

Spring 2006



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President's Message- Donna Ratliff MT(ASCP)

As the President of KABB, I look forward to the following year. I would like to encourage all KABB members to become active. This is an organization that welcomes new ideas and suggestions. If you have any suggestions for further educational topics, comments or would like to become more involved in KABB please contact me at Donna.Ratliff@kctcs.edu.

For a list of the KABB board members for 2006-2007 see page two or visit our website at www.kabb.org Please feel free to contact any board member with questions and educational topics of interest in your area.

We have several meetings planned. Please make plans to attend these meetings. You can obtain CEU's and have a good time too.

KABB Fall Meeting 2006

Cumberland Falls State Park
Saturday September 16th
Corbin, Ky.

Reservations may be made by calling 1-800-325-0063. The price of the room is \$84.95. Mention you are with KABB for this price. Deadline for making reservations at this price is August 15th.

For more details about the fall meeting, please check our website www.KABB.org. The website will be updated as more information becomes available.

KABB Spring Meeting 2007

Natural Bridge State Park
Saturday March 10th
Slade, Ky.

Details to follow as more information becomes available.

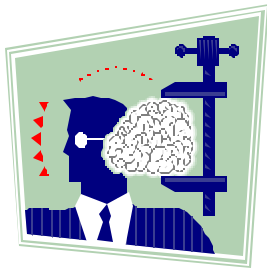
KABB/KSCLS Joint Meeting 2007

September 11th and 12th. The meeting will be at Louisville Marriott East in Louisville, Ky.
Details to follow as more information becomes available.

Now, about our Spring 2006 meeting. Our meeting was in Lexington on March 7th and 8th. The meeting was co-sponsored with KSCLS. The theme for this years meeting was Power Up for Knowledge. There were many topics presented for everyone to enjoy. Our speakers were wonderful and I am sure we all left with new "Knowledge". I would like to thank everyone who was involved in planning and working on the meeting. This includes our speakers, exhibitors, sponsors and all of our participants.

Special Thanks

KABB would like to say THANKS to the hospitals, companies and organizations that helped make the Spring 2006 meeting a success. These include Abbott Laboratories, American Red Cross, Baxter, Digi-Trax, Helmer, Hemocue, Inc. ImmucorGamma, Jewish Hospital and St. Mary's Healthcare, Ky. Organ Donor Affiliates, Next Control Systems, Olympus America, Ortho Clinical Diagnostics, Pall Corporation, Rees Scientific, Shamrock, Terumo Medical Corporation, Med-Alliance, KODA, CKBC, Advance Magazines, Lexington Visitor Center, Crowne Plaza Campbell-House, Cumberland Security Bank, Ky. River, Williamson ARH, LCRH, Baptist Regional, Somerset Community College and various drug companies. I would like to apologize to anyone I have forgotten to mention.



SEVERE AUTOIMMUNE HEMOLYTIC ANEMIA WITH ANTI-A₁ SPECIFICITY

D. E. Stapp, L. M. Michalski, C. E. Meena-Leist, & W. B. Lockwood. Department of Pathology & Laboratory Medicine and American Red Cross Blood Services, River Valley Region Immunohematology Reference Laboratory, Louisville, KY

ABSTRACT

Warm autoantibodies are typically reactive with an antigen of undetermined specificity. This is demonstrated by panagglutination with reagent and patient red blood cells. When warm autoantibodies demonstrate specificity, it is usually directed towards a core antigen complex in the Rh blood group system. Autoantibodies directed toward the A₁ antigen have been reported but are extremely rare. We report a case of fatal intravascular hemolysis in a 27-year-old group A₁, Rh (D) negative female. The patient presented with fatigue and mild jaundice as an outpatient, hemoglobin was 9.8 g/dL, and total bilirubin 5.4 mg/dL (mostly unconjugated). The next day she was febrile, experienced syncope, and was hospitalized. Hemoglobin was 6.3 g/dL, total bilirubin 6.7 mg/dL, platelets 416,000/ μ L, LDH 518 IU/L, and haptoglobin <50 mg/dL. Bilirubin remained elevated above the reference range for the remainder of her life, reaching a peak of 7.2 mg/dL on hospital day 2 when reticulocyte count was noted at 12.5%. Platelet counts decreased during hospitalization, reaching a low of 83,000/ μ L the morning before her death. The patient was transfused with 7 units of least incompatible, type specific blood with minimal increase in hemoglobin during her hospitalization and she expired on the 8th hospital day. An autopsy was performed and multiple pulmonary emboli were listed as the cause of death. To evaluate the severe hemolytic anemia, we performed multiple serum and elution studies to confirm autoantibody reactivity and specificity. The patient's neat serum, autologous adsorbed serum and a series of eluates were tested at temperatures ranging from 4°C to 37°C using a low ionic strength solution enhancement media and anti-IgG to rule out alloantibodies. Initially the patient had a positive antibody screen and direct antiglobulin test (DAT) with both anti-IgG and anti-C3d. Although panagglutination was found in her serum, alloantibodies were excluded using warm autologous adsorptions. Testing of the eluates initially using group O reagent red blood cells was negative. Subsequent testing of the eluate using A₁ red blood cells revealed autoanti-A₁ reactivity, supporting our suspicion of an autoanti-A₁. This was further supported with reactivity in the patient's serum. These results support our conclusion that this patient with group A₁ blood type had an autologous anti-A₁ antibody resulting in severe intravascular hemolytic anemia, a disease process known to cause disseminated intravascular coagulopathy (DIC). Therefore the autoanti-A₁ contributed significantly to her death with DIC leading to the formation of pulmonary emboli. Although coagulation studies such as PT, PTT, and fibrin split products were not done, the platelet count decrease does support DIC.



JOB OPPORTUNITY:

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

The American Red Cross Reference Laboratory (Louisville, KY) has a 2nd 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 2nd 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 **CKBC is a drug-free and EOE.**

www.ckbc.org



Donor –Recipient ABO Incompatibility in Hematopoietic Stem Cell Transplantation

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Allogeneic hematopoietic stem cell transplantation (HSCT) is increasingly used as curative therapy for malignant and non-malignant disorders. Stem cell sources include marrow, peripheral blood, and cord blood with donor selection primarily determined by degree of human leukocyte antigen (HLA) matching between the donor and recipient. HLA-identical related donors are initially chosen, if available. However, only 25-30% of the population has an HLA-identical sibling. If no matched relative is available, a search for an unrelated donor is conducted, with an average time of 90 days from search initiation to HSCT. If an unrelated donor is not available or if the unrelated donor search period is too long based on the recipient's clinical condition, then a mismatched family member donor or a mismatched cord blood graft may be considered depending on the transplant center preference.

HLA typing is the primary determinant used to identify potential stem cell donors. However, the inheritance of blood group antigens is separate from the HLA tissue complex. Therefore, discordance between donor and recipient ABO typing is noted in 30-40% of matched related donor transplants, and is likely increased in the unrelated donor transplant setting. While ABO matching between the donor and recipient is not necessary for successful HSCT, knowledge of donor and recipient ABO typing is essential for the stem cell processing laboratory, the blood bank, and the transplant team caring for the patient. This information is critically important to anticipate and to prevent potential hemolytic complications and to guide graft manipulation. The importance of this information is reflected in the Foundation for the Accreditation of Cellular Therapies (FACT) and American Association of Blood Banks (AABB) requirements for recipient and donor compatibility testing.

ABO incompatibility between donor and recipient can be managed by reducing the amount of incompatible cells or plasma administered. This reduction is accomplished by standard procedures available in most graft processing laboratories. The degree of incompatibility and the amount of incompatible product are important factors to consider in graft processing as they will in part determine the amount of time required and cell processing staff necessary for the product preparation. Marrow grafts typically contain a larger volume of red blood cells. For ABO compatible donor-recipient pairs, red cells may be transfused along with the product. In these circumstances, patients should not usually receive transfusions of packed red blood cells on the day of transplantation as the red cells infused along with the product will serve that purpose. However, the volume of the graft product may need to be reduced prior to infusion based on the size of the recipient in order to prevent volume overload. Peripheral blood stem cell grafts typically contain lesser amounts of red cells than marrow grafts due to the nature of the apheresis collection process; however, the number of lymphocytes in peripheral blood grafts is typically increased several fold compared to bone marrow grafts. The volume of red cells contained in cord blood grafts is variable, but is typically low. Depending upon the transplant center, the volume of red cells in a graft is typically reduced for ABO incompatible donor-recipient pairs to a specified maximum volume of red cells permitted to be infused. The absolute amount of incompatible red cells infused will vary depending on transplant center criteria for release of the product.

Two basic immunologic mechanisms capable of initiating hemolysis after allogeneic HSCT exist. The first, based on pre-existing isohemagglutinins that immediately lyse target red cells, is typically seen in major or bidirectional ABO mismatching between donor and recipient. The second is based on the generation of new isohemagglutinins by transfer of passenger lymphocytes in response to a foreign antigen exposure in the patient causing hemolysis 7-14 days after HSCT. This is most commonly observed after minor ABO mismatching between donor and recipient.

In major ABO incompatibility (seen in approximately 20% of HSCT), the following immunohematologic problems may be seen:

- Immediate hemolysis of donor red cells infused with graft;
- Delayed hemolysis of donor red cells by persistent recipient isohemagglutinins;
- Delayed red cell production;
- Pure red cell aplasia.

With minor ABO incompatibility between donor and recipient (observed in 25% of transplants), immediate hemolysis of recipient red cells by donor-derived isohemagglutinins in the graft or delayed hemolysis of recipient red cells by isohemagglutinins may be observed.

With bidirectional ABO incompatibility (seen in 1% of transplants), both immediate and delayed hemolysis are possible due to donor isohemagglutinins against recipient red cells and recipient antibodies directed against donor red cells.

When a major ABO donor-recipient incompatibility exists, most strategies to prevent acute hemolysis focus on the removal of red cells from the stem cell product and decreasing the concentration of isohemagglutinins in recipient plasma. Otherwise, techniques for erythrocyte removal must be used and vary in processing time, labor intensity, equipment needed, and the degree of mononuclear cell loss. Typically, the goal is to infuse a stem cell product containing less than 10ml red cell contamination with sufficient nucleated cells for engraftment. This requirement usually necessitates collecting larger volumes of marrow or processing larger volumes of donor blood in mismatched donor-recipient pairs than in matched donor-recipient pairs.

In major ABO incompatible transplants, isohemagglutinins will continue to lyse the cells expressing the target antigen as long as recipient antibody is produced. As erythroid progenitors acquire blood group antigens in development, the antibody can produce destruction of marrow precursors resulting in pure red cell aplasia. In myeloablative transplant, there is no reproducible evidence that donor-recipient ABO incompatibility alters myeloid or platelet engraftment, graft rejection, or graft-versus-host disease (GVHD). However, several investigators have described delayed erythroid engraftment and increased red cell transfusion requirements in ABO-incompatible transplantation.

In reduced intensity (non-myeloablative) transplants, there is a purposeful, more protracted coexistence of host and donor hematopoiesis because the donor's allogeneic response (rather than the chemoradiotherapy) is relied upon to eradicate the malignancy. In recipients of major ABO-incompatible nonmyeloablative HSCT, there is a more prolonged time to erythroid engraftment and a higher incidence of pure red cell aplasia compared to myeloablative regimens.

In minor ABO incompatible transplantation, donor isohemagglutinins passively transfused with the stem cell product can cause acute hemolysis of recipient red cells; therefore, donor plasma is removed from the graft prior to infusion. Supporting this observation, apheresis platelet products with high isohemagglutinin titers have been rarely reported to cause severe hemolysis when transfused without volume reduction. In minor ABO-incompatible HSCT, hemolysis may occur up to 2 weeks following transplantation due to new isohemagglutinins generated by donor passenger B lymphocytes transfused with the graft at the time of HSCT. Therefore, pretransplant antibody titers may not be indicative of potential hemolysis since the antibody may arise from passenger B lymphocytes. The incidence of this disorder increases with B-cell content of the graft and is therefore higher with peripheral blood grafts, which typically contain 10 fold more B cells, compared to marrow grafts. This passenger lymphocyte syndrome can cause severe hemolysis, which can occasionally be fatal. While ABO antigens are the most common targets of this immunologic reaction, Rh, Jka, Kidd, and Lewis blood groups antigens have been implicated. The severity of hemolysis depends on the rate of rise of donor antibody, the secretor status, and rapidity of engraftment.

In major ABO-incompatible HSCT, delayed hemolysis can also occur depending on the recipient isohemagglutinin directed at newly produced erythrocytes. Even when overt hemolysis is not evident by standard laboratory measures, there have been reports of delayed erythroid engraftment.

Primary management strategies of blood product support for ABO incompatible transplant recipients is based on established standard criteria for red blood cell and plasma products based on donor-recipient ABO typing (Table 1). In all situations, group O cells may be infused in the immediate post-HSCT period because these cells lack target antigen. When administered to non-group O patients, they will dilute the percentage of red cells targeted. Major mismatch recipients should have red cells removed from the stem cell graft product and O red cells should be transfused post-HSCT until the recipient isohemagglutinin titer (anti-A, anti-B) is not detectable and recipient types as donor. Donor type platelets and plasma should be transfused and if non-donor type platelets are used, they should be volume reduced. Minor mismatch recipients should have plasma removed for the stem cell product to prevent immediate hemolysis if isohemagglutinin titers are high. Following HSCT, they should receive group O red cells after HSCT. Platelet and plasma lacking isohemagglutinin directed against recipient red cells should be transfused or volume reduction of product should be done. Coombs testing should be monitored for hemolysis caused by passenger lymphocytes. Bidirectional mismatch recipients should have red cells removed from the product and receive O red cells after HSCT. Plasma should be removed from the donor stem cell product and group AB plasma and platelet products should be used before and after HSCT with volume reduction for out of group products.

Prior to HSCT, donors and recipients should have isohemagglutinin titers identified. After HSCT, all patients should be monitored for the emergence of donor antigen erythrocytes, persistence of recipient isohemagglutinin, and evidence of hemolysis (LDH, reticulocyte count, and direct anti-globulin testing). Isohemagglutinin titers fall more rapidly in unrelated donor HSCT than after matched sibling donor HSCT with the time to undetectable titers considerably shorter in unrelated donor recipients. In related donors, those who develop GVHD have had a more rapid decline in antibody titers.

Despite immunosuppression, patients can develop alloimmunization to non-ABO red cell antigens after HSCT, most typically Rh, Kell, or Kidd antigens. This occurrence is most typically seen in patients receiving ABO incompatible HSCT, which is the most common scenario for immune-mediated hemolysis is after allogeneic HSCT.

Pre-transplant testing of the donor-recipient pair, which should include ABO and Rh antigen testing with isohemagglutinin titers, serves to identify the potential for hemolytic reactions. Preventative interventions can then be performed by stem cell product manipulation and by transfusing appropriate blood products after HSCT. The clinical team caring for the patient can then also be aware of potential immunohematologic complications.

Table 1. Blood product support for allogeneic HSCT recipients

If Patient's ABO group is:	And Donor's ABO group is:	Support with RBCs that are ABO group:	Support with Plasma that is ABO group:	After patient's ABO group changes, support with RBCs that are ABO group:
O	O	O	Any Type	NA
	A	O	A or AB	A
	B	O	B or AB	B
	AB	O	AB	AB
A	A	A	A or AB	NA
	O	O	A or AB	O
	B	O	AB	B
	AB	A	AB	AB
B	B	B	B or AB	NA
	O	O	B or AB	O
	A	O	AB	A
	AB	B	AB	AB
AB	AB	AB, A or B*	AB	NA
	O	O	AB	O
	A	A	AB	A
	B	B	AB	B

NA not applicable

TRANSFUSION 2005 - Vol. 45, Supplement	ABSTRACT SUPPLEMENT	81A
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SP171 **Effects Of Sealers On The Hemolysis Of Red Blood Cells Post Filtration** G P Becknel, Jr. (jaybecknel@unitedpharma.org),
UnitedPharma, Duluth, GA 770-270-6867

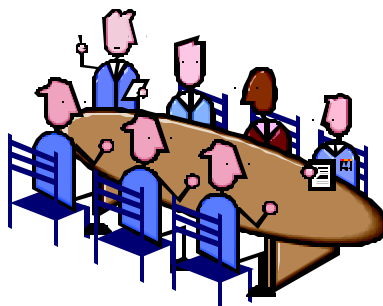
Background: During the heightened awareness of hemolysis observed in leukoreduced red blood cells (RBC), we were conducting an implementation of a leukoreduction (LR) process at a blood center. In the course of the validation, 90% of the units (27/30) that had been filtered showed hemolysis in the segments after storage at 1° to 6°C for two days. As a result of the investigation, it was found that the blood in the units was not hemolyzed, while the segments showed significant hemolysis. A study on the sealers used in the facility was conducted. The study determined that a single sealer was responsible for the hemolysis that had been noted. Method: Two fresh AS-1 RBC were used with each sealer. To create an assembly unit, approximately 60 inches of tubing was attached to a small sampling pouch. The RBC was gently mixed. Using a sterile connection device, the assembly unit was attached to the RBC. Three assembly units per AS-1 RBC unit were produced (6 total). Blood was allowed to flow into the assembly and then was sealed using one of the three sealers present in the lab. One sealer (C) had an adjustable power knob. Using this sealer, the power adjustment starting point was the original setting the laboratory was using. Additional samples were taken at lower settings until the power setting had incomplete seals. Two sealers (A & C) had no adjustment capability for power setting. After sealing, the assemblies were stored at 1° to 6°C for 3 weeks. Following the 3 week storage, the contents of the segments from each assembly was pooled, centrifuged and the plasma was harvested and tested for plasma hemoglobin (Hb) content.

Results:

Sample ID	Sealer	Power Level (%)	Plasma Hb (mg/dL)	% Hemolysis
N35597	A	N/A	302.8	0.94
	B	N/A	128.9	0.40
	C	50	121.3	0.38
	C	45	144.4	0.45
	C	40	144.5	0.45
	C	35	142.3	0.45
N35598	A	N/A	407.5	0.91
	B	N/A	126.8	0.28
	C	50	IS	-
	C	45	217.4	0.48
	C	40	106.7	0.24
	C	35	IS	-

N/A – Not Applicable IS –Insufficient Sample

Conclusion: The percentage of hemolysis observed in the segment supernatant of RBC using sealers B and C is considerably lower as compared to the hemolysis observed with using sealer A. The combined percent hemolysis average for B and C for sample N35597 is 0.42% vs. 0.94% for A. The combined percent hemolysis average for B and C for sample N35598 is 0.34% vs. 0.91% for A. This study demonstrates the use of a sealer (A) as the cause of hemolysis observed in RBC segments post LR process.



KABB BOARD MEMBERS 2006-2007

The following are members of your 2006-2007 KABB board. You may contact board members with any questions and educational topics of interest in your area.

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WORD SEARCH

BY SHARON NOBLE

H J I O C H E M O R A D I O T H E R A P Y
I U M E N U S A T C U M B E R L A N C D S
T A M T V E P A R K I N S E P T T I E M B
E R U A M I K L W H P J K M H C T L L K I
Q T N M N P T T L B N B X R T E Z C G C N
H P O L Q L D A M M H M O X I J H X S L C
Z N S W M H E L L J R M P O D F M S M T O
F F U A T N L U J B B N P W D D E L W J M
X J P P N Z T H K O A O R C L N T L R L P
Z K P H E Z B R C O T O V Q I M D E K L A
Z X R E M Z W Y A A C C L R M R T C K Z T
W L E R T K T F M N M Y O E C K N M Y Y I
Y M S E F E M E F T S T T V Y R N E Q W B
W N S S A J H N C Y C F R E N M Q T M M I
N L I I R L Q K A A T W U J A T W S B K L
J Q O S G N V P R M K V N S G N T K W W I
N R N M N R L F F K L M N C I W T R Y Z T
Q N K Q E A E R M J B L H Y J O R I M M I
T D W K S R M V G X X N H N P M N F G M E
W N O I T A Z I N U M M I O L L A K A E S
M W A T R A N S P L A N T A T I O N D H N

FIND THE **WORDS** (not symbols/ abbreviations) BELOW:

ALLOIMMUNIZATION
APHERESIS
APLASIA
CHEMORADIOTHERAPY
ENGRAFTMENT
HEMATOPOIETIC
HUMAN LEUKOCYTE ANTIGEN
IMMUNOSUPPRESSION
INCOMPATIBILITIES
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