

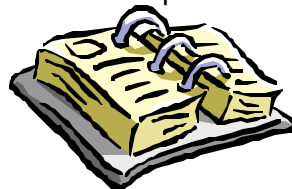


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## President's Message- Donna Ratliff MT(ASCP)

Summer is passing by quickly. I would like to give you some information on our fall meeting. This year it will be held on Saturday, September 16<sup>th</sup> at Cumberland Falls State Park in Corbin, Kentucky. For online registration, go to [www.kabb.org](http://www.kabb.org) or you can mail in the registration form. You can also find the meeting brochure and details of future KABB meetings on the website under Calendar of Events.

Our Education Committee put a lot of effort into planning the upcoming meeting so we hope you plan on attending this year to show your appreciation for all the hard work they have done and gain valuable information that you can take back to your workplace. It is always nice to learn the latest in the blood banking world from those selected to speak. CEUs are available for the lectures if you need them for your certification or place of employment. We hope we will see you there.



### **UPCOMING MEETINGS: MARK YOUR CALENDAR!!!!**

FALL MEETING 2006  
SATURDAY  
SEPTEMBER 16, 2006  
CUMBERLAND FALLS  
STATE PARK  
CORBIN, KY

SPRING MEETING 2007  
SATURDAY  
MARCH 10, 2007  
NATURAL BRIDGE  
STATE PARK  
SLADE, KY

FALL MEETING 2007  
TUESDAY & WEDNESDAY  
SEPTEMBER 11 & 12, 2007  
MARRIOTT EAST  
LOUISVILLE, KY



PRDT and MacoPharma, an industry leader in blood collection and filtration systems, are bringing to market the first prion filter to demonstrate reduction of TSE prions from whole blood.

Contact UnitedPharma to learn more about the P-CAPT<sup>TM</sup> filter: [YarivSivan@UnitedPharma.org](mailto:YarivSivan@UnitedPharma.org)

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# Platelet Transfusions: Evidence-Based Practices

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Platelet transfusions have increased annually because of newer chemotherapeutic agents being used for cancer treatments and intensive myeloablative treatment prior to peripheral blood stem cell (PBSC) or cord blood (CB) transplantation. Platelet components currently manufactured include whole-blood derived platelet concentrates and single donor plateletpheresis units in the United States, and buffy coat preparations in Europe. The appropriate utilization of these blood components is necessary to both maintain an adequate platelet inventory and reduce wastage, and provide the most efficacious transfusion for the patient.

## INDICATIONS

Indications for platelet transfusions are to treat or prevent bleeding associated with *thrombocytopenia and/or platelet dysfunction*. Diseases or other causes of thrombocytopenia/platelet dysfunction that are included in such indications are:

- Bone marrow failure (disease, cytotoxic therapy, irradiation)
- Massive transfusion
- Acute Disseminated Intravascular Coagulopathy (DIC)
- Inherited platelet function disorders
- Acquired platelet function disorders (e.g., cardiovascular bypass)
- Neonatal Alloimmune Thrombocytopenia (NAIT)
- Idiopathic Thrombocytopenia Purpura (ITP)

The minimum daily platelet count required to prevent blood loss in stool as a marker of hemorrhage secondary to thrombocytopenia is approximately 5,000/ $\mu$ L in an average adult (Slichter and Harker, 1978). Current debate as to the best "transfusion trigger" for platelets centers on the use of prophylactic platelet transfusions at 10,000/ $\mu$ L versus 20,000/ $\mu$ L. It has been demonstrated that 21.5% fewer platelet transfusions occurred at a 10,000/ $\mu$ L threshold with no statistical significant increase in bleeding episodes when compared to a higher level threshold (Rebulla et al, 1997). Patients that 1) are bleeding, 2) have received massive transfusions, 3) are to have neurosurgical procedures, or 4) are neonates, may require a higher platelet count (50,000-100,000/ $\mu$ L) to maintain adequate hemostasis (Consensus Conference, 1998; Guideline, 2003).

## PLATELET SELECTION

The selection of the type of platelet component to transfuse is important in the prevention of transfusion complications or decreased response. The ABO/Rh type, irradiation requirement, CMV sero-status, and leukoreduction are important parameters that have been evaluated for platelet transfusion efficacy. Based on reviews of new clinical evidence (Menitove, 2002; Ronghe, 2002; Guideline, 2003), the following recommendations for platelet selection have been developed:

- *ABO compatibility*
  - a) ABO type-specific platelet concentrates are the component of choice,
  - b) ABO non-identical platelet transfusions are associated with decreased post-transfusion increments in some studies, but may not be clinically significant; platelet refractoriness may result with these transfusions. Therefore, during times of low platelet inventories or when the use of HLA-matched platelets are required but are ABO non-identical, such platelet transfusions may be acceptable,
  - c) Group O platelets negative for high-titer anti-A and anti-B may be used for group A, B and AB patients (consider volume reduction as appropriate)
- *Rh(D) incompatibility*
  - a) Rh(D)-negative platelets should be given, whenever possible, to Rh(D)-negative women of child-bearing age (<50 years of age),
  - b) If Rh(D)-positive platelets must be transfused to women <50 years of age, it is recommended that Rh Immune Globulin (RHIG) be given (a 50  $\mu$ g dose should be sufficient to treat a patient receiving up-to five (5) Rh(D) positive single donor plateletpheresis units)
- *CMV-seronegative platelets*
  - a) All intrauterine transfusions must be CMV seronegative in addition to being leukoreduced,
  - b) Other patients (CMV-seronegative pregnant women, CMV-seronegative allogeneic hematopoietic stem cell transplant recipients, CMV-seronegative solid organ transplant recipients, CMV-seronegative HIV patients) at risk for primary CMV or reactivation of CMV,

Leukoreduction is considered CMV-seronegative "equivalent" for most patients including neonates, when CMV-seronegative inventory is unavailable.

## COMPLICATIONS

Platelet transfusions may manifest familiar immunologic reactions (febrile, allergic, transfusion-related acute lung injury [TRALI]), as well as be a source of transfusion-transmitted disease. As platelets are stored at room temperature, this allows possible bacterial contaminated units to increase the yield of pathogenic bacteria. The most common bacteria are skin flora from venipuncture at collection (*Staphylococcus* sp., *Streptococcus* sp.) and several processes have been implemented in collection facilities to reduce platelet contamination. Sample diversion collection bags are available for sequestering the initial blood collected following venipuncture in order to divert the “contaminated” skin plug from the collection bag. Technical approaches to bacteria detection vary from simple (observation of component for color change/decreased swirling effect, glucose/pH determination) to complex (culture, molecular biology/nucleic acid testing). Properly validated, most all these procedures may be utilized. Each has limitations and false negatives. Bacteria-inactivation studies are in progress, including licensing of pooled whole-blood derived platelets (Ness, 2005).

Response to platelet transfusions should be monitored, as should transfusions of other blood components. Various formulas are available to calculate the increase in the platelets post-transfusion, but the more commonly used is the “Corrected Count Increment” (CCI). The CCI is determined at one (1) hour post-transfusion as follows:

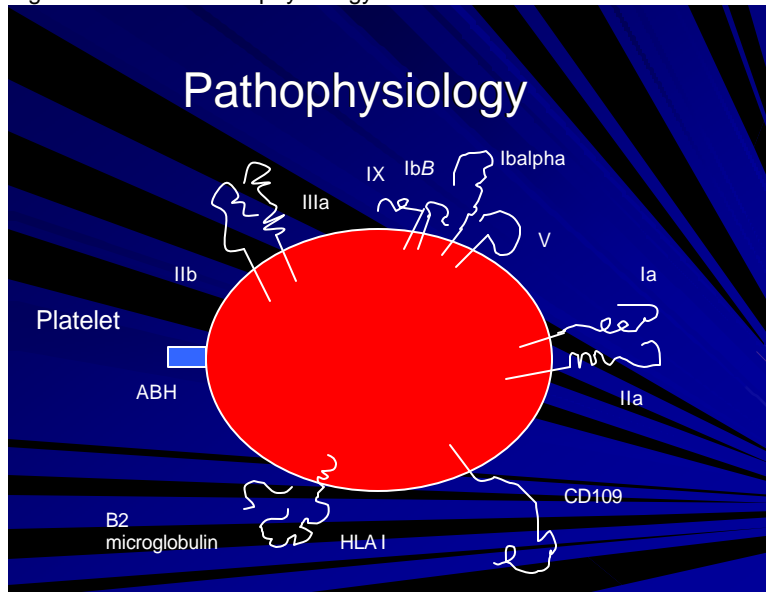
$$\frac{[\text{Platelet increment } (\mu\text{L}) \times \text{Body Surface Area } (\text{m}^2)]}{\text{Platelet dose } (\times 10^{11})} = \text{CCI}$$

An expected CCI is >7500/ $\mu\text{L}$  at 60 minutes and >4500/ $\mu\text{L}$  at 18-24 hours. *Less than* the predicted platelet increment on *two (2) occasions* using platelets <72 hours old and ABO compatible indicate platelet “refractoriness”. Causes of platelet refractoriness include:

- Non-immune (infection/sepsis, DIC, splenomegaly)
- Immune (Alloantibodies to Human Leukocyte Antigens [HLA Class I] and/or Human Platelet Antigens [HPA] as well as ABO; other antibodies such as autoantibodies or drug-dependent antibodies)

The platelet membrane is the site for many receptors (glycophorins) involved in hemostasis, and other antigens such as HLA as depicted in Figure 1 (Field, 2005):

Figure 1 Platelet Pathophysiology



Risk factors for developing platelet refractoriness (i.e. alloimmunization) is the number of transfusions of blood components (particularly those that have white blood cells -HLA Class II antigens), disease process(es) on-going in the recipient (hematological malignancies), and multiple pregnancies. A seminal study on platelet refractoriness (TRAP, 1997) reviewed newly diagnosed Acute Myelocytic Leukemia (AML) patients during remission induction therapy. Study groups consisted of patients who were transfused with: 1) whole-blood derived pooled platelets (control), 2) pooled platelets leukoreduced by filtration, 3) pooled platelets treated with ultraviolet B (UVB) irradiation, and 4) leukoreduced plateletpheresis. Results of this study demonstrated that:

- All treatment groups had significantly less HLA alloimmunization and refractoriness than the control group,
- No differences were detected between study groups,
- There was a low incidence of bleeding (0-1%) in all groups,
- There was no significant difference in development of platelet refractoriness with whole-blood derived platelets versus plateletpheresis components, and
- Leukoreduced platelets (filtered) were the recommended component for AML patients.

This and other studies provide evidence-based data that leukoreduction of cellular blood components minimizes the development of platelet alloimmunization.

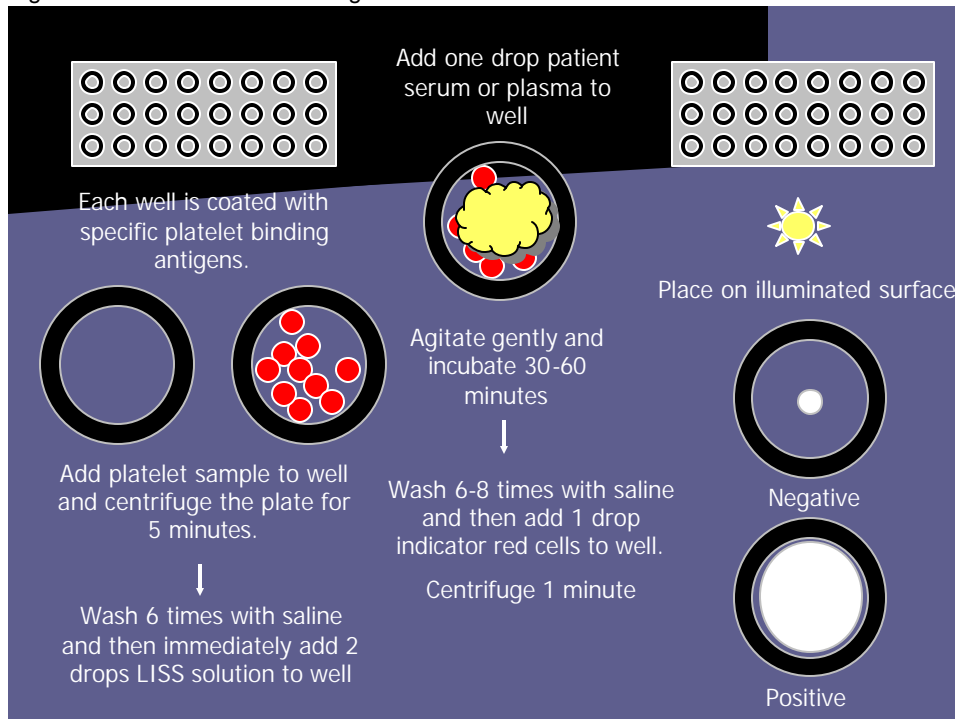
## DIAGNOSIS AND MANAGEMENT OF PLATELET REFRACTORINESS

Alloimmunization to platelet transfusions may be due to either antibodies to HLA or HPA. Test methodologies are now available to identify one or both offending antibodies. The classic HLA antibody test is the Lymphocytotoxicity Assay (LCT). The test uses microtiter plates (50-100 wells) that have HLA typed lymphocytes added to the wells, followed by patient serum and complement. If HLA antibodies are present in the patient serum, they will attach to the HLA antigen site, activate complement and lyse the lymphocyte. Dye is then added which penetrates the lysed cells and these cells are counted as percent of total. The result is reported as "Panel Reactive Antibody" (PRA). Levels of 70% or higher equate with alloimmunization. If HLA antibodies are identified, matched platelets can be utilized. Grades of HLA match indicate the probable transfusion response ("A" match is a perfect match for all four epitopes of the HLA-A and B sites; "B1U" match has three matched epitopes and one unidentified locus; "B1X" has three matched epitopes and one cross-reactive locus). Regardless of the non-mismatched platelet for transfusion, 12-39% of HLA matched platelets will fail to give an acceptable CCI.

Antibodies to platelet specific antigens (e.g. Glycoprotein [GP] IIB/IIIA or IB/IX) are much less frequent causes of alloimmunization (2-8%). These antibodies may be identified by use of solid phase assays which contain immobilized GP in microtiter plates or columns. The presence of antibody is determined by its reaction with platelet antigen and visually determined, or measured as optical density with a "visible wavelength" spectrophotometer.

Platelet crossmatching has become the test of choice in determining potential platelet components for transfusion in refractory patients. The procedure has the capability of determining the identification of the presence of platelet specific antigens, is more rapid than HLA matching, and appears to provide equivalent platelet transfusion response when compared to HLA testing. The assay is a solid phase antibody detection system for the presence of IgG platelet antibody. Figure 2 depicts the test methodology (Bahrami, 2006)

Figure 2 Platelet Crossmatching



In this methodology, several items should be noted for obtaining the optimum results:

- ABO compatible platelets should be used
- Indicator cells, positive/negative controls, Low Ionic Strength Saline solution (LISS), and washing step materials are separate in the commercial kit
- All reagents must be at 18°- 30°C before use, and
- Incubation step must not exceed 60 minutes.

Clinical results of transfusion of crossmatched platelets are variable, but patients will usually show an increased CCI. As mentioned for HLA matched platelets, a highly refractory patient may not respond to these platelet components. A trial of whole-blood derived platelet pools has proven successful in some patients unresponsive to either platelet crossmatched or HLA match platelets due to the heterogeneity of HLA/platelet antigens.

On rare occasions, a patient will show no response to any of the preceding platelet component transfusions. These are very difficult patients to manage and should bleeding become severe, increasing the number of platelets transfused of any type is the only treatment modality. The use of high-dose intravenous immunoglobulin (IVIg), splenectomy and plasma exchange has not been shown to be effective in most patients (Schiffer, et al., 2001).

## CONCLUSION

The use of platelet transfusions should be guided by current evidence-based medicine when the Transfusion Medicine literature supports a specific transfusion approach. More randomized controlled studies need to be performed in severely alloimmunized patients which present the clinician and the Transfusion Services with the greatest challenge. Enhancement of sensitivity and specificity of future HLA/platelet antibody test methodologies will be required.

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## **JOB OPPORTUNITY:**

### **Reference Laboratory Technologist (American Red Cross, Louisville, KY)**

The American Red Cross Reference Laboratory (Louisville, KY) has a 2<sup>nd</sup> shift Reference Technologist position open. The hours are from 4:30pm – 1am, M-F including weekend on-call rotation. Bachelor's degree in Science or equivalent with MT (ASCP) certification or equivalent certification required. Minimum of two years recent blood bank experience preferred. BB or SBB preferred. For more information or if you have any questions please contact us at 1-888-820-1327 / 540-7044 or come by our downtown location to pickup an application.

### **Reference Laboratory Technologist (Central Kentucky Blood Center Lexington, KY)**

Seeking enthusiastic medical technologist to perform and interpret serological procedures on specimens submitted for compatibility testing or problem resolution. Will resolve typing, antibody identification, and crossmatch problems. Will communicate with hospitals and other Reference Labs as needed.

Being a part of the Reference Lab team will provide you with many opportunities for professional growth: you will get involved with other transfusion services via consultation and educational sessions; will be part of a team working toward AABB IRL Accreditation; and will have the opportunity to participate in Kentucky Association of Blood Banks (KABB) meetings. In addition, CKBC broke ground on a new 4-acre lot to build a state-of-the-art blood center where we plan to relocate sometime in 2007.

This job requires a MT(ASCP) with minimum two years recent blood bank experience, MT(ASCP)SBB preferred. Ideal candidate will have strong written and oral communication skills, a do-what-it-takes work ethic, and a team player attitude. Full time, hours negotiable, M-F 2<sup>nd</sup> shift preferred, including on-call rotation, relocation assistance provided. **Please send cover letter and resume to:** CKBC, Attn: HR 330 Waller Avenue Lexington, KY 40504 [jobs@ckbc.org](mailto:jobs@ckbc.org) **CKBC is a drug-free and EOE.** [www.ckbc.org](http://www.ckbc.org)

# WORD SEARCH

BY SHARON NOBLE

G H A L P H A G R A N U L E S Z P V  
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FIND THE **WORDS** (not symbols/ abbreviations) BELOW:

ADHESION  
AGGREGATION  
ALPHAGRANULES  
APHERESIS  
CONTAMINATION  
GLUCOSE  
HEMOSTASIS  
LYSOSOMES  
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