14th International Donor Registry Conference & WMDA Meetings
25 – 29 June, 2024 – Cape Town, South Africa
All patients & donors matter
www.capetownidrc.co.za

Searching for the Most Suitable Donor: WMDA's Search & Match Service

WMDA
matching donors • serving patients

Alicia Venter

Pillar 1: Optimising Search, Match & Connect

Project Coordinator

Outline

01

Bioinformatics in Unrelated Donor selection

- Probabilistic matching algorithms
- Haplotype frequencies

02

Identifying a suitable stem cell product

- Leveraging technologies to save time
- Donor/cord blood unit Identification Tools

Outline

01 Bioinformatics in Unrelated Donor selection

- Probabilistic matching algorithms
- Haplotype frequencies

Bioinformatics & Search & Match

Bioinformatics is the use of digital tools for computation and analysis in order to capture and interpret biological data. Bioinformatics is essential for **management of data** in modern biology and medicine, in particular when the data sets are **large and complex**, such as HLA.

Search & Match Service (SMS) is the **primary source** of all hematopoietic stem cell donors and cord blood units globally.

The database holds over 41 million donors and more than 790,000 cord blood units from 134 registries and cord blood banks across 57 countries.

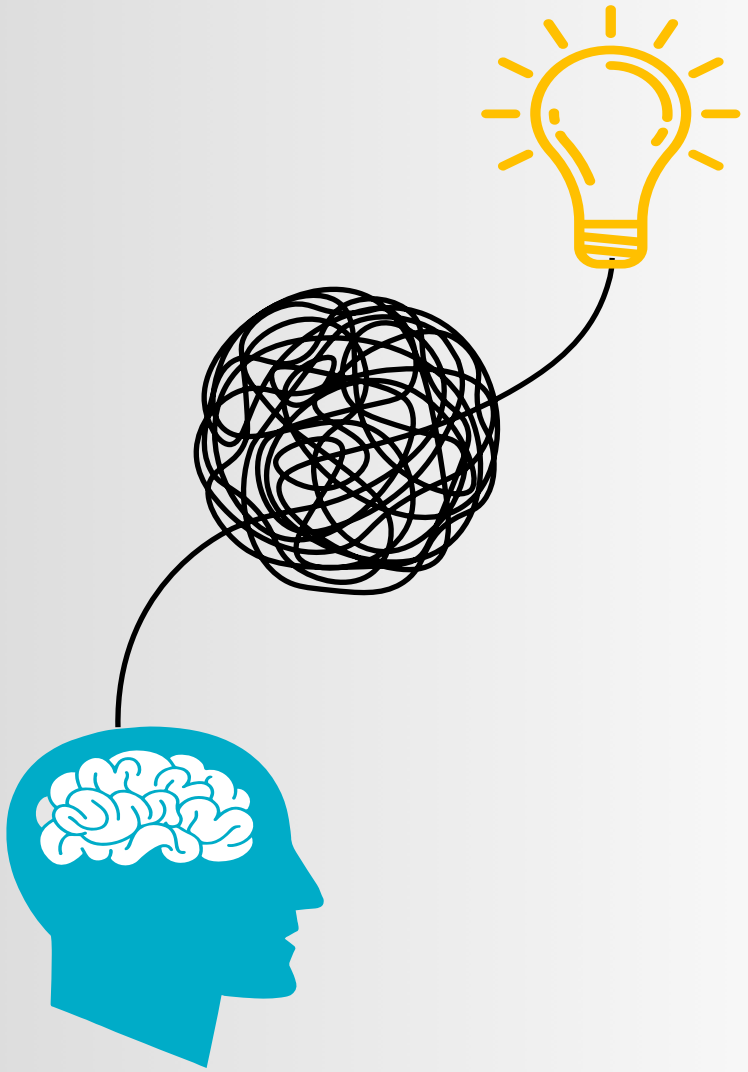
SMS provides a fast preliminary search facility to find the **best suitable cell source in the world** for a patient in need of a hematopoietic stem cell transplant.

Probabilistic matching algorithms

An **algorithm** is simply a series of instructions that are followed, step by step, to **do** something useful or **solve a problem**.

For example, you could consider a cake recipe an **algorithm** for making a cake.

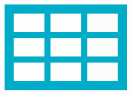
In computing, **algorithms** provide computers with a successive **guide to completing actions**.



Probabilistic matching algorithms

The matching algorithms helps to provide probability matching percentages using haplotype frequencies.

WMDA hosts the data from donors and cords worldwide on behalf of the listing organisations in a database to which the algorithm is also connected.



The data collected is used to periodically calculate Haplotype Frequency (HF) sets which are used by the algorithms to perform the probability matching.

Haplotype frequency (HF)

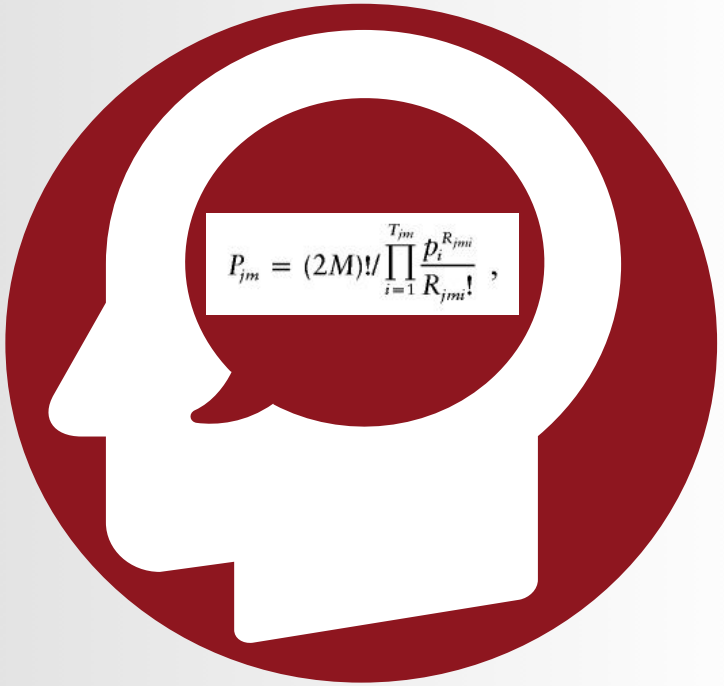
HF is defined as the **proportion of chromosomes** of that type in the population.

WMDA uses HF set configuration to better serve all patients and provide increased accuracy when selecting suitable donors and cord blood units to patients.

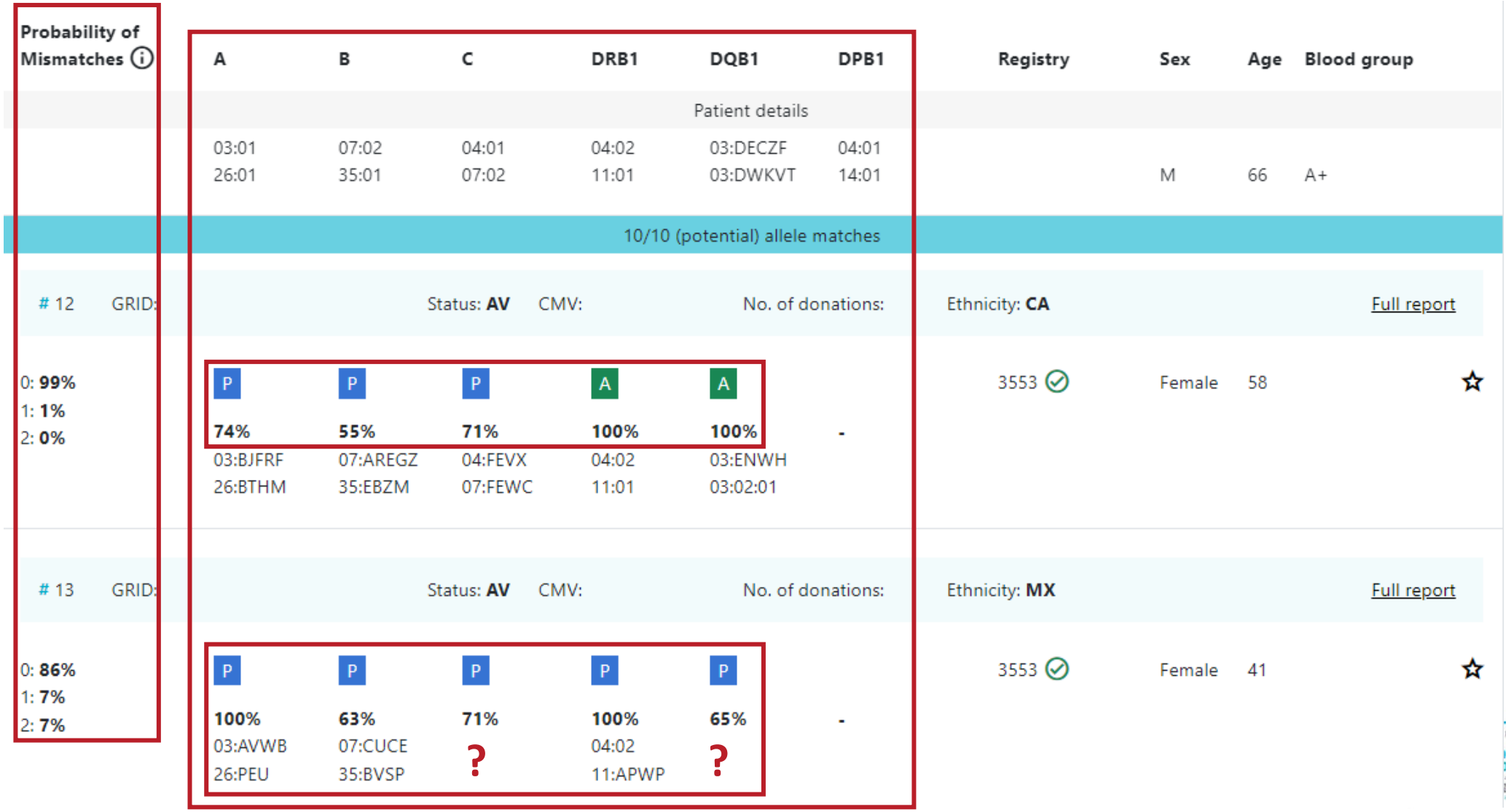
These frequency sets utilize high resolution typing results from organisations to extrapolate the haplotypes of the region or organisation.

Thus, an organisation or geographical region must meet a minimum threshold of number of donors and availability of high resolution typing to build usable and valuable frequency set.

For organisations or geographical regions that do not meet this minimum threshold, the global HF set is applied.



Probabilistic matching algorithms



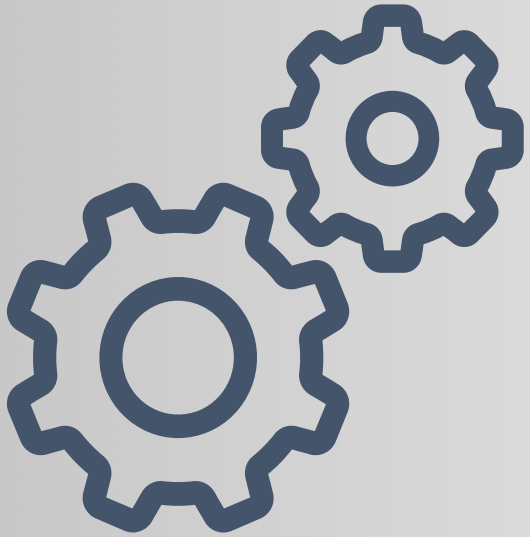
Probability of Mismatches	A	B	C	DRB1	DQB1	DPB1	Registry	Sex	Age	Blood group
				Patient details						
	03:01 26:01	07:02 35:01	04:01 07:02	04:02 11:01	03:DECZF 03:DWKVT	04:01 14:01		M	66	A+
				10/10 (potential) allele matches						
# 12 GRID:				Status: **AV** CMV:		No. of donations:	Ethnicity: **CA**			Full report
0: **99%** 1: **1%** 2: **0%**	P **74%** 03:BJFRF 26:BTHM	P **55%** 07:AREGZ 35:EBZM	P **71%** 04:FEVX 07:FEWC	A **100%** 04:02 11:01	A **100%** 03:ENWH 03:02:01	-	3553	Female	58	☆
# 13 GRID:				Status: **AV** CMV:		No. of donations:	Ethnicity: **MX**			Full report
0: **86%** 1: **7%** 2: **7%**	P **100%** 03:AVWB 26:PEU	P **63%** 07:CUCE 35:BVSP	P **71%** ?	P **100%** 04:02 11:APWP	P **65%** ?	-	3553	Female	41	☆

Outline

02

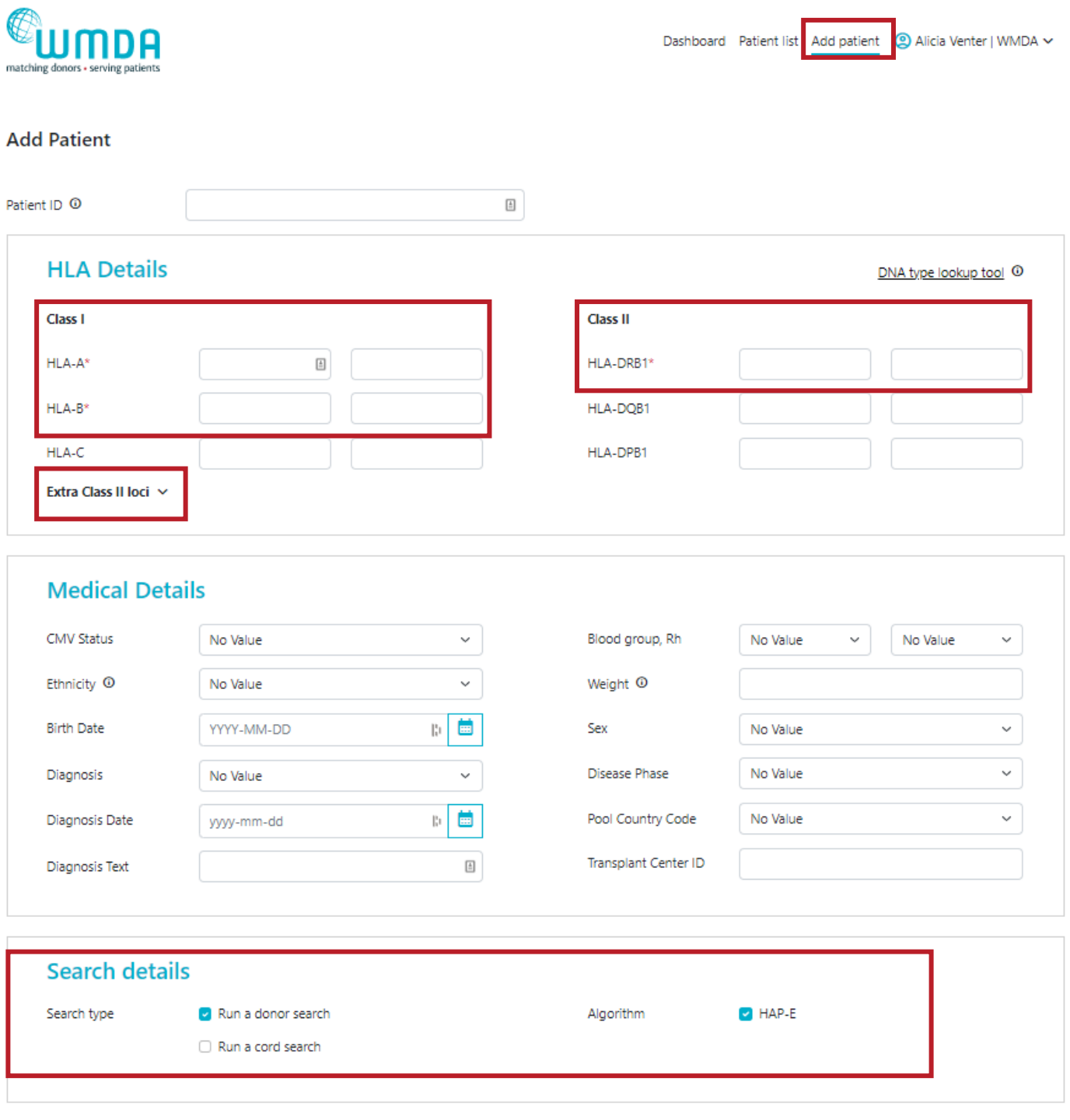
Identifying a suitable stem cell product

- Leveraging technologies to save time
- Donor/cord blood unit Identification Tools



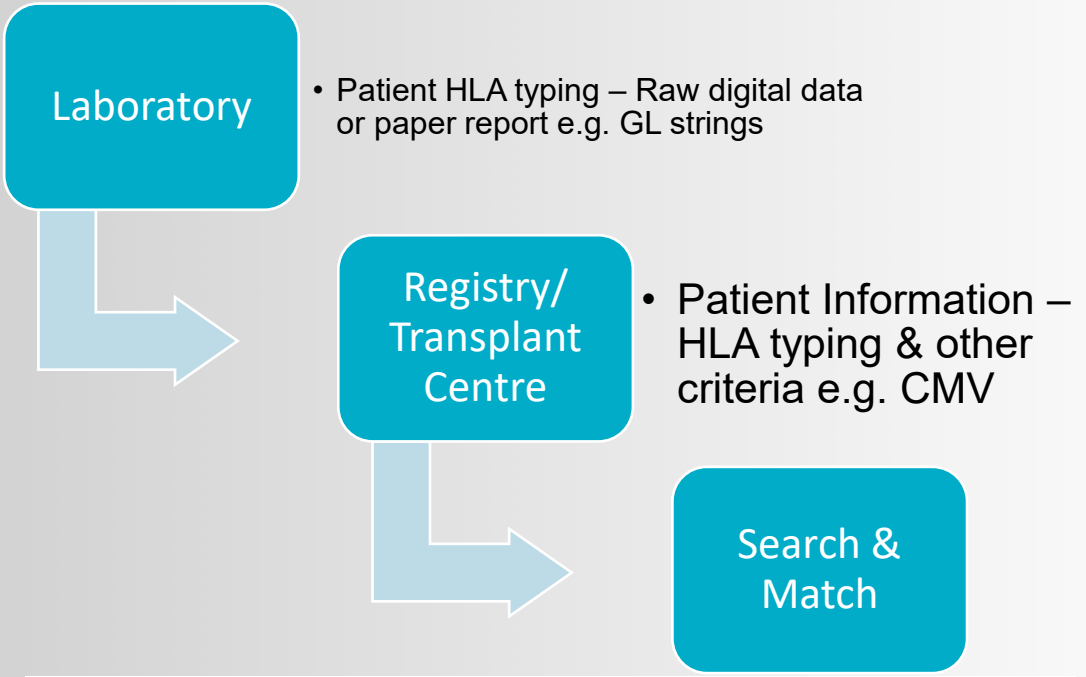
Steps to identify a suitable cell source:

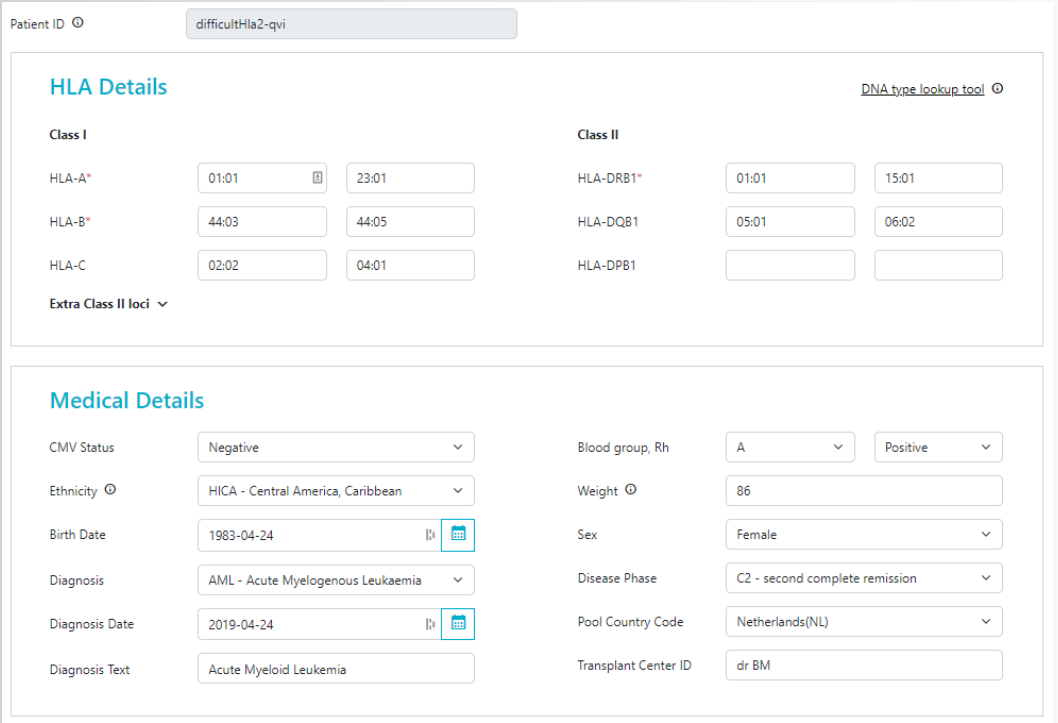
1. Go to WMDA website
2. Login with Multi Factor Authentication (MFA)
3. Add patient data - Consent?
4. Enter required fields
   HLA-A, -B, DRB1
5. Enter optional Class II loci
   HLA-DRB3/4/5, -DQA1, DPA1
6. Indicate the search you want



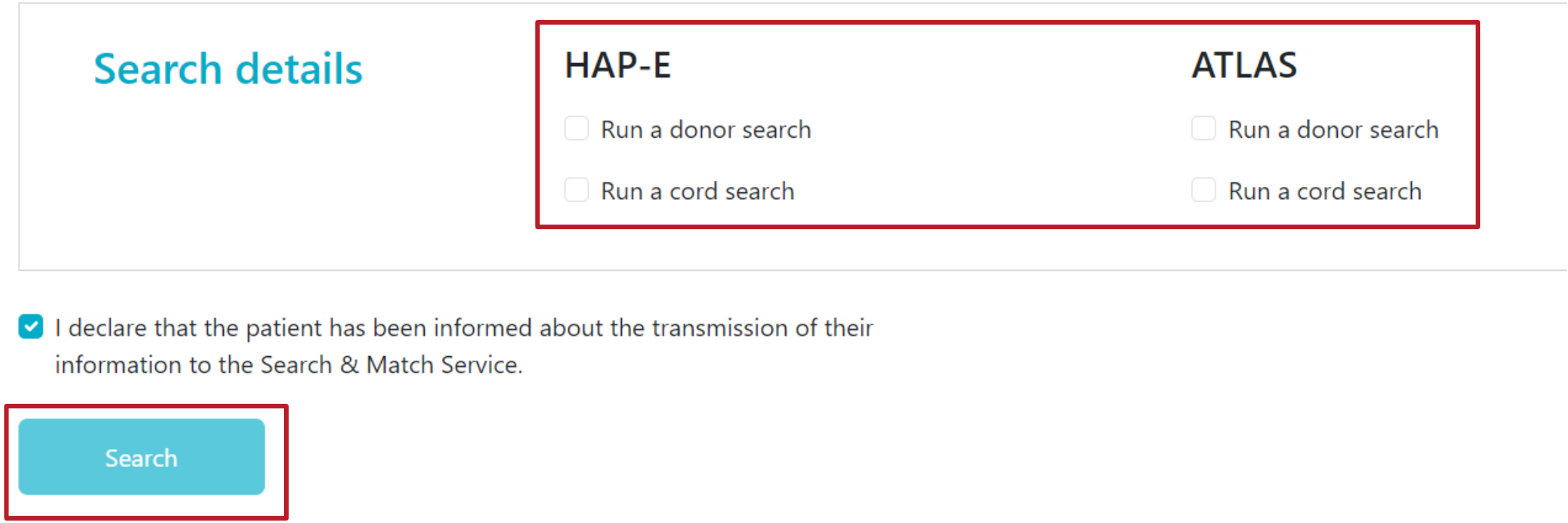
…alternatively

You can ***Automatically transfer*** patient data from your local system to Search & Match Service using the Patient API.



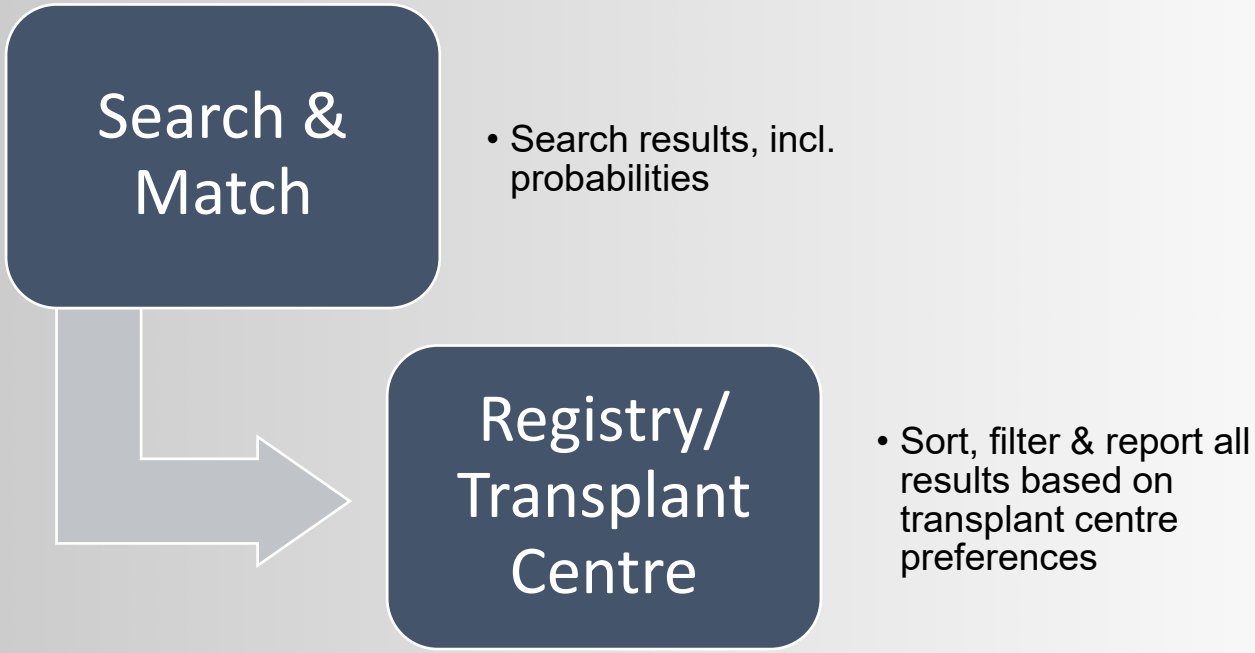


Initiate Search



Probability of Mismatches	A	B	C	DRB1	DQB1	DPB1	Registry	Sex	Age	Blood group
Patient details										
	01:01 23:17	08:01 41:02	07:01 17:01	07:01 11:01	02:02 06:02	104:01 105:01				
10/10 (potential) allele matches										
# 3 GRID: **4987 0000 0003 8224 836** Status: **AV** CMV: No. of donations: **0** Ethnicity: Full report										
0: **0%** 1: **1%** 2: **29%**	P **100%** 01:XX 23:XX	P **59%** 08:XX 41:XX	P **100%**	P **100%** 07:XX 11:XX	P **41%**	- -	4987 IL-Ezer Mizion	Male	53	
# 4 GRID: **4987 0000 0002 0976 027** Status: **AV** CMV: No. of donations: **0** Ethnicity: Full report										
0: **0%** 1: **1%** 2: **29%**	P **100%** 01:XX 23:XX	P **59%** 08:XX 41:XX	P **100%**	P **100%** 07:XX 11:XX	P **41%**	- -	4987 IL-Ezer Mizion	Male	59	
9/10 (potential) allele matches										
# 5 GRID: **6939 DKM0 0086 6391 004** Status: **AV** CMV: No. of donations: **0** Ethnicity: **CAEU** Full report										
0: **0%** 1: **100%** 2: **0%**	A - 01:01:01G 23:01:01G	A - 08:01:01G 41:02:01	A - 07:01:01G 17:01:01G	M - 07:01:01 **(15:01:01)**	A - 02:02:01 06:02:01	G - **(04:01:01)** **(15:01:01)**	5525 DE-DKMS	Female	29	B-
# 6 GRID: **9968 DKM0 0000 1819 907** Status: **AV** CMV: **N 2020-12-10** No. of donations: **0** Ethnicity: **CAEU** Full report										
0: **0%** 1: **100%** 2: **0%**	A - 01:01:01G 23:01:01G	A - 08:01:01G 41:02:01	A - 07:01:01G 17:03:01	A - 07:01:01G 11:01:01	M - 02:02:01 **(03:01:01)**	G - **(02:01:02)** **(02:01:02)**	9968 GB-DKMS	Male	33	A+

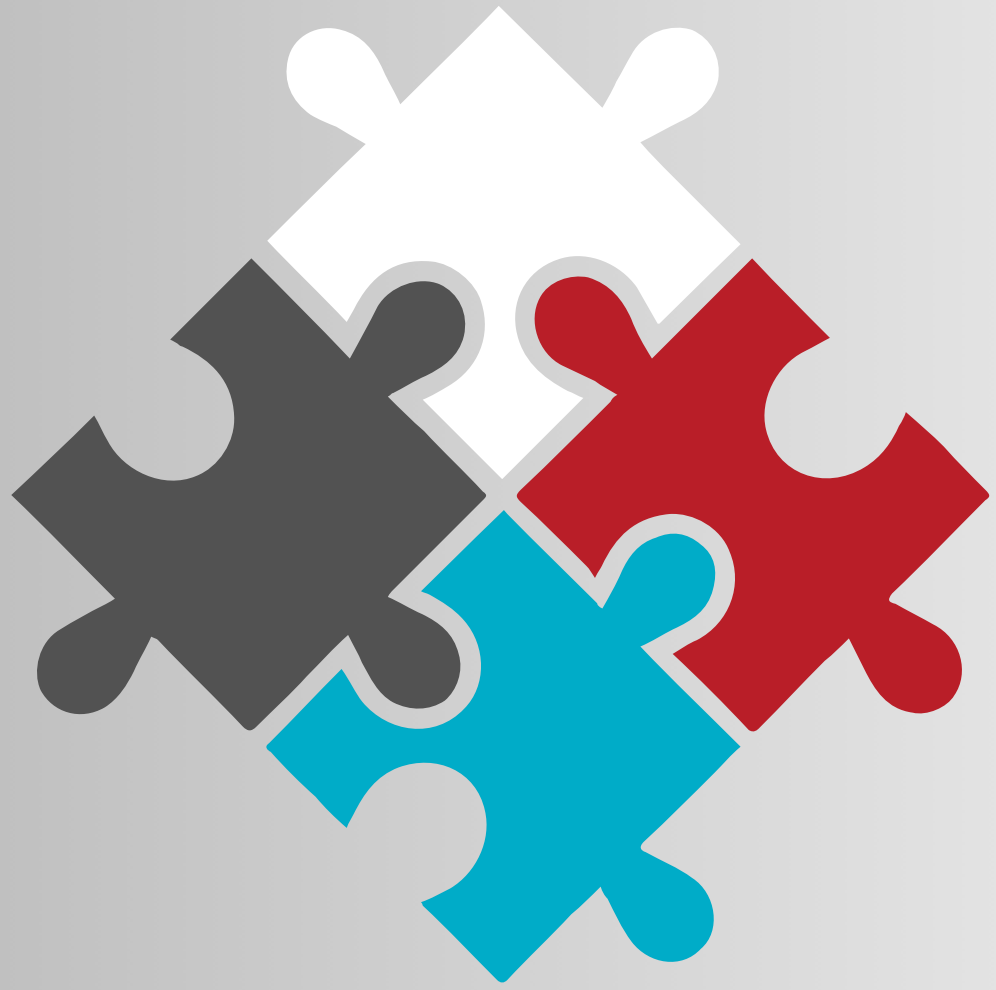
You can
Automatically download
donor and/or cord blood data from Search & Match Service to your local system using the Search API.



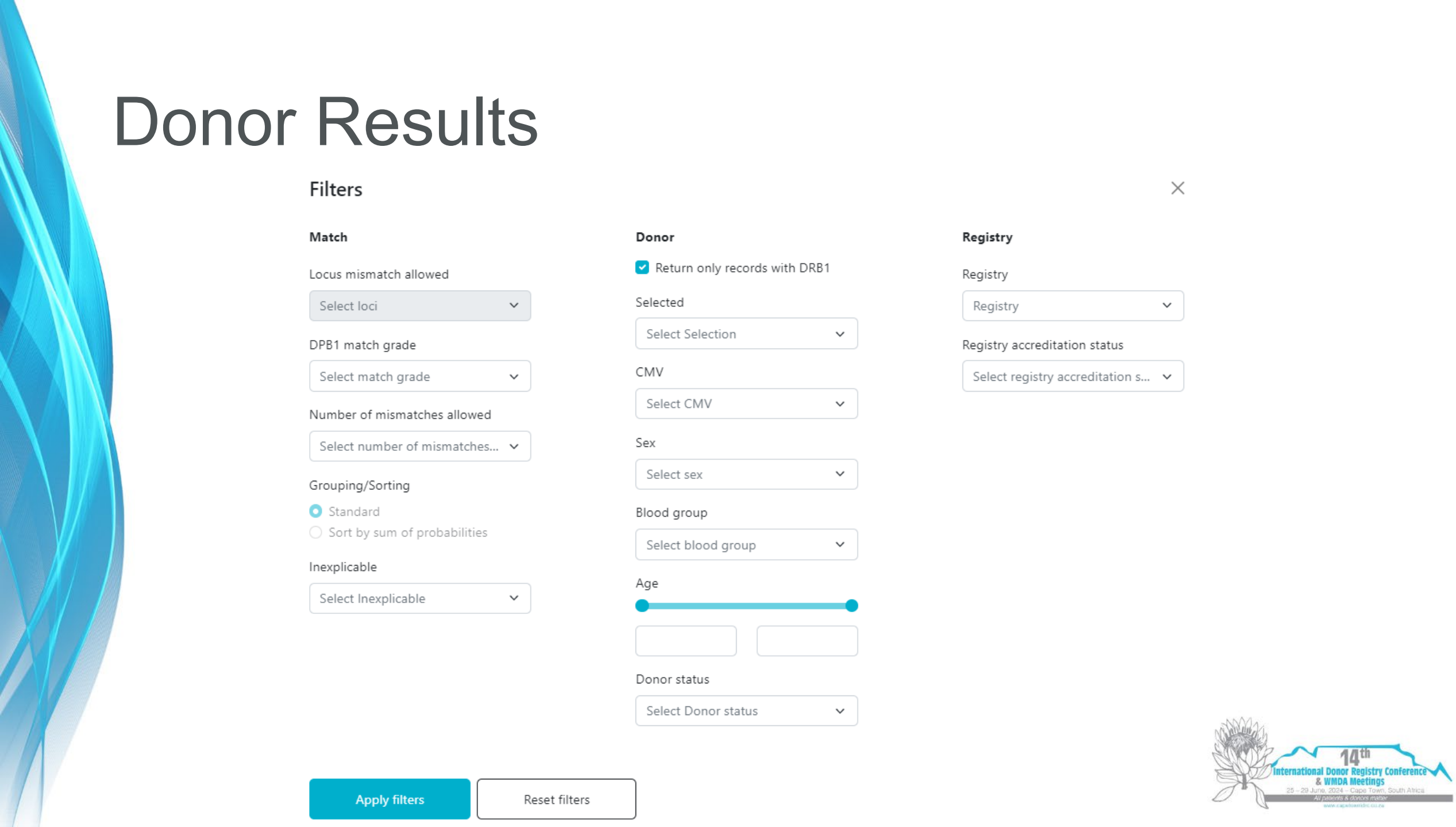
Donor/CBU identification tools

Donor/CBU identification tools

Utilising various **filters** to narrow down the results based on TC preferences.



Donor Results



CBU Results

Filters

Match

Locus mismatch allowed

Select loci

DPB1 match grade

Select match grade

Number of mismatches allowed

Select number of mismatches...

Grouping/Sorting

- Standard
- Sort by sum of probabilities

Secondary sort by

- TNC
- CD34+

Inexplicable

Select Inexplicable

Donor

- [x] Return only records with DRB1

Selected

Select Selection

CMV

Select CMV

Blood group

Select blood group

Age

Donor status

Select Donor status

Registry

Registry

Registry

Cord search filters

TNC

Minimum TNC $x10^7$

CD34+

Minimum CD34+ $x10^6$

CBB accreditation status

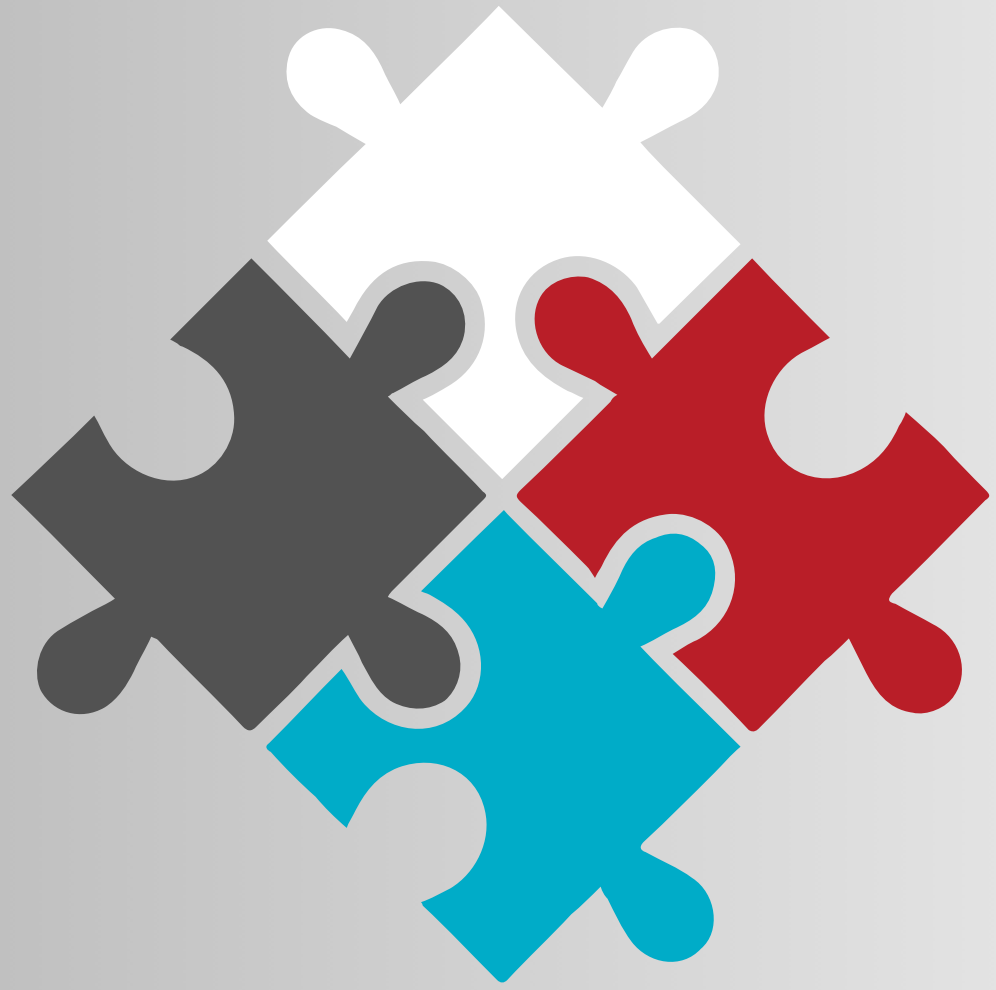
Select CBB accreditation status

Apply filters

Reset filters

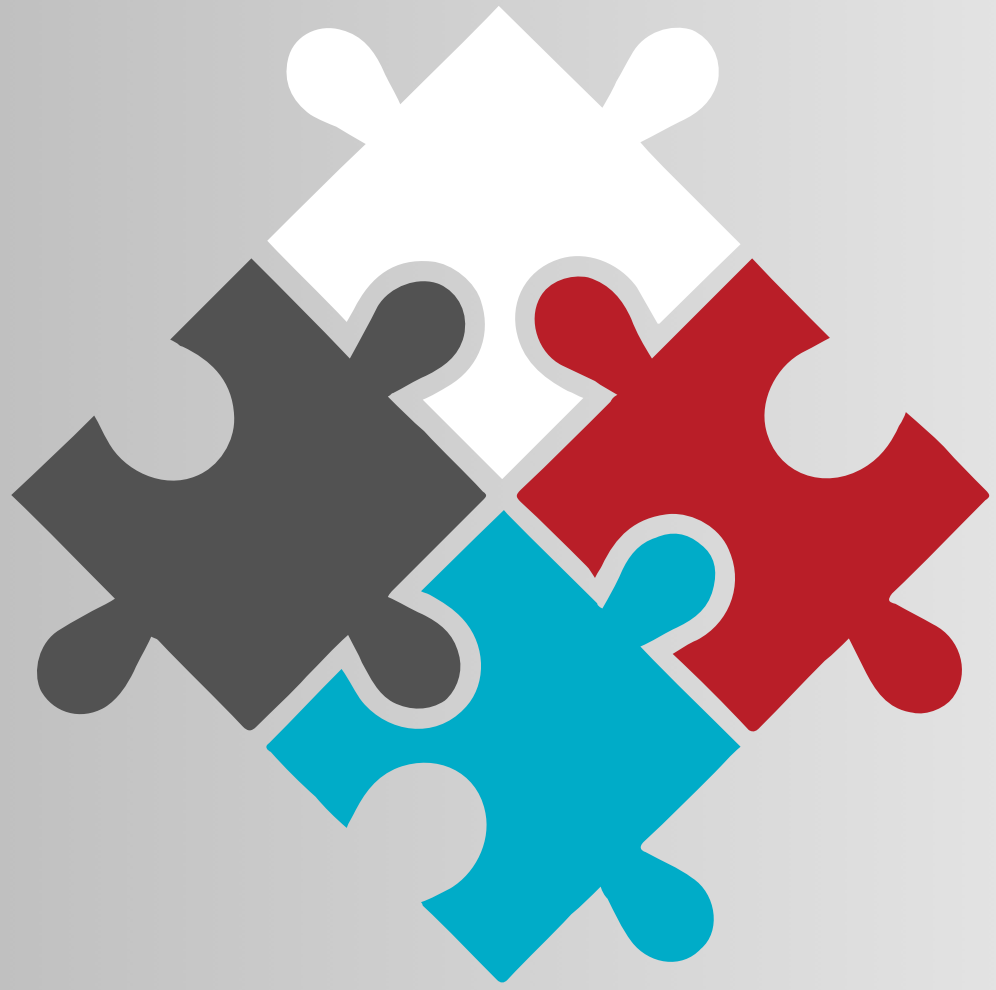
Donor/CBU identification tools

Utilising various **filters** to narrow down the results based on TC preferences.



Donor/CBU identification tools

Utilising various **filters** to narrow down the results based on TC preferences.



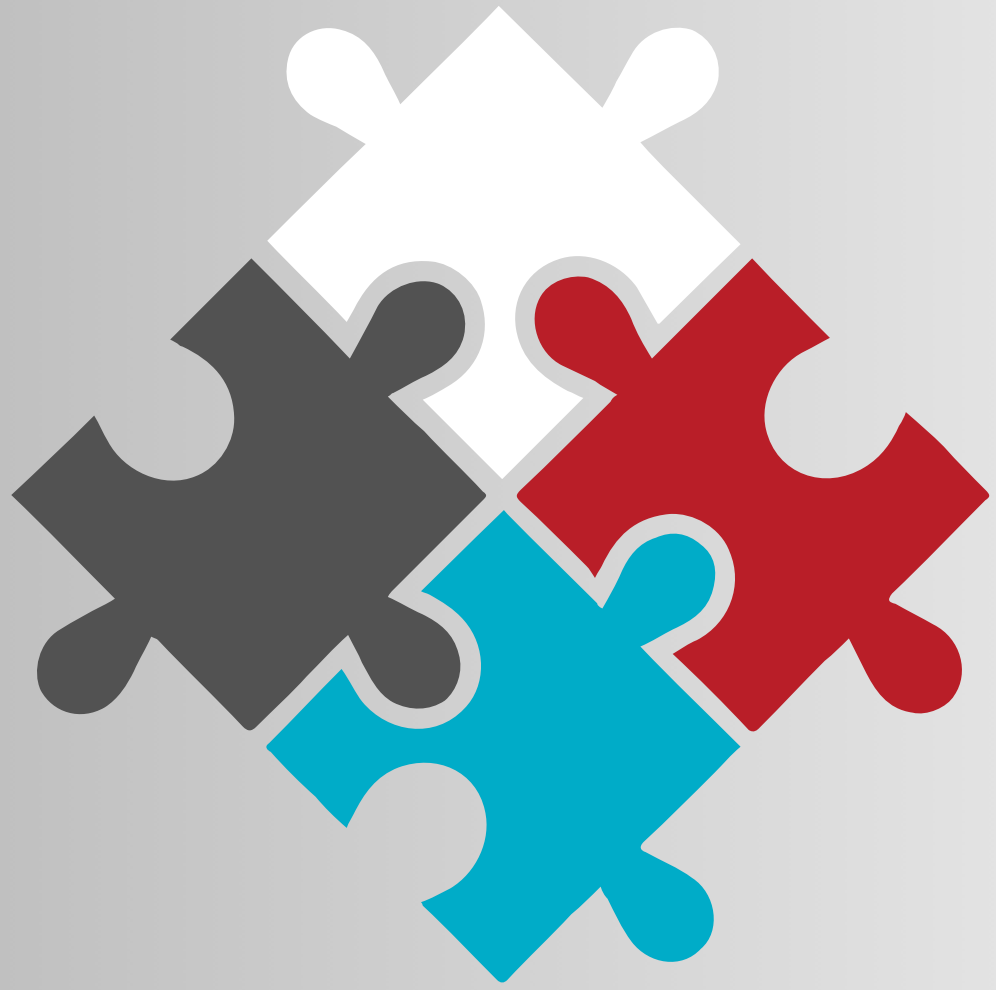
Automatic Updates of active searches with notifications about changes in search results.

Patient ID	Username	Results	Auto Refresh	Status Activity
IDRC - 550056	alicia.venter@wmda.info	Donor search | Hap-E | 10/10 | 33 potential donors Donor search | ATLAS | 10/10 | 31 potential donors Cord search | ATLAS | 10/10 | 0 potential cords Cord search | Hap-E | 10/10 | 0 potential cords Donor search | Hap-E | 9/10 | 1052 potential donors Donor search | ATLAS | 9/10 | 1026 potential donors Cord search | ATLAS | 9/10 | 39 potential cords Cord search | Hap-E | 9/10 | 39 potential cords		41 days until deactivation
IDRC - 550055	alicia.venter@wmda.info	Donor search | ATLAS | 10/10 | 0 potential donors Cord search | ATLAS | 10/10 | 0 potential cords Cord search | Hap-E | 10/10 | 0 potential cords Donor search | Hap-E | 10/10 | 0 potential donors Donor search | Hap-E | 9/10 | 95 potential donors Donor search | ATLAS | 8/10 | 4323 potential donors Cord search | ATLAS | 8/8 | 0 potential cords Cord search | ATLAS | 7/8 | 5 potential cords Cord search | ATLAS | 6/6 | 0 potential cords Cord search | ATLAS | 5/6 | 5 potential cords		38 days until deactivation

Probability of Mismatches	A	B	C	DRB1	DQB1	DPB1	Donor pool	Sex	Age	Blood group
				Patient details						
	03:01:01 24:02:01	07:02:01 15:01:01	03:04:01 07:02:01	04:01:01 15:01:01	03:02:01 06:02:01	04:01:01				
				10/10 (potential) allele matches						
# 2 GRID: **5525 DKM0 0606 8459 935** Status: **AV** CMV: **O 2024-06-04** No. of donations: **0** Ethnicity: **CAEU**										Full report
0: **100%** 1: **0%** 2: **0%**	A - 03:01:01G 24:02:01G	A - 07:02:01G 15:01:01G	A - 03:04:01G 07:02:01G	A - 04:EACPF 15:EKCEM	A - 03:EDYCS 06:EEPNS	A - 04:ERTTH 04:ERTTH	5525 DE-DKMS	Male	46	O+
# 3 GRID: Status: CMV: No. of donations: Ethnicity:										Full report
0: **100%** 1: **0%** 2: **0%**	A - 03:AAAUY 24:ABGEW	A - 07:TXXS 15:ACMGN	A - 03:ACMGT 07:ABGFN	A - 04:01:01 15:01	A - 03:YGKM 06:AAAXA	Pe - **(04:FNVS)** **(05:RGPW)**	0			

Donor/CBU identification tools

Utilising various **filters** to narrow down the results based on TC preferences.

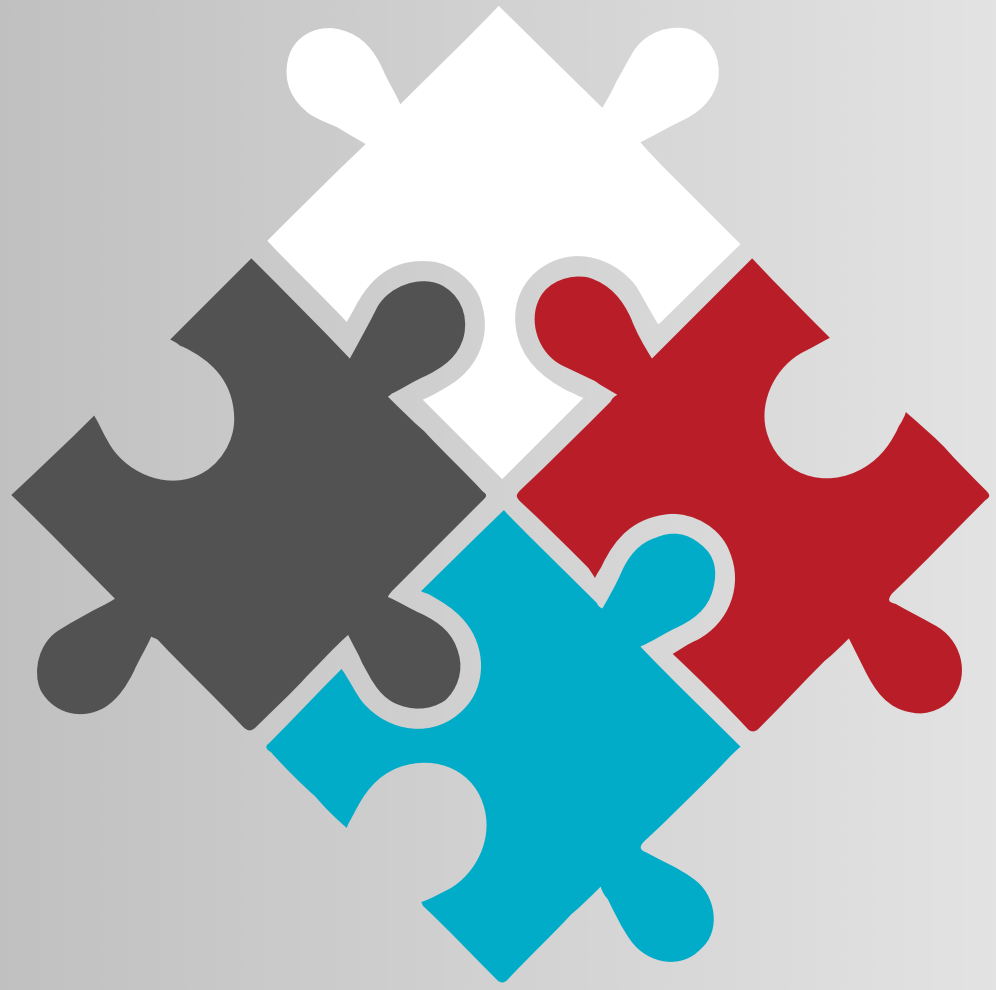


Automatic Updates of active searches with notifications about changes in search results.

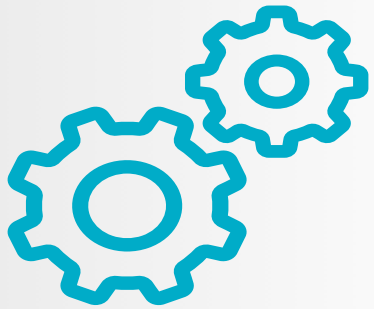
Donor/CBU identification tools

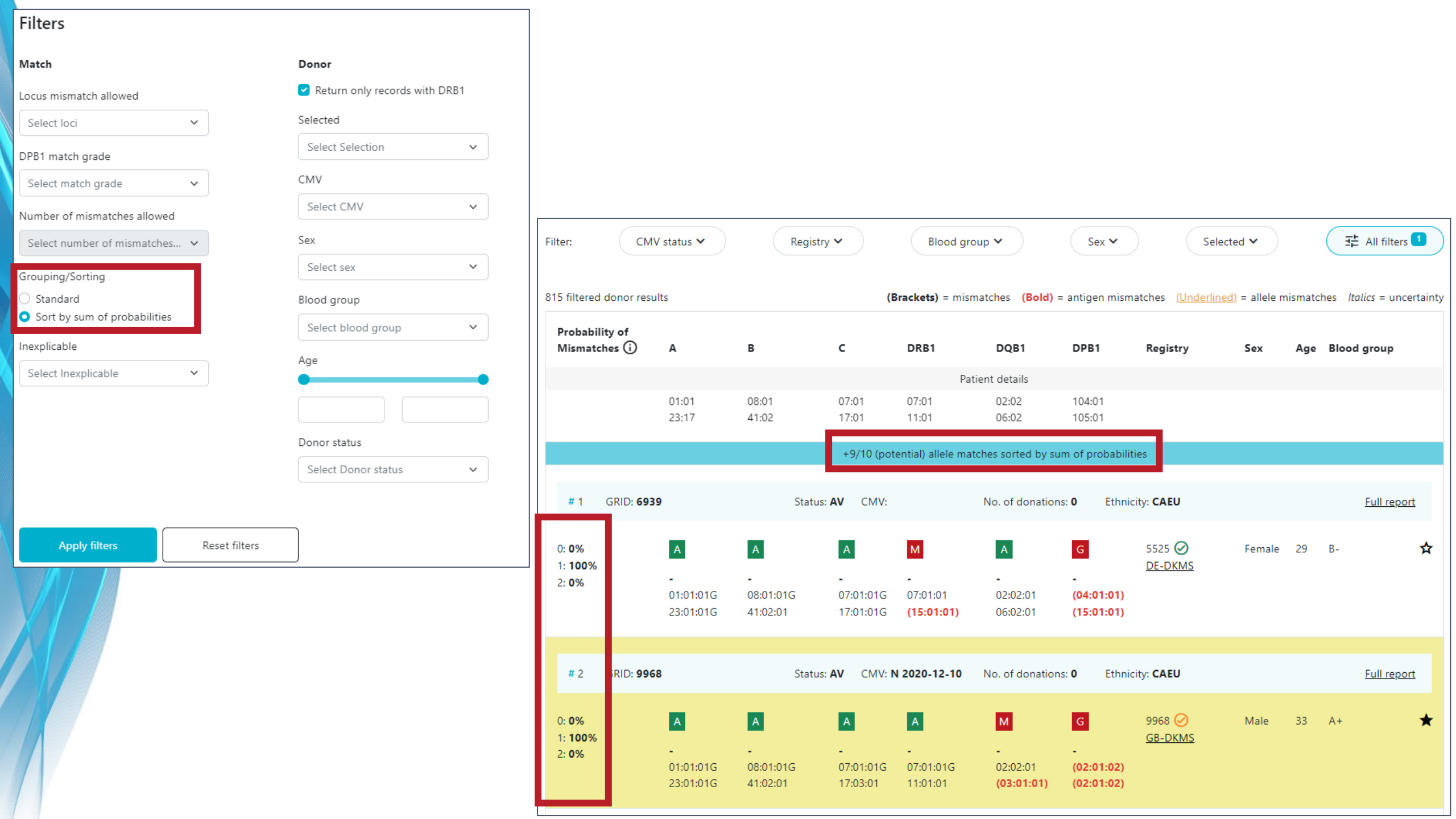
Utilising various **filters** to narrow down the results based on TC preferences.

Grouping or sorting search results by match class or match probability.



Automatic Updates of active searches with notifications about changes in search results.

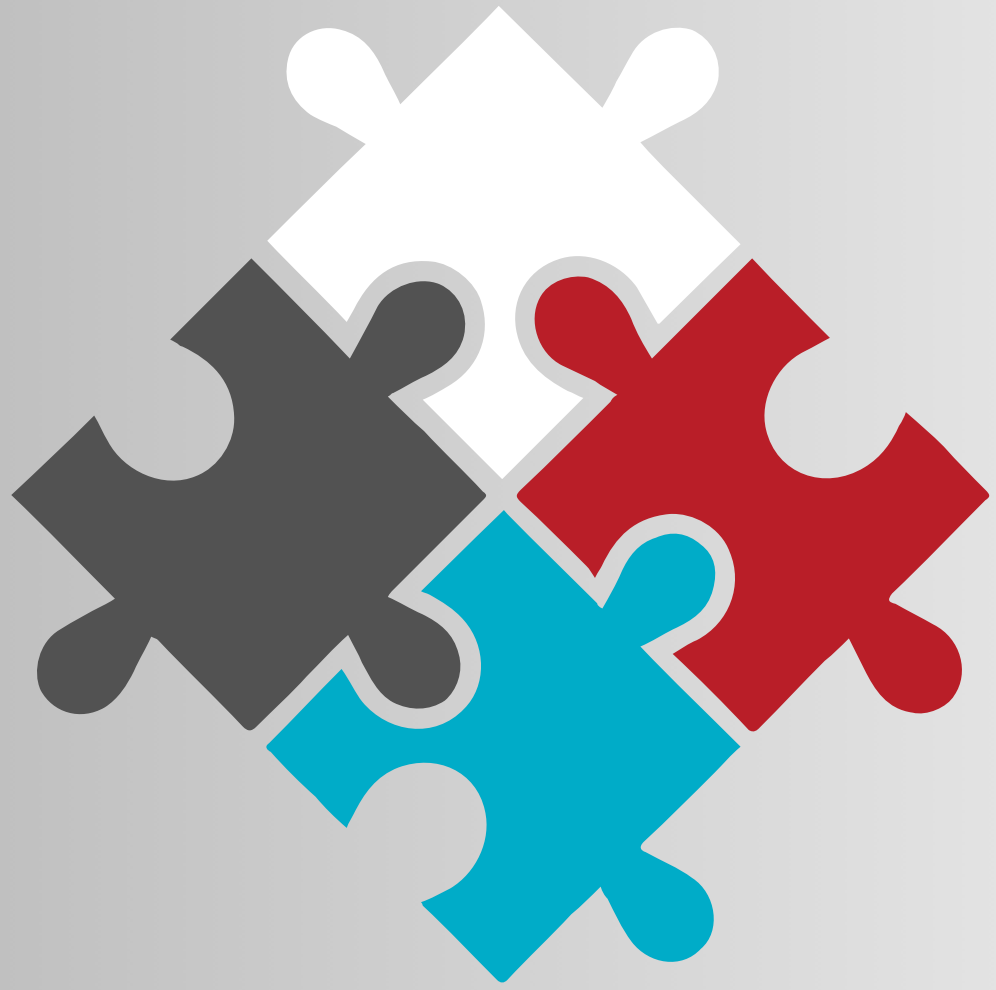



Filters
Match
Locus mismatch allowed
Select loci
DPB1 match grade
Select match grade
Number of mismatches allowed
Select number of mismatches...
Grouping/Sorting
Standard
Sort by sum of probabilities
Inexplicable
Select Inexplicable
Donor
Return only records with DRB1
Selected
Select Selection
CMV
Select CMV
Sex
Select sex
Blood group
Select blood group
Age
Donor status
Select Donor status
Apply filters
Reset filters
Filter:
CMV status
Registry
Blood group
Sex
Selected
All filters 1
815 filtered donor results
(Brackets) = mismatches (Bold) = antigen mismatches (Underlined) = allele mismatches Italics = uncertainty
Probability of Mismatches
A
B
C
DRB1
DQB1
DPB1
Registry
Sex
Age
Blood group
Patient details
01:01 23:17
08:01 41:02
07:01 17:01
07:01 11:01
02:02 06:02
104:01 105:01
+9/10 (potential) allele matches sorted by sum of probabilities
1 GRID: 6939 Status: AV CMV: No. of donations: 0 Ethnicity: CAEU Full report
0: 0%
1: 100%
2: 0%
A A A M A G
- - - - - -
01:01:01G 08:01:01G 07:01:01G 07:01:01 02:02:01 (04:01:01)
23:01:01G 41:02:01 17:01:01G (15:01:01) 06:02:01 (15:01:01)
5525
DE-DKMS
Female 29 B-
2 GRID: 9968 Status: AV CMV: N 2020-12-10 No. of donations: 0 Ethnicity: CAEU Full report
0: 0%
1: 100%
2: 0%
A A A A M G
- - - - - -
01:01:01G 08:01:01G 07:01:01G 07:01:01G 02:02:01 (02:01:02)
23:01:01G 41:02:01 17:03:01 11:01:01 (03:01:01) (02:01:02)
9968
GB-DKMS
Male 33 A+

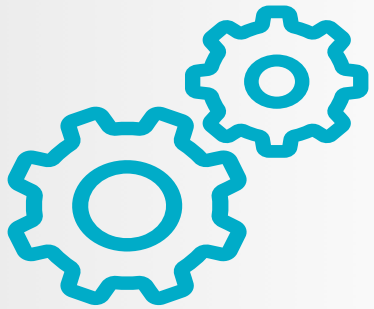
Donor/CBU identification tools

Utilising various **filters** to narrow down the results based on TC preferences.

Grouping or sorting search results by match class or match probability.



Automatic Updates of active searches with notifications about changes in search results.



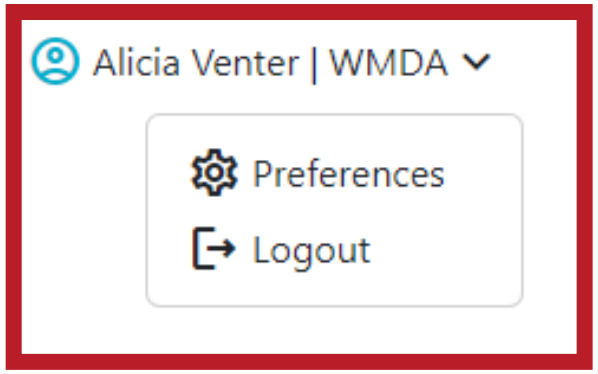
Donor/CBU identification tools

Utilising various **filters** to narrow down the results based on TC preferences.

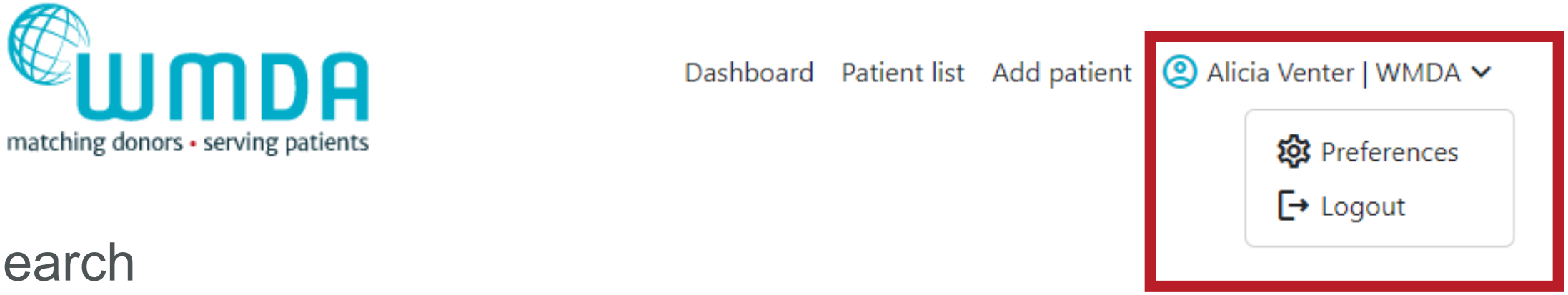
Grouping or sorting search results by match class or match probability.

Automatic Updates of active searches with notifications about changes in search results.

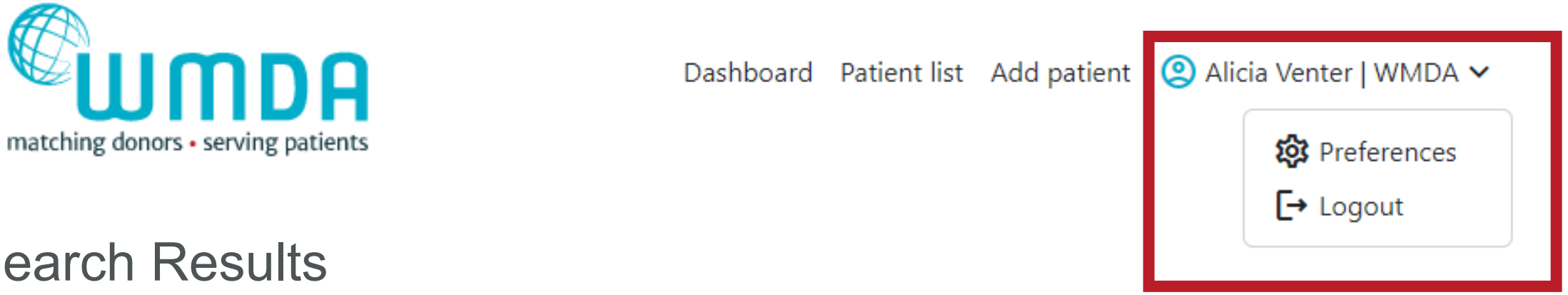
Set user or TC specific preferences as **search defaults**.



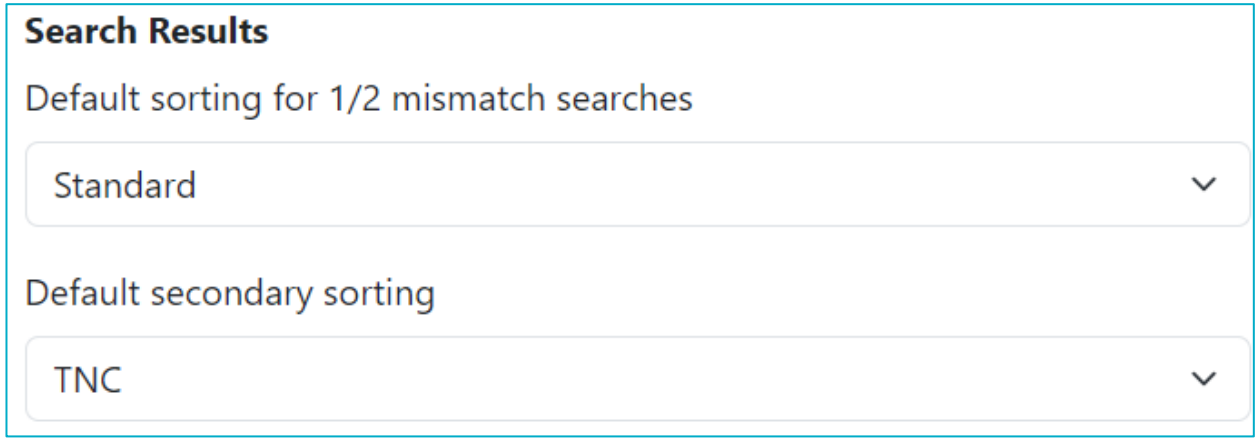
- Patient List
  - Visible Tabs
    - All tabs
    - Only “My patients” tab
    - Only “My organisation’s patients” tab
  - Default visible tab
    - My patients
    - My organisation’s patients



- Search
  - Default match engine for searches
    - Hap-E or ATLAS
  - Default Donor search when patient HLA-A, B, C, DRB1, DQB1 is provided
    - 10/10 search (at HLA-A, B, C, DRB1, DQB1)
    - 8/8 search (at HLA-A, B, C, DRB1)
  - Default Cord search when patient HLA-A, B, C, DRB1, DQB1 is provided
    - 10/10 search (at HLA-A, B, C, DRB1, DQB1)
    - 8/8 search (at HLA-A, B, C, DRB1)

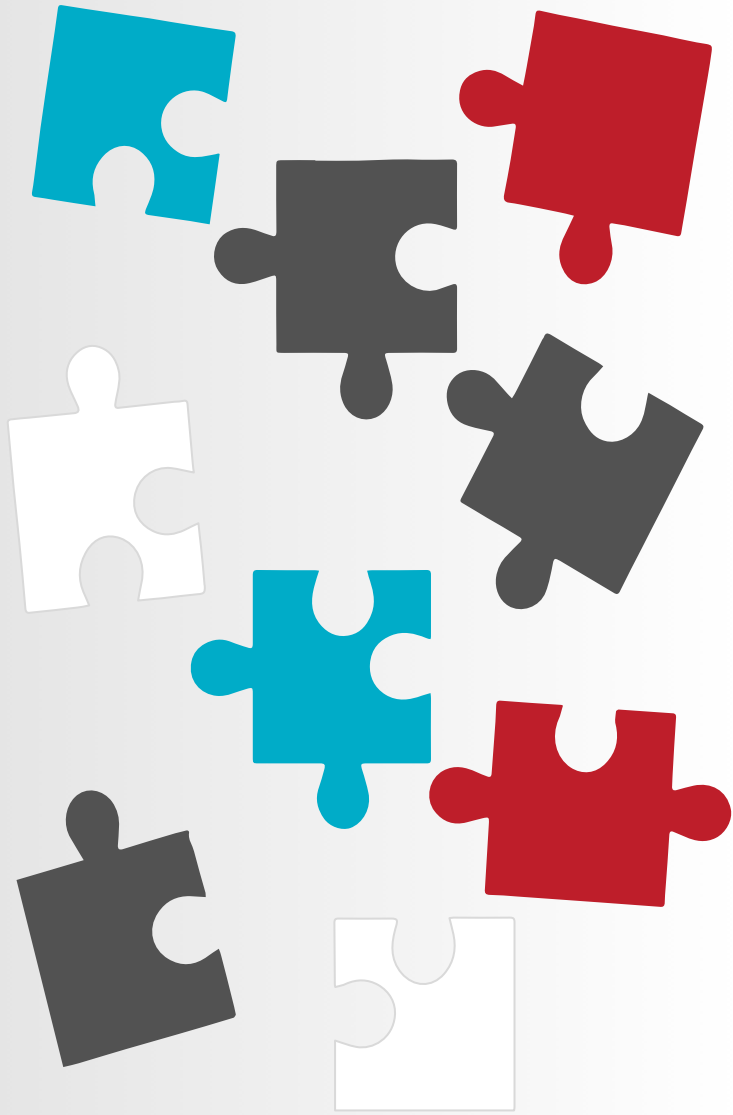


- Search Results
  - Default sorting for 1/2 mismatch searches
    - Standard
    - Sum of probabilities
  - Default secondary sorting
    - TNC
    - CD34+



WHAT DOES THE FUTURE HOLD?
Central source of truth & communication solution

- New product: Adult Donor Cryopreserved Units (ADCU)
- New product feature: Extensively tested cord blood units
  - which includes post-thaw & verification typing data
- Match-Connect
  - New registry-to-registry communication solution
  - Registries can send requests automatically after identifying a suitable cell source
  - Place Health Availability Checks, VT/CT, ET, IDM and WU requests from your internal systems to ANY other connected registry in the world



Thank you.

14th International Donor Registry Conference & WMDA Meetings
25 – 29 June, 2024 – Cape Town, South Africa
All patients & donors matter
www.capetownidc.co.za