Abstract

The Immature Platelet Fraction (IPF): Its Clinical Utility in the Differential Diagnosis of Thrombocytopenia and Guide to Platelet Transfusion Requirement Post Haemopoietic Stem Cell Transplantation

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A new automated method to reliably quantitate reticulated platelets, expressed as the immature platelet fraction (IPF), has been developed on an automated cell counter (XE-2100, Sysmex). The IPF is identified by flow cytometery using a polymethine dye, staining platelet RNA, in the reticulocyte channel; the results are available at the same time as the FBC. 168 patients from several different clinical groups, where platelet production or destruction might be abnormal, were studied and some patients followed serially during treatment. The clinical utility of this parameter has been established in the differential diagnosis of thrombocytopenia due to bone marrow failure and increased peripheral consumption. Reproducibility and stability results over 48 hours were acceptable. The IPF normal range (n = 50) is 1.1-6.1%, mean 3.4%, 2 SD 2.3%. The IPF% is raised when there is increased peripheral platelet consumption/destruction. In untreated idopathic thrombocytopenic purpura, n = 12, mean IPF 22.3%, range 9.2-33.1% and active thrombotic thrombocytopenic purpura, n = 5, mean 17.2%, range 11.2-30.9%.

Patients who may require prophylactic platelet transfusion, usually at threshold counts less than 10 x 10^9/L, to support periods of marrow aplasia were monitored daily for platelet count and IPF%. 30 patients receiving cytotoxic chemotherapy were tested and 13 of these patients followed serially. 15 patients post autologous or allogeneic transplant were followed daily for platelet count and IPF% to monitor platelet recovery.

The recovery phase of thrombocytopenia in most chemotherapy and transplant patients was preceded by a rise in IPF% several days prior to platelet recovery. In particular, patients undergoing autologous transplantation (n=8) using peripherally collected stem cells have a characteristic IPF% motif, with a rise 1 or 2 days prior to engraftment. A raised IPF% is a predictor of platelet recovery and should allow a more reasoned approach to prophylactic platelet transfusion, if the IPF% results had been used in these patients platelet transfusions may have been avoided or reduced.

For bone marrow transplant patients the increase in IPF was more variable, the rise preceded the increase in platelet count by 2-7days. These patients suffer more septic episodes where there is a rise in the IPF with no immediate increase in the platelet count, and they require more regular platelet transfusions. In all patients following a platelet transfusion there is a 24-hour transitory fall in the IPF response, which may impede platelet recovery.

The automated IPF% is a useful parameter in the clinical evaluation of the thrombocytopenic patient and has the potential to allow optimal transfusion of platelet concentrates, thus minimising donor exposure, infection risk and allowing substantial financial savings.