TRAINING UPDATE

Lab Location:	SGAH and WAH	**Date Implemented:**	6.3.2014
Department:	Blood Bank	**Due Date:**	6.8.2014

DESCRIPTION OF PROCEDURE REVISION

Name of procedure:

Crossmatched Platelet Products

Description of change(s):

1. We used to have one procedure titled, "HLA-Matched and Crossmatched Platelet Products." These were separated into 2 separate procedures given new changes to the HLA-matched platelet process.
2. None of the content for this procedure has changed.

Non-Technical SOP

Title	**Crossmatched Platelet Products**	
Prepared by	Stephanie Codina	Date: 05.23.2014
Owner	Stephanie Codina	Date: 05.23.2014

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**

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1. PURPOSE

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. Crossmatching provides a mechanism to predict and avoid platelet transfusion failure. This procedure outlines the process of obtaining crossmatched platelets for transfusion.

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. Platelet crossmatch provides a mechanism to predict and avoid transfusion failure. Crossmatched platelets require additional time for preparation. Orders should be coordinated with the blood supplier.

3. RESPONSIBILITY

All Blood Bank staff must understand and adhere to this procedure when 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.

5. PROCEDURE

Step	Action
1	All initial requests 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. HLA antibody screening should be considered the first time crossmatched platelets are requested. This will help with long-term transfusion management of the patient. C. Once crossmatched platelet products are approved, all subsequent platelet transfusions will meet either crossmatched or HLA-matched platelet transfusion criteria (as applicable based on testing). D. Platelet crossmatching is not performed on-site and must be coordinated with the blood supplier.
2	Notify the ordering provider that there may be a time delay. A. Crossmatched platelet products take approximately 24 hours from the time the specimen is received by the reference laboratory. B. Crossmatched platelets are not available on nights, weekends, or holidays.
3	Document the need for special platelet transfusion by placing a comment in the patient's blood bank administrative data file. Enter ";CIRPP" for the comment "Patient requires crossmatched, irradiated platelet products."

Step	Action
4	Obtain a properly-labeled 10-mL EDTA tube for testing. Additional sample may be necessary if the provider also ordered HLA testing.
5	Complete the ARC "Donor—Request for Special Blood" form using the instructions on the backside of the form. Whenever possible, crossmatched platelets should be ABO-matched to the recipient (request crossmatched platelets that have the same blood type as the recipient).
6	Submit the sample and request form to the reference laboratory per procedure.
7	The blood supplier will send the platelets when available. A. **All crossmatched platelet products MUST be irradiated prior to transfusion. Irradiate upon arrival if ARC did not irradiate prior to shipment.** B. Crossmatched platelet products must be billed at the time of issue using code "PLAXM."

6. RELATED DOCUMENTS

SOP: Entering Special Transfusion Attributes into the LIS
SOP: Reference Workup for Antibody Identification
Form: American Red Cross Donor-Request for Special Blood

7. REFERENCES

1. Roback, J.D., Grossman, B.J., Harris, T., and Hillyer, C.D. 2011. Technical Manual of the AABB, 17th ed. AABB Publishing, Bethesda, Maryland.
2. Standards for Blood Banks and Transfusion Services, 2014. AABB, 29th 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

9. ADDENDA AND APPENDICES

A: Matched Platelet Support Pathway

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

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Blood Services