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Manual No.	03
Revision	May 30, 2016
Product No.	103
Lot No.	C12-0

**CTS** Collaborative Transplant Study

**WORKING INSTRUCTION**  
**HLA-C\***  
**CTS-PCR-SSP TRAY KIT**  
**LOCUS- AND LOT-SPECIFIC MANUAL**

To be applied to the following product:

Product No.	Description
103	HLA-C* CTS-PCR-SSP TRAY KIT 

**1. Main differences**

- **Between Lot C12-0 (the current lot) and Lot C11-2**  
 Mix 22 and Mix 23 were modified for optimal use in combination with another DNA polymerase. Please pay attention to the changes in mix specificities and size of the PCR products (210 bp amplified by Mix 22 and 655 bp amplified by Mix 23).
- **Attention:**  
 All CTS-PCR-SSP Kits (for both HLA class I and HLA class II typing) can be used with the new “Mastermix SSP” as PCR buffer. There is no change in the Mastermix volume to be used for setting up the PCR reaction. Taq polymerase is also required as previously.

**2. Introduction**

- Intended use: This kit reveals a low/intermediate resolution typing of HLA-C\* by the PCR-SSP method.
- Allele coverage: IMGT/HLA Sequence Database Release 3.23.0, January 2016, except:  
 C\*01:02:10/01:02:27-01:02:28/01:50/01:75/01:101-01:102, C\*03:58/03:86/03:94/03:99, C\*04:01:23/04:118/04:130/04:197, C\*05:18:02/05:103/05:107, C\*07:02:48/ 07:95/ 07:140/ 07:165/ 07:241/ 07:265/07:304/07:307/07:338/07:342/07:347N/07:447/07:487, C\*08:13/08:16:01-08:16:02/ 08:55N/08:94, C\*15:02:10/15:02:17/15:41/15:43/15:65/15:99/15:102, C\*16:35/16:40/16:53/16:68.  
 The HLA-C\* alleles which are not covered are considered to be uncommon or rare and can be detected by e. g. sequencing with the CTS-SEQUENCE Kit (you may contact us for further information).
- This manual is only valid for **Lot No. C12-0**.
- This manual should be used together with the Main Manual (General Information Sheet) which is the ‘Working instruction for the CTS-PCR-SSP **TRAY and MINITRAY KITS**’ (Manual No. 100A).

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Table 2: Amplification patterns of HLA-C* and other HLA alleles detected by the HLA-C* CTS-PCR-SSP primer mixes (Lot No. C12-0) based on IMGT/HLA Sequence Database Release 3.23.0, January 2016 .....	9
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#### 4. Kit Composition

- Number of PCR primer mixes per test: 24 (23 allele-specific and 1 negative control mix)
- Number of tests per tray: 4
- Number of trays per kit: 10
- The primer mixes are aliquoted and dried in thin-walled, blue PCR-trays.
- PCR buffer: 3.0 ml of Mastermix SSP (without Taq polymerase)

For storage condition, please refer to Section 1 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

#### 5. Materials, Reagents and Equipment not supplied

Please refer to Section 2 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

#### 6. Sample Requirements, PCR and Gel Electrophoresis

Please refer to Section 3 to 6 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

#### 7. Result Evaluation

- Check the approximate size of the PCR product against the Primer Mix Specificity Table (Table 1) to confirm the correct product size.
- Use the Amplification Pattern Tables (Table 2) to make allele assignment. Alternatively, you can use the SCORE Software ([www.IHWG.org](http://www.IHWG.org)) for detailed result interpretation.

#### 8. Interpretation Hints

- The quality and quantity of DNA as well as of the Taq polymerase are extremely crucial factors. If your bands are too weak, you might try to adjust these two factors until you obtain optimal results.
- Please also refer to Section 7 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

#### 9. Special notes

- **Exclusion/detection of C\*04:09N:**
  - If **only** mix 6 is positive, the DNA may be C\*04 positive (e. g. C\*04:01), but negative for C\*04:09N.
  - In contrast, if mix 6 **and** 7 are both positive, the DNA is positive for HLA-C\*04:09N.
  - **Attention:** The fragment size of mix 7 is relatively **small** (140 bp)!
- PCR-SSP mix no. 1, 5 and 12 will also detect some HLA-**A\*** specificities (most of them are considered to be rare). Please take this into consideration when interpreting your results.
- PCR-SSP mix no. 2, 3, 5, 6, 11, 12, 15, 16 and 20 will also detect some HLA-**B\*** specificities (most of them are considered to be rare). Please take this into consideration when interpreting your results.

#### 10. Troubleshooting

Please refer to Section 8 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

#### 11. Precaution

Please refer to Material Safety Data Sheet for the CTS-PCR-SSP TRAY and MINITRAY KITS (Manual No. 100B) supplied along with this product.

## **12. Contact**

If you have any particular questions concerning this kit, which are not answered in this or the Main Manual, please do not hesitate to contact me or my coworkers at:

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Fax: +49 6221 564200

E-mail: [hien.tran@med.uni-heidelberg.de](mailto:hien.tran@med.uni-heidelberg.de)

Hien Tran, M.D.

### 13. Appendix

**Table 1:** Sizes of the PCR products and allele specificities of each **HLA-C\*** CTS-PCR-SSP primer mix (**Lot No. C12-0**) based on IMGT/HLA Sequence Database Release 3.23.0, January 2016

Position				Mix	Allele	Serology	Size
H1	H4	H7	H10	Mix 1	C*01:02:01-01:02:09/01:02:11-01:02:18/01:02:19w/01:02:20/01:02:21w/01:02:22-01:02:26/01:02:29-01:49:02/01:51-01:54/01:55w/01:56N-01:66/01:67w/01:68-01:74/01:76-01:100/01:103-01:113/01:114w/01:115-01:119, 04:71w, 14:58w, A*01:91w, A*03:99w	Cw1, -, Null	570 bp
G1	G4	G7	G10	Mix 2	C*01:10, 02:02:01-02:02:03/02:02:05-02:40:02/02:42/02:44-02:57/02:59-02:77/02:79-02:81/02:83-02:112, 03:34/03:142/03:261/03:272, 04:32/04:77, 05:105, 06:08, 07:15, 08:31, 12:119, 14:25, 16:29/16:50, 17:01:01:01-17:06/17:08-17:16/17:18-17:22/17:24-17:31, 18:03, B*07:13, B*46:06/46:25/46:30	-, Cw2, Null	570 bp
F1	F4	F7	F10	Mix 3	C*01:65, 03:02:01-03:04:28/03:04:30-03:11:02/03:13:01-03:15/03:17-03:40:04/03:42-03:57:02/03:59-03:85/03:87:01-03:93/03:95/03:97-03:98/03:100-03:112/03:114-03:150/03:152-03:178/03:180-03:183/03:184:01w/03:184:02-03:193/03:195-03:250/03:252-03:259/03:261-03:273/03:275-03:276/03:277Nw/03:278-03:285/03:287-03:292/03:294-03:310/03:311w/03:312, 04:201/04:212, 07:133/07:242/07:330, B*56:37	-, Cw10(w3), Cw9(w3), Cw3, Null	580 bp
E1	E4	E7	E10	Mix 4	C*01:97, 03:02:01-03:04:22/03:04:23w/03:04:24-03:04:26/03:04:28/03:04:30w/03:04:31-03:06:02/03:08-03:11:02/03:13:01-03:13:02/03:16-03:24/03:26-03:40:01/03:40-03-03:43:01/03:44/03:46-03:57:02/03:59-03:85/03:87:02-03:93/03:95-03:98/03:100-03:101/03:103-03:118/03:120-03:129/03:131-03:139/03:141-03:162/03:164-03:178/03:180-03:183/03:184:01w/03:184:02-03:189N/03:190w/03:191-03:219/03:221-03:242/03:244Q-03:262/03:264-03:266/03:269-03:272/03:273w/03:275-03:276/03:277Nw/03:278-03:296/03:298-03:310/03:311w/03:312, 04:11/04:29/04:36/04:55/04:172/04:214, 07:02:32/07:242, 08:01:07/08:02:07/08:33:02, 12:03:20, 14:02:01/14:02:03-14:03/14:05-14:11/14:13-14:16/14:18-14:48/14:50-14:63/14:65-14:71/14:72w/14:73, 16:01:06	-, Cw10(w3), Cw9(w3), Cw3, Null	450 bp
D1	D4	D7	D10	Mix 5	C*01:65, 03:02:01-03:02:14/03:04:01:01-03:04:37/03:04:39-03:10/03:14/03:17/03:19/03:23-03:29/03:33-03:38:02/03:40:01-03:40:04/03:42/03:44/03:46-03:48/03:51/03:54/03:57:01-03:57:02/03:63-03:65/03:70-03:74/03:77-03:78/03:80/03:82/03:84/03:87:01-03:87:02/03:89-03:93/03:95/03:98/03:100-03:101/03:104-03:111/03:114-03:115/03:117-03:118/03:121N/03:123/03:125/03:128-03:131/03:134-03:135/03:137-03:140/03:143/03:145-03:149/03:153-03:157/03:159/03:162-03:164/03:166/03:169Q-03:170/03:172-03:174/03:178-03:181/03:183-03:184:02/03:186:01-03:186:02/03:190-03:191/03:193/03:197-03:201N/03:208N-03:213/03:215-03:216/03:218-03:219/03:221-03:222/03:224N-03:226/03:232-03:236/03:238-03:240/03:244Q-03:250/03:252/03:255-03:259/03:261/03:263-03:266/03:269-03:270/03:277N-03:282/03:283w/03:287/03:292/03:294/03:296/03:298-03:303/03:305-03:306/03:309-03:311, A*03:146, A*68:118, B*15:96/15:331, B*27:118, B*56:37	-, Cw10(w3), Cw3, Null, B62(15)	535 bp
C1	C4	C7	C10	Mix 6	C*02:02:11, 04:01:01:01-04:01:22/04:01:24-04:01:29/04:01:31-04:01:70/04:03:01-04:14/04:15:02-04:20/04:23-04:36/04:38-04:79/04:81-04:99/04:101-04:117/04:119-04:129/04:131-04:177/04:179-04:186/04:187w/04:188-04:196/04:198-04:230, 05:01:20/05:64:01, 08:02:06/08:19/08:62, 12:02:09/12:10:01/12:31/12:96, B*37:01:06, B*67:02	Cw2, Cw4, -, Null, B37	475 bp
B1	B4	B7	B10	Mix 7	C*04:09N	Null	140 bp

Position				Mix	Allele	Serology	Size
A1	A4	A7	A10	Mix 8	C*02:22, 04:223, 05:01:01:01-05:01:01:02/05:01:03-05:01:17/05:01:19/05:01:21-05:01:30/05:03-05:04:01/05:05-05:18:01/05:18:03-05:19/05:21-05:31/05:33-05:102/05:104-05:106/05:108/05:110-05:127, 08:10, 16:02:05	-, Cw5, Null	430 bp
H2	H5	H8	H11	Mix 9	C*05:01:01:01-05:01:27/05:01:29-05:01:31/05:03-05:11/05:13-05:17/05:19-05:28/05:30-05:44:02/05:45w/05:46-05:91N/05:93-05:96/05:98-05:102/05:104-05:105/05:108-05:114/05:116-05:127, 07:41w, 08:02:01:01-08:02:12/08:04:01-08:05/08:07/08:12/08:15:01-08:15:02/08:17/08:18w/08:19/08:23/08:28-08:32/08:34/08:37/08:43/08:45/08:47-08:49/08:51-08:53/08:57/08:62-08:63/08:67-08:71/08:73-08:77/08:90/08:92-08:93/08:100/08:103-08:104/08:108/08:110-08:116/08:120/08:123/08:125-08:126	Cw5, -, Null, Cw8	600 bp
G2	G5	G8	G11	Mix 10	C*04:230, 06:02:01:01-06:02:01:03/06:02:03-06:22/06:24-06:29/06:31-06:34:02/06:36-06:46N/06:48/06:50-06:57/06:59-06:71/06:73-06:85/06:87-06:100/06:102-06:116N/06:118-06:125/06:128N-06:130/06:132:01-06:135/06:137-06:138/06:139w/06:140-06:141/06:145w/06:146-06:170/06:171Nw/06:172-06:173, 07:31:01-07:31:02, 12:28/12:135, 16:26/16:46/16:55/16:64	-, Cw6, Null	310 bp
F2	F5	F8	F11	Mix 11	C*06:31/06:118, 07:01:01:01-07:01:13/07:01:15-07:02:24/07:02:25w-07:02:26w/07:02:27-07:02:47/07:02:49-07:02:55/07:02:57-07:21/07:22w/07:23-07:25/07:27:01-07:32N/07:35-07:40/07:42-07:61N/07:62w/07:63/07:65-07:91/07:93-07:94/07:97-07:130/07:131:01w/07:132w/07:133-07:136/07:137:01w/07:137:02/07:138w-07:139w/07:141:01-07:164N/07:166-07:240/07:243-07:245/07:247-07:264N/07:266/07:267w/07:268-07:292/07:293w/07:294/07:297-07:303/07:305-07:306/07:308-07:313/07:315/07:318-07:321/07:322w/07:323-07:324/07:326-07:337/07:339-07:341/07:343-07:346/07:348-07:350N/07:352-07:367/07:369-07:401/07:403-07:446/07:448/07:450-07:486, 16:21/16:80, B*08:143	-, Cw7, Null	720 bp
E2	E5	E8	E11	Mix 12	C*06:31w/06:118, 07:01:01:01-07:01:44/07:01:45w/07:01:46-07:02:39/07:02:41-07:02:47/07:02:49-07:03/07:05-07:10/07:13-07:19/07:21/07:22w/07:23-07:29:02/07:31:01-07:33N/07:35-07:40/07:42-07:44/07:46-07:62/07:65-07:67/07:69-07:72/07:74-07:91/07:93-07:94/07:97-07:100/07:102-07:135/07:136w/07:137:02/07:138w/07:141:01-07:141:02/07:143-07:150Q/07:152N-07:164N/07:166-07:171/07:173-07:180/07:182-07:198N/07:200-07:240/07:243-07:263/07:264Nw/07:266-07:271/07:273-07:294/07:296-07:301/07:303/07:305-07:306/07:308-07:322/07:325-07:327/07:330/07:331w/07:332-07:335/07:337/07:339-07:341/07:343-07:346/07:348-07:353/07:356/07:359-07:360/07:362-07:363/07:366-07:375/07:377/07:379-07:384/07:386-07:389/07:391-07:393N/07:396-07:402/07:404-07:405/07:407-07:419/07:421-07:425/07:427/07:429-07:446/07:448-07:458/07:460-07:465/07:468-07:479/07:481-07:486, 08:14/08:80, 16:80, A*01:199, A*11:133, B*07:51/07:220/07:226, B*08:143, B*15:200, B*39:60/39:82	-, Cw7, Null	675 bp
D2	D5	D8	D11	Mix 13	C*01:43, 02:87, 03:280, 07:101/07:148/07:161, 08:01:01-08:09/08:11-08:12/08:14-08:15:02/08:17/08:18w/08:19-08:24/08:26N-08:54/08:56-08:63/08:65-08:93/08:95-08:128, 12:127	-, Cw8, Null	165 bp

Position				Mix	Allele	Serology	Size
C2	C5	C8	C11	Mix 14	C*01:04w/01:21, 07:01:20/07:01:27/07:02:38/07:04:08/07:460, 12:02:01-12:02:05/12:02:07/12:02:09-12:02:11/12:02:13/12:03:19/12:03:32/12:08/12:10:01-12:10:02/12:14:02/12:16/12:18:01/12:19/12:22/12:27/12:30/12:36/12:40/12:44/12:49w/12:56/12:59/12:64/12:67-12:69/12:72-12:74/12:80N/12:83-12:86/12:96/12:103-12:106/12:112/12:114/12:117/12:123-12:124/12:126-12:128/12:130/12:132/12:134/12:136-12:137/12:142/12:145/12:148N/12:151/12:155Q/12:161-12:162/12:166/12:168-12:169	-, Null	see below
					C*07:460, 12:19/12:59	-	375 bp
					C*01:04w/01:21, 07:01:20/07:01:27/07:02:38/07:04:08, 12:02:01-12:02:05/12:02:07/12:02:09-12:02:11/12:02:13/12:03:19/12:03:32/12:08/12:10:01-12:10:02/12:14:02/12:16/12:18:01/12:22/12:27/12:30/12:36/12:40/12:44/12:49w/12:56/12:64/12:67-12:69/12:72-12:74/12:80N/12:83-12:86/12:96/12:103-12:106/12:112/12:114/12:117/12:123-12:124/12:126-12:128/12:130/12:132/12:134/12:136-12:137/12:142/12:145/12:148N/12:151/12:155Q/12:161-12:162/12:166/12:168-12:169	-, Null	465 bp
B2	B5	B8	B11	Mix 15	C*01:04/01:21, 08:01:19/08:02:02, 12:02:01-12:03:01:03/12:03:03-12:03:07/12:03:09-12:03:15/12:03:18-12:03:19/12:03:21-12:03:26/12:03:28-12:03:29/12:03:31-12:03:32/12:03:33w/12:03:35-12:03:37/12:04:02-12:08/12:10:01-12:13/12:14:02-12:18:01/12:20-12:25/12:27/12:29-12:32/12:34-12:58/12:60-12:72/12:74-12:75/12:77-12:131/12:133-12:134/12:136-12:143/12:145/12:147-12:170/12:172, 14:02:08, 15:02:14, 16:01:17/16:02:13/16:15:02, B*27:05:27, B*40:02:21	-, Cw8, Null	425 bp
A2	A5	A8	A11	Mix 16	C*02:12/02:49w/02:55:01w-02:55:02w, 03:15w/03:27/03:38:01-03:38:02/03:69/03:130w/03:136/03:163w/03:246/03:274/03:297w, 04:03:01w/04:06w/04:16w/04:80w/04:103w/04:107w/04:147w/04:160w/04:171w/04:190w, 05:42w/05:46w, 06:03:01w-06:03:02w/06:76:01w-06:76:02w/06:132:01w-06:132:02w, 07:26:01-07:26:02/07:92/07:96:01-07:96:02/07:314:01-07:314:02/07:317/07:351, 08:05/08:21/08:25, 12:02:01-12:03:37/12:04:01w-12:04:02w/12:06-12:08/12:10:01-12:15/12:18:01-12:20/12:22-12:32/12:34-12:40/12:41w/12:42Q-12:48/12:50-12:53/12:54w/12:56-12:59/12:60w/12:61-12:97/12:99-12:125/12:127-12:128/12:129w/12:130-12:141/12:142w/12:143-12:145/12:146w/12:148N-12:163/12:164w/12:165-12:170/12:172, 15:03w/15:16w/15:25, 16:15:01-16:15:02/16:25w/16:64, 17:01:01:01w-17:19w/17:21w/17:22/17:23w-17:26w/17:28w-17:31w, 18:09w, B*07:13/07:15/07:160, B*67:02	-, Null, B7	230 bp
H3	H6	H9	H12	Mix 17	C*02:05:01-02:05:03, 04:230, 05:16, 06:02:01:01-06:02:01:03/06:02:03-06:02:11/06:02:13-06:10/06:12-06:22/06:24-06:34:02/06:36-06:46N/06:48/06:50-06:51/06:53:01-06:57/06:59-06:60/06:62-06:68/06:70:01-06:71/06:73-06:81/06:83-06:100/06:102-06:116N/06:118-06:121/06:122w/06:123/06:124w/06:125-06:126/06:128N-06:130/06:132:01-06:135/06:137-06:138/06:139w/06:140-06:141/06:145w/06:146/06:148-06:159/06:161-06:173, 12:04:01-12:05/12:09/12:33/12:135w/12:154w, 15:55/15:58, 16:02:01-16:02:13/16:09/16:12/16:19/16:25/16:37w/16:46-16:48/16:60/16:63/16:69-16:70/16:74/16:77N/16:84/16:88-16:91, 17:21	-, Cw6, Null	340 bp

Position				Mix	Allele	Serology	Size
G3	G6	G9	G12	Mix 18	C*02:02:01-02:02:03/02:02:05-02:02:11/02:02:13-02:02:20/02:02:22-02:02:30/02:04-02:11/02:12w/02:13-02:15/02:17/02:19-02:26/03/02:28-02:31/02:33-02:40/02:42-02:64/02:66-02:71/02:73-02:86/02:88-02:112, 04:94:01-04:94:02, 05:08/05:52/05:89/05:106, 06:02:01:01-06:02:01:03/06:02:03-06:02:11/06:02:13-06:03:02/06:07-06:10/06:12-06:39/06:40w/06:41-06:51/06:53:01-06:60/06:62-06:68/06:70:01-06:78/06:80-06:81/06:83-06:117/06:119-06:121/06:122w/06:123/06:124w/06:125-06:146/06:148-06:152N/06:154-06:159/06:161-06:173, 12:04:01-12:05/12:21/12:33/12:41/12:60/12:72w/12:135w/12:146/12:154w, 15:74, 16:91, 18:03	Cw2, -, Null, Cw6	515 bp
F3	F6	F9	F12	Mix 19	C*01:67, 03:231, 04:01:30/04:15:01/04:37/04:100/04:178, 05:78, 07:64/07:402, 12:55, 14:02:01-14:02:03/14:02:05-14:02:08/14:02:10-14:18/14:19w/14:20-14:32/14:34w/14:35N-14:40/14:41w/14:42-14:73, 15:36	-, Null	575 bp
E3	E6	E9	E12	Mix 20	<b>C*02:06:01-02:06:02/02:23/02:36/02:62/02:68, 03:04:25, 04:80/04:100/04:108/04:178, 05:10, 08:44/08:61/08:82/08:113/08:126w, 12:15/12:44/12:113, 14:54, 15:02:01:01-15:02:09/15:02:11-15:02:16/15:02:18-15:13/15:15-15:19/15:21-15:40/15:42/15:44-15:64/15:66-15:98/15:100-15:101/15:103-15:121, 16:20, B*35:08:02/35:08:05, B*67:02</b>	-, Null, B35	<b>see below</b>
					C*02:62, 03:04:25, 04:80/04:100/04:178, 05:10, 08:44/08:61/08:82/08:126w, 12:44, 14:54, 15:02:01:01-15:02:09/15:02:11-15:02:16/15:02:18-15:13/15:15-15:19/15:21/15:23-15:36/15:38-15:40/15:42/15:44-15:54/15:56-15:57/15:59-15:64/15:66-15:71/15:73-15:77/15:79-15:98/15:100-15:101/15:103-15:120, B*35:08:02/35:08:05	-, Null, B35	445 bp
					C*02:06:01-02:06:02/02:23/02:36/02:68, 04:108/04:178, 08:113, 12:15/12:113, 15:02:01:01-15:02:09/15:02:11-15:02:16/15:02:18-15:03/15:05:01-15:13/15:15-15:19/15:21-15:24/15:26-15:29/15:31-15:39/15:42/15:44-15:48/15:50-15:64/15:67-15:75/15:78-15:98/15:100-15:101/15:103-15:121, 16:20, B*35:08:02/35:08:05, B*67:02	-, Null, B35	500 bp
D3	D6	D9	D12	Mix 21	C*16:01:01:01-16:02:13/16:04:01/16:04:03/16:06-16:34/16:36-16:39:02/16:41-16:47/16:49-16:52/16:54-16:67/16:69-16:87/16:89N-16:92	-, Null	470 bp
C3	C6	C9	C12	Mix 22	C*17:01:01:01-17:06/17:09-17:31	-, Null	210 bp
B3	B6	B9	B12	Mix 23	C*03:39/03:67, 04:42:01-04:42:02/04:220, 06:02:08/06:34:02, 07:02:32/07:242, 18:01-18:08/18:10	Cw3, -, Null	655 bp
A3	A6	A9	A12	Mix 24	Negative Control		None (90 bp)

**Amplification control (internal positive control):** 90 base pairs (bp)

w = weak

? = nucleotide sequence information not available for the primer matching sequence

**Bold:** mixes which result in PCR fragments of different sizes (the specificities are first indicated all in one row, then split into several groups in the subsequent rows depending on the fragment size)



**Table 2:** Amplification patterns of **HLA-C\*** and other HLA alleles detected by the HLA-C\* CTS-PCR-SSP primer mixes (**Lot No. C12-0**) based on IMGT/HLA Sequence Database Release 3.23.0, January 2016

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C*01:02:01-01:02:09/01:02:11-01:02:18/01:02:20/01:02:22-01:02:26/ 01:02:29-01:03/01:05-01:09/01:11-01:20/01:22-01:42/01:44-01:49:02/01:51- 01:54/01:56N-01:64/01:66/01:68-01:74/01:76-01:96/01:98N-01:100/01:103- 01:113/01:115-01:119	Cw1, -, Null	1																						
C*01:02:19/01:02:21/01:55/01:114, A*01:91, A*03:99	-	w																						
C*01:04	-	1													w	15								
C*01:10	-	1	2																					
C*01:21	-	1													14	15								
C*01:43	-	1												13										
C*01:65	-	1		3		5																		
C*01:67	-	w																		19				
C*01:97	-	1			4																			
C*02:02:01-02:02:03/02:02:05-02:02:10/02:02:13-02:02:20/02:02:22- 02:02:30/02:04/02:07-02:11/02:13-02:15/02:17/02:19-02:21/02:24- 02:26:03/02:28-02:31/02:33-02:35/02:37-02:40/02:42/02:44-02:48/02:50- 02:54/02:56-02:57/02:59-02:61/02:63-02:64/02:66-02:67Q/02:69-02:71/ 02:73-02:77/02:79-02:81/02:83-02:86/02:88-02:112	Cw2, -, Null		2																	18				
C*02:02:11	Cw2		2			6														18				
C*02:02:12/02:02:21/02:03/02:16:01-02:16:02/02:18/02:27:01-02:27:02/ 02:32/02:65/02:72, B*46:06/46:25/46:30	-		2																					
C*02:05:01-02:05:03	-		2															17	18					
C*02:06:01-02:06:02/02:23/02:36/02:62/02:68	-		2																18	20				
C*02:12	-		2													16		w						
C*02:22	-		2						8										18					
C*02:43/02:58/02:78/02:82, 06:23/06:35/06:47/06:49N/06:58/06:72/ 06:101/06:117/06:127:01-06:127:02/06:131/06:136/06:142-06:144	-, Null																		18					
C*02:49/02:55:01-02:55:02	-		2													w		18						
C*02:87	-		2											13										

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
C*03:02:01-03:02:14/03:04:01:01-03:04:22/03:04:24/03:04:26/03:04:28/ 03:04:31-03:04:37/03:04:39-03:06:02/03:08-03:10/03:17/03:19/03:23-03:24/ 03:26/03:28-03:29/03:33/03:35-03:37:02/03:40:01/03:40:03-03:40:04/03:42/ 03:44/03:46-03:48/03:51/03:54/03:57:01-03:57:02/03:63-03:65/03:70- 03:74/03:77-03:78/03:80/03:82/03:84/03:87:02/03:89-03:93/03:95/03:98/ 03:100-03:101/03:104-03:111/03:114-03:115/03:117-03:118/03:121N/ 03:123/03:125/03:128-03:129/03:131/03:134-03:135/03:137-03:139/03:143/ 03:145-03:149/03:153-03:157/03:159/03:162/03:164/03:166/03:169Q- 03:170/03:172-03:174/03:178/03:180-03:181/03:183/03:184:02/03:186:01- 03:186:02/03:191/03:193/03:197-03:201N/03:208N-03:213/03:215-03:216/ 03:218-03:219/03:221-03:222/03:224N-03:226/03:232-03:236/03:238- 03:240/03:244Q-03:245/03:247-03:250/03:252/03:255-03:259/03:264- 03:266/03:269-03:270/03:278-03:279/03:281-03:282/03:287/03:292/03:294/ 03:296/03:298-03:303/03:305-03:306/03:309-03:310	Cw10(w3), -, Cw3, Null			3	4	5																			
C*03:03:01-03:03:29/03:04:38/03:11:01-03:11:02/03:13:01-03:13:02/ 03:18:01-03:18:02/03:20N-03:22Q/03:30-03:32/03:43:01/03:49-03:50/03:52- 03:53/03:55-03:56/03:59-03:62/03:66/03:68/03:75-03:76/03:79/03:81/ 03:83/03:85/03:88/03:97/03:103/03:112/03:116:01-03:116:02/03:120/ 03:122/03:124/03:126-03:127/03:132-03:133/03:141/03:144/03:150/ 03:152/03:158/03:160-03:161/03:165/03:167-03:168/03:171/03:175-03:177/ 03:182/03:185/03:187-03:189N/03:192/03:195-03:196/03:202-03:207/ 03:214/03:217/03:223/03:227-03:230/03:237/03:241-03:242/03:253-03:254/ 03:262/03:271/03:275-03:276/03:284-03:285/03:288-03:291/03:295/03:304/ 03:307-03:308/03:312	Cw9(w3), -, Cw3, Null			3	4																				
C*03:04:23/03:04:30/03:190	-			3	w	5																			
C*03:04:25	-			3	4	5															20				
C*03:04:27/03:07/03:14/03:25/03:40:02/03:87:01/03:140/03:263, B*56:37	-, Cw3			3		5																			
C*03:04:29/03:179, A*03:146, A*68:118, B*15:96/15:331, B*27:118	-, B62(15)					5																			
C*03:15/03:297	-			3													w								
C*03:16/03:41:01-03:41:02/03:96/03:113/03:151/03:194/03:251/03:260/ 03:286/03:293, 14:02:04/14:02:09/14:33	-				4																				
C*03:27/03:38:01-03:38:02/03:246	-			3	4	5											16								
C*03:34/03:261	-		2	3	4	5																			
C*03:39/03:67, 07:242	Cw3, -			3	4																			23	
C*03:43:02/03:45/03:102/03:119/03:220/03:243/03:267-03:268	-			3																					
C*03:69/03:136	-			3	4												16								

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C*03:130/03:163	-			3		5											w							
C*03:142/03:272	-		2	3	4																			
C*03:184:01/03:277N/03:311	-, Null			w	w	5																		
C*03:231	-			3	4																19			
C*03:273	-			3	w																			
C*03:274, 07:92/07:96:01-07:96:02, 08:25, 12:03:02/12:03:08/12:03:16-12:03:17/12:03:27/12:03:30/12:03:34:01-12:03:34:02/12:14:01/12:18:02/12:26/12:76/12:144, B*07:15/07:160	-, B7																16							
C*03:280	-			3	4	5								13										
C*03:283	-			3	4	w																		
C*04:01:01:01-04:01:22/04:01:24-04:01:29/04:01:31-04:01:70/04:03:02-04:05/04:07-04:08/04:10/04:12-04:14/04:15:02-04:15:03/04:17-04:20/04:23-04:28/04:30-04:31/04:33-04:35/04:38-04:41/04:43-04:54/04:56-04:70/04:72-04:76/04:78-04:79/04:81-04:93N/04:95N-04:99/04:101-04:102/04:104-04:106/04:109-04:117/04:119-04:129/04:131-04:146/04:148-04:159/04:161-04:170N/04:173N-04:177/04:179-04:186/04:188-04:189/04:191N-04:196/04:198-04:200/04:202-04:211/04:213/04:215N-04:219/04:221-04:222/04:224-04:229, B*37:01:06	Cw4, -, Null, B37						6																	
C*04:01:30/04:15:01/04:37, 07:64, 14:02:02/14:04/14:12/14:17/14:49/14:64	-																				19			
C*04:03:01/04:06/04:16/04:103/04:107/04:147/04:160/04:171/04:190	-					6											w							
C*04:09N	Null					6	7																	
C*04:11/04:29/04:36/04:55/04:172/04:214	-				4	6																		
C*04:32/04:77	-		2			6																		
C*04:42:01-04:42:02/04:220	-					6																	23	
C*04:71	-	w				6																		
C*04:80, 15:03/15:16	-																w				20			
C*04:94:01-04:94:02	-					6													18					
C*04:100/04:178, 15:36	-																			19	20			
C*04:108	-					6															20			
C*04:187	-					w																		
C*04:201/04:212	-			3		6																		
C*04:223	-					6		8																
C*04:230	-					6					10							17						

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
C*05:01:01:01-05:01:01:02/05:01:03-05:01:17/05:01:19/05:01:21-05:01:27/ 05:01:29-05:01:30/05:03-05:04:01/05:05-05:07N/05:09:01-05:09:03/05:11/ 05:13-05:15/05:17/05:19/05:21-05:28/05:30-05:31/05:33-05:41/05:43- 05:44:02/05:47-05:51Q/05:53-05:63/05:64:02-05:77/05:79-05:88/05:90- 05:91N/05:93-05:96/05:98-05:102/05:104/05:108/05:110-05:114/05:116- 05:127	Cw5, -, Null								8	9															
C*05:01:02/05:01:18/05:01:31/05:04:02/05:20/05:32/05:109	Cw5, -									9															
C*05:01:20	-					6				9															
C*05:01:28/05:12/05:18:01/05:18:03/05:29:01-05:29:02/05:92N/05:97/ 05:115, 08:10	-, Null								8																
C*05:08/05:52/05:89	-								8	9									18						
C*05:10	-								8	9											20				
C*05:16	-								8	9								17							
C*05:42/05:46	-								8	9							w								
C*05:45	-								8	w															
C*05:64:01	-					6			8	9															
C*05:78	-								8	9										19					
C*05:105	-		2						8	9															
C*05:106	-								8											18					
C*06:02:01:01-06:02:01:03/06:02:03-06:02:07/06:02:09-06:02:11/06:02:13- 06:02:44/06:07/06:09-06:10/06:12-06:22/06:24-06:29/06:32-06:34:01/06:36- 06:39/06:41-06:46N/06:48/06:50-06:51/06:53:01-06:57/06:59-06:60/06:62- 06:68/06:70:01-06:71/06:73-06:75/06:77-06:78/06:80-06:81/06:83-06:85/ 06:87-06:100/06:102-06:116N/06:119-06:121/06:123/06:125/06:128N- 06:130/06:133-06:135/06:137-06:138/06:140-06:141/06:146/06:148- 06:152N/06:154-06:159/06:161-06:170/06:172-06:173	Cw6, -, Null										10								17	18					
C*06:02:08/06:34:02	-										10								17	18				23	
C*06:02:12/06:11/06:52/06:61/06:69/06:82/06:147/06:160	-										10														
C*06:03:01-06:03:02/06:76:01-06:76:02/06:132:01-06:132:02	-										10						w		17	18					
C*06:04:01-06:06/06:79N/06:153	-, Cw6, Null										10								17						
C*06:08	-		2								10								17	18					
C*06:30/06:86/06:126, 12:33	-																		17	18					
C*06:31	-										10	11	w						17	18					
C*06:40	-										10								17	w					

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
C*06:118	-										10	11	12					17							
C*06:122/06:124	-										10							w	w						
C*06:139/06:145	-										w							w	18						
C*06:171N	Null										w							17	18						
C*07:01:01:01-07:01:13/07:01:15-07:01:19/07:01:21-07:01:26/07:01:28-07:01:44/07:01:46-07:02:24/07:02:27-07:02:31/07:02:33-07:02:37/07:02:39/07:02:41-07:02:47/07:02:49-07:02:55/07:02:57-07:03/07:05-07:10/07:13-07:14/07:16-07:19/07:21/07:23-07:25/07:27:01-07:29:02/07:32N/07:35-07:40/07:42-07:44/07:46-07:61N/07:65-07:67/07:69-07:72/07:74-07:91/07:93-07:94/07:97-07:100/07:102-07:130/07:134-07:135/07:137:02/07:141:01-07:141:02/07:143-07:147/07:149-07:150Q/07:152N-07:160/07:162-07:164N/07:166-07:171/07:173-07:180/07:182-07:198N/07:200-07:240/07:243-07:245/07:247-07:263/07:266/07:268-07:271/07:273-07:292/07:294/07:297-07:301/07:303/07:305-07:306/07:308-07:313/07:315/07:318-07:321/07:326-07:327/07:332-07:335/07:337/07:339-07:341/07:343-07:346/07:348-07:350N/07:352-07:353/07:356/07:359-07:360/07:362-07:363/07:366-07:367/07:369-07:375/07:377/07:379-07:384/07:386-07:389/07:391-07:393N/07:396-07:401/07:404-07:405/07:407-07:419/07:421-07:425/07:427/07:429-07:446/07:448/07:450-07:458/07:461-07:465/07:468-07:479/07:481-07:486, B*08:143	Cw7, -, Null											11	12												
C*07:01:14/07:02:56/07:33N/07:131:02/07:246/07:296/07:316/07:325/07:368/07:449, A*01:199, A*11:133, B*07:51/07:220/07:226, B*15:200, B*39:60/39:82	-, Null												12												
C*07:01:20/07:01:27/07:02:38/07:460	-											11	12		14										
C*07:01:45/07:136/07:264N/07:331	-, Null											11	w												
C*07:02:25-07:02:26/07:62/07:131:01/07:132/07:267/07:293/07:322	-											w	12												
C*07:02:32	-				4							11	12											23	
C*07:02:40/07:04:01-07:04:07/07:04:09-07:04:10/07:11-07:12/07:20/07:30/07:45/07:63/07:68/07:73/07:142/07:151/07:172:01-07:172:02/07:181/07:199:01-07:199:02/07:272/07:302/07:323-07:324/07:328-07:329N/07:336/07:354-07:355/07:357-07:358/07:361/07:364-07:365/07:376/07:378/07:385/07:390/07:394-07:395/07:403/07:406/07:420/07:426/07:428/07:459/07:466-07:467/07:480	-, Cw7, Null											11													
C*07:04:08	-											11			14										
C*07:15	-		2									11	12												
C*07:22/07:138	-											w	w												

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C*07:26:01-07:26:02/07:314:01-07:314:02/07:317/07:351	-												12				16							
C*07:31:01-07:31:02	-										10	11	12											
C*07:41	-									w														
C*07:101	-											11		13										
C*07:133/07:330	-			3								11	12											
C*07:137:01/07:139	-											w												
C*07:148/07:161	-											11	12	13										
C*07:402	-												12							19				
C*08:01:01-08:01:06/08:01:08-08:01:18/08:03:01-08:03:03/08:06/08:08:01-08:09/08:11/08:20/08:22/08:24/08:26N-08:27/08:33:01/08:33:03/08:35-08:36N/08:38-08:42/08:46/08:50/08:54/08:56/08:58-08:60/08:65-08:66/08:72:01-08:72:02/08:78-08:79/08:81/08:83-08:89N/08:91/08:95-08:99/08:101-08:102/08:105-08:107/08:109/08:117-08:119/08:121N-08:122/08:124/08:127N-08:128	Cw8, -, Null													13										
C*08:01:07/08:33:02	-				4									13										
C*08:01:19	-												13		15									
C*08:02:01:01-08:02:01:02/08:02:03-08:02:05/08:02:08-08:02:12/08:04:01-08:04:03/08:07/08:12/08:15:01-08:15:02/08:17/08:23/08:28-08:30/08:32/08:34/08:37/08:43/08:45/08:47-08:49/08:51-08:53/08:57/08:63/08:67-08:71/08:73-08:77/08:90/08:92-08:93/08:100/08:103-08:104/08:108/08:110-08:112/08:114-08:116/08:120/08:123/08:125	Cw8, -, Null									9				13										
C*08:02:02	Cw8									9			13		15									
C*08:02:06/08:19/08:62	-					6				9			13											
C*08:02:07	-				4					9			13											
C*08:05	-									9						16								
C*08:14/08:80	-												12	13										
C*08:18	-									w			w											
C*08:21	-												13			16								
C*08:31	-			2						9			13											
C*08:44/08:61/08:82	-												13								20			
C*08:113	-									9			13									20		
C*08:126	-									9			13									w		

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C*12:02:01-12:02:05/12:02:07/12:02:10-12:02:11/12:02:13/12:03:19/ 12:03:32/12:08/12:10:02/12:14:02/12:18:01/12:22/12:27/12:30/12:36/ 12:40/12:56/12:64/12:67-12:69/12:74/12:80N/12:83-12:86/12:103-12:106/ 12:112/12:114/12:117/12:123-12:124/12:128/12:130/12:134/12:136- 12:137/12:145/12:148N/12:151/12:155Q/12:161-12:162/12:166/12:168- 12:169	-, Null														14	15	16							
C*12:02:06/12:02:08/12:02:12/12:03:01:01-12:03:01:03/12:03:03-12:03:07/ 12:03:09-12:03:15/12:03:18/12:03:21-12:03:26/12:03:28-12:03:29/12:03:31/ 12:03:35-12:03:37/12:06-12:07/12:11-12:13/12:20/12:23-12:25/12:29/ 12:32/12:34-12:35/12:37-12:39N/12:42Q-12:43/12:45-12:48/12:50-12:53/ 12:57-12:58/12:61-12:63/12:65-12:66/12:70-12:71/12:75/12:77-12:79/12:81- 12:82/12:87-12:95/12:97/12:99-12:102/12:107-12:111/12:115-12:116/ 12:118/12:120-12:122/12:125/12:131/12:133/12:138-12:141/12:143/12:149- 12:150/12:152-12:153/12:156-12:160/12:163/12:165/12:167/12:170/12:172	-, Null															15	16							
C*12:02:09/12:10:01/12:96	-					6									14	15	16							
C*12:03:20	-			4													16							
C*12:03:33	-															w	16							
C*12:04:01	-																w	17	18					
C*12:04:02	-															15	w	17	18					
C*12:05	-															15		17	18					
C*12:09, 16:48/16:88	-																	17						
C*12:15/12:113	-															15	16				20			
C*12:16/12:126	-														14	15								
C*12:17/12:98/12:147, B*27:05:27, B*40:02:21	-															15								
C*12:19/12:59/12:73/12:132	-														14		16							
C*12:21	-															15			18					
C*12:28	-										10						16							
C*12:31	-					6										15	16							
C*12:41/12:60	-															15	w		18					
C*12:44	-														14	15	16				20			
C*12:49	-														w	15								
C*12:54/12:129/12:164	-															15	w							
C*12:55	-															15				19				
C*12:72	-														14	15	16		w					

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
C*12:119	-		2													15	16								
C*12:127	-													13	14	15	16								
C*12:135	-										10					16	w	w							
C*12:142	-														14	15	w								
C*12:146	-															w		18							
C*12:154	-															15	16	w	w						
C*14:02:01/14:02:03/14:02:05-14:02:07/14:02:10-14:03/14:05-14:11/14:13-14:16/14:18/14:20-14:24:02/14:26-14:32/14:35N-14:40/14:42-14:48/14:50-14:53/14:55-14:57/14:59-14:63/14:65-14:71/14:73	-, Null				4															19					
C*14:02:08	-				4											15				19					
C*14:19/14:34/14:41	-				4															w					
C*14:25	-		2		4															19					
C*14:54	-				4															19	20				
C*14:58	-		w		4															19					
C*14:72	-				w															19					
C*15:02:01:01-15:02:09/15:02:11-15:02:13/15:02:15-15:02:16/15:02:18-15:02:24/15:04:01-15:13/15:15/15:17-15:19/15:21-15:24/15:26-15:35/15:37-15:40/15:42/15:44-15:54/15:56-15:57/15:59-15:64/15:66-15:73/15:75-15:98/15:100-15:101/15:103-15:121, B*35:08:02/35:08:05	-, Null, B35																				20				
C*15:02:14	-															15					20				
C*15:25	-																16				20				
C*15:55/15:58	-																	17			20				
C*15:74	-																		18		20				
C*16:01:01:01-16:01:05/16:01:07-16:01:16/16:01:18-16:01:19/16:04:01/16:04:03/16:06-16:08/16:10-16:11/16:13-16:14/16:16Q-16:18/16:22-16:24/16:27-16:28/16:30N-16:34/16:36/16:38-16:39:02/16:41-16:45/16:49/16:51-16:52/16:54/16:56-16:59/16:61-16:62/16:65-16:67/16:71-16:73/16:75-16:76/16:78-16:79/16:81-16:83/16:85-16:87/16:92	-, Null																						21		
C*16:01:06	-				4																		21		
C*16:01:17	-															15						21			
C*16:02:01-16:02:04/16:02:06-16:02:12/16:09/16:12/16:19/16:47/16:60/16:63/16:69-16:70/16:74/16:77N/16:84/16:89N-16:90	-, Null																	17				21			
C*16:02:05	-								8									17				21			



Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C*16:02:13	-															15		17				21		
C*16:15:01	-																16					21		
C*16:15:02	-															15	16					21		
C*16:20	-																				20	21		
C*16:21	-											11										21		
C*16:25	-																w	17				21		
C*16:26/16:55	-										10											21		
C*16:29/16:50	-		2																			21		
C*16:37	-																	w				21		
C*16:46	-										10							17				21		
C*16:64	-										10						16					21		
C*16:80	-											11	12									21		
C*16:91	-																	17	18			21		
C*17:01:01:01-17:06/17:09-17:16/17:18-17:19/17:24-17:26/17:28-17:31	-		2														w						22	
C*17:07, 18:09	-																w							
C*17:08	-		2														w							
C*17:17/17:23	-																w						22	
C*17:20/17:27N	-, Null		2																				22	
C*17:21	-		2														w	17					22	
C*17:22	-		2														16						22	
C*18:01-18:02/18:04-18:08/18:10	-, Null																							23
C*18:03	-		2																18					23
B*07:13	-		2														16							
B*67:02	-					6											16				20			

w = weak

? = nucleotide sequence information not available for the primer matching sequence