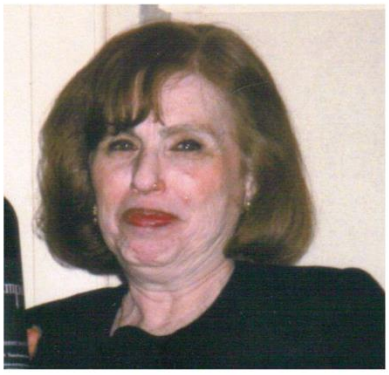
ILLINOIS ASSOCIATION OF BLOOD BANKS

The Phyllis Unger Annual Case Studies Meeting

Thursday, February 21, 2019



This case studies meeting is dedicated to Phyllis Unger in memory of all the wonderful case studies she presented to students, technicians, technologists, residents, fellows and physicians. Phyllis was a dedicated blood banker who spent much of her time teaching and educating whether she was at Michael Reese, University of Illinois or LifeSource. She was always willing to answer questions or test a sample if you sent it to her. She inspired many blood bankers and gave them the desire to look further into a problem. Phyllis was the first Medical Technologist to be President of the ILABB. Prior to this only a physician could hold the office. She wrote many papers and contributed to a few books including "Blood Group System: MN and Gerbich." She had many things outside of blood banking that she enjoyed as well such as travel, music and bridge. Even these things helped give her blood banking perspective. She was known for never saying anything bad about anyone and always finding the best in them. We hope that this annual meeting will

serve as a lasting memory to the knowledge she shared with all who came in contact with her over the years. Thank you Phyllis.

Agenda:

Social hour: 6-7pm

Presentations will begin promptly at 7pm.

Abstract #	Presenting Author	Title
1	Jim Perkins	ABO Discrepancy; B(A) phenotype with a novel glycosyltransferase
2	Zhen Mei	Improving Accuracy of Final Bedside Checks of Blood Products with an Electronic Scanning System
3	Scott Allen	A very challenging case of refractory Thrombocytopenic Thrombotic Purpura
4	Glenn Ramsey	Double umbilical-cord stem cell transplant with long-term dual chimerism: Group O donor WBCs and group B donor RBCs
5	Scott Allen	Hyperhemolysis syndrome in a patient with HbSC and an anti-M antibody
6	Helena Antongiorgi	Two daratumumab (DARA) cases with reactive eluates
7	Jill Cseri	A serological approach to identification and characterization of anti-PP1Pk
8	Jigna Rami	No evidence of HDFN in a patient with high titer of anti-In(b)

ABO Discrepancy; B(A) phenotype with a novel glycosyltransferase.

Jim Perkins,*, Wylene Patterson, Helena Antongiorgi, Jason Kang, Greg Denomme, NorthShore University HealthSystem Blood Banks, Versiti Wisconsin Immunohematology Reference Lab

Background: "B(A)" is a form of cis-AB phenotype with strong expression of B, weaker expression of A, and anti-A reacting with A_1 and A_2 RBCs. We investigated a similar patient and his daughter including ABO locus sequencing.

Case study: The patient was a 75 year old man having cardiac catheterization who had not been tested previously by our lab, but whose family were aware of apparent paternity exclusion; on remote donor testing he was reportedly group B, while in multiple, more recent tests performed at our lab the daughter was group A and the mother (patient's spouse) was group O.

His initial test results included:

	ABO/Rh Typing				Ab Screen		DAT
	Anti-A	Anti-B	A_1C	BC	Anti-D	SCI	SCII	Poly-AHG
Gel	4+	4+	4+	0	0	0	0	0
Tube	4+	4+	4+	0	0			

Additional patient testing revealed:

- His cells reacted weakly (1+ using warm-washed RBCs) with anti-A_1 lectin.
- His serum agglutinated A2 cells weakly (2+ at IS).
- His RBCs reacted strongly with a second monoclonal/tube anti-A but NOT with polyclonal reagent anti-A or donor group B plasmas.
- He had a weak cold autoantibody (NR at IS, w+ at RT, 3+ at 4^{o}C).
- His anti-A titer with A_1 RBCs was normal (64 at IS, 512 at RT, 32 at 37^{o}C.

The patient's daughter was group A, with RBCs that reacted strongly with polyclonal reagent anti-A as well as with multiple group B donor plasmas (3-4+).

Sequencing of the ABO glycosyltransferase genes of the patient and daughter demonstrated an *ABO*A.2.01*, allele, which codes for the most common transferase yielding an A2 serologic phenotype, in both father and daughter. The daughter's alternate allele had a deleted Guanidine at position 261 (261delG), the most common sequence yielding an inactive, truncated group O transferase. The father's second ABO allele shared sequence homology with alleles associated with the B(A) phenotype, particularly *ABO*B(A).01* from which it differed at 2 bases, 467T and 526C.

Discussion: This patient's discrepant ABO typing results most closely match the B(A) phenotype in that:

- The patient's cells express both A and B antigens, and weakly express A_1.
- The A antigen is detected by monoclonal but not polyclonal anti-A.
- The patient makes anti-A reacting with both A_1 and A_2 cells.

The patient differs from the B(A) phenotype in that his forward type with monoclonal anti-A is strong, perhaps because in addition to his apparent B(A) transferase he has an A_2 transferase adding more N-acetyl-galactosamine to his RBCs.

The first order paternity exclusion that was apparent in the past was solved by use of monoclonal anti-A, and verified by genotyping at the ABO locus. However, A antigen expression by the same transferase was stronger in the daughter.

Conclusion: This patient presented with a phenotype similar to a B(A) and was found to have a novel B(A)-like allele.

Improving Accuracy of Final Bedside Checks of Blood Products with an Electronic Scanning System

Zhen Wei Mei[1], Ariana King[1], Geoffrey Wool[1]

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Background: Ensuring the right blood gets to the right patient at the right time is one of the foundational principles guiding transfusion medicine. Given the marked reduction in transfusion-related infectious hazards, mistransfusion remains one of the most common causes of transfusion morbidity and mortality. Bedside blood check procedures ensure positive patient identification prior to transfusion of blood products. Failure to perform an adequate final bedside check immediately prior to transfusion has been a major factor for mistransfusion cited in observational studies. Electronic scanning systems are available and can reduce logistical and clerical transfusion mistakes.

Case Report: Our previous standard procedure for bedside blood check required a read-back and verification procedure with two healthcare team members, as well as patient participation (if possible). Documentation of the transfusion was recorded performed manually into the electronic medical record (EMR), resulting in documentation errors and possible administration delays for emergency transfusions.

Implementation of a bar-code scanner-based transfusion recording system, similar to systems utilized for medication administration, allows multiple benefits: 1) improved accuracy of required bedside verifications (patient identification number and donor unit information); 2) improved timeliness and accuracy of transfusion documentation in the EMR; and 3) if the system is interfaced with the Blood bank LIS to allow check of bedside product against a patient's issued product(s), elimination of the requirement for two healthcare providers for bedside check.

With the advent of the level 1 adult trauma center within our institution, the need to improve both speed and accuracy of transfusion became an increasingly pressing issue. Implementing Lattice Medicopia for this purpose was performed in phases, starting with inpatient and

emergency areas and expanded to ambulatory and specialty care areas as well; the third phase will include all procedural areas.

There were some obstacles in the implementation of this system, including education of the clinical staff. We have observed marked improvement in the accuracy and completeness of administration documentation (see fig 1). No known mistransfusions have been prevented to-date, though the system generates a monthly report of all potential mistransfusion events.

Unfortunately, many alerts of mistransfusion represent system glitches or errors (e.g. a mismatch in patient encounter number) not an actual patient/blood misidentification. A limitation of the system at our facility is capturing meaningful data regarding transfusion events, difficulty scanning the barcodes, and misuse involving the override of safety checks within the system. Work is ongoing to improve reporting capabilities.

Conclusion: While utilizing an electronic scanner system can improve accuracy and efficiency of bedside blood checks, other issues may arise during the implementation process that require fine-tuning this process. Continuing education and training of the clinical staff as well as mining meaningful data collected by the system are both necessary.

Figures

Blood Product Scanned

Blood Product ABO/Rh	B NEG	B NEG
Blood Product ID Number	W040718690426	W040718690426
Blood Product Description	RED BLOOD CELLS	RED BLOOD CELLS
Blood Product Expiration Date/Time	2018-12-20 23:59	2018-12-20 23:59
Product ISBT	E0336	E0336
Leukocyte reduced?	Leukocyte reduced	Leukocyte reduced
Pooled?		
Thawed?		
Status	Started	Transfused
Started By	Ariana King	Ariana King
Start Time	2018-12-10 12:36	2018-12-10 12:36
Stopped By		Ariana King
Stop Time		2018-12-10 12:36

Fig. 1 An example of the data collected by the scanner that is automatically transmitted into EPIC during a transfusion event

A very challenging case of refractory Thrombocytopenic Thrombotic Purpura

Authors: Scott Allen, MD, Chancey Christenson, MD, Melisa Tjota, MD, Ph.D, Benjamin Derman, MD, Fatima Aldarweesh, MD

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Background: We present a patient with extremely refractory Thrombotic Thrombocytopenic Purpura (TTP) who did not respond to conventional therapy. Remission was ultimately achieved after 34 treatments of therapeutic plasma exchange (TPE), corticosteroids, Rituximab, Intravenous Immunoglobulin (IVIG) and the protesome inhibitor Bortezomib.

Case: A 30 year old male with a past medical history of questionable sarcoidosis and treated syphilis presented to the emergency department with 12 days of confusion, altered speech and vomiting. Labs were notable for thrombocytopenia with a platelet count(PC) of 10 x 10^3/uL (Reference range (RR):150-450 x 10^3/dL) and hemolytic anemia ((hemoglobin-9.5 g/dL(RR: 13.5-17.5 g/dL), lactate dehydrogenase-1,820 U/L (RR: 116-245 U/L), haptoglobin- <20 mg/dL (RR:51-192), and indirect bilirubin- 2.6 mg/dL (RR: 0.1-1.0 mg/dL)). His peripheral smear demonstrated numerous schistocytes, consistent with microangiopathic hemolytic anemia. A presumptive diagnosis of TTP was made. An ADAMTS13 activity and inhibitor assay was drawn and TPE with 1.0 total plasma volumes (TPV) was initiated. Corticosteroids were concurrently started. The ADAMTS13 level returned at less than <3% (RR: 69-133%) with an inhibitor of greater than 2 Bethesda Units (RR: <0.5). The patient's PCs remained refractory despite seven treatments of TPE and corticosteroids. Weekly Rituximab infusion was then initiated alongside continued daily plasma exchange. Due to a lack of response after the first dose, N-acetylcysteine was added for 10 daily doses. Despite an initial improvement of the PC to >150 x 10^3/uL, he relapsed within 48 hours after cessation of TPE. TPE was restarted, and after an additional four TPEs, the volume of exchange was increased to 1.5 TPV. IVIG was initiated at this time, and he received a total of four doses. However, his disease remained refractory, and splenectomy was considered. Based on case reports in the current literature, a different approach was considered- Bortezomib. The patient received four cycles of Bortezomib, and after the first cycle, the PC was noted to start increasing (platelets increased from 123 x 10^3/uL to 157 x 10^3). TPEs were continued during this period, but reduced to 1.0 TPV after the

PCs were above 150 x 10^3/uL for two consecutive days. After two days of this regimen, the PCs remained stable. TPE was then stopped.

Conclusions: TPE with corticosteroids remains the mainstay of treatment for TTP in most cases. Rituximab represents a useful adjunct therapy and has additionally been proven to reduce the risk of relapse. IVIG has also been shown to be useful. These modalities failed to induce lasting remission in this patient. Recently, case reports have shown proteosome inhibitors such as Bortezomib may be effective in these refractory cases. This case is in keeping with current literature which suggests that Bortezomib may be a valid treatment option for extremely refractory TTP, as the patient only achieved lasting remission with the addition of Bortezomib.

Double umbilical-cord stem cell transplant with long-term dual chimerism: Group O donor WBCs and group B donor RBCs

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Blood Bank, Northwestern Memorial Hospital, Chicago, IL

Background: For adults with hematological diseases who lack matched related or unrelated peripheral-blood stem cell donors, double umbilical-cord transplants can provide sufficient progenitor cells and comparable outcomes.[1] One graft typically becomes dominant within several weeks. Cord products are selected without regard for ABO matching.

Case Report: A 41-year-old group A+ woman had acute myeloid leukemia with t(3;3)(q21.3;q26.2) translocation conveying high-risk prognosis. After cytarabine/daunorubicin induction and fludarabine/cytarabine/G-CSF (FLAG) reinduction to obtain morphologic and

molecular remission, she underwent DC stem cell transplantation. The grafts were both male, group O+ and group B+, 4/6 and 5/6 HLA-A, -B and -DRB1 matches (3/6 interunit match), and contained 5.37 and 2.54 x 10^7 total nucleated cells (TNC)/kg, all respectively. The conditioning regimen was of intermediate intensity (fludarabine/cyclophosphamide/thiotepa/total body irradiation 400 cGy) and graft-vs-host-disease prophylaxis employed cyclosporine/mycophenolate. Peripheral blood DNA chimerism was examined with short tandem repeat (STR) analysis of total cells, CD3+ T cells and CD33+ myeloid cells (detection sensitivity 3-5%). The blood bank placed her on O+ RBC units and monitored ABO typing reactions, direct antiglobulin tests (DATs) with each typing, and chimerism analyses.

Results: Serial chimerism results and RBC ABO typings are shown in the Table. After d21, chimerism results were 100% from the group O cord donor for blood (d49-231) and marrow (d77, d187). However, group B RBCs were detected from day 92. Anti-B plasma agglutination was seen in all specimens through d231, but after group B RBCs appeared, anti-B was low-titer (d92 IgM 2, IgG 1; d231 IgM <1, IgG 0) and all DATs were negative. Anti-A was not seen in routine typing except on d92 (weak+). She required periodic RBC transfusions through d196, with group O transfused RBCs contributing to mixed-field RBC ABO typings and precluding extended serologic typing of engrafted RBCs. She remained in clinical remission at d259.

Discussion: In DC transplants, one graft typically becomes the 'winner' by d80-100. Graft dominance has been associated with more TNC and progenitor cells, better HLA matching, first-unit infusion and/or T-cell alloreactivity to the losing graft.[2,3] In DC transplant series with longterm followup, dual-donor DNA chimerism after 1 year is seen in 5% of cases, associated with grafts closely HLA-matched to the patient and each other or with high-dose antithymocyte globulin therapy.[2] However, we have found no other published reports of persistent myeloid and erythroid cell lines from different cord donors. Nondetection of group-B-donor erythroid precursors in marrow chimerism analysis at d187 could have been due to a low cell proportion below the 3-5% test sensitivity. The nonreactivity of this patient's group-O donor anti-B with the group-B donor RBCs may have facilitated accommodation between the two grafts.

Days post-transplant (d)	Chimerism -- blood	Chimerism -- marrow	RBC ABO forward typings
d4-d42	d21: patient 4%, O donor 96%		A, 3-4+ mixed-field (mf)
d49-d85	d49: O donor 100%	d77: O donor 100%	d85: O
d92-d117	---		B, 1-2+ mf
d121-d231	d187, d231: O donor 100%	d187: O donor 100%	B, 3-4+ mf

1. Barker JN et al. Biol Blood Marrow Transplant 23:882, 2017
2. Hashem H, Lazarus HM. Biol Blood Marrow Transplant 21:612, 2015
3. Lamers CHJ et al. Blood 128:2165, 2016

Hyperhemolysis syndrome in a patient with HbSC and an anti-M antibody

Authors: Scott Allen, MD, Geoffrey Wool, MD, Ph.D, Cindy Wang, MD, Pamela Madden, MS, Nhu Pham, MBA, Gunta Musa, MHA, Chancey Christenson, MD

Affiliation: The University of Chicago, Chicago, IL, 60637

Background: We present a patient with HbSC disease with multiple allo- and auto-antibodies requiring hip surgery and undergoing pre-procedure prophylactic exchange transfusion prior to the procedure. Postoperatively, she developed possible acute hyperhemolysis syndrome. She received two post-operative simple transfusions of packed red blood cells (pRBCs). A subsequent direct antiglobulin test (DAT) was 3+ positive with anti-IgG and anti-M was eluted.

A concurrent drop in her hemoglobin to below pre-transfusion levels and hemolysis were noted- consistent with delayed hyperhemolysis syndrome.

Case: The patient is an 84 year-old female with a history of HbSC disease. She suffered from a mechanical fall at home and presented to the emergency department. Orthopedic surgery decided that surgery was required for her hip. Her initial type and screen revealed Cold Agglutinins, anti-Fya, anti-Fyb, anti-E, anti-V, anti-Jkb, and anti-S. A high titer low avidity antibody and an anti-M, both previously identified by outside institution, were also noted. The outside institution had seen the anti-M antibody reacting variably at 37 degrees C (depending on the sample).

The Apheresis service was consulted to perform preoperative prophylactic exchange transfusion. After discussion with the primary service and difficulty finding fully matched units, exchange was performed with five units of crossmatch compatible pRBCs; two of these units were M antigen negative. The starting hematocrit (Hct) was 21.4% (Reference Range(RR): 36-47%). The RCE end Hct goal was set at 24%. Two days later, her Hct had dropped to 18.3%, and she was transfused an additional one unit of pRBCs. An appropriate rise of the Hct to 23.9% was noted. Another two days later, the Hct was noted to be 21.4%. She was again transfused with one unit of pRBCs with an appropriate rise in Hct to 24.8% noted. Both of these units were M negative.

A new type and screen was ordered nine days later after the exchange transfusion, at such time as the Hct had dropped to 18.1%. A positive DAT was noted, and a sample was sent out for further investigative studies. A clinically significant anti-M antibody was eluted by the immunohematology reference laboratory. Concurrently, the hct dropped to 11.6%. The lactate dehydrogenase (LDH) was elevated at 1,569 U/L(RR: 116-245 U/L) and the haptoglobin was <20 mg/dL(RR: 51-192 mg/dL). Given the timing and the finding of a new clinically significant antibody, these findings were attributed to delayed hyperhemolysis syndrome.

Conclusions: Hyperhemolysis syndrome represents a rare but distinct phenomenon in sickle cell disease patients, presenting as a drop in hct below pre-transfusion levels after transfusion. Given the anti-M eluted from the post-transfusion patient sample 7-10 days after the exchange transfusion and the additional laboratory findings, this case represents delayed hyperhemolysis

syndrome. A literature review reveals this condition associated with an anti-M antibody is exceptionally rare.

Two daratumumab (DARA) cases with reactive eluates

Helena Antongiorgi*, Jim Perkins, Jolynne Friend, Jason Kang, Thomas Gniadek

NorthShore University Health System Blood Bank

Background: DARA is a monoclonal anti-CD38 with cytotoxic activity against myeloma cells. Since CD38 is also expressed on RBCs, intravenous DARA presents as an RBC panagglutinin, but the DAT and eluate are typically non-reactive.

Case #1: Multiple type-and-screens were received on an 84 y/o woman with a history of Multiple Myeloma (MM) and anti-K previously identified in 2013. All samples typed as AB positive. DARA was started 10/9/'18. On 12/5/'18, 7 days after a DARA infusion, the screening cells reacted 2+ in gel but the sample was non-reactive with DTT-treated cells. The DAT reacted weakly with polyspecific and IgG AHG. An eluate reacted weakly with untreated but not with DTT treated cells; the last wash was non-reactive. Two weeks later (12/19/'18) the reactions with screening cells, untreated and DTT-treated, were the same, but the DAT was non-reactive. One-month later (1/16/'19) untreated and DTT-treated screening cells showed the typical DARA findings but the DAT was again reactive with a non-reactive eluate by the PEG/tube method.

Case #2: Six samples were received for type-and-screen from a 69 y/o woman with MM after starting DARA on 12/6/'18. Pre-treatment testing showed the patient to be A-pos, antibody screen negative. After treatment all antibody screens were positive (1+ to 2+) with untreated cells and non-reactive with DTT-treated cells. The first (12/11) sample had a negative DAT, but samples from 12/20, 12/24, and 1/10/'19 had positive DATs with polyspecific- and IgG-AHG (1+ to 2+), with non-reactive eluates in gel. A week later (1/17/19, 7 days after the last DARA

dose) the DAT was 2+ (polyspecific- and IgG-AHG), and multiple eluates reacted w+ to 2+ by gel and PEG/tube methods with untreated, but not with DTT-treated, RBCs. Of interest the last wash reacted 1+ with untreated cells in gel and PEG in two of the eluate procedures but not in the third. A week later (1/21) the patient again had a positive DAT with a non-reactive eluate.

Discussion: Two patients treated with DARA had varying DAT reactivity as reported in many as half of cases in different series. In the DAT-positive cases reported only a few have yielded reactive eluates, but in the current cases on at least one instance each patient had an eluate with reactivity against untreated RBCs which was eliminated by DTT treatment. In one case the last wash contained apparent anti-CD38. We speculate that anti-CD38 continued to elute from the patient's cells during washing.

Conclusion: Patients treated with DARA can have a reactive DAT and eluate, with apparent anti-CD38 in the eluate based on elimination of the reactive by DTT treatment. In one case the reactive eluate was accompanied by a positive last-wash test using untreated cells, possibly reflecting ongoing elution of this low-affinity antibody.

A serological approach to identification and characterization of Anti-PP1Pk

Authors: Jill Cseri, MT(ASCP)SBB; Mona Papari, MD

Vitalant IRL – Illinois

Background: Anti-PP1Pk antibodies (formerly known as Anti-Tja) have most of the time in vitro characteristics of an IgM hemolysin, but occasionally they can be a mixture of IgM and IgG; in vivo, these antibodies may cause repeated early abortions, fetal growth retardation, hemolytic disease of the fetus and newborn (HDFN), and severe hemolytic transfusion reactions (HTRs). This antibody (a combination of anti-P, anti-P1 and anti-Pk) is formed without red cell sensitization by individuals who are phenotypically p, meaning that they lack both P and Pk antigens.

This is a case of an anti-PP1Pk antibody identified in a 21 year-old pregnant Hispanic female, Group O, Rh-negative, who presented to an outpatient clinic for a prenatal workup done and for administration of RhIg, at approximately 26-28 weeks gestational age.

Methods: Initial antibody screening was performed by gel-column agglutination method at the hospital associated with the outpatient clinic. A sample was subsequently submitted to our Immunohematology Reference Laboratory (IRL) for antibody identification. Testing was performed using our standard methods; serum was initially tested by gel method against an antibody identification panel of 11 cells, followed by selective tube testing using low-ionic strength saline (LISS) and ficin treated cells, as well as use of the prewarming technique. In addition, a serological phenotype was performed on the patient's cells. There was no evidence of hemolysis in the patient's plasma.

Results: Initial testing revealed the possibility of an antibody against a high-frequency antigen because all of the cells in the panel displayed a 2+ uniform reactivity combined with a negative direct antiglobulin test (DAT). Testing in tube using LISS showed 3+ reactivity at immediate spin against selected cells, 2+ reactivity at 37oC and 2+ reactivity in the antiglobulin phase with all cells tested, displaying a wide thermal range. The ficin-treated cells tested also showed a strong uniform reactivity at 37oC and in the antiglobulin phase. The patient's red blood cells typed as C-, E-, c+, e+, K-, S-, Fy(a)+, Fy(b)+, Jk(a)+, Jk(b)+, M+, and P 1-. Based upon these findings an anti-PP1Pk was suspected. To confirm our suspicion, 2 rare frozen PP1Pk-negative cells were deglycerolized and tested with patient's serum in tube using LISS; no reactivity was seen in either cell at immediate spin, 37oC, or at the antiglobulin phase. All other possible alloantibodies were ruled out using stroma-absorbed plasma at 4oC. The identified antibody had a titer of 1:16 by gel method. No subsequent samples were sent to the IRL for further follow-up and no subsequent titration was performed.

Conclusion/Discussion: This case confirms the serological characteristics of an Anti-PP1Pk with a wide thermal range and uniform reactivity. This patient's antibody consisted of the IgG immunoglobulin class as well as the IgM class since reactivity was demonstrated in the antiglobulin phase using prewarming testing techniques. The patient's identification as P1-negative by serological phenotype was of tremendous help in identifying this antibody. This

patient was known to have had a miscarriage on her first pregnancy while she was outside of the United States, but we do not know any details about the gestational age at the time of the miscarriage or if any workups were performed; the current pregnancy was completed to term (gestational age of 39 weeks), without any apparent complication, and she had a baby girl approximately 12 weeks after the initial workup. The baby was typed as group O, Rh-positive and had a weakly-positive DAT; no samples were sent to the IRL for testing. In consideration of the clinical implications of anti-PP1Pk, this patient should be monitored closely throughout her eventual subsequent pregnancies, and different treatment modalities should be considered if deemed necessary, such as plasmapheresis, administration of IVIG (intravenous immunoglobulin), and/or intrauterine transfusions. Given the rarity of compatible blood donors, if this patient will need transfusions in the future, her siblings, if any, should be typed for the P and Pk antigens and evaluated for eligibility as blood donors; autologous donation is another option to be considered if transfusion is anticipated.

No evidence of HDFN in a patient with high titer of Anti-In(b)

Vitalant IRL – Illinois

Authors: Jigna Rami, MT(ASCP); Jason E. Crane, DO; Mona Papari, MD

Background/Case Study: We are presenting the case of a pregnant patient with a high titer of anti-In(b) antibody. The In(b) antigen is a high-frequency antigen carried by the CD44 glycoprotein, found in about 99% of Caucasians and 96% of Indian/South Asian nationalities, making antigen-negative units a very rare commodity. This antibody was associated with immediate and delayed transfusion reactions, ranging from mild to severe hemolysis. There are no reported cases of hemolytic disease of the newborn (HDFN), as anti-In(b) might not be able to cross the placenta, despite being an IgG, or because of absorption of the antibody by the placental CD44.

Method and Results: In April of 2017, a sample for a prenatal workup on a 35 year-old female, G3P2, of Eastern Indian/Pakistani descent with a positive antibody screen was sent to our reference laboratory for work up.

Initial testing showed the following: patient's blood group was B, Rh-positive, the antibody screen was positive, and the antibody panel showed 4+ reactivity with all tested cells, in a manner suggestive of panagglutination. The direct Coombs test was negative, and there were no indications of hemolysis, meaning that the reactivity was not due to a warm autoimmune antibody. The serological typings were: C+ E- c+ e+ K- Fy(a+b+) Jk(a+b+) P1+ M+ N+ S+ s+ Le(a+b-).

Additional testing performed in tube using selected cells showed the following reactivity:

LISS: Immediate spin: Negative 37C/LISS: 2-3+ AGT/LISS: 4+

Ficin: Negative at 37C and AGT.

DTT: Negative at AGT.

All cells still showed 3+ reactivity at antiglobulin phase after prewarming.

Selected phenotypically matched cells tested positive with LISS and PEG, pointing towards an antibody directed to a possible high-frequency antigen.

Additional selected cells were tested, and all reacted strongly positive (3+) at antiglobulin, except for one In(b)-negative cell, which was nonreactive. Additional In(b)-negative cells from our rare inventory were tested and were found to be nonreactive against the patient's plasma. The initial anti-In(b) titer was 128; subsequent samples tested in May and June also tittered to 128.

A national search was put out to find In(b)-negative units but the search was unsuccessful. No additional family members were available for typing and compatibility testing. Transfusion was not anticipated prior to delivery, as the patient's pregnancy was not complicated, and the risk for bleeding was considered to be low; hemoglobin was stable at 10.3 g/dL and the patient was also taking iron supplements. In June, the patient delivered a healthy baby girl (blood group O, Rh-positive; negative Coombs test) with no evidence of HDFN; the baby was not tested for the In(b) antigen. The patient returned in March of 2018 with a new pregnancy (G4P3) for a prenatal

workup; the initial sample was not sufficient to complete the antibody identification workup and no additional samples were sent to the reference laboratory.

Conclusion: Our case adds to the existing literature on the lack of association of anti-In(b) with HDFN. As compatible blood units are close to impossible to obtain, transfusions need to be reserved for only severe emergency situations, and all efforts should be done to minimize the need for transfusion. Strategies to be employed in the case of pregnant patients are iron supplementation, autologous transfusions, directed transfusions from potentially-compatible family members, intraoperative blood recovery, as well as use of hemostatic agents. Recently, a national/international search for In(b)-negative units has been conducted for a 2 year-old girl in Florida with neuroblastoma. Vitalant has been an active member in helping to set up donation drives and have been testing donors for the In(b) antigen. Unfortunately, the units tested so far from the donations in Chicago-area have not been found to be compatible, but the search was able to find four compatible donors located elsewhere.