

SURVIVAL AND FUNCTION OF PRESERVED PLATELETS

C. ROBERT VALERI, M.D.

DIRECTOR

NAVAL BLOOD RESEARCH LABORATORY

BOSTON UNIVERSITY SCHOOL OF MEDICINE

BOSTON, MA

The survival of preserved platelets has been used primarily to determine their therapeutic effectiveness. The function of the preserved platelets has been difficult to assess.

In our previous study in patients, the function of liquid-preserved platelets stored at 22 C for a mean of 3.4 days and cryopreserved platelets was assessed by their ability to reduce non-surgical blood loss and the need for allogeneic red blood cells and fresh frozen plasma. The previously frozen platelets transfused to the anemic thrombocytopenic patients had reduced survival but improved function and were more effective in reducing non-surgical blood loss and reducing the need for allogeneic red blood cells and fresh frozen plasma than the liquid-preserved platelets stored at 22 C for a mean of 3.4 days that had better survival but impaired hemostatic function.

In stable thrombocytopenic patients platelet function of preserved allogeneic platelets is evaluated by the reduction in bleeding time. In our recent study in healthy male baboons, we evaluated both the survival and function of autologous fresh, liquid preserved, and cryopreserved platelets in the correction of an aspirin-induced thrombocytopeny. In the baboon study, we evaluated the ability of autologous platelets to correct an increased bleeding time and a reduced shed blood thromboxane B2 level at the template bleeding time site produced by aspirin ingestion. The 18-hour and 48-hour liquid-stored platelets reduced the bleeding time and restored towards normal the thromboxane level in shed blood following transfusion. However, although the liquid preserved platelets stored for 72 hours had in vivo recovery similar to 18-hour-stored platelets and had significantly increased shed blood thromboxane B2 levels, they did not correct the bleeding time following transfusion. Cryopreserved platelets significantly reduced the bleeding time and increased the shed blood thromboxane level following transfusion. Both the in vivo survival and function of the platelets stored at 22 C for 5 days were reduced compared to the cryopreserved platelets.

Some investigators have questioned the rationale of comparing the ability of platelets to correct an aspirin-induced thrombocytopenia in normal volunteers to platelet function in the treatment of thrombocytopenic patients. Results from our previous studies in human volunteers and from our recent study in the baboon are similar to those reported by Khuri and associates when cardiopulmonary bypass patients were transfused with allogeneic liquid-preserved platelets stored for a mean of 3.4 days and allogeneic previously frozen washed platelets.

These findings indicate that liquid-preserved platelets will increase the platelet count and cryopreserved platelets will restore hemostasis and reduce non-surgical blood loss in patients.

REFERENCES

Khuri SF, Healey N, MacGregor, H, et al: Comparison of the effects of transfusions of cryopreserved and liquid-preserved platelets on hemostasis and blood loss after cardiopulmonary bypass. *J Thorac Cardiovasc Surg* 1999;117:172-184.

Barnard MR, MacGregor H, Ragno G, et al: Fresh, liquid-preserved, and cryopreserved platelets: adhesive surface receptors and membrane procoagulant activity. *Transfusion* 1999;39:880-888.

Valeri CR, MacGregor H, Giorgio A, Ragno G: Circulation and hemostatic function of autologous fresh, liquid-preserved, and cryopreserved baboon platelets transfused to correct an aspirin-induced thrombocytopenia. Submitted for publication.