

<b>Type</b>	<b>Canadian Transplant Registry</b>
<b>Program</b>	<b>Inter-provincial Sharing: Heart</b>
<b>Policy Title</b>	<b>Allocation: Matching and Ranking</b>

<b>Policy Number</b>	CTR.10.002
<b>Version</b>	v1.0
<b>Policy Sponsor</b>	Heart Transplant Advisory Committee (HTAC)
<b>Committee Review</b>	CCTN (2016-10-21), NHLAAC (2017-04-20), DTAAC (2017-08-25), ODTEAC (2017-08-25)
<b>Committee Endorsement</b>	NHLAAC (2017-04-21), DTAAC (2017-10-18), ODTEAC (2017-08-25), CCTN (2017-10-20)
<b>Provincial/Territorial Sign-Off</b>	See Appendix B
<b>Effective Date</b>	2018-02-06

## Purpose

The Canadian Transplant Registry (CTR) identifies transplant opportunities across Canada, for heart transplant candidates who are highly sensitized to Human Lymphocyte Antigens (HLA) and/or designated as medically urgent (i.e., designated as medical status 4<sup>1</sup>). This policy outlines the rules used to identify and rank highly sensitized patients (HSP) and medical status 4 patients, who are potential matches to an available donor heart.

## Policy

### 1. Identifying Potential Recipient Matches

There are two steps that the matching algorithm performs to generate the list of potential recipients (i.e., matches) for a heart from a deceased donor who has been registered in the CTR:

- 1) Blood Group (ABO) Compatibility
- 2) HLA Compatibility

#### 1.1 Blood Group Compatibility

- 1.1.1 Potential recipients are first identified by an assessment of blood group compatibility, which is determined according to the following table.

---

<sup>1</sup> As defined by the Canadian Cardiac Transplant Network (CCTN).

Blood Group (ABO) Compatibility	
If donor blood group is:	then recipient blood group can be:
O	O, A, B, AB
A	A, AB
B	B, AB
AB	AB

Table 1. Blood Group (ABO) Compatibility

- 1.1.2 Transplant programs can designate potential recipients as eligible for ABO incompatible transplants, regardless of age.
- 1.1.3 Potential recipients designated as eligible for ABO incompatible transplants will be flagged as blood group compatible by the matching algorithm.

## 1.2 HLA Compatibility

- 1.2.1 Recipient HLA antibody specificities are compared to donor HLA antigens to determine which donors cannot be matched to a recipient due to unacceptable antigens. (“Virtual Crossmatch”)
- 1.2.2 Allele-specific antigens are identified and flagged for investigation, but potential recipients are not excluded from the list of potential matches on this basis.
- 1.2.3 Potential recipients who are medically urgent (i.e., designated as medical status 4<sup>1</sup>) are not excluded from the list of potential matches when the Virtual Crossmatch is positive (i.e., when the donor has Human Leukocyte Antigens that have been listed as unacceptable in the recipients’ records.)
- 1.2.4 Potential recipients who are not medically urgent (i.e., not designated as medical status 4<sup>1</sup>) but are highly sensitized patients participating in the *Inter-provincial Sharing: Heart* program are excluded from the list of potential matches when the Virtual Crossmatch is positive (i.e., when the donor has Human Leukocyte Antigens that have been listed as unacceptable in the recipients’ records).
- 1.2.5 The virtual crossmatch rules are presented in Appendix A.

## 2. Ranking of Matched Potential Recipients

2.1 If more than one potential recipient is a match for a donor heart, matches are prioritized based on the following ranking criteria.

Ranking Attribute	Rank
Medical urgency (medical status = 4 <sup>1</sup> )	1
Donor < 19 years old and recipient < 19 years old	2
<p>cPRA</p> <p>Higher cPRA ranked above lower cPRA according to the following hierarchy:</p> <ol style="list-style-type: none"> <li>1) cPRA = 100</li> <li>2) cPRA = 99</li> <li>3) cPRA = 98</li> <li>4) cPRA = 90-97</li> <li>5) cPRA = 80-89</li> </ol> <p>Ranking rule for cPRA only applies to potential recipients with a negative virtual crossmatch.</p>	3
Paediatric (Recipient is < 19 years of age)	4
<p>Medical Status</p> <p>Greater urgency ranked above lesser urgency according to the following hierarchy:</p> <ol style="list-style-type: none"> <li>1) 3.5</li> <li>2) 3</li> <li>3) 2</li> <li>4) 1</li> </ol>	5
<p>Number of Days Listed at Current Medical Status</p> <ul style="list-style-type: none"> <li>- Potential recipients do not accumulate days on previous medical status, when 'On Hold' (medical status = 0).</li> </ul>	6
<p>The donor and potential recipient are in the same region. The algorithm will compare the donor's ODO province against the potential recipient's transplant centre province. The regions are:</p> <ul style="list-style-type: none"> <li>- British Columbia</li> <li>- Alberta, Saskatchewan, Manitoba</li> <li>- Ontario, Manitoba</li> <li>- Quebec</li> <li>- Nova Scotia, New Brunswick, Newfoundland and Labrador, Prince Edward Island</li> </ul>	7

Table 2. Ranking Attributes

- 2.1.1 All potential recipients (i.e., patients wait-listed for heart transplant either designated as medically urgent (i.e., designated as medical status 4<sup>1</sup>) or having a cPRA  $\geq$  80) are reviewed annually at a meeting of representatives from a majority of transplant centres (i.e., Canadian Cardiac Transplant Network meetings).

### 3. Review

This policy is reviewed at the discretion of the Heart Transplant Advisory Committee (HTAC), Donation and Transplantation Administrators Advisory Committee (DTAAC), and the Organ Donation and Transplantation Expert Advisory Committee (ODTEAC).

References
Cardiac Transplantation: Eligibility and Listing Criteria in Canada (2012)

Version History		
Version	Date	Comments /Changes
v1.0	2018-02-06	Original Version

## Appendix A – VXM Rules

*Note: Based on cumulative antibodies*

<b>If the DONOR Serology HLA Value for ....</b>	<b>And the Recipient UNACCEPTABLE antigen list...</b>	<b>Then...</b>
A_1, A_2	Includes either of donor's A value	Fail on A
B_1, B_2	Includes either of donor's B value	Fail on B
Cw_1, Cw_2	Includes either of donor's Cw value	Fail on Cw
DR_1, DR_2	Includes either of donor's DR value	Fail on DR
DQB_1, DQB_2	Includes either of donor's DQB value	Fail on DQB
DQA_1, DQA_2	Includes either of donor's DQA value	Fail on DQA
DPA_1, DPA_2	Includes either of donor's DPA value	Fail on DPA
DPB_1, DPB_2	Includes either of donor's DPB value	Fail on DPB
DR51 is positive	Includes DR51	Fail on DR51
DR52 is positive	Includes DR52	Fail on DR52
DR53 is positive	Includes DR53	Fail on DR53
Bw4 is positive	Includes Bw4	Fail on Bw4
Bw6 is positive	Includes Bw6	Fail on Bw6
<b>If both DONOR Serology HLA Value for ....</b>	<b>Are not found in recipient's ...</b>	<b>Then...</b>
A_1, A_2	UNACCEPTABLE ANTIGEN List	Pass on A
B_1, B_2	UNACCEPTABLE ANTIGEN List	Pass on B
Cw_1, Cw_2	UNACCEPTABLE ANTIGEN List	Pass on Cw
DR_1, DR_2	UNACCEPTABLE ANTIGEN List	Pass on DR
DQB_1, DQB_2	UNACCEPTABLE ANTIGEN List	Pass on DQB
DQA_1, DQA_2	UNACCEPTABLE ANTIGEN List	Pass on DQA
DPA_1, DPA_2	UNACCEPTABLE ANTIGEN List	Pass on DPA
DPB_1, DPB_2	UNACCEPTABLE ANTIGEN List	Pass on DPB
<b>If the DONOR Serology HLA Value for ....</b>	<b>And is not found in recipient's ...</b>	<b>Then...</b>
DR51 is positive or negative	UNACCEPTABLE ANTIGEN List	Pass on DR51
DR52 is positive or negative	UNACCEPTABLE ANTIGEN List	Pass on DR52
DR53 is positive or negative	UNACCEPTABLE ANTIGEN List	Pass on DR53
Bw4 is positive or negative	UNACCEPTABLE ANTIGEN List	Pass on Bw4
Bw6 is positive or negative	UNACCEPTABLE ANTIGEN List	Pass on Bw6
<b>If the DONOR Serology HLA Value for ....</b>	<b>And is found in recipient's ...</b>	<b>Then...</b>
DR51 is negative	UNACCEPTABLE ANTIGEN List	Pass on DR51
DR52 is negative	UNACCEPTABLE ANTIGEN List	Pass on DR52
DR53 is negative	UNACCEPTABLE ANTIGEN List	Pass on DR53
Bw4 is negative	UNACCEPTABLE ANTIGEN List	Pass on Bw4
Bw6 is negative	UNACCEPTABLE ANTIGEN List	Pass on Bw6

## Appendix B – Provincial/Territorial Approvals

## Appendix B – Provincial/Territorial Approvals

Version	Jurisdiction	Clinical Authority			Administrative Authority		
		Name	Title	Date	Name	Title	Date
v1.0	British Columbia	Dr. David Landsberg	Provincial Medical Director	2017-11-24	Edward Ferre	Provincial Operations Director	2017-11-24
v1.0	Edmonton	Dr. Norman Kneteman	Zone Clinical Section Chief Transplant	2017-11-07	Deanna Paulson	Director Transplant	2017-10-30
v1.0	Calgary	Dr. Serdar Yilmaz	Medical Director	2017-12-21	Carol Easton	Executive Director	2017-12-21
v1.0	Saskatchewan	Dr. Ahmed Shoker	Medical Director	2017-11-19	Carol Brown	Director	2017-11-07
v1.0	Manitoba	Dr. Peter Nickerson	Medical Director (TM-GLP)	2017-10-25	Kim Werestruik	Manager of Patient Care	2017-10-25
v1.0	Ontario	Dr. Jeff Zaltzman	CMO TGLN	2017-11-27	Ronnie Gavsie	CEO TGLN	2017-11-27
v1.0	Québec	Dr. Prosanto Chaudhury	Medical Director – Transplantation	2018-02-05	Louis Beaulieu	General Director – Transplant Quebec	2018-02-06
v1.0	New Brunswick	Dr. Robert Adams	Medical Director NBOTP	2017-11-10	Mary Gatien	Director NBOTP	2017-11-10
v1.0	Nova Scotia	Dr. Miroslaw Rajda	Medical Director	2017-12-06	Brian Butt	Director	2017-12-11
v1.0	Newfoundland	Dr. Sean Connors	Clinical Chief, Cardiac Care	2017-12-12	Cathy Burke	Regional Director of Cardiac Critical Care Program	2017-12-14