

EMDIS NATIONAL RULES

DKMS Registry

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Introduction

This document outlines the specific implementation of EMDIS in the DKMS Registry. It is intended for use by EMDIS network partners to understand the processes at DKMS Registry and their effect on message exchange in the EMDIS framework.

Contact Information

- For business related questions or concerns, the e-mail address is: services@dkmsregistry.org
- For workup requests, the e-mail address is: workup@dkmsregistry.org
- For IT questions or concerns, the e-mail address is: emdisadmin@dkms.de
- Our professional homepage: www.dkmsregistry.org
- DKMS Operational User Guide: <https://professional.dkms.org/services/operational-user-guide>

Level of Implementation

Message	Incoming	Outgoing
ADMIN	n/a	n/a
ALM_REQ	NO	NO
ALM_RES	NO	NO
CBR_REQ	n/a	YES
DONOR_CB	YES	YES
IDM_REQ	YES	YES
IDM_RES	YES	YES
MARR_STAT	NO	NO
MATCH_SUM	YES	YES
MSG_ACK	YES	YES
MSG_DEN	YES	YES
NEW_ADD	YES	YES
NO_RES	YES	YES
PAT_STAT	YES	YES
PAT_UPD	YES	YES
PHEN_LIST	YES	YES
REQ_CAN	YES	YES
RES_REM	YES	YES
RSV_REQ	YES	YES
RSV_RES	YES	YES

SMP_ARR	YES	YES
SMP_REQ	YES	YES
SMP_RES	YES	YES
SMP_INFO	YES	YES
TXT_MSG	YES	YES
TYP_REQ	YES	YES
TYP_RES	YES	YES
WARNING	YES	YES
WOR_REQ	NO	NO

Search Algorithm

The search algorithm used at DKMS Registry is called Hap-E Search (Haplotype-Enhanced Search). Hap-E Search is a probabilistic search algorithm based on haplotype frequencies and was developed by DKMS in 2012. Where only incomplete HLA typing information is available, haplotype frequencies are used to estimate the probability that a specific donor is a match. The algorithm currently uses 29,334 German, Turkish, Polish, Italian, Russian and Indian HLA-A, -B, -C, -DRB1, and -DQB1 haplotype frequencies, depending on donor's and patient's descent. Hap-E Search predicts the 10/10, 9/10 and 8/10 matching probability of a donor, i.e. the probability that there are no, one or two allele-level mismatches between donor and patient. Potential 9/10 and 10/10 matched donors are selected based on antigen recognition site matching (WMDA A13). Hap-E Search has been validated in the WMDA matching validation project (Bochtler et. al, 2011, 2013, 2016).

Patient Administration

The DKMS Registry lists unrelated stem cell donors from India (DKMS Foundation India, ION-9935), Chile (Fundación DKMS, ION-1574), United Kingdom (DKMS Foundation United Kingdom, ION-9968), Poland (Fundacja DKMS, ION-7414) Germany (DKMS Donor Center gGmbH, ION-5525) and South Africa (DKMS Africa Formerly known as The Sunflower Fund, ION-6738).

Please note:

- DKMS requires, that EMDIS partners have processes in place to evaluate experience and equipment of Transplant Centers to perform matched / mismatched unrelated donor transplantations.
- No cord blood units are available via EMDIS from the DKMS Registry. Requests for cord blood units and the respective messages and codes are ignored when a search inquiry is processed.
- Data provided on the patient's ethnic group and on the grafting physician's identification are not evaluated.
- Serological HLA typing results for patient data are generally not accepted. At a minimum antigen and/or allele value for the HLA loci HLA-A, -B, and -DRB1 must be provided with the PAT_UPD messages. Best matching results are achieved when at least HLA loci HLA-A, -B, -C, -DRB1, -DQB1 are provided. If the patient's HLA data is not provided in high resolution, a WARNING is issued.
- Before sending a request, HLA data should be provided in high resolution.
- DKMS Registry rejects any HLA information submitted using HLA Nomenclature Versions prior to 3.x.
- DKMS Registry maintains a strict policy on provision of stem cell products to patients with clear indication for HSCT. Therefore, each patient case is evaluated with respect to the patient's age and diagnosis. More information about this process is provided in the DKMS Operational User Guide: <https://professional.dkms.org/services/operational-user-guide>.

Matching Preference

DKMS Registry provides 10/10 and 9/10 matching results only. Mismatches are evaluated according to published WMDA matching criteria on antigen recognition site identical alleles. The direction of mismatches (GvH/HvG) is not evaluated.

Donors with more than one mismatch can be sent via EMDIS upon request to services@dkmsregistry.org.

DKMS Registry always performs a 10/10 or 9/10 search, where the mismatch can be on any locus (A, B, C, DRB1 or DQB1), regardless of the P_MATCH_DR or P_MATCH_AB parameter. In particular, no locus is ignored in the search. Then the requested filter criteria as specified in the P_MATCH_DR string are applied following DKMS Registry implementation (see below) and results are sent out accordingly.

Not all settings for the matching preferences (P_MATCH_AB / P_MATCH_DR), which are possible according to EMDIS semantics, are accepted by DKMS Registry:

- The first position of the string will be ignored by us (=HvG mismatches are not ignored).
- For mismatches at antigen recognition sites of the loci, a maximum of one mismatch is accepted. If a higher number is requested, it is automatically reset to one.
- DKMS Registry accepts all possible values for the value filter part (HLA-C, HLA-DQ, HLA-DPB1, gender, CMV-status).
- The third part of the MP string is not processed.

Examples for P_MATCH_DR

Incoming P_MATCH_DR	Outgoing P_MATCH_DR
0:XX:61:2121XX21XX/	0:11:11:1111111111/
0:XX:61:2121XX20XX/	0:11:11:1111111011/
0:XX:60:2020XX20XX/	0:11:00:0000110011/

P_MATCH_CB is silently ignored and is not processed as DKMS Registry does not list any cord blood units.

If P_MATCH_AB / P_MATCH_DR are missing or are blank, the following default values are used:

P_MATCH_AB= 0:11:10:1010111111/ and

P_MATCH_DR= 0:11:10:1010111011/.

Repeat Search Program

Search updates for patients with status active (ACT) are run daily (overnight, Central European Time). Remote registries are requested to set the status of registered patients to suspended (SUS) or stopped (STP) once regular search updates are not needed anymore. For cases, which are inactive for longer than 185 days, the repeat search is stopped. However, any patient related message via EMDIS re-activates the daily repeat search for the patient.

Donor Administration

KIR typing

In our lab the typing of KIR loci 2DL5A and 2DL5B cannot be separated. Sometimes it is known that only one locus is present, but it cannot be determined which one. In this situation, we send POS for both loci.

Number of Transfusions and Number of Pregnancies

According to the EMDIS semantics the field length for the number of transfusions and for the number of pregnancies is limited to one. Therefore, whenever there are more than nine transfusions or pregnancies, nine is indicated.

Requests

Incoming Sample Request [SMP_REQ, SMP_RES, SMP_ARR]

Please note the following national rules:

- The amount of blood samples requested for verification typing (SMP_REQ) must not exceed 50 ml. If more than a total of 50 ml is requested, an explanation is required and authorization from the registry/donor center, where the donor is registered, is needed. A WARNING is sent accordingly.
- It cannot be guaranteed that the blood samples will be delivered exactly as requested. The number, volume of tubes and, in rare cases, the anticoagulant may vary from the order placed due to the availability of certain types of tubes. Since available tubes also vary depending on the donor pool, the total amount of anticoagulant is considered while the number and volume of tubes are not.
- If no volume quantity is specified, a tube containing 10 ml of blood with the specified reagents is sent as standard. Requests are not processed for which the volume, but not the reagent is specified. A WARNING is sent.
- Requests for tubes with Citrate Phosphate Dextrose (CPD) as anticoagulant are not be processed as CPD cannot be provided. A WARNING is sent.
- The shipping address of the blood sample (INST_SMP_SENT) is only processed if the institution has the type LAB.
- Duplicate orders are joined and treated as one request.
- REC_DATE1 and REC_DATE2 are ignored.

- Once the request has been received, the donor is automatically reserved for this patient for six weeks.
- Once the date of blood draw has been scheduled, reservation period is adapted and the donor is automatically reserved for this patient for another 90 days.
- In case of ongoing interest in the donor (DON_ACCPT=Y), the donor is reserved for this patient for 90 days from the submission of the sample testing results. However, whenever the blood draw date is more than six months ago, an automatic extension of the reservation when submitting the sample testing results is not possible. DKMS Registry needs to be contacted directly. A WARNING is sent clarifying this.
- Cancellations are not possible once IDM results have been sent. A message denial is sent in this case.
- Result reminders are sent four weeks after the IDM results have been shared in case the results of the sample request have not been sent. The process continues in a biweekly rhythm until the reservation expires.

The screening for infectious disease markers is included in a sample request (SMP_REQ). It comprises routinely:

- HBsAG, Anti-HBc, Anti-HIV, Anti-HCV, Anti-CMV (IgG + IgM) and STS (Lues), as well as the testing of the ABO blood group and Rhesus factor.
- For single extra markers such as EBV, note a comment in the REMARK field of the SMP_REQ, e.g. "Plus EBV testing". The EBV testing result will then be sent as an IDM_RES message along with the other IDM markers that are tested during the sample request.
- For donors from India (ION-9935) a test for Malaria QBC is performed in addition.
- For donors from Chile (ION-1574) antibodies to Trypanosoma cruzi (IgG, Chagas) are tested in addition.

The results of Malaria and Chagas tests are shared via text message or within the IDM results.

Incoming Typing Request [TYP_REQ, TYP_RES]

All requested loci are typed in high resolution by molecular methods. Except HLA-DRB3, HLA-DRB4 and HLA-DRB5, all other loci can be requested individually. The donor is not automatically reserved for the patient after a typing request. Requests for donors having a high resolution in all loci are denied.

Incoming Request for Infectious Disease Markers [IDM_REQ, IDM_RES]

Our standard profile includes the following infectious disease markers:

- HBsAG, Anti-HBc, HBV-NAT, Anti-HCV, HCV-NAT, Anti-HIV, HIV-NAT, STS (Lues), Anti-CMV (IgG + IgM), Anti-HTLV I/II, Anti-EBV (IgG + IgM) and Anti-Toxoplasmosis (IgG + IgM).
- For donors from India (ION-9935) testing for Malaria QBC is possible in addition.
- For donors from Chile (ION-1574) antibodies to Trypanosoma cruzi (IgG, Chagas) are also tested.
- CCR5 will not be tested, if the donor is already typed for CCR5.
- Additional markers can also be typed. Please contact us via e-mail to services@dkmsregistry.org for IDM testing beyond the standard profile described above.
- Our software will produce message denials upon IDM requests containing only markers and/or test methods not included in our standard profile. Please contact us via mail to services@dkmsregistry.org to place such requests.
- For IDM requests containing a combination of standard and non-standard markers, the request will be adapted and only the standard tests will be handled via EMDIS. A warning message pointing this out will be sent. Please contact us via e-mail to services@dkmsregistry.org as soon as possible whenever you receive such a warning. We will then forward your request of additional markers to the respective donor center.

Incoming Reservation Request [RSV_REQ, RSV_RES]

Reservation requests without a previous sample request to hub DR are not possible. A message denial is sent.

Workup Request

Messages related to workup requests are not dealt via EMDIS. Workup requests have to be sent to the DKMS Registry for all donor pools (ION-9935, ION-1574, ION-9968, ION-7414, ION-5525 and ION-6738). You may use respective WMDA forms for workup request, subsequent donation request or request for MHC Apheresis.

Contact: workup@dkmsregistry.org or send a fax to +49 7071 943 2299.

Cord Blood Units

DKMS registry does not provide CBUs. Messages relating to cord blood units are not processed.

Invoicing

Invoicing address is

DKMS Registry gGmbH
Kressbach 1
72072 Tübingen
Germany

Invoices received from DKMS Registry must be paid within 30 days, otherwise dunning charges may apply.

References

Bochtler W, Maiers M, Bakker JNA, Oudshoorn M, Marsh SGE, Baier D, Hurley CK, Müller CR on behalf of the Information Technology Working Group of the World Marrow Donor Association. (2011) World Marrow Donor Association framework for the implementation of HLA matching programs in hematopoietic stem cell donor registries and cord blood banks, *Bone Marrow Transplantation*, 46:338-343.

Bochtler W, Maiers M, Bakker JNA, Baier DM, Hofmann JA, Pingel J, Rist HG, Oudshoorn M, Marsh SG, Müller CR, Hurley CK, Information Technology Working Group of the World Marrow Donor Association. (2013). An update to the HLA Nomenclature Guidelines of the World Marrow Donor Association, 2012., *Bone Marrow Transplantation*, 48:1387-8.

Bochtler W, Gragert L, Patel ZI, Robinson J, Steiner D, Hofmann JA, Pingel J, Baouz A, Melis A, Schneider J, Eberhard HP, Oudshoorn M, Marsh SGE, Maiers M, Muller CR. (2016) A comparative reference study for the validation of HLA-matching algorithms in the search for allogeneic hematopoietic stem cell donors and cord blood units. *HLA*, 87:439-448. doi:10.1111/tan.12817