**PLATELET CONCENTRATES**

1888

IN VIVO STUDIES ON RED CELLS AND PLATELETS STORED IN HALF-STRENGTH CITRATE


We have previously shown that donation of blood into anticoagulants containing half the normal amount of citrate results in a dramatic improvement in the stability of coagulation factor VIII and has no adverse effect on the in vitro qualities of red cells or platelets during storage. To confirm the viability of stored cellular components we are now performing autologous survival studies in healthy volunteers using radio-labeled cells from red cells and platelets stored for 35 and 5 days respectively. Results to date indicate a 24 hour survival of 80% for red cells stored at a hematocrit of 0.70 for 35 days. Influence of IIIIn oxine labeled platelets after storage for 5 days in full or half-strength citrate gave recoveries of 40% and survival of 7 days. These encouraging results suggest use of half-strength citrate may be a route to increasing factor VIII supply.

Studies have also been performed on cellular components and reveal that full or half-strength citrate gave recoveries of 30% and survivals of 7 days. We conclude that the success in extending storage life of platelets by using half-strength citrate may be a route to increasing factor VIII supply without any additional donor recruitment. Further in vitro studies have also been performed on cellular components and reveal adequate in vitro quality for half-strength citrate blood held at room temperature for 23 hours prior to component preparation.

1890

GENERATION OF COMPLEMENT ACTIVATION PEPTIDES DURING STORAGE OF PLATELET CONCENTRATES (PC). A.P. Bode (1), D.T. Hiller (1), and S. Newman (2). East Carolina University School of Medicine, Department of Clinical Pathology and Diagnostic Medicine, Greenville, NC (1) and University of North Carolina, Department of Medicine, Chapel Hill, NC (2), U.S.A.

Platelets are routinely stored for transfusion at room temperature in autologous, citrated plasma. We have demonstrated previously that these conditions do not completely block activation of plasma enzyme systems, as indicated by generation of thrombin activity (Vox Sangam., 51:192, 1986). Here, we demonstrate the conversion of large amounts of complement factor C3 during storage of citrated PC by using radio-immunoassay quantitation of the activation peptide C3a des-Arg (Upjohn Diagnostics). Supernatant samples from stored PC and from citrated platelet-poor plasma (PPP) stored under the same conditions showed a rapid linear increase in C3a levels over time with no significant difference (paired t-test, p>0.5) between PC and PPP (see table). The data show a rapid increase of approximately 11% of the native C3. Possible effects on stored platelets of C3 conversion in the surrounding plasma include: activation of platelets by C3a des-Arg (N. Polley and R. Nachman; J.Exp.Med. 158:603, 1983) and deposition of complement factor C5. The presence of C5 on the cell surface as "innocent bystanders" (A. Salama and C. Mueller-Eckhardt; Transfusion 22:328, 1982).

The effect of extended storage on platelet in vitro and in vivo viability was investigated to determine the reliability and efficiency of storage of Indium-111 labeled of long-term stored platelets. The fitness of various mathematical models for measurement of platelet survival and recovery was also evaluated. 13 CPD-A PC were prepared and stored for various periods of time. The volume of the PC was adjusted to 65-75 mL to prevent phall with autologous stored concentrates. The dose of Indium-111 for the in vitro assay and for radiolabeling with Indium-111-oxine using the standard method in the PC had of 1.1. After reinfusion of the labeled platelets, samples for measurement of radioactivity were taken at three hours and at seven days for each.

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In contrast, 0.1% of the PC was found to be in all samples tested, representing less than 0.5% conversion of C5a. Nephrometric assay of native C5 levels in PC samples showed a slight but significant difference by a paired t-test (p=0.04) between fresh PC (mean±SD 7.5±12.0, n=6) and PC stored for 10 days (mean±SD 18.8±4.9). No change in C5 levels was observed in stored PPP (mean±SD 0.06±1.07 ng/mL). Radio-labeled monoclonal antibodies to C3 fragments showed less than 600 molecules bound per platelet. This study demonstrates for the first time the extent of complement activation in stored platelet concentrates.

1891

INDIUM-111 PLATELET SURVIVAL STUDIES ON PLATELET CONCENTRATES (PC) STORED FOR UP TO 14 DAYS. A. Borell(1), D. Newton(1), and R. Nachman(2). American Red Cross, تميدور(1) and Eastern Virginia Medical School, Norfolk, VA (2).

Three filtered platelet concentrates, stored for 4, 8, 14 days after filtration, were used for these studies. The results of these studies are shown in the table below.

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CLINICAL EXPERIENCE WITH TRANSFUSION OF LEUKOCYTE-POOR PLATELET CONCENTRATES PREPARED BY FILTRATION WITH PROSTACYCLIN. M. van der Wilg Kooy, H.C. van Proling, T.J. Riemens, J.W.N. Riemens, J.W.N. (1), and S. Nevrman (2). East Carolina University School of Medicine, Greenville, NC (2).

Repeated transfusions with platelets from randomly selected donors lead to an early alloimmunization in about 50% of the patients. This is caused by lymphocytes that contaminate the platelet concentrates. Attempts to remove the leukocytes from the platelet concentrates by additional centrifugation steps lead to substantial loss of platelets.

We report here a new procedure for removal of almost all leukocytes with excellent platelet recoveries. Single donor concentrates are treated with 30 mg/ml prostacyclin in order to inactivate the platelet concentrate transferred. The concentrates are then passed through a cellulose acetate filter to remove the leukocytes. In 30 fresh concentrates this treatment reduced the contamination by leukocytes to less than 0.1 million per concentrate. In concentrates stored for 3 days the contamination was reduced to about 3 million per concentrates. Thirty filtered platelet concentrates, obtained from single donors by platelet apheresis using a Bionetics U 55, were transfused to ten thrombocytic patients within 1 hour after filtration and were well tolerated. No signs of hypotension or other side effects were observed. The transfusions led to corrected count increments of (22.3±11.1) x 10^9 per mL blood after one hour and normal survival thereafter. In four out of five patients these concentrates reduced the bleeding time.

We conclude that this consistent inactivation of platelets by prostacyclin enables optimal removal of leukocytes and may help to reduce alloimmunization during frequent transfusions with platelet concentrates.

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