TRAINING UPDATE

Lab Location:	SGAH and WAH	**Date Implemented:**	5.16.2013
Department:	Blood Bank	**Due Date:**	5.20.2013

DESCRIPTION OF PROCEDURE REVISION

Name of procedure:
HLA Matched / Crossmatched Platelet Pheresis Products
Description of change(s):
• ARC has a new form for ordering crossmatched and/or HLA-matched platelets. • The form is named, "Donor-Request for Special Blood." • This form will be used to order all reference units from ARC. • Instructions for completing the form can be found on the back of the form. • SOP was updated to reflect the change of form.

Non-Technical SOP

Title	**HLA Matched/Crossmatched Platelet Pheresis Products**
Prepared by	Leslie Barrett Date: 1/21/2009
Owner	Stephanie Codina Date: 5/11/2010

Laboratory Approval

Print Name and Title	Signature	Date
Refer to the electronic signature page for approval and approval dates.		
Local Issue Date:	Local Effective Date:	

Review:

Print Name	Signature	Date

Form revised 3/31/00

TABLE OF CONTENTS

1. PURPOSE

HLA matched or crossmatched apheresis platelet products are used to treat patients that have become refractory to platelet transfusions due to the presence of HLA or platelet specific antibodies.

2. SCOPE

Platelets bear a variety of antigens, including HLA and platelet-specific antigens. Patients who have been transfused may develop antibodies towards platelet antigens. When platelets are transfused to a patient with an antibody directed towards an antigen expressed on the platelets, the survival time of the transfused platelets may be markedly shortened. Matching the HLA antigens on the platelets to the HLA antibodies that the recipient possesses **or** performing a platelet crossmatch may help to provide platelets with longer periods of survival. Both crossmatched and HLA-matched platelets require additional time for preparation and orders should be coordinated with the blood supplier.

3. RESPONSIBILITY

All Blood Bank staff must understand and follow this procedure when HLA-matched and/or crossmatched platelets are requested for a patient.

4. DEFINITIONS

Platelet Transfusion Refractoriness - When the recipient experiences a "less-than-expected" increase in platelets following a platelet transfusion. Platelets can be destroyed by immune mechanisms (HLA and platelet-specific antibodies) or non-immune mechanisms (splenomegaly, sepsis, fever, intravascular devices, and DIC). A 1-hour post-transfusion platelet count should be used to differentiate between immune-mediated and non-immune-mediated destruction. Immune refractory states will demonstrate poor recovery in the early post-infusion interval.

Corrected Count Increment (CCI) - A calculation used to determine the recipient's response to platelet transfusion. A 1-hour CCI >7500 indicates an adequate response to platelet transfusion, while a CCI <5000 on two separate occasions indicates platelet refractoriness. CCI values that are adequate 1 hour post transfusion and continue to decrease are more suggestive of non-immune causes (splenomegaly, fever, infection, DIC, amphotericin B use, bleeding, etc.). Neither crossmatched nor HLA-matched platelets are needed for non-immune platelet destruction.

$$CCI = \frac{\text{Body Surface Area } (m^2) \times (\text{Post Transfusion Platelet Count} - \text{Pre Transfusion Platelet Count}) \times 10^{11}}{\text{Number of Platelets Transfused}}$$

Crossmatched Platelets – This test is performed similarly to crossmatching for red cells. Donor platelets and recipient plasma are tested against each other. Donor platelets that react with the recipient plasma are considered incompatible. Donor platelets that do not react with recipient plasma are considered compatible. Crossmatched platelets may be used for brief support of the patient. However, results may not be accurate and testing relies upon a large supply of donor platelets which is not always available. All platelet crossmatch orders should be followed with HLA typing of the recipient for long-term platelet support.

HLA-Matched Platelets – Both the donor and recipient are tested for HLA antigens. The antigens are matched for HLA-A and-B locus as best as possible. If the patient has HLA antibodies, donor platelets that lack the corresponding antigen are also selected. HLA-matched platelets provide more successful transfusion response in up to 75% of patients with immune-mediated refractoriness.

5. PROCEDURE

Step	Action
1	All initial requests for HLA-matched and crossmatched platelets should be approved by the Blood Bank Medical Director or clinical pathologist on-call. A. Approval or rejection should be documented in the Blood Bank Communication Log. Include the date, time, and pathologist's name. B. Once approved, all subsequent platelet transfusion will meet the HLA-matched or crossmatched platelet transfusion criteria. C. Crossmatched and HLA-matched platelet products are not normally stored in inventory and will take extra time to prepare. a. Crossmatched platelet products take approximately 24 hours from the time the specimen is received by the reference laboratory. b. HLA-matched platelet products take approximately 5 days from the time the specimen is received by the reference laboratory.
2	Document the need for special platelet transfusion by placing a comment in the patient's blood bank historical data. Refer to procedure, "Entering Special Transfusion Attributes into the LIS." A. Enter ";HLA" for the comment "Irradiated and HLA matched platelets required." B. Enter ";CIRPP" for the comment "Patient requires crossmatched, irradiated platelet products."

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Step	Action
3	An HLA type and antibody screen should be referred to the American Red Cross (ARC) the first time HLA-matched platelets are requested. A. Complete a "Hisotcompatibility Testing Requisition" form. a. For HLA typing, order test HLA 072, HLA-A and B Typing For Platelet Transfusion b. For HLA antibody screen, order test HLA 025, HLA Antibody Screen for Transfusion, Class I c. Order both tests for refractoriness. B. Have the appropriate specimen collected from the patient (1 tube per test). a. HLA typing uses EDTA or ACD whole blood b. HLA antibody screen uses serum without clot activator or gel separator C. Notify the ARC reference lab that the testing is coming D. Send the specimens to the ARC reference laboratory
4	Complete the "Donor-Request for Special Blood" form. Submit the order form, HLA typing results for patient (if available), and specimen (if applicable) to the ARC Reference Laboratory. A. Complete the "Information Provided by the Requesting Facility" section of the form. a. Requesting facility b. Requesting facility phone number c. Contact person/date and time of request d. Patient's name e. Patient's ABO/Rh f. The type and number of blood components needed g. The date and time blood components are needed h. Comments or details about how the units should be shipped i. Type of acceptable components (circle ABO/Rh-Compatible or Type-specific only). j. Other special requirements needed i. Circle if the patient requires CMV-negative or irradiated units. ii. Document whether the patient needs crossmatched or HLA-matched platelets in the "Other" section. For crossmatched platelets, send one 7mL EDTA tube stored at room temperature.
5	A. When HLA results are returned, enter the patient's HLA type into the blood bank historical data file. B. Fax a copy of the result to the ARC order management department to obtain HLA-matched platelet products.

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Step	Action
6	The blood supplier will send the platelets when available. A. **All HLA-matched and crossmatched platelet products MUST be irradiated prior to transfusion. Irradiate upon arrival if ARC did not irradiate prior to shipment.** B. HLA-matched platelets are entered into the computer using product code "PPHL." C. Crossmatched platelet products must be billed at the time of issue using code "PLAXM."

6. RELATED DOCUMENTS

Form: American Red Cross Histocompatibility Testing Requisition
Form: American Red Cross Donor-Request for Special Blood

7. REFERENCES

1. Roback, J.D., Combs, M.R., Grossman, B.J., Hillyer, C.D. 2008. Technical Manual of the AABB, 16th ed. AABB Publishing, Bethesda, Maryland.
2. Standards for Blood Banks and Transfusion Services, 2009. AABB, 26th ed. AABB Publishing, Bethesda, Maryland.
3. AABB, ABC, ARC, and ASBP. 2009. Circular of information for the use of human blood and blood components.
4. Vassallo, R. R. 2008. Changing Paradigms in Matched Platelet Support. American Red Cross.

8. REVISION HISTORY

Version	Date	Reason for Revision	Revised By	Approved By
		Supersedes SOP WAH-SGAH B321.002		
000	5/11/2010	Updated owner Section 4: Definitions added Section 5: Computer process revised to reflect computer upgrade Section 9: added Addenda A	S. Codina	N. Cacciabeve
001	10.12.12	Section 4: Added definitions for HLA-matched and crossmatched platelet products. Section 5: Changed HLA testing lab from Quest to ARC. Section 9: Removed appendices instructing techs how to HLA-match platelet products. Added Appendix for Matched Platelet Support Pathway.	SCodina	NCacciabeve
002	5.15.2013	Section 5: Updated form "American Red Cross Special Products Request Form" to "Donor-Request for Special Blood" form.	SCodina	NCaccaibeve

9. ADDENDA AND APPENDICES

A: Matched Platelet Support Pathway

Form revised 3/31/09

American Red Cross

Blood Services

Matched Platelet Support Pathway

v. 03132008

Percent Predicted Recovery (PPR)

$$PPR\ (\%) = \frac{\text{observed increment } (x10^9/L)}{\frac{\text{\# plts. txf'd } (x10^9)}{\text{blood volume (L)}}}$$

Gilcher's Rule of 5s for blood volume (mL/kg):

	Obese	Thin	Normal	Muscular
Male:	60	65	70	75
Female:	55	60	65	70

Corrected Count Increment (CCI)

$$CCI\ (m^2/\mu L/10^{11}) = \frac{\text{increment } (/\mu L) \times BSA\ (m^2)}{\text{\# plts. txf'd } (x10^{11})}$$

Is the patient platelet refractory?
(Inappropriately low increments after ≥2 successive doses of ABO-identical platelets: 18 – 24 hr. post-tfxn. increment <9,000 - 10,000/μL or CCI <5,000 or PPR <20%)

↓

Perform 1-hour post-tfxn. EDTA platelet count
(10 min. – 4 hr. sample) Calculate CCI or PPR.

↓

Adequate 1 hr. CCI or PPR?

NO → CCI <7,500 or PPR <30%

↓

Potential immune refractoriness

Immunized patients tend to have both markedly shortened post-transfusion platelet recovery (1 hr.) and survival (18 – 24 hr.).

↓

(See other side for pathway)

YES → CCI ≥7,500 or PPR ≥30%

↓

Continue support with ABO-matched platelets. Consider non-immune causes of poor 18 – 24 hr. increments.

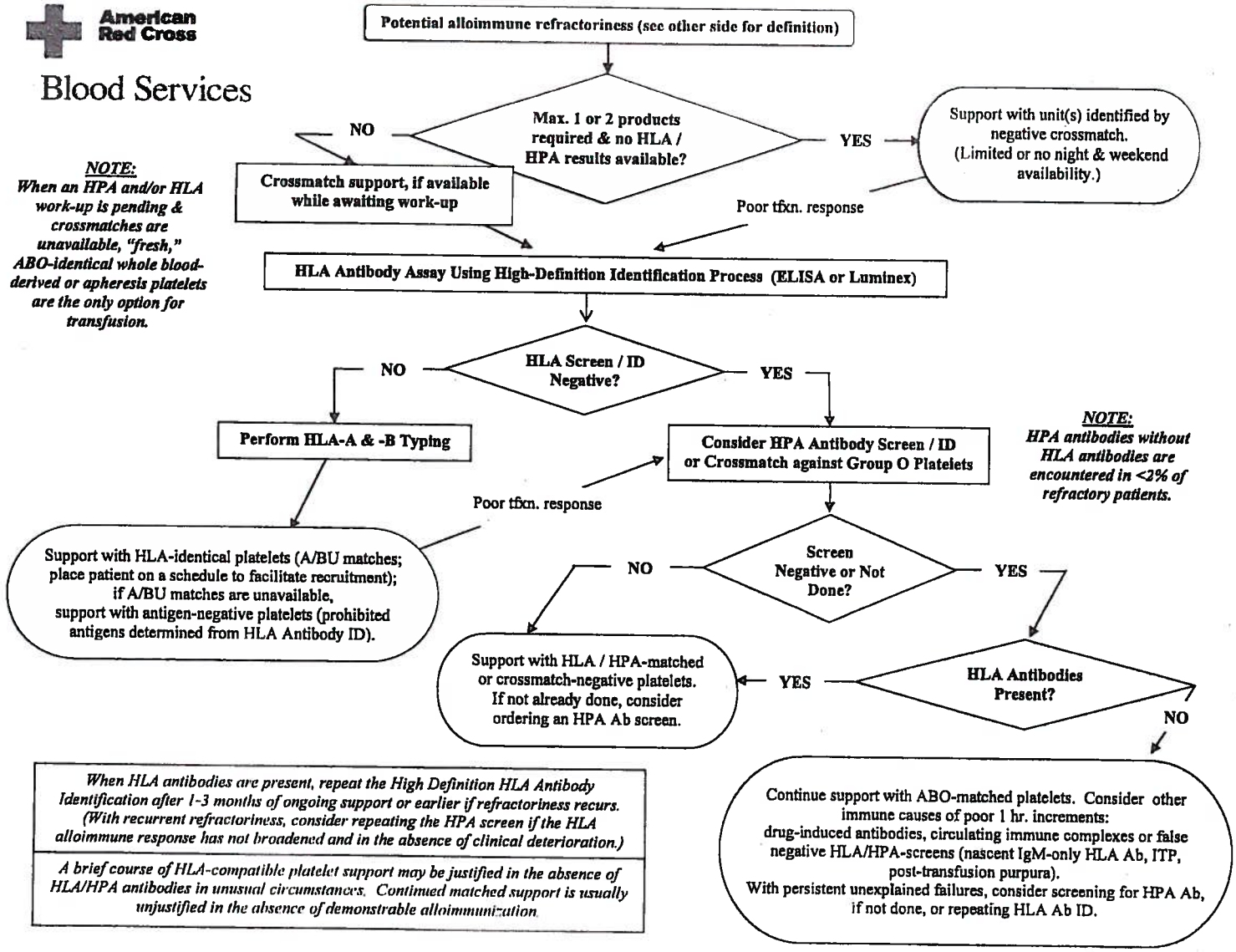
Most non-immune causes of platelet destruction have a greater effect on platelet survival (18 – 24 hr.) than recovery (1 hr.) [except significant splenomegaly and brisk hemorrhage].

Nonimmune causes of refractoriness include: splenomegaly, fever/infection, DIC, s/p BMT, SOS/VOD, amphotericin B use, bleeding, platelet deterioration w/ storage.

Most alloimmunization occurs against Class I Human Leukocyte Antigens (HLA-A & HLA-B loci), with occasional Human Platelet Antigen (HPA) co-immunization, or rarely, HPA-only alloimmunization (e.g., HPA-1b, HPA-5b, etc.).

Likelihood of successful transfusion for HLA-alloimmunized patients (in descending order):

1. HLA-identical platelet selection
   (A/BU matches when available; selective recruitment for pts. w/ broad alloimmunization)
2. HLA antigen-negative units or platelets compatible by crossmatching
3. HLA type-selected non-identical matches (well-chosen BX, BUX and C matches)
4. ABO-identical whole blood-derived or apheresis platelets when HPA and/or HLA work-up is pending & crossmatches are unavailable


American Red Cross
Blood Services
Potential alloimmune refractoriness (see other side for definition)
Max. 1 or 2 products required & no HLA / HPA results available?
NO
YES
Support with unit(s) identified by negative crossmatch. (Limited or no night & weekend availability.)
Crossmatch support, if available while awaiting work-up
Poor tfxn. response
NOTE:
When an HPA and/or HLA work-up is pending & crossmatches are unavailable, "fresh," ABO-identical whole blood-derived or apheresis platelets are the only option for transfusion.
HLA Antibody Assay Using High-Definition Identification Process (ELISA or Luminex)
HLA Screen / ID Negative?
NO
YES
Perform HLA-A & -B Typing
Consider HPA Antibody Screen / ID or Crossmatch against Group O Platelets
NOTE:
HPA antibodies without HLA antibodies are encountered in <2% of refractory patients.
Poor tfxn. response
Support with HLA-identical platelets (A/BU matches; place patient on a schedule to facilitate recruitment); if A/BU matches are unavailable, support with antigen-negative platelets (prohibited antigens determined from HLA Antibody ID).
Screen Negative or Not Done?
NO
YES
Support with HLA / HPA-matched or crossmatch-negative platelets. If not already done, consider ordering an HPA Ab screen.
HLA Antibodies Present?
YES
NO
When HLA antibodies are present, repeat the High Definition HLA Antibody Identification after 1-3 months of ongoing support or earlier if refractoriness recurs. (With recurrent refractoriness, consider repeating the HPA screen if the HLA alloimmune response has not broadened and in the absence of clinical deterioration.)
A brief course of HLA-compatible platelet support may be justified in the absence of HLA/HPA antibodies in unusual circumstances. Continued matched support is usually unjustified in the absence of demonstrable alloimmunization.
Continue support with ABO-matched platelets. Consider other immune causes of poor 1 hr. increments: drug-induced antibodies, circulating immune complexes or false negative HLA/HPA-screens (nascent IgM-only HLA Ab, ITP, post-transfusion purpura).
With persistent unexplained failures, consider screening for HPA Ab, if not done, or repeating HLA Ab ID.

American Red Cross
Washington, DC 20006

Donor - Request for Special Blood

American Red Cross

Fax or e-mail to:		Region Name/Address:	

Information Provided by the Requesting Facility

ONE PATIENT REQUEST PER ORDER FORM

Requesting facility:	Requesting facility phone number:	Contact person/date and time of request:	Patient's name:	Patient's ABO/Rh:
Circle component type, record number of components needed. _____RBC _____PLASMA ____APHERESIS Other:		Date and time when components needed:	Comments/detail how units should be shipped:	

Which of the following would be acceptable? (Circle)	**ABO/Rh-Compatible**				**Type-specific only**
Other special requirements needed for the components? (Circle all that apply.)	**CMV–**	**Irradiated**	**HgbS –**	**Washed**	**Other:**

Which Antigens Do the RBC Components Need to Lack? (Circle all that apply)

C	**c**	**E**	**e**	**K**	**k**	**Fy^a**	**Fy^b**	**Jk^a**	**Jk^b**	**M**	**N**	**S**	**s**	**Le^a**	**Le^b**	**Other Antigens:**

To Be Completed By the American Red Cross

Order receipt date:	Time:		Request Received By (initials):						**Modifiers (Circle all that apply)**		
ABO/Rh (indicate #)	_____O+	_____A+	_____B+	_____AB+	_____O–	_____A–	_____B–	_____AB–		HgbS	CMV	
Service fees (Circle all that apply) Ag= Red cell antigen	A4I (1 Ag) Qty: _____	B4I (2 Ag) Qty:_____	C4I (3 Ag) Qty:_____	D4I (4 Ag) Qty:_____	E4I (5 Ag) Qty:_____	F4I (6 Ag) Qty:_____	G4I (7 Ag) Qty:_____	H4I (8 Ag) Qty:_____	I4I (9 Ag) Qty:_____	IgA	EMP	
PLTX= Platelet x-cross component (code explanation)	J5I (PLTX) Qty:_____	A5I ARDP) Qty:_____	E5I (HistTyp) Qty:_____	F5I Pheno) Qty:_____	Qty:_____	Qty:_____	Qty:_____	Qty:_____	Qty:_____			

DIN/WBN# Sent

Comments (date and initial any comments):				