140														
DRB1*1141														
DRB1*1142														
DRB1*1143														
DRB1*1144														
DRB1*1145														
DRB1*1146														
DRB1*1147														
DRB1*1148														
DRB1*1149														
DRB1*1150														
DRB1*1151														
DRB1*1152														
DRB1*1153														
DRB1*1154														
DRB1*120101														
DRB1*120102														
DRB1*120201														
DRB1*120202														
DRB1*120302														
DRB1*1204														
DRB1*1205														
DRB1*1206														
DRB1*1207														
DRB1*1208														
DRB1*1209														
DRB1*1210														
DRB1*1211														
DRB1*130101														
DRB1*130102														
DRB1*130103														
DRB1*130201														
DRB1*130202														
DRB1*130301														
DRB1*130302														
DRB1*1304														
DRB1*1305														
DRB1*1306														
DRB1*130701														
DRB1*130702														
DRB1*1308														
DRB1*1309														
DRB1*1310														
DRB1*1311														
DRB1*1312														
DRB1*1313														
DRB1*131401														
DRB1*131402														
DRB1*1315														
DRB1*1316														
DRB1*1317														
DRB1*1318														
DRB1*1319														
DRB1*1320														
DRB1*1321														
DRB1*1322														
DRB1*1323														
DRB1*1324														
DRB1*1325														
DRB1*1326														
DRB1*1327														
DRB1*1328														
DRB1*1329														
DRB1*1330														
DRB1*1331														
DRB1*1332														
DRB1*1333														
DRB1*1334														
DRB1*1335														

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Kit Probes	DR28G	DR30C	DR37C	DR37G	DR38T2	DR39G	DR40A	DR42A	¹ DR140T	² DR170G	³ DR173A	DR174G	DR210C	DR220C
DRB1*1336														
DRB1*1337														
DRB1*1338														
DRB1*1339														
DRB1*1340														
DRB1*1341														
DRB1*1342														
DRB1*1343														
DRB1*1344														
DRB1*1345														
DRB1*1346														
DRB1*1347														
DRB1*1348														
DRB1*1349														
DRB1*1350														
DRB1*1351														
DRB1*1352														
DRB1*1353														
DRB1*1354														
DRB1*1355														
DRB1*1356														
DRB1*1357														
DRB1*1358														
DRB1*1359														
DRB1*1360														
DRB1*1361														
DRB1*1362														
DRB1*1363														
DRB1*1364														
DRB1*1365														
DRB1*1366														
DRB1*140101														
DRB1*140102														
DRB1*1402														
DRB1*140301														
DRB1*140302														
DRB1*1404														
DRB1*140501														
DRB1*140502														
DRB1*1406														
DRB1*140701														
DRB1*140702														
DRB1*1408														
DRB1*1409														
DRB1*1410														
DRB1*1411														
DRB1*1412														
DRB1*1413														
DRB1*1414														
DRB1*1415														
DRB1*1416														
DRB1*1417														
DRB1*1418														
DRB1*1419														
DRB1*1420														
DRB1*1421														
DRB1*1422														
DRB1*1423														
DRB1*1424														
DRB1*1425														
DRB1*1426														
DRB1*1427														
DRB1*1428														
DRB1*1429														
DRB1*1430														
DRB1*1431														
DRB1*1432														
DRB1*1433														
DRB1*1434														
DRB1*1435														

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Kit Probes	DR28G	DR30C	DR37C	DR37G	DR38T2	DR39G	DR40A	DR42A	¹ DR140T	² DR170G	³ DR173A	DR174G	DR210C	DR220C
DRB1*1436														
DRB1*1437														
DRB1*1438														
DRB1*1439														
DRB1*1440														
DRB1*1441														
DRB1*1442														
DRB1*1443														
DRB1*1444														
DRB1*1445														
DRB1*1446														
DRB1*1447														
DRB1*1448														
DRB1*150101														
DRB1*150102														
DRB1*150103														
DRB1*150104														
DRB1*150105														
DRB1*150201														
DRB1*150202	?	?	?	?	?	?	?	?						
DRB1*150203														
DRB1*1503														
DRB1*1504														
DRB1*1505														
DRB1*1506														
DRB1*1507														
DRB1*1508														
DRB1*1509														
DRB1*1510														
DRB1*1511														
DRB1*1512														
DRB1*1513														
DRB1*1514														
DRB1*1515														
DRB1*160101														
DRB1*160102														
DRB1*160201														
DRB1*160202														
DRB1*1603														
DRB1*1604														
DRB1*160501														
DRB1*160502														
DRB1*1607														
DRB1*1608														
DRB2*0101														
DRB3*010101														
DRB3*01010201														
DRB3*01010202														
DRB3*010103														
DRB3*010104														
DRB3*0102														
DRB3*0103														
DRB3*0104														
DRB3*0105														
DRB3*0106														
DRB3*0107														
DRB3*0108														
DRB3*0109														
DRB3*0110														
DRB3*0111														
DRB3*0201														
DRB3*020201														
DRB3*020202														
DRB3*020203														
DRB3*020204														
DRB3*0203														
DRB3*0204														
DRB3*0205														
DRB3*0206														
DRB3*0207														

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Kit Probes	DR28G	DR30C	DR37C	DR37G	DR38T2	DR39G	DR40A	DR42A	¹ DR140T	² DR170G	³ DR173A	DR174G	DR210C	DR220C
DRB3*0208														
DRB3*0209														
DRB3*0210														
DRB3*0211														
DRB3*0212														
DRB3*0213														
DRB3*0214														
DRB3*0215														
DRB3*0216														
DRB3*0217														
DRB3*0218														
DRB3*0219														
DRB3*030101														
DRB3*030102														
DRB3*0302														
DRB3*0303														
DRB4*010101														
DRB4*0102	?	?	?	?	?	?								
DRB4*01030101														
DRB4*01030102N														
DRB4*010302														
DRB4*010303														
DRB4*010304														
DRB4*0104														
DRB4*0105														
DRB4*0106														
DRB4*0107														
DRB4*0201N														
DRB4*0301N														
DRB5*010101														
DRB5*010102														
DRB5*0102														
DRB5*0103														
DRB5*0104														
DRB5*0105														
DRB5*0106														
DRB5*0107														
DRB5*0108N														
DRB5*0109														
DRB5*0110N														
DRB5*0111														
DRB5*0112														
DRB5*0113														
DRB5*0202														
DRB5*0203														
DRB5*0204														
DRB5*0205														
DRB6*0101														
DRB6*0201														
DRB6*0202	?	?												
DRB7*010101														
DRB7*010102			?											
DRB8*0101														
DRB9*0101														

?: Probe is located in portion of exon not yet sequenced

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Foot Notes: *Due to the sharing of sequence motifs between Class II alleles, some non HLA-DR, Class II alleles may be captured with these probes:*

¹Probe DR140T: DQB1*020102, DQB1*0202, DQB1*0203, DQB1*0204, DPB1*010101, DPB1*010103, DPB1*0102, DPB1*020102, DPB1*020103, DPB1*020104, DPB1*020105, DPB1*020106, DPB1*0202, DPB1*0203, DPB1*0030101, DPB1*030102, DPB1*0302, DPB1*040101, DPB1*040102, DPB1*0402, DPB1*0403, DPB1*0501, DPB1*0502, DPB1*0601, DPB1*0602, DPB1*0801, DPB1*0802, DPB1*0901, DPB1*0902, DPB1*1001, DPB1*1002, DPB1*1102, DPB1*1301, DPB1*1401, DPB1*1601, DPB1*1701, DPB1*1801, DPB1*1901, DPB1*200101, DPB1*200102, DPB1*2101, DPB1*2201, DPB1*2301, DPB1*2401, DPB1*2501, DPB1*260102, DPB1*2701, DPB1*2801, DPB1*2901, DPB1*3001, DPB1*3101, DPB1*3201, DPB1*3301, DPB1*3401, DPB1*3501, DPB1*3601, DPB1*3701, DPB1*3801, DPB1*3901, DPB1*4001, DPB1*4101, DPB1*4401, DPB1*4501, DPB1*4701, DPB1*4801, DPB1*4901, DPB1*5001, DPB1*5101, DPB1*5201, DPB1*5301, DPB1*5401, DPB1*5501, DPB1*5601, DPB1*5701, DPB1*5801, DPB1*5901, DPB1*6001, DPB1*6101N, DPB1*6201, DPB1*6301, DPB1*6401N, DPB1*6501, DPB1*6601, DPB1*6701, DPB1*6801, DPB1*6901, DPB1*7001, DPB1*7101, DPB1*7201, DPB1*7301, DPB1*7401, DPB1*7501, DPB1*7601, DPB1*7701, DPB1*7801, DPB1*7901, DPB1*8001, DPB1*8101, DPB1*8201, DPB1*8301, DPB1*8401, DPB1*8501, DPB1*8601, DPB1*8701, DPB1*8801, DPB1*8901, DPB1*9001, DPB1*9101, DPB1*9201, DPB1*9301, DPB1*9401, DPB1*9501, DPB1*9601, DPB1*9701, DPB1*9801, DPB1*9901

²Probe DR170G: DQB1*050201, DQB1*050202, DQB1*0504, DQB1*0610

³Probe DR173A: DPB1*020102, DPB1*020103, DPB1*020104, DPB1*020105, DPB1*020106, DPB1*0402, DPB1*0602, DPB1*0801, DPB1*1001, DPB1*1102, DPB1*1601, DPB1*1801, DPB1*2501, DPB1*2801, DPB1*3701, DPB1*4101, DPB1*4501, DPB1*4801, DPB1*4901, DPB1*5101, DPB1*5301, DPB1*5901, DPB1*6001, DPB1*6801, DPB1*7301, DPB1*7501, DPB1*7701, DPB1*7901, DPB1*8101, DPB1*8201, DPB1*8301, DPB1*8401, DPB1*9301, DPB1*9401

HLA-A Probe DR28G

Product Name	Size	Product Number
HaploPrep HLA DR28G	25 Separations	H113.PDR28G

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
GAG <u>G</u> AGG	28	2

HLA-DR Alleles Targeted:

DRB1*100101, DRB1*100102, DRB1*1122

No sequence information is available for the following alleles in the position of this HSE probe, therefore the ability to capture the allele is unknown:

DRB1*0413, DRB1*0414, DRB1*0417, DRB1*0420, DRB1*080402, DRB1*110801, DRB1*110802, DRB1*150202, DRB4*0102, DRB6*0202

- W = weakly targeted

HLA-A Probe DR30C

Product Name	Size	Product Number
HaploPrep HLA DR30C	25 Separations	H113.PDR30C

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
TACTC	30	2

HLA-DR Alleles Targeted:

DRB1*030101, DRB1*030102, DRB1*030201, DRB1*030202, DRB1*0303,
 DRB1*0304, DRB1*030501, DRB1*030502, DRB1*0306, DRB1*0307, DRB1*0308
 DRB1*0309, DRB1*0310, DRB1*0311, DRB1*0312, DRB1*0313, DRB1*0314,
 DRB1*0315, DRB1*0316, DRB1*0317, DRB1*0318, DRB1*0319, DRB1*0320
 DRB1*0321, DRB1*0322, DRB1*0323, DRB1*0324, DRB1*0325, DRB1*0326
 DRB1*0327, DRB1*0328,
 DRB1*080101, DRB1*080102, DRB1*080201, DRB1*080202, DRB1*080203,
 DRB1*080302, DRB1*080401, DRB1*080403, DRB1*080404, DRB1*0805, DRB1*0806,
 DRB1*0807, DRB1*0808, DRB1*0809, DRB1*0810, DRB1*0811, DRB1*0812,
 DRB1*0813, DRB1*0814, DRB1*0815, DRB1*0816, DRB1*0817, DRB1*0818,
 DRB1*0819, DRB1*0820, DRB1*0821, DRB1*0822, DRB1*0823, DRB1*0824,
 DRB1*0825, DRB1*0826, DRB1*0827, DRB1*0828, DRB1*0829,
 DRB1*110101, DRB1*110102, DRB1*110103, DRB1*110104, DRB1*110105,
 DRB1*1102, DRB1*1103, DRB1*110401, DRB1*110402, DRB1*1105, DRB1*110601,
 DRB1*110602, DRB1*1107, DRB1*1109, DRB1*1110, DRB1*1111, DRB1*111201,
 DRB1*111202, DRB1*1113, DRB1*1114, DRB1*1115, DRB1*1116, DRB1*1117,
 DRB1*1118, DRB1*1119, DRB1*1120, DRB1*1121, DRB1*1123, DRB1*1124,
 DRB1*1125, DRB1*1126, DRB1*112701, DRB1*112702, DRB1*1128, DRB1*1129,
 DRB1*1131, DRB1*1132, DRB1*1133, DRB1*1134, DRB1*1135, DRB1*1136,
 DRB1*1137, DRB1*1138, DRB1*1139, DRB1*1140, DRB1*1141, DRB1*1142,
 DRB1*1143, DRB1*1144, DRB1*1145, DRB1*1146, DRB1*1147, DRB1*1148,
 DRB1*1149, DRB1*1150, DRB1*1151, DRB1*1152, DRB1*1153, DRB1*1154,
 DRB1*120101, DRB1*120102, DRB1*120201, DRB1*120202, DRB1*120302,
 DRB1*1204, DRB1*1205, DRB1*1206, DRB1*1207, DRB1*1208, DRB1*1209,
 DRB1*1210, DRB1*1211,
 DRB1*130101, DRB1*130102, DRB1*130103, DRB1*130201, DRB1*130202,
 DRB1*130301, DRB1*130302, DRB1*1304, DRB1*1305, DRB1*1306, DRB1*130701,
 DRB1*130702, DRB1*1308, DRB1*1309, DRB1*1310, DRB1*1311, DRB1*1312,
 DRB1*1313, DRB1*131401, DRB1*131402, DRB1*1315, DRB1*1316, DRB1*1317,
 DRB1*1318, DRB1*1319, DRB1*1320, DRB1*1321, DRB1*1322, DRB1*1323,
 DRB1*1324, DRB1*1325, DRB1*1326, DRB1*1327, DRB1*1328, DRB1*1329,
 DRB1*1330, DRB1*1331, DRB1*1332, DRB1*1333, DRB1*1334, DRB1*1335,
 DRB1*1336, DRB1*1337, DRB1*1338, DRB1*1339, DRB1*1340, DRB1*1341,
 DRB1*1342, DRB1*1343, DRB1*1344, DRB1*1345, DRB1*1346, DRB1*1347,
 DRB1*1348, DRB1*1349, DRB1*1350, DRB1*1351, DRB1*1352, DRB1*1353,
 DRB1*1354, DRB1*1355, DRB1*1356DRB1*1357, DRB1*1358, DRB1*1359,

For Research Use Only

DRB1*1360, DRB1*1361, DRB1*1362, DRB1*1363, DRB1*1364, DRB1*1365,
DRB1*1366
DRB1*140101, DRB1*140102, DRB1*1402, DRB1*140301, DRB1*140302, DRB1*1404,
DRB1*140501, DRB1*140502, DRB1*1406, DRB1*140701, DRB1*140702, DRB1*1408,
DRB1*1409, DRB1*1411, DRB1*1412, DRB1*1414, DRB1*1415, DRB1*1416,
DRB1*1417, DRB1*1418, DRB1*1419, DRB1*1420, DRB1*1421, DRB1*1422,
DRB1*1423, DRB1*1424, DRB1*1425, DRB1*1426, DRB1*1427, DRB1*1428,
DRB1*1429, DRB1*1430, DRB1*1431, DRB1*1432, DRB1*1433, DRB1*1434,
DRB1*1435, DRB1*1436, DRB1*1437, DRB1*1438, DRB1*1439-W, DRB1*1440,
DRB1*1441, DRB1*1442, DRB1*1443, DRB1*1444, DRB1*1445, DRB1*1447,
DRB1*1448

No sequence information is available for the following alleles in the position of this HSE probe, therefore the ability to capture the allele is unknown:

DRB1*0413, DRB1*0414, DRB1*0417, DRB1*0420, DRB1*080402, DRB1*110801,
DRB1*110802, DRB1*150202, DRB4*0102, DRB6*0202

- W = weakly targeted

HLA-A Probe DR37C

Product Name	Size	Product Number
HaploPrep HLA DR37C	25 Separations	H113.PDR37C

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
AACAT	37	2

HLA-DR Alleles Targeted:

DRB1*040101, DRB1*040102, DRB1*0402, DRB1*040301, DRB1*040302, DRB1*0404, DRB1*040501, DRB1*040502, DRB1*040503, DRB1*040504, DRB1*0406, DRB1*040701, DRB1*040702, DRB1*040703, DRB1*0408, DRB1*0409, DRB1*0410, DRB1*0411, DRB1*0412, DRB1*0415, DRB1*0416, DRB1*0418, DRB1*0419, DRB1*0421, DRB1*0422, DRB1*0423, DRB1*0424, DRB1*0425, DRB1*0426, DRB1*0427, DRB1*0428, DRB1*0429, DRB1*0430, DRB1*0431, DRB1*0432, DRB1*0433, DRB1*0434, DRB1*0435, DRB1*0436, DRB1*0437, DRB1*0438, DRB1*0439, DRB1*0440, DRB1*0441, DRB1*0442, DRB1*0443, DRB1*0444, DRB1*0445, DRB1*0446, DRB1*0447, DRB1*0448, DRB1*0449-W, DRB1*0450, DRB1*0451, DRB1*0452, DRB1*070102-W, DRB1*1122, DRB1*1410

No sequence information is available for the following alleles in the position of this HSE probe, therefore the ability to capture the allele is unknown:

DRB1*0413, DRB1*0414, DRB1*0417, DRB1*0420, DRB1*080402, DRB1*110801, DRB1*110802, DRB1*150202, DRB4*0102, DRB7*010102

- W = weakly targeted

HLA-A Probe DR37G

Product Name	Size	Product Number
HaploPrep HLA DR37G	25 Separations	H113.PDR37G

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
CGGT	36	2

HLA-DR Alleles Targeted:

DRB1*080101, DRB1*080102, DRB1*080201, DRB1*080202, DRB1*080203,
 DRB1*080302, DRB1*080401, DRB1*080403, DRB1*080404, DRB1*0805, DRB1*0806,
 DRB1*0807, DRB1*0808, DRB1*0809, DRB1*0810, DRB1*0811, DRB1*0812,
 DRB1*0813, DRB1*0815, DRB1*0816, DRB1*0817, DRB1*0818, DRB1*0819,
 DRB1*0821-W, DRB1*0822, DRB1*0823, DRB1*0824, DRB1*0825, DRB1*0826,
 DRB1*0827, DRB1*0828, DRB1*0829,
 DRB1*1105,
 DRB1*120101, DRB1*120102, DRB1*120201, DRB1*120202, DRB1*120302,
 DRB1*1204, DRB1*1205, DRB1*1206, DRB1*1207, DRB1*1208, DRB1*1209,
 DRB1*1210, DRB1*1211,
 DRB1*1317,
 DRB1*1404, DRB1*1411, DRB1*1415, DRB1*1428, DRB1*1431

No sequence information is available for the following alleles in the position of this HSE probe, therefore the ability to capture the allele is unknown:

DRB1*0413, DRB1*0414, DRB1*0417, DRB1*0420, DRB1*080402, DRB1*110801,
 DRB1*110802, DRB1*150202, DRB4*0102, DRB7*010102

- W = weakly targeted

HLA-A Probe DR38T2

Product Name	Size	Product Number
HaploPrep HLA DR38T2	25 Separations	H113.PDR38T2

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
AGTTT	37	2

HLA-DR Alleles Targeted:

DRB1*090102, DRB1*0902, DRB1*0903, DRB1*0904, DRB1*100101-W, DRB1*100102-W

No sequence information is available for the following alleles in the position of this HSE probe, therefore the ability to capture the allele is unknown:

DRB1*0413, DRB1*0414, DRB1*0417, DRB1*0420, DRB1*080402, DRB1*110801, DRB1*110802, DRB1*150202, DRB4*0102, DRB7*010102

- W = weakly targeted

HLA-A Probe DR39G

Product Name	Size	Product Number
HaploPrep HLA DR39G	25 Separations	H113.PDR39G

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
AGGGA	39	2

HLA-DR Alleles Targeted:

DRB1*150101, DRB1*150102, DRB1*150103, DRB1*150104, DRB1*150105,
 DRB1*150201, DRB1*150203, DRB1*1503, DRB1*1504, DRB1*1505, DRB1*1506,
 DRB1*1507, DRB1*1508, DRB1*1509, DRB1*1510, DRB1*1511, DRB1*1512,
 DRB1*1513, DRB1*1514, DRB1*1515, DRB1*160101, DRB1*160102, DRB1*160201,
 DRB1*160202, DRB1*1603, DRB1*1604, DRB1*160501, DRB1*160502, DRB1*1607,
 DRB1*1608

No sequence information is available for the following alleles in the position of this HSE probe, therefore the ability to capture the allele is unknown:

DRB1*0414, DRB1*0417, DRB1*0420, DRB1*080402, DRB1*150202, DRB4*0102,
 DRB7*010102

- W = weakly targeted

HLA-A Probe DR40A

Product Name	Size	Product Number
HaploPrep HLA DR40A	25 Separations	H113.PDR40A

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
ATAAG	40	2

HLA-DR Alleles Targeted:

DRB1*070101, DRB1*070102-W, DRB1*0703, DRB1*0704, DRB1*0705, DRB1*0706, DRB1*0707, DRB1*0708, DRB1*0709

No sequence information is available for the following alleles in the position of this HSE probe, therefore the ability to capture the allele is unknown:

DRB1*0414, DRB1*080402, DRB1*150202

- W = weakly targeted

HLA-A Probe DR42A

Product Name	Size	Product Number
HaploPrep HLA DR42A	25 Separations	H113.PDR42A

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
TTGAATG	41	2

HLA-DR Alleles Targeted:

DRB1*010101, DRB1*010102, DRB1*010103, DRB1*010201, DRB1*010202,
DRB1*010203, DRB1*0103, DRB1*0104, DRB1*0105, DRB1*0106,
DRB1*0107-W, DRB1*0108, DRB1*0109, DRB1*0110, DRB1*0111, DRB1*0112

No sequence information is available for the following alleles in the position of this HSE probe, therefore the ability to capture the allele is unknown:

DRB1*0414, DRB1*080402, DRB1*150202

- W = weakly targeted

HLA-A Probe DR140T

Product Name	Size	Product Number
HaploPrep HLA DR140T	25 Separations	H113.PDR140T

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
GTTCC	140	2

HLA-DR Alleles Targeted:

DRB1*030101, DRB1*030102, DRB1*0304, DRB1*030501, DRB1*030502, DRB1*0307,
 DRB1*0308, DRB1*0309, DRB1*0310, DRB1*0311, DRB1*0312, DRB1*0313,
 DRB1*0314, DRB1*0315, DRB1*0318, DRB1*0319, DRB1*0320, DRB1*0321,
 DRB1*0322, DRB1*0323, DRB1*0324, DRB1*0325, DRB1*0328,
 DRB1*0428, DRB1*0435, DRB1*0442, DRB1*0443
 DRB1*0817, DRB1*0828
 DRB1*110101, DRB1*110102, DRB1*110103, DRB1*110104, DRB1*110105,
 DRB1*1102, DRB1*1103, DRB1*110401, DRB1*110402, DRB1*1105, DRB1*110601,
 DRB1*110602, DRB1*1107, DRB1*110801, DRB1*110802, DRB1*1109, DRB1*1110,
 DRB1*1111, DRB1*111201, DRB1*111202, DRB1*1113, DRB1*1114, DRB1*1115,
 DRB1*1116, DRB1*1118, DRB1*1119, DRB1*1120, DRB1*1121, DRB1*1122,
 DRB1*1123, DRB1*1124, DRB1*1125, DRB1*1126, DRB1*112701, DRB1*112702,
 DRB1*1128, DRB1*1129, DRB1*1130, DRB1*1131, DRB1*1132, DRB1*1133,
 DRB1*1134, DRB1*1135, DRB1*1136, DRB1*1138, DRB1*1139, DRB1*1140,
 DRB1*1142, DRB1*1143, DRB1*1144, DRB1*1145, DRB1*1146, DRB1*1147,
 DRB1*1149, DRB1*1151, DRB1*1153, DRB1*1154,
 DRB1*120101, DRB1*120102, DRB1*120201, DRB1*120202, DRB1*120302,
 DRB1*1204, DRB1*1205, DRB1*1206, DRB1*1207, DRB1*1208, DRB1*1209,
 DRB1*1210, DRB1*1211-W,
 DRB1*130101, DRB1*130102, DRB1*130103, DRB1*130201, DRB1*130202,
 DRB1*1304, DRB1*1305, DRB1*1306, DRB1*1309, DRB1*1310, DRB1*1311,
 DRB1*131401, DRB1*131402, DRB1*1315, DRB1*1316, DRB1*1317, DRB1*1318,
 DRB1*1320, DRB1*1321, DRB1*1322, DRB1*1323, DRB1*1324, DRB1*1325,
 DRB1*1327, DRB1*1328, DRB1*1329, DRB1*1330, DRB1*1331, DRB1*1334,
 DRB1*1335, DRB1*1339, DRB1*1341, DRB1*1342, DRB1*1343, DRB1*1344,
 DRB1*1345, DRB1*1346, DRB1*1350, DRB1*1351, DRB1*1352, DRB1*1354,
 DRB1*1356, DRB1*1357, DRB1*1359, DRB1*1361, DRB1*1362, DRB1*1363,
 DRB1*1364, DRB1*1366
 DRB1*1417, DRB1*1421, DRB1*1430, DRB1*1433, DRB1*1435, DRB1*1442
 DRB1*150101, DRB1*150102, DRB1*150103, DRB1*150104, DRB1*150105,
 DRB1*150201, DRB1*150202, DRB1*150203, DRB1*1503, DRB1*1504, DRB1*1505,
 DRB1*1506, DRB1*1508, DRB1*1509, DRB1*1510, DRB1*1512, DRB1*1513,
 DRB1*1514, DRB1*1515

Non HLA-DRB Alleles Targeted:

For Research Use Only

DQB1*020102, DQB1*0202, DQB1*0203, DQB1*0204
DPB1*010101, DPB1*010103, DPB1*0102, DPB1*020102, DPB1*020103, DPB1*020104,
DPB1*020105, DPB1*020106, DPB1*0202, DPB1*0203, DPB1*0030101, DPB1*030102,
DPB1*0302, DPB1*040101, DPB1*040102, DPB1*0402, DPB1*0403, DPB1*0501,
DPB1*0502, DPB1*0601, DPB1*0602, DPB1*0801, DPB1*0802, DPB1*0901,
DPB1*0902, DPB1*1001, DPB1*1002, DPB1*1102, DPB1*1301, DPB1*1401,
DPB1*1601, DPB1*1701, DPB1*1801, DPB1*1901, DPB1*200101, DPB1*200102,
DPB1*2101, DPB1*2201, DPB1*2301, DPB1*2401, DPB1*2501, DPB1*260102,
DPB1*2701, DPB1*2801, DPB1*2901, DPB1*3001, DPB1*3101, DPB1*3201,
DPB1*3301, DPB1*3401, DPB1*3501, DPB1*3601, DPB1*3701, DPB1*3801,
DPB1*3901, DPB1*4001, DPB1*4101, DPB1*4401, DPB1*4501, DPB1*4701,
DPB1*4801, DPB1*4901, DPB1*5001, DPB1*5101, DPB1*5201, DPB1*5301,
DPB1*5401, DPB1*5501, DPB1*5601, DPB1*5701, DPB1*5801, DPB1*5901,
DPB1*6001, DPB1*6101N, DPB1*6201, DPB1*6301, DPB1*6401N, DPB1*6501,
DPB1*6601, DPB1*6701, DPB1*6801, DPB1*6901, DPB1*7001, DPB1*7101,
DPB1*7201, DPB1*7301, DPB1*7401, DPB1*7501, DPB1*7601, DPB1*7701,
DPB1*7801, DPB1*7901, DPB1*8001, DPB1*8101, DPB1*8201, DPB1*8301,
DPB1*8401, DPB1*8501, DPB1*8601, DPB1*8701, DPB1*8801, DPB1*8901,
DPB1*9001, DPB1*9101, DPB1*9201, DPB1*9301, DPB1*9401, DPB1*9501,
DPB1*9601, DPB1*9701, DPB1*9801, DPB1*9901

- W = weakly targeted

HLA-A Probe DR170G

Product Name	Size	Product Number
HaploPrep HLA DR170G	25 Separations	H113.PDR170G

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
TAGCG (reversed)	170	2

HLA-DR Alleles Targeted:

DRB1*0312,
 DRB1*040501, DRB1*040502, DRB1*040503, DRB1*040504, DRB1*0409, DRB1*0410,
 DRB1*0411, DRB1*0412, DRB1*0417, DRB1*0424, DRB1*0428, DRB1*0429,
 DRB1*0430, DRB1*0445, DRB1*0448,
 DRB1*080101, DRB1*080102, DRB1*080302, DRB1*0805, DRB1*0806, DRB1*0810,
 DRB1*0812, DRB1*0814, DRB1*0816, DRB1*0817, DRB1*0818, DRB1*0819-W,
 DRB1*0822, DRB1*0823, DRB1*0826, DRB1*0827, DRB1*0829,
 DRB1*130301, DRB1*130302, DRB1*1304, DRB1*1312, DRB1*1313, DRB1*1321,
 DRB1*1330, DRB1*1332, DRB1*1333, DRB1*1338, DRB1*1348, DRB1*1349,
 DRB1*1355, DRB1*1358, DRB1*1365, DRB1*1366,
 DRB1*1413,
 DRB1*1512
 DRB3*0208

Non HLA-DRB Alleles Targeted:

DQB1*050201, DQB1*050202, DQB1*0504, DQB1*0610

- W = weakly targeted

HLA-A Probe DR173A

Product Name	Size	Product Number
HaploPrep HLA DR173A	25 Separations	H113.PDR173A

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
TGAGG (reversed)	173	2

HLA-DR Alleles Targeted:

DRB1*0308,
 DRB1*0415,
 DRB1*110101, DRB1*110102, DRB1*110103, DRB1*110104, DRB1*110105,
 DRB1*1102, DRB1*1103, DRB1*110401, DRB1*110402, DRB1*1105, DRB1*110601,
 DRB1*110602, DRB1*1107, DRB1*110801, DRB1*110802, DRB1*1109, DRB1*1110,
 DRB1*1111, DRB1*111201, DRB1*111202, DRB1*1113, DRB1*1114, DRB1*1115,
 DRB1*1116, DRB1*1117, DRB1*1118, DRB1*1119, DRB1*1120, DRB1*1121,
 DRB1*1122, DRB1*1123, DRB1*1124, DRB1*1125, DRB1*1126, DRB1*112701,
 DRB1*112702, DRB1*1128, DRB1*1129, DRB1*1130, DRB1*1131-W, DRB1*1132,
 DRB1*1133-W, DRB1*1134, DRB1*1135-W, DRB1*1136, DRB1*1137, DRB1*1138-W,
 DRB1*1139, DRB1*1140, DRB1*1141, DRB1*1142, DRB1*1143, DRB1*1144,
 DRB1*1145, DRB1*1146, DRB1*1147, DRB1*1148, DRB1*1149, DRB1*1150,
 DRB1*1151, DRB1*1152-W, DRB1*1153, DRB1*1154,
 DRB1*1204,
 DRB1*1411,
 DRB3*0218,
 DRB5*0113

Non HLA-DRB Alleles Targeted:

DPB1*020102, DPB1*020103, DPB1*020104, DPB1*020105, DPB1*020106, DPB1*0402,
 DPB1*0602, DPB1*0801, DPB1*1001, DPB1*1102, DPB1*1601, DPB1*1801,
 DPB1*2501, DPB1*2801, DPB1*3701, DPB1*4101, DPB1*4501, DPB1*4801,
 DPB1*4901, DPB1*5101, DPB1*5301, DPB1*5901, DPB1*6001, DPB1*6801,
 DPB1*7301, DPB1*7501, DPB1*7701, DPB1*7901, DPB1*8101, DPB1*8201,
 DPB1*8301, DPB1*8401, DPB1*9301, DPB1*9401

- W = weakly targeted

HLA-A Probe DR174G

Product Name	Size	Product Number
HaploPrep HLA DR174G	25 Separations	H113.PDR174G

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
CTGCGGAGC	174	2
(reversed)		

HLA-DR Alleles Targeted:

DRB1*0310,
DRB1*0706,
DRB1*0808, DRB1*0815-W,
DRB1*1343, DRB1*1345,
DRB1*140101, DRB1*140102, DRB1*1404, DRB1*140701, DRB1*140702, DRB1*1408,
DRB1*1410, DRB1*1416, DRB1*1422, DRB1*1425, DRB1*1426, DRB1*1428,
DRB1*1431, DRB1*1432, DRB1*1435, DRB1*1438, DRB1*1439,
DRB3*0216

- W = weakly targeted

HLA-A Probe DR210C

Product Name	Size	Product Number
HaploPrep HLA DR210C	25 Separations	H113.PDR210C

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
AGACGA	210	2

HLA-DR Alleles Targeted:

DRB1*0103,
 DRB1*0402, DRB1*0414, DRB1*0437,
 DRB1*1102, DRB1*1103, DRB1*1111, DRB1*1114, DRB1*1116, DRB1*1120,
 DRB1*1121, DRB1*1136, DRB1*1140, DRB1*1141, DRB1*1148,
 DRB1*130101, DRB1*130102, DRB1*130103, DRB1*130201, DRB1*130202,
 DRB1*1304, DRB1*1308, DRB1*1315, DRB1*1316, DRB1*1317, DRB1*1319,
 DRB1*1320, DRB1*1322, DRB1*1323, DRB1*1324, DRB1*1327, DRB1*1328,
 DRB1*1329, DRB1*1331, DRB1*1332, DRB1*1334, DRB1*1335, DRB1*1336,
 DRB1*1338, DRB1*1339, DRB1*1340, DRB1*1341, DRB1*1343, DRB1*1345,
 DRB1*1348, DRB1*1351, DRB1*1352, DRB1*1353, DRB1*1354, DRB1*1357,
 DRB1*1359, DRB1*1361, DRB1*1363, DRB1*1364, DRB1*1365,
 DRB1*1416,
 DRB1*1510

- W = weakly targeted

HLA-A Probe DR220C

Product Name	Size	Product Number
HaploPrep HLA DR220C	25 Separations	H113.PDR220C

Probe target sequence (unique sequence element, center nucleotide position & exon):

USE	center nt pos	exon
CCCTG (reversed)	220	2

HLA-DR Alleles Targeted:

DRB1*0412, DRB1*0418, DRB1*0425, DRB1*0431,
 DRB1*080101, DRB1*080102, DRB1*080201, DRB1*080202, DRB1*080203,
 DRB1*080302, DRB1*080401, DRB1*080402, DRB1*080403, DRB1*080404,
 DRB1*0806, DRB1*0807, DRB1*0808, DRB1*0809, DRB1*0810, DRB1*0811,
 DRB1*0812, DRB1*0813, DRB1*0814, DRB1*0815, DRB1*0816, DRB1*0817,
 DRB1*0819, DRB1*0820, DRB1*0821, DRB1*0822, DRB1*0823, DRB1*0826,
 DRB1*0827, DRB1*0828,
 DRB1*1123, DRB1*1125, DRB1*1145,
 DRB1*1313, DRB1*1318, DRB1*1347, DRB1*1355,
 DRB1*140301, DRB1*140302, DRB1*1412, DRB1*1415, DRB1*1427, DRB1*1440,
 DRB1*1604,
 DRB4*0107,
 DRB5*0104

- W = weakly targeted