Abstract No. 1

Authors:
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Title:
PURE RED CELL APLASIA AFTER HEMATOPOIETIC STEM CELL TRANSPLANTATION ACROSS A MAJOR ABO MISMATCH

Text:
An ABO identity or compatibility between donor and recipient is neither a requirement nor an obstacle to allogeneic hematopoietic stem cell transplantations (HCT). An ABO-barrier can be minor (donor isohemagglutinins against patient A/B antigens), major (patient isohemagglutinins against donor A/B antigens) or bidirectional (a combination of both). Pure red cell aplasia (PRCA) is a specific complication of major/bidirectional ABO donor-to-recipient incompatibility, and occurs in 8% - 29% of allogeneic HCT with major/bidirectional ABO disparity. Published data on risk factors and the impact of PRCA on clinical outcomes after allogenic HCT are not conclusive.

The prevalence of PRCA, risk factors and outcomes were retrospectively evaluated in patients who underwent HCT across a major/bidirectional ABO-barrier, with a comparative analysis between cases with and without PRCA. Cell engraftment, transfusion requirements, acute and chronic graft-versus-host-disease (GVHD) and survival were analyzed. Anti-A/B IgM and IgG isohemagglutinins were measured at baseline, at day 30 and at day 180 post-transplant.

Of 692 allogeneic HCT performed between 01.01.2006 and 31.12.2015, in 104 (15%) a major/bidirectional ABO incompatibility was present. Excluding 3 patients (2 with graft failure, 1 case where red blood cell - RBC - engraftment was not evaluable), data of 101 HCT in 98 patients were analyzed. PRCA occurred in 19 cases (19%). Factors associated with PRCA were the involvement of a donor with A blood group (p = 0.001), and a donor-to-recipient A/O incompatibility (p = 0.007). Patients with PRCA had delayed RBC engraftment, higher RBC transfusion requirements and prolonged time to myeloid reconstitution (p = 0.018), and showed a trend to more severe chronic GVHD (p = 0.098). Survival at 5 years was similar in cases with and without PRCA. (p = 0.123) Of note, anti-A/B antibody titers were higher in PRCA patients at all determinations and persisted longer post-transplant.

Preventing PRCA by means of pre-transplant measures (e.g., avoiding whenever possible major/bidirectional ABO-disparity in the selection of stem cell donors and reducing isohemagglutinin titers in case of a A/O donor-to-recipient incompatibility), and appropriately treating
PRCA after HCT would reduce transfusion requirements and complications of RBC transfusions, such as iron overload. However, the optimal management of PRCA requires further evaluation in larger patient cohorts.

Abstract No. 2

Authors:
Young-Lan Song, Antigoni Zorbas, Daniele Siciliano, Christoph Gassner, Beat M. Frey, Charlotte Engström

Affiliation:
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Title:
ACUTE WARM AUTOIMMUNE HEMOLYTIC ANEMIA CAUSED BY AUTOANTI-D

Text:
Introduction: We report a case of a 68 year-old woman who developed a warm autoimmune hemolytic anemia (AIHA) caused by an autoantibody with anti-D specificity requiring transfusions. Two weeks after suffering from gastroenteritis of unknown cause, the patient was hospitalized due to symptomatic hemolytic anemia. Laboratory tests revealed hemoglobin of 6.2 g/dL, elevated lactate dehydrogenase, reticulocytes and bilirubin as well as decreased haptoglobin. Differential diagnostics excluded any disease associated with AIHA.

Methods: Standard serological methods for antibody detection and specification were used (gel-card and tube test; BioRad, Cressier, CH). The Rhesus (Rh) phenotype was CcD.Ee. Direct antiglobulin test (DAT) was positive for IgG1. Autocontrol was positive and the patient’s serum and eluate reacted with all antiglobulin test (DAT) was positive for IgG after incubation with patient’s serum and serum eluate was entirely negative. Initial anti-D-titer was very high (1:16384). Additional reactions with Dithiothreitol (DTT)-treated RhD positive RBC ruled out an anti-LW mimicking anti-D specificity. Further supporting the presence of an autoanti-D. At follow-up DAT and antibody detection were negative by routine techniques. Though, DAT was slightly positive for IgG after incubation with patient’s serum and serum reacted weakly positive with some papainized R2R2 (eeD.EE) RBC in IAT. Autocontrol was positive and the eluate was entirely negative.

Conclusions: There are only rare cases of AIHA caused by autoanti-D described so far. In our laboratory, whenever autoanti-D is suspected certain investigations are performed not to overlook an alloantibody. The overall results confirmed autoanti-D causing the hemolysis. Autoantibodies are mostly taken irrelevant for transfusion but get crucial when causing acute hemolysis. Fortunately, autoanti-D can be taken into account by choosing RhD negative RBC. In our case, the patient was transfused with 3 RhD negative RBC products showing an increase of the hemoglobin value up to 9.8 g/dL. Shortly thereafter, when steroid therapy was started, no more transfusion was required and the patient improved completely.

Abstract No. 3

Authors:
L. Infanti, N. Tschopp-Weber, A. Plattner, A. Holbro, A. Buser

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Title:
IN VITRO QUALITY OF PLATELET CONCENTRATES PATHOGEN INACTIVATED USING TRIPLE STORAGE PROCESSING SET

Text:
This study evaluated the in vitro quality parameters of PC collected by large volume apheresis procedures with PLT doses sufficient for 3 therapeutic single units and treated using the INTERCEPT TS sets. Twelve triple dose collections (target 8.0 - 10.0 × 1011 PLT in 600 - 650 mL) were performed, 6 with Amicus (Fresenius Kabi) and 6 with Trima (Terumo BCT), obtaining 36 single dose PC. Apheresis products were suspended in about 40% plasma / 60% PAS (SSP+) and stored up to 7 days after treatment in the TS sets. Six apheresis products were treated on the day of collection with addition of 15 mL of 6 mM amotosalen and illumination with UVA 3 J/cm², incubated with a double compound adsorption device (CAD) wafer overnight (close to 16 hours), and finally split into 3 storage containers. Six apheresis products were stored overnight then treated in the same way on day 1 with subsequent short CAD incubation (slightly above 4 hours). In vitro parameters were tested before treatment (day 0 or 1), post-CAD incubation and split (day 1), and at days 5 and 7 of storage.

Single PC had a mean PLT content of 2.89 + 0.35 x 1,011 and a mean volume of 188 + 10 mL (recovery of 96 ± 15%). pH values at 22°C (n = 12) at day 7 were similar to values at day 0/1 pre-processing (7.0 + 0.1 vs. 7.1 + 0.1). pO2 increased from 11.3 + 2.4 to 18.3 + 3.5 kPa (p < 0.001). pCO2 decreased from 4.1 + 0.8 to 1.5 + 0.7 kPa (p < 0.001) between day 0/1 and day 7. Glucose was 26.1% of the initial concentration at day 5 and 6.0% at day 7. Lactate increased from 3.6 + 1.7 at day 0/1 to 12.1 + 1.5 mmol/L at day 7 (p < 0.001). Bicarbonate was at 40.4% of initial at day 7. ATP concentration was 68.0% of initial.
LDH increased from 201 + 119 at day 0/1 to 324 + 203 U/L at day 7 (p < 0.001). Residual amotosalen concentrations after short and long CAD incubation were < 2 µM. Triple dose PC collected by apheresis and processed with the INTERCEPT TS sets exhibited satisfactory metabolic activity during 7-day storage. The EDQM requirements for PLT content, PC volume and pH values were met. INTERCEPT TS sets allow reducing the number of procedures, materials and labor time for pathogen reduction treatment of PC while preserving product quality.

**Abstract No. 4**

**Authors:**
Young-Lan Song, Gabrielle Rizzi, Antigoni Zorbas, Ariane Caesar, Peter Schwind, Christoph Gassner, Charlotte Engström, Beat M. Frey

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**Title:**
A RAPID AND RELIABLE NEW MEMBER FOR THE IMMUNOHEMATOLOGY TOOLBOX - THE MDMULTICARD®

**Text:**
Previously presented at ISBT 2018, Toronto

**Introduction:** MDmulticard® Basic Extended Phenotype (Grifols, Duedingen, CH) was launched in September 2016 and allows simultaneous typing of Jka, Jkb, Fya, Fyb, S, s antigens using lateral flow technique. In order to implement the MDmulticard® as an additional analytic tool we examined samples taken from patients with clinical conditions known to hamper serological red blood cell (RBC) antigen typing.

**Methods:** 63 Samples of patients suffering from positive DAT including warm and cold autoimmune hemolysis (AIHA) and spherocyte disease, paraproteinemia due to Multiple Myeloma or Morbus Waldenström and samples of newborns as well as samples of healthy blood donors (three with known weak Fyx) were assessed by MDmulticard®. These results were compared with the findings of alternative test methods, either by standard serology typing (gelcard on Erytra®, Medion Grifols, Duedingen, CH or BioRad, Cressier, CH) or by molecular typing using PCR-SSP (inno-train GmbH, Kronberg i. T., D).

**Results:** MDmulticard® was easy to handle and provided rapid results (in average 9 minutes from test start) making the method suitable for emergency applications. Generally, the results were confirmed by alternative methods or known pre-values. Two of known Fya- samples showed false positive reactions by MDmulticard® due to the patients' strongly positive DAT (3+ and 4+).

One sample showed a weak Jkb+ result by MDmulticard® although the patient was known to be Jkb- by PCR. Clinical evaluation revealed recent transfusion of Jkb+ RBC. In two IgM-DAT positive samples, the predicted phenotype by PCR could be delivered accurately by MDmulticard® only upon washing the patient’s RBCs. A similar observation was made with cord blood cells. Another sample from a patient with severe cold AIHA needed to be washed with warm NaCl 0.9%.

**Conclusions:** MDmulticard® allows reliable RBC typing even of DAT positive samples. MDmulticard® may be applied to samples of patients suffering from sickle cell disease, AIHA or paraproteinemia impairing standard serological typing. In pre-transfused patients or such with a strongly positive DAT, the distinct positive reactions by MDmulticard® allow to differentiate between false positive reactions and inherited antigen positive RBC. For emergency situations, the MDmulticard® proves to provide fast and reliable antigen typing which allows trans-fusing the patient with phenotype compatible RBC.

**Abstract No. 5**

**Authors:**
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**Title:**
ANTI-VERWEYST (ANTI-MNS9) ALLOANTIBODY CAUSING SEVERE NEONATAL HYPOGENCEITIC ANEMIA AND THROMBOCYTO- PENIA

**Text:**
**Background:** Gene conversion resulting in hybrid glycolphorin A-B-A genes within the MNS system is the molecular basis of rare incidence antigens such as the Verweyst (Vw) antigen. Yet, its prevalence is unexpectedly high (1.43%) in the population of South East Switzerland. Anti-Vw alloantibodies develop naturally (IgM) or upon active immunization due to blood transfusion or pregnancy (IgG). Indeed, IgG anti-Vw is known to cause severe transfusion reactions and hemolytic disease of the fetus and newborn (HDFN).
Case report: A 39-year-old Caucasian woman, 5G1P, who had acquired anti-Vw alloantibodies during her first pregnancy, was followed regularly by titrating anti-Vw antibodies and performing Doppler ultrasound to detect fetal anemia. At 30th gestational week, the fetus presented accelerated middle cerebral artery peak systolic velocity with cardio- and hepatosplenomegaly associated to a drastic reduction in fetal hemoglobin (44 g/L) and thrombocytopenia (49 G/L). Consequently, an in-utero blood transfusion at 31st gestation week was performed, while the mother received IVIG infusions (400 mg/kg; day 1 - 5), followed by premature cesarean section at week 32. The newborn exhibited severe hyptregenerative anemia (Hb 134 g/L; reticulocyte count, 76 G/L) and thrombocytopenia (14 G/L), requiring an additional transfusion of red blood cells (12 cc/kg) and two platelet transfusions (12 cc/kg). Neonate direct antiglobulin testing confirmed the presence of anti-Vw antibodies. At day 1 after birth, an exchange transfusion with red cells was carried out to reduce maternal-derived anti-Vw antibodies, leading to a slow but favorable evolution of the infant’s Hb and thrombocytopenia.

Conclusions: Here, we describe a rare case of severe anemia due to anti-Vw alloantibody associated with reduced reticulocytosis and absence of erythroblasts, requiring multiple red cell and platelet transfusions. This case further supports the clinical significance of anti-Vw alloantibodies in HDFN. Moreover, our observations are in line with the hypothesis that anti-Vw antibodies may suppress erythropoiesis at the progenitor-cell level, similarly to the anti-Kell model. To address this point, we recovered plasma from the mother containing anti-Vw antibodies and plan to perform assays on erythroid progenitor cells. Finally, whether the detected thrombocytopenia was of multifactorial origin or a direct effect mediated by anti-Vw also requires further investigations.

Abstract No. 6

Authors:
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Title:
REACTIVE IRON SPECIES IN SUBJECTS WITH ASYMPTOMATIC HEREDITARY HEMOCHROMATOSIS: AN INTERIM ANALYSIS OF A PROSPECTIVE, RANDOMIZED STUDY OF BLOODLETTING TREATMENT

Text:
Introduction: Healthy carriers of hereditary hemochromatosis (HH) can donate blood if meeting the eligibility crite-
tion in C282Y/C282Y, but not that of targeting a SF level as low as 50 µg/L. For other HFE mutations, intensive treatment is probably unnecessary. Data of further 17 HH cases are being currently analyzed.

Abstract No. 7
Authors: Tanja Rüfli, Vildana Pehlic, Nadja Borer, Syzane Rexhepi, Andreas Holbro, Andreas Buser, Laura Infanti

Affiliation: Regional Blood Transfusion Center, Swiss Red Cross, Basel, Switzerland

Title: RECRUITMENT OF BLOOD DONORS OF NON-CAUCASIAN ETHNICITY

Text: Introduction: In Switzerland, an increasing number of patients of African or Asian origin with sickle cell disease (SCD) or transfusion dependent thalassemia (TDT) require red blood cell (RBC) transfusions, and many have RBC alloantibodies. Selecting optimally matched RBC units for these patients is essential for preventing not only acute hemolysis but also further alloimmunization. Beside antigen-matching for ABO, Rh D, C, c, E, e and K, patients with SCD and TDT should ideally receive RBC units matched also for M, N, S, s, Fya, Fyb, Jka and Jkb (extended phenotype). This is the policy at our center, which currently provides RBC products to 31 patients with hemoglobinopathies. Because the vast majority of Swiss blood donors are Caucasians, the selection of matched RBC units for patients of different ethnic origin can be difficult. Therefore, expanding the number of available African and Asian blood donors is becoming increasingly necessary. Here we provide the first results of the recruitment strategy of non-Caucasian blood donors at our center.

Methods: Since 01.01.2013, in the file of all non-Caucasian first-time blood donors an alert is entered in order to trigger the determination of the extended RBC phenotype along with routine testing. RBC antigen testing is performed in our laboratory with serologic methods. In selected cases (e.g. suspected RhD or RhCE variant), samples are sent to another laboratory for molecular analysis. If a rare RBC phenotype is detected, a coded comment is entered in the donor data and the donor is listed in the national Rare Donor File.

Results: From 01.01.2013 until 01.06.2018, an extended RBC antigen phenotype was determined in 281 individuals. Seventeen rare donors (6%) were identified and included in the Rare Donor File. Overall, these 17 donors provided 61 RBC units (range 1 - 20), are all still active and 8 are reserved for dedicated donations. The internal price of RBC antigen testing per donor is approximately 100 CHF, resulting in a total financial effort of around 28,100 CHF in the time since the project was started.

Conclusions: In our experience, a “passive” recruitment of non-Caucasian blood donors has an overall low efficiency from a logistic and financial point of view. However, the targeted determination of extended RBC antigen phenotype does allow the identification of individuals with rare phenotypes. Strategies for the active recruitment and the retention of such blood donors are urgently needed.

Abstract No. 8
Authors: Nora Dögnitz, Andreas Studer, Andreas Wicki

Affiliation: Interregionale Blutspende SRK AG, Bern, Switzerland

Title: VALIDATION OF THE INTERCEPT BLOOD SYSTEM FOR PLASMA AT IRB SRK AG

Text: Background: The pathogen inactivation (PI) process with the INTERCEPT Blood System for Plasma (IBS) has been validated in our facility. In total, 8 pools of whole blood (WB) derived plasma units and 8 apheresis plasma collections were included in the validation.

Methods: 5 WB plasma units were pooled (PurePlas 6 pooling-set TF400, Heinz Meise GmbH), filtered and split into 2 sub-pools, each was treated with one INTERCEPT set (Cerus) to obtain 6 IBS plasma units. Each plasma collection coming from plasmapheresis or platelet apheresis was treated directly with one INTERCEPT set to obtain 3 or 2 IBS plasma units, respectively. The processing time and blood groups were chosen as planned for the routine practice. The overall processing time for 4 out of 8 WB plasma pools and 3 out of 8 apheresis collections was shorter than 8 hours. The other plasma pools and collections were processed between 16 - 20 hours. Processing included donation, a holding period of different length, the PI, and ended after plasma freezing. Complete freezing to temperatures below -30°C took place in less than 50 minutes. The blood groups were A and 0 for the plasma pools, and AB and B for apheresis. For the analysis of factor VIII and fibrinogen, samples of approx. 10 mL were collected before filtration (for WB plasma pools), before and after pathogen inactivation, and after 1 month storage time.

Results: All WB plasma sub-pools and apheresis plasma collections met the INTERCEPT guard band requirements before PI (volume 385 - 650 mL, contaminating red blood cells ≤ 4 x 106/mL). All final plasma products met the Swiss Transfusion SRC quality requirements after PI, in-
including volume 200 ± 20 mL, factor VIII ≥ 0.5 IU/mL, and residual amotosalen < 2 μM. Factor VIII recovery after 1 month storage time at -25°C (calculated versus before filtration) was in average 82% for ISB plasma units derived from WB and 79% for apheresis, with final concentrations of 1.94 ± 0.04 g/L and 1.97 ± 0.40 g/L, respectively.

Conclusions: The treatment by IBS of WB derived pooled plasma and apheresis plasma was validated according to the routine conditions of use. All Swiss Transfusion SRC quality requirements were met. The factor VIII absolute levels were as expected lower in the WB plasma series including 50% of blood group 0.

Abstract No. 9

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Affiliation: 1 Blood Transfusion Service of the Swiss Red Cross, Aarau, Switzerland 2 Blood Transfusion Service of the Swiss Red Cross, Basel, Switzerland 3 Blood Transfusion Service of the Swiss Red Cross, Bern, Switzerland

Title: ANTI-HNA ANTIBODIES IN PLATELET APERESIS DONORS WITH AND WITHOUT PRIOR IMMUNIZING EVENTS

Text: Background: Transfusion related acute lung injury (TRALI) is a fatal complication of transfusion, caused by human leucocyte antigen (HLA-) and/or human neutrophil antigen (HNA)-antibodies in donor plasma. For TRALI prevention, screening of PLT donors with prior immunizing events for HLA- and HNA-antibodies is advocated, as platelet (PLT) concentrates contain at least 1/3 of plasma and a male-donor-only strategy is not feasible. However, granulocyte immunofluorescence testing (GIFT), granulocyte agglutination testing (GAT) or monoclonal antibody-immobilized granulocyte antigen (MAIGA) assays are not suitable for high-throughput testing. The LABScreen MULTI assay (One Lambda, USA) is a bead-based assay for specific detection of antibodies directed against HNA-1a, HNA-1b, HNA-1c, HNA-2, HNA-3a, HNA-3b, HNA-4a, HNA-5a and HNA-5b. In our current study we tested the prevalence of HNA-antibodies in PLT apheresis donors with and without previous immunizing events.

Material and Methods: 160 serum samples of male and female PLT apheresis donors with and without prior immunizing events (pregnancy or transfusion) were tested for anti-HNA-antibodies with the LABScreen MULTI assay. All samples had previously been tested negative by GAT/GIFT.

Results: The 160 serum samples included 118 female and 42 male donors, 59 of them had prior immunizing events. 15 of 160 (9%) donors had anti-HNA antibodies (4 male, 11 female). None of the male and five of the female anti-HNA-antibody positive donors had prior immunizing events. The specificities of the antibodies were: 4 anti-HNA-1a, 1 anti-HNA-2, 10 anti-HNA-3a and 1 anti-HNA-3b (one donor had two anti-HNA specificities).

Conclusions: LABScreen Multi assay detects specific anti-HNA-antibodies in PLT apheresis donors that have previously been tested negative by GAT/GIFT. Anti-HNA-antibodies are also present in donors without history of prior immunizing events. Disturbingly, the most prevalent specificity in our cohort was anti-HNA-3a which is associated with severe TRALI cases.

Abstract No. 10

Authors: C. Tinguely, M. Hotz, C. Niederhauser

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Title: COMPARISON STUDY OF THE NEWLY LAUNCHED ROCHE ELECSYS INFECTIOUS DISEASE PARAMETER ON COBAS E801 IN BLOOD DONOR SCREENING

Text: Previously presented at ISBT 2018, Toronto

Background: Testing all blood donations for markers of infectious diseases in blood banks plays an important role in maintaining the safety of blood transfusions. Mandatory serological testing is performed for anti-HCV, HIV Ag/Ab, HBsAg and Syphilis. Highly specific and sensitive tests with corresponding automation are essential for this purpose.

Aims: To evaluate the performance of the Elecsys HIV Duo, Anti-HCV II, HBsAg II and Syphilis (Roche Diagnostics) infectious disease parameters on the new cobas e 801 instrument a comparative study was carried out with the currently used ELISA methods on the Quadriga BeFree System (Siemens Healthcare Diagnostics).

Methods: The study took place in the Interregional Blood Transfusion Service in Berne, Switzerland. The specificity
of the parameters has been studied on 3,066 blood donor sera (using sera from both first time and repeat donors). The samples were tested initially on the quadriga Be Free System with the Enzygnost HBsAg 6.0, Enzygnost Anti-HCV 4.0, Enzygnost HIV Integral 4 and on the PK7300 (Beckman Coulter) with the newbio-PK TPHA (Newmarket Biomedical). These samples were retested on the same day on the cobas e 801 with Elecsys® HIV Duo, Anti-HCV II, HBsAg II and Syphilis. Initial reactive samples were repeated in duplicate. Discriminatory tests were carried out on repeatedly reactive samples using alternative screening tests and neutralisation (for HBsAg) on an Abbott Architect i1000 system, immunoblots (HIV-, HCV-, Syphilis-, INNO-LIA, Fujirebio), as well as, individual donation nucleic acid assay ID-NAT (HCV, HIV, HBV, Roche cobas 8800 system).

Results: Based on the results from testing 3,066 blood donations, the observed specificity of Roche Elecsys assays on cobas e 801 (R) and Siemens Enzygnost assays on Quadriga BeFree (S) are comparable: % specificity / % confidence interval: HCV 99.84 / 99.62 - 99.95 (R), 99.97 / 99.82 - 100 (S), HIV 99.77 / 99.53 - 99.91 (R), 99.97 / 99.82 - 100 (S), HBsAg 99.90 / 99.71 - 99.98 (R), 99.84 / 99.62 - 99.95 (S), Syphilis 99.93 / 99.76 - 99.99 (R), 100.00 / 99.88 - 100 (S). The initial reactive (IR) and repeat reactive (RR) % specificity were identical. One sample was positive with Elecsys HBsAg II and confirmed by Elecsys HBsAg Confirmatory assay but negative in the Enzygnost HBsAg 6.0, Architect HBsAg confirmatory, Architect anti-HBc and Roche HBV ID NAT. Further tests with this sample including repetition of the HBsAg confirmatory assay and Auto-Confirmatory-Prototype assay (Roche Diagnostics) were negative indicating the Roche Elecsys HBsAg result was false reactive.

Conclusions: The observed performance of Roche Elecsys assays to Siemens Enzygnost assays is comparable in a blood donor screening setting. Due to the insufficient number of donor samples tested in parallel it was not able to analyse the specificity data statistically. It is worth noting that 92% of the samples included in the study derived from repeat donors who had been previously tested with the Enzygnost assays but were “naive” for the Elecsys assays. The anti-HCV, HIV Ag/Ab, HBsAg and Syphilis assays from both systems exhibit a very good specificity and are highly suitable and practicable for routine blood donor screening.

Title: AN ANTIBODY AGAINST A NOVEL HIGH INCIDENCE ANTIGEN IN THE INDIAN BLOOD GROUP SYSTEM

Text: Previously presented at ISBT 2018, Toronto; published in Vox Sanguinis, Volume113, Issue S1, June 2018, P-485

Background: The Indian (In) blood group glycoprotein CD44, is the predominant cell surface receptor for hyaluronan and other components of the extracellular matrix. The protein is encoded by the CD44 gene on chromosome 11, consisting of 19 exons of which 10 are variable. The hematopoietic isoform is composed of exon 1 to 5, 15 to 17 and 19. The Indian blood group system consists of 4 high prevalence antigens IN2 (Inb), IN3 (INFI), IN4 (INJA) and IN5 (INRA) and one low prevalence antigen IN1 (Ina). IN: -3, IN: -4 and IN: -5 have been reported in only a few cases. IN1, which is antithetical to IN2, is more prevalent in the Arabic, Iranian and Indian population with up to 10% being IN: 1, 2.

Aims: A sample from a patient of Sri Lankan origin was investigated for antibody specificity due to pan reactivity. A sample from the brother of the patient was also investigated.

Methods: Serological investigations were performed by IAT (tube and column agglutination). Papain and trypsin treated cells were also utilised. Soluble recombinant In blood group proteins (In-rBGP) (Imusyn, Germany) were used in neutralization tests. The clinical significance of the antibody was assessed by a monocyte monolayer assay (MMA). Genomic DNA was isolated from whole blood and the samples were further characterized by PCR amplification and Sanger sequencing including flanking intronic regions of the hematopoietic isoform of CD44 (exons 1 - 5, 15 - 17 and 19).

Results: The plasma of the patient and his brother reacted positive with all cells tested, except their own, by IAT and trypsin IAT, but negative in papain and saline tests. The antibody was neutralized with In-rBGP, thereby confirming In specificity. The patient and his brother were found to have the IN: 2 phenotype. The monocyte index (MI) for the patient was Z.276C> A in a homozygous state for both the patient and his brother. This mutation leads to amino acid change p.H92Q. The patient’s serum was compatible with cells from his brother. Cells from the patient’s brother were found to be IN: 3, 5. IN: -3 and IN: -4 cells were found to be incompatible with the brother’s plasma.

Conclusions: We report the case of a patient of Sri Lankan origin whose cells lack a novel high prevalence antigen of the In system and his plasma contains the corresponding anti-In antibody. Lack of the novel In antigen is due to homozygosity for a novel mutation c.276C>A in exon 3 of CD44. His brother was found to have the same genotype and was serologically compatible with the patient’s plasma. As the patient and his brother apparently have not
been transfused, we presume that the antibody is naturally occurring. An MI < 3% suggests that the antibody is not clinical relevant.

Abstract No. 12

Authors:
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Title:
IMMUNOADSORPTION AS ADJUNCTIVE TREATMENT IN PATIENTS WITH ACQUIRED HEMOPHILIA

Text:
Background: Aquired hemophilia is a rare but life-threatening disease with substantial therapeutic challenges. Immunoadsorption is suggested as an adjunctive treatment to reduce the antibody levels rapidly and support the initial treatment. The clinical data are however limited to case reports and small case series.

Aim: We report on the clinical course of all patients treated with immunoadsorption in our institution.

Methods: In a retrospective design, we identified, and summarized all patients with acquired hemophilia treated with immunoadsorption since its implementation in 2003. Patients were identified through diagnosis codes, and electronic patient charts and laboratory records were used for data collection. Factor VIII:C was determined in a one stage clotting assay using Pathromtin® SL (Siemens Healthcare) and FVIII inhibitor titers were assessed by the Nijmegen-modified Bethesda assay.

Results: Seven patients were identified. Median age was 77 years (range: 68 to 86), 14% were female (n = 1). Indication for immunoadsorption were high inhibitor titers (n = 4; 57%) and/or severe bleeding. No triggering cause was identified (idiopathic) in 6 patients (86%), while 1 (14%) patient had Wegener granulomatosis. Factor VIII:C was below 1% in 5/7 patients (71%). Median inhibitor titer was 21.6 BU/mL (range 6.7 to 214). Additional treatments were high-dose steroids (n = 7; 100%), recombinant factor VIIa (n = 5; 71%), cyclophosphamide (n = 6; 86%), rituximab (n = 1; 14%), intravenous immunoglobulins (n = 2; 28%), activated prothromplex concentrate (n = 1; 14%), and high-dose factor VIII (n = 1; 14%). Columns for immunoadsorption being used were Immunosorba (Protein-Al Ligand) in 6/7 patients (86%) and GlobAffin Adsorber (Peptid-GAM-Ligand) in one patient. The median number of immunoadsorption cycles was 5 (range 4 to 7). Bleeding was stopped in 5/7 patients (71%). No FVIII:C response was recorded in 2/7 patients (28%), and only partial recovery (FVIII:C > 30%) was observed in one patient (14%). Within a follow-up of 12 months, three patients died due to different causes (one patient lost to follow-up).

Conclusions: Our results suggest that immunoadsorption supported antibody clearance and factor VIII recovery in the majority of patients. Larger registry studies might seek to establish which patients benefit most.

Abstract No. 13

Authors:

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Title:
TWO CASES OF CAUCASIAN BOMBAY AND THREE CASES OF PARA-BOMBAY PHENOTYPE REVEALED FIVE NOVEL FUT1 ALLELES

Text:
Previously presented at ISBT 2018, Toronto, published in Vox Sanguinis, Volume113, Issue S1, June 2018, P-529

Background: The rare Bombay (Oh) and para-Bombay (H+W) phenotypes have non-functional or partially functional α(1, 2)-fucosyltransferases. These enzymes are encoded by two highly homologous genes FUT1 (H) and FUT2 (Se). The α2FucT1 enzyme encoded by FUT1 is crucial for the synthesis of H antigen on red blood cells (RBCs), a precursor processed to form either the A or B antigens. The α2FucT2 enzyme encoded by FUT2 is responsible for the synthesis of H antigen in body fluids such as saliva and plasma (secretor phenotype). Bombay individuals neither express ABH antigens on their RBCs nor secrete H substance in their saliva due to inactive FUT1 and FUT2 alleles, respectively. Para-Bombay phenotype typically displays weakened H antigen expression. This can either result from FUT1 variant allele(s) diminishing enzyme activity in non-secretors or by a non-functional FUT1 in secretors.

Aims: Two samples (probands 1 and 2) of Caucasian origin were investigated due to the presence of anti-H in their plasma and three samples (probands 3, 4 and 5) were analysed because of discrepancies in ABO blood group typing.

Methods: RBC typing and antibody identification was performed using standard serological testing (BioRad,
Results: Probands 1 and 2 had no detectable A, B or H antigens by serology or flow cytometry. Plasma from both probands contained strong anti-H reacting by IAT, compatible with Oh RBCs. Proband 1 genotyped as ABO*01/A BO*B1.01, proband 2 as ABO*A1.01/ABO*O.01.02. DNA sequencing of FUT1 revealed that proband 1 was homozygous for FUT1*01N.12 whereas proband 2 showed compound heterozygosity for FUT1*01N.12 and a novel mutation, FUT1 c.791_792insG (p.M265Hfs*5). Samples from the parents of proband 2 showed that the new FUT1 allele was inherited by the group A father. Probands 3, 4 and 5 showed reduced expression of A antigen (negative to weakly positive). ABO genotyping [SJ1] predicted A phenotypes. Anti-H(I) was detected in the serum of proband 3.

Summary/Conclusions: Five novel mutations of the FUT1 gene were identified, resulting in a Bombay or para-Bombay phenotype. Flow cytometric analysis of proband 3 RBCs demonstrated a para-Bombay-like (Ah) expression with monoclonal anti-A, but were nonreactive with monoclonal anti-H. Serum from proband 4 showed strong anti-A. Serum from proband 5 was antibody negative. Sequencing of FUT1 revealed homozygosity for c.396_398delCCC (p.Pro133del) in proband 3; proband 4 was heterozygous for FUT1*01 W.04 and a novel mutation, FUT1 c.710delG (p.G237Af s*43); proband 5 was heterozygous for two novel mutations FUT1 c.288T>A (p.Y96Ter) and FUT1 c.454delG (p.E152 W.04 and a novel mutation, FUT1 c.710delG (p.E152 Rsfs*6). SSP-PCR for FUT2 c.428 suggested that proband 3 and 5 are secretors, whereas proband 4 is a non-secretor.

Abstract No. 14

Authors:
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Title:
OCCURRENCE AND DYNAMICS OF HLA- AND HPA-ANTIBODIES IN THE SETTING OF MATCHED RELATED HEMATOPOIETIC STEM CELL TRANSPLANTATION

Text:
Background: HLA-antibodies are increasingly recognized to play an important role in the setting of HSCT. The aim of the current prospective study was to evaluate occurrence and dynamics of HLA- and HPA-antibodies after matched related HSCT.

Methods: Patients and their matched related donors were prospectively included in the IRB approved study. HLA- and HPA-antibodies were determined by Luminex technique at predefined time points. For patients, samples were drawn at baseline (before HSCT), at HSCT and weekly thereafter until 4 weeks after HSCT and for donors at eligibility assessment and at donation. We used generalized estimating equation models of the Gaussian and negative binomial family with log links and robust standard errors in order to assess temporal trajectories of patients’ average mean fluorescence intensity (MFI), highest MFI, and the number of antibodies with MFI > 500.

Results: Among the 50 patients included in the study, 26 (51%) were female and median age at transplantation was 51 years. The majority of patients had AML (37%) and MM (15.7%), received myeloablative conditioning (58.8%) and GvHD prophylaxis consisted mainly of cyclosporine containing regimens. At baseline, HLA-antibodies were detected in 48 patients (96%) (mean number of antibody specificities: 13; range 0 - 51) and in only 25 donors (50%) (mean number of antibody specificities: 13; range 0 - 51). Overall, both number and MFI of class I antibodies were higher compared to those of class II antibodies. At baseline, the total number was 348 for class I (mean MFI: 2330) and 310 for class II antibodies (mean MFI: 1637). The highest mean MFI for class I and class II antibodies were 4126 and 3735, respectively.

Surprisingly, a considerable increase of the number and intensity of antibodies was observed within a few days, from baseline to the day of transplantation. At HSCT the total number of antibodies was 706 for class I with a mean highest MFI of 6007 and 353 for class II antibodies with a mean highest MFI of 3482, respectively. Thereafter, the number of antibodies as well as MFI-levels - measured weekly - remained stable until the end of observation. This finding was similar after adjusting for gender, age, diagnosis, conditioning, GvHD prophylaxis, CMV status, and ABO incompatibility.

Furthermore, 14 of the 50 patients (28%) developed new HLA antibodies over the observed time period. New class II antibodies (mean number: 184, mean MFI: 2549) occurred more often and at higher intensities than class I antibodies (mean number: 42, mean MFI: 1415). Some of the molecular specificities of these antibodies emerging in the
patients were the same as those found in their corresponding donors. By contrast, only one of the 50 patients had low-level HPA-antibodies and HPA-antibodies were not detected in the donors.

**Conclusions:** Our data show that HLA antibodies are frequently present in patients undergoing HSCT and that they should be measured at the day of transplantation. Additionally, some patients develop new, presumably donor-derived antibodies. This might have some impact regarding both transfusion strategies (platelet transfusion refractoriness) as well as transplant outcome. Since HLA-mismatched (incl. haploidentical) HSCT are increasingly performed worldwide, further studies on the significance of HLA-antibodies in these settings are warranted. On the other hand, HPA-antibodies seem to play a minor role and should be assessed only in selected patients.

**Abstract No. 16**

**Authors:** Craig Wilkes

**Affiliation:** NHS Blood and Transplant, Birmingham, Great Britain

**Title:** ONLINE BLOOD ORDERING SYSTEM (OBOS)

**Text:**

**Introduction:** NHS Blood and Transplant (NHSBT) is dedicated to saving and improving lives. Responsible for ensuring the safe and secure supply of blood and blood components to approximately 300 hospitals, we supplied approximately 1.5 million red blood cells in 2016/17. Up until 2009/10 orders were placed by hospitals using handwritten request forms, faxed to NHSBT, who then transposed the information into our PULSE computer system for processing. In 2009 the NHSBT Board approved the development of an electronic ordering system to modernise the ordering process. A collaborative approach was adopted working with key hospital users. This ensured that essential user requirements were captured, allowing hospitals to quickly select their required components and transmit orders directly into the NHSBT PULSE computer system. In 2009 the NHSBT Board approved the development of an electronic ordering system to modernise the ordering process. A collaborative approach was adopted working with key hospital users. This ensured that essential user requirements were captured, allowing hospitals to quickly select their required components and transmit orders directly into the NHSBT PULSE computer system. On-line Blood Ordering System (OBOS) was built and tested by the end of 2009 and piloted in five hospitals early in 2010 with national roll out to all hospitals from July 2010. Training key users in each hospital using a training system, go to meetings and practice orders. This resulted in a more efficient ordering process and enabled NHSBT to accurately capture true demand of all components and reliable data on component substitutions.

**Results:** Since OBOS became the primary method for ordering components we have seen a number of improvements:
- Increased customer satisfaction with ordering process
- Reduction of complaints relating to accuracy of orders
- Reduction in substitutions
- 100% electronic audit trail (request to issue)

**Conclusions:** OBOS achieved and surpassed all the benefits expected, including a reduction in complaints, and increase in satisfaction with the ordering process. Development continues and remains a collaborative effort, with regular new versions launched each year. NHSBT encourages changes and ideas from both internal and external users. Since the initial launch, we have introduced several major improvements. These include: the ability to order human leukocyte antigen (HLA) matched platelets and in 2017 a version designed using Hyper Text Mark up Language (HTML) to ensure compatibility with the wide range of internet browsers used by our hospitals as well as compatibility with mobile devices. OBOS has assisted a reduction in substitutions, complaints, improved satisfaction and delivery of a full electronic audit trail. Helping NHSBT provide a world class, cost effective service to patients.

**Abstract No. 17**

**Authors:** Mélanie Abonnenc 1, David Crettaz 1, Michel Prudent 1, Pascal Aegerter 2

**Affiliation:**
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**Title:** PERFORMANCE EVALUATION OF A NEW FLEXIBLE WB IN-LINE FILTER FOR REMOVAL OF LEUKOCYTES AND PLATELETS FROM WHOLE BLOOD UNITS

**Text:**

**Background and Objectives:** A new flexible filter named “Bioflex WB” intended for removal of platelet and leukocytes from whole blood units has been developed by Fresenius-Kabi. The aim of the present study was to evaluate the performance of the filter for the leukodepletion (LD) of WB units and the quality of LD red blood cell and plasma units that may be used for standard transfusion purposes. Within the study, we also compared two methods for measuring the free Hb concentration in RBC units, the Systemex-based and the Harboe methods.

**Materials and Methods:** A total of 50 whole blood donations (450 - 500 mL +/- 10%) collected from non-eligible donors were processed with the kits PQ41555 (Compo-
Methods are well correlated at high Hb concentration ($r^2 = 0.9159$) such as the end of the storage period. Besides the successful validation of the new WB in-line filter from Fresenius-Kabi, the study was aimed to evaluate a flow cytometric method for determination of different ABO phenotypes.

**Methods:** Analysis was performed on a flow cytometer (FACS Canto II, Becton Dickinson, Allschwil, CH) and measured with identical instrument settings. BD FACS Diva software was used for graphical presentation (histogram). RBCs were incubated with anti-A (BIRMA-1, Merck KGaA, Darmstadt, D). Next, antigen-antibody bonding was fixed with 1.5% glutaraldehyde after a secondary labelled antibody (Alexa Fluor® 647 AffiniPure Goat Anti-Mouse IgG, Jackson ImmunoResearch Europe Ltd, UK) was added. Finally, gating of RBC was ensured by additional staining with anti-Glycophorin A (GPA, CD235a APC, Becton Dickinson AG, Allschwil, CH).

**Results:** In total 32 serologically clearly defined samples (A1 (7; MFI mean: 29283), A2 (7; MFI mean: 15598), A1B (7; MFI mean: 19695), A2B (2; MFI mean: 13956), B (7; MFI mean: 404), 0 (7; MFI mean: 468)) and 2 serological (0 - 2 + agglutination with different monoclonal anti-A and anti-A, B and no reaction with anti-Ahel) weak A subtypes were examined. Distinguishable flow cytometric patterns based on the level of A antigen-expression of the different ABO phenotypes were displayed. The 2 serologically weak A samples showed a distinct lower MFI (1449 and 1242).

**Conclusions:** During the evaluation several different approaches were tested. Ultimately the most solid results were obtained by the described method using a fixation with glutaraldehyde. To summarize, our method was able to show a constant correlation of the MFI and the respective amount of A antigens in common ABO phenotypes. Furthermore, we could clearly discriminate the 2 serologically weakened A samples from the common ABO phenotypes, supporting the sensitivity of this flow cytometric method. It must be noted, though, that this method will need to be further proven by investigating additional serologically and genetically defined ABO subgroups.

**Abstract No. 19**

**Authors:**

Matteo Binda, Vincenzo Favaloro, Norbert Piel, Jody D. Berry, Peter Schwind

**Affiliation:**

Medion Grifols Diagnostics, Düringen, Switzerland

**Title:**

NOVEL RECOMBINANT CD38 ENABLES DETECTION OF IRREGULAR ANTIBODIES IN ANTI-CD38 CONTAINING PLASMA
**Text:**

**Background:** Novel anti-CD38 drugs for treatment of multiple myeloma, such as daratumumab (DARA), interfere with diagnostic screening and identification of irregular antibodies causing pan-reactivity of Reagent Red Blood Cells (RRBC). Strategies to overcome this problem have been proposed, e.g.: 1) Pretreatment of RRBC with reducing agents; 2) Issuing phenotype/genotype matched RBC units; 3) Pre-incubation of patient plasma with soluble CD38 (sCD38) or anti-idiotype antibodies (Oostendorp et al. Transfusion 2015). The aim of this study was to evaluate the diagnostic utility of a newly developed sCD38.

**Methods:** A fusion protein containing the extracellular domain of CD38 was expressed in mammalian cells, purified and concentrated as soluble CD38. For evaluation of its diagnostic functionality, anti-CD38 (Darzalex, Janssen, Horsham, USA) spiked donor plasma (containing alloantibodies or not) were mixed and incubated for 15 minutes at 37°C with varying volumes/concentrations of i) sCD38 or ii) PBS as control. Antibody detection was then performed by Indirect Antiglobulin Test (IAT) in conventional tube technique or DG Gel technique (Medion Grifols Diagnostics, Duedingen, Switzerland; Diagnostic Grifols, Parets del Valles, Spain).

**Results:** A ratio of 2µL and 4µL of recombinant sCD38 (~30mg/mL) per 25µL of plasma, allowed for complete inhibition of 0.5mg/mL and 1mg/mL anti-CD38, respectively. Alloantibodies (anti-D, -E, -c, -Cw, -Fya, -Jka, -S, -s, -M, -Lua, -Cob) spiked at barely detectable amounts into DARA-spiked donor plasma could be readily detected in 16/16 samples when 25µL of plasma were incubated with 2µL of sCD38 (Figure 1.).

**Conclusions:** The results show the inhibition of therapeutic plasma concentrations (Oostendorp et al. Transfusion 2015; De Vooght et al. Curr Opin Hematol 2016) of daratumumab using a novel highly concentrated sCD38 at small volumes without interference in the detection of irregular antibodies. This sCD38 may provide, in combination with IAT, a rapid and accurate screening and identification method of even weakly reacting alloantibodies masked by anti-CD38, which is neutralized readily, with minimal plasma dilution during pre-treatment.

![Figure 1.](image)

**Abstract No. 20**

**Authors:**
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**Title:**
SATURATION OF OXYGEN IN RED BLOOD CELL CONCENTRATES AND ANAEROBIC STORAGE

**Text:**
The storage lesions degrade red blood cells (RBCs) and this is known to be oxygen-dependent. Recently, an unexpected oxygen saturation (sO2) distribution in RBC concentrates (RCCs) was reported which was shown to vary widely from 95%. The reasons for such a distribution are not yet totally explained, whereas the role of oxygen and oxidative lesions has been documented.

In the first part, data on the level of % sO2 measured using Raman spectroscopy in 1,701 leukoreduced RCCs derived from whole blood donations in both top-bottom (TB, n = 1,366) and top-top (TT, n = 335) kits will be presented. Results indicated that % sO2 exhibited a wide non-Gaussian distribution with a mean of 51.3% +/- 18.6. TT processing showed a higher % sO2 than TB processing with a mean of 58.9% +/- 18.3 vs. 49.4% +/- 18.1, respectively (p < 0.0001). Time-to-process did not show any significant difference however processing from whole blood to RCC (n = 112) reduced the % sO2 from 57.3% +/- 18.7 to 50.6% +/- 18.1 (p < 0.0001), whereas no correlations were observed in function of age or hemoglobin level. Additionally, the donors’ location clearly influenced the sO2 and a positive correlation between the % sO2 and the minimal location elevation in male donors was found.

Observing this wide distribution, where one third of the RCCs are above 65% sO2, and conscious of the damaging effects of oxygen and oxidative lesions on RBC storage, an O2 controlled environment might be beneficial. Consequently, recent anaerobic RBC storage data will be reviewed and presented in a second part. Based on metabolomic, proteomic and morphological analyses during storage as well as standard quality control measurements, the advantages for reducing sO2 in RCCs will be discussed.

In conclusion, the sO2 in RCCs was influenced by processing and particularly by donor characteristics such as gender and location. At this stage it is not possible to clearly identify the origin of these differences and confounding variables (such as pollution or life style) should be considered. Since the oxygen saturation is related to a number of known and unknown variables which cannot be adequately controlled, the overall quality of RCCs could be significantly improved by using anaerobic storage.
Abstract No. 21

Authors: Mélanie Abonnenc, David Crettaz, Giona Sonego, Michel Prudent

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Title: EFFECT OF MIRASOL TREATMENT ON PHENOTYPE, METABOLIC AND AGGREGATION FUNCTIONS OF PLATELET CONCENTRATES

Text: Background: Pathogen reduction of platelet concentrates (PCs) is currently implemented to reduce the risk of transfusion transmitted infections. Different pathogen reduction technologies (PRTs) based on photochemical treatment are currently available. Many studies have reported about alterations of the in vivo properties of treated platelets by these PRTs. The present studies evaluated the impact of Mirasol on in vitro platelet quality.

Methods: PCs were derived from whole blood and stored in additive solution (T-PAS+), after pooling 5 ABO-matched buffy coats. Identical ABO-matched PCs were produced by pooling and splitting into 3 illumination bags out of the Mirasol™ Platelet Disposable kits. One unit remained untreated (35 mL of T-PAS+ were added without any other manipulations), the two other units were illuminated according the manufacturer’s instructions in the presence (Mirasol-treated) or absence of riboflavin (UVB-treated). The three units were stored at 22°C under agitation up to 7 days. Samples were withdrawn under sterile conditions on days 2, 5 and 7. Hypotonic shock response (HSR) and dual-agonist aggregation assays (epinephrine plus collagen or ADP) were carried out. Platelet phenotype and functional assays were measured by flow cytometry. Clinical chemistry investigation (glucose, lactate, pH, bicarbonate, pCO2, pO2 and LDH) were performed at the Lausanne University Hospital.

Results: HSR was affected by the Mirasol and UVB treatments and decreased during storage. Accordingly, the marker of senescence annexin V increased during storage with a pronounced effect by the UVB treatment. JC-1 decreased during storage, with significant differences compared to untreated only at day 7 (p - value < 0.01). The markers of activation (PAC-1) and degranulation (CD62) were increased by Mirasol and UVB treatments by 6 fold and 3.6 fold at day 2, respectively. As for CD42, a continuous decrease along storage was observed for both Mirasol and UVB treatments. The dual-aggregation assays showed that collagen response was affected only at day 7 whereas ADP response was reduced both at days 2 and 7 in Mirasol-PCs. Both UVB and Mirasol increased glycolysis rate compared to untreated PCs.

Conclusions: Mirasol- and UVB-treated platelets were more activated, exhibited higher apoptosis markers and lower capacity to respond to hypotonic shock as well as to ADP agonist compared to untreated PCs. Response to collagen was affected only at late stage of storage. UVB alone induced lesions to platelets, suggesting that the alteration of platelet properties results mostly from the UV illumination which is essential to all PRTs. Finally, recently published results of an in vivo clinical study demonstrated non-inferiority of Mirasol-treated platelets to standard of care platelets using PCs in plasma. More investigations are required to understand the clinical impact of in vitro modifications.

Abstract No. 22

Authors: Sonja Heer, Nicole Heim, Adriana Fasciati, Rahel Wallimann, Maria Plank-Thiemuth, Reinhard Henschler

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Title: IMPLEMENTING TRANSFUSION SAFETY MEASURES IN A MAJOR REGIONAL HOSPITAL REQUIRES CLOSE AND STEADY INTERACTION BETWEEN BLOOD SERVICE AND CLINICIANS

Text: Background and Objective: In 2017, a new guideline for Quality Assurance in Hospital Transfusion Practice has been introduced in Switzerland ("Leitfaden für die Qualitätssicherung in der Transfusionspraxis"). We report here on the workup of transfusion errors and near miss events and the consequent „learning from errors“ to achieve improvements in hospital transfusion practice by continuous inflow into in-hospital guidelines and steady dialogue between involved personnel on different levels.

Methods: Cases of transfusion errors and near miss incidents were routinely reported through an electronic in-house hemovigilance system. A Transfusion Commission was established within the quarterly Laboratory Commission of our cantonal hospital, involving MDs, nurses and SRK Blood Service responsibles.

Results: At a total of ca. 5,000 annual transfusions, numbers of reported transfusion reactions and near misses were 17 and 2 (2015); 16 and 2 (2016); 22 and 3 (2017), respectively. Numbers of severity grade 2, 3 and 4 reactions were 3, 0, 0 (2015); 5, 1, 1 (2016) and 1, 0, 0 (2017). Numbers of near misses were 2 (2015); 2 (2016) and 5 (2017). Of all near misses, 4 were mixup/crossovers of patients and test tubes, 3 were insufficiently labeled test tubes, and 2 were missed fillup of 0 neg red cell units in the emergency unit, resulting in delayed emergency transfusions. All
cases were reported within the Transfusion Commission and near misses were discussed in the Critical Incident Reporting System (CIRS) Commission. Four near misses resulted in text revisions of Hospital Transfusion Guideline (HTG). HTG was revised jointly with responsible nurses and also discussed in the Nursing Personnel Conference, allowing further additions from members of the Nursing Staff. Improvements included (i) the systematic supervision of an independent second blood sample before each red cell transfusion, (ii) prohibition of non-emergency transfusions and sample taking during night time, (iii) improvement of four-eye patient identification and (iv) intensified control of the emergency room 0 neg unit stock.

Conclusions: Implementation of additional transfusion safety measures is possible using established conferences and media and without the setup of new committees. Electronic reporting of transfusion errors supports reporting and consecutive workup. Involvement of Nursing Staff, of the CIRS commission and of the hospital directors was found relevant and helpful to improve transfusion error workup and safety in a 300-bed cantonal hospital, implying a steady interaction between Blood Service and Clinicians.

Abstract No. 23

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Title: REASSESSING THE INFECTIOUS SAFETY OF HEPATITIS B VIRUS FOR BLOOD PRODUCTS IN SWITZERLAND

Text: Background: Infection screening of blood donors for Hepatitis B (HBV) in Switzerland is based on negativity of HBsAg ELISA plus a negative NAT test with a sensitivity of < 25 IU/mL. Using this method, the frequency of undetected HBV potential transmissions in Switzerland is currently theoretically calculated around 1:550,000, whereas for HIV and HCV it is < 1:6,600,000 and < 1:11,700,000 respectively. In recent years, cases of chronic occult Hepatitis B infection (OBI) have been described which are negative for HBsAg, and either show undulating HBV NAT positivity or are NAT negative.

Aim of the Study: Since even single donor NAT testing with a sensitivity of 1.2 IU/mL (cobas MPX test, Roche) could overlook a potential infectious dose of HBV in a red cell concentrate in a primate HBV infection model, and since anti-HBc regularly detects OBI cases, we asked whether anti-HBc testing would be feasible in a Swiss Transfusion Blood Service and could theoretically lower HBV transmission risk.

Results: Routine testing of 2,571 donations (2,518 whole blood and 53 apheresis donations) revealed 26 anti-HBc positive donors (22 repeat and 4 first time donors) of which 24 (9%) could be confirmed. Eleven (46%) of these confirmed donors tested also positive for anti-HBe and 19 (79%) tested positive for anti-HBs, with very variable titres. Anti-HBc positive donors were interviewed and mostly found to be migrants into Switzerland, or had obviously acquired HBV from an HBV infected migrant partner or mother. All anti-HBc positive donors were informed and deferred from further donations.

A risk analysis on the calculated HBV infection risk by transfusion was carried out, and showed that the risk to acquire HBV by transfusion could be theoretically lowered to < 1:5,000,000 to 1:10,000,000 i.e. similar values as calculated for HCV and HIV, by performing anti-HBc tests for all first time donors and once every 5 years for repeat donors.

Conclusions: Additional testing and permanent deferral of anti-HBc positive donors is feasible at an acceptable donor loss and could improve the safety of blood products at moderate additional costs. It remains unclear if the expected low viral load in such contaminated blood products is effectively infectious for the recipients. Since the implementation of the highly sensitive ID-NAT, no transfusion-transmitted case has been reported in Switzerland, but some may pass undetected.
318 PLT transfusions (196 apheresis-PCs and 122 buffy coat derived pool-PCs). Transfused PCs contained 3.09 ± 0.47 x 10E11 platelets/unit (mean ± SD). Transfusions were sorted for departments of Oncology and Trauma/Sepsis/ICU. CCI values were calculated according to Delaflor-Weiss E, Mintz PD, Transfus Med Rev 2000;14:180-96.

We found that in 93% of evaluable transfusions, absolute platelet counts increased post PLT transfusion, whereas they remained constant in 2% and slightly decreased in 5% of transfusions. Mean CCI (1 hour) was 10,437, the mean CCI (24 hours) was 4,078. A high correlation (r² = 0.82) was observed between transfusion trigger and increase of the platelet count after transfusion. Strong correlations were also evident between applied platelet dose and CCI (1 hour). Finally, a subset analysis showed a clear dependency of the CCI (1 hour) on the PC age, indicating a continuous loss of average CCI (1 hour) from 14,536 to 8,746 between day 1 and day 7 of PC age/storage time.

In conclusion, an increase in circulating platelet counts could be demonstrated in 93% of platelet transfusions. A continuous loss of CCIs (1 hour) was evident with increasing age of PCs before transfusion. Thus, we are able to routinely supervise the quality of our PCs using CCIs.
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