NEW TEST:
IPF: Platelet reticulocyte test for assessment of thrombopoiesis

David Zwick
Director, Clinical Hematology Laboratory

So-called “reticulated” platelets, like RBC reticulocytes, are young platelets in the stage of still synthesizing proteins with residual RNA. Reticulated platelets are detected and quantified by flow cytometric means based on staining cells with a fluorescent dye that has affinity for nucleic acids. Like the percentage of RBC reticulocytes, levels are reported as a percentage of total platelets (i.e. immature platelet fraction or IPF), and as the absolute number of reticulated platelets per unit volume of whole blood. Similar to RBC reticulocytes, the IPF and absolute number of immature platelets are an indirect indicator of marrow response to thrombocytopenia; low values indicate a hypoproliferative marrow response and increased values indicate an accelerated or increased marrow production of platelets.

Over the past 15 years, many studies have been published that establish clinical utility. These studies confirm that the proportion or absolute number of reticulated platelets in the peripheral blood is a reliable indicator of thrombopoietic activity. Test results are useful for distinguishing conditions associated with impaired platelet production from diseases associated with accelerated platelet destruction, consumption or sequestration. Studies in adults, children and neonates confirm that reticulated platelet levels are elevated in conditions such as ITP, hypersplenism, and TTP. Levels are normal or depressed in marrow failure or myelosuppressive conditions like aplastic anemia, drug or infection associated myelosuppression (see fig 3 below). IPF values are also useful in detecting onset of platelet recovery, even before a rise in platelet count, in patients recovering from treatment induced myelosuppression. Rise in the IPF has been shown to be an early indication of marrow recovery following transplantation. One study indicates a role for IPF in identifying the subset of patients with thrombocytosis at increased risk for thrombosis, and hence guide anti platelet treatment in patients with high platelet counts.

Previously, limitations in instrumentation and the lack of standardization hampered widespread clinical use. This is about to change in your laboratory. The FDA approved the test for clinical use that is done on the automated CBC analyzer and available 24 hours a day, 7 day a week. (See figure 1 below.) The test can be ordered as “Immature platelet fraction.” Results are reported as both a fractional percentage of all platelets that are immature and as the absolute number of immature platelets per liter of whole blood (e.g. 13%; 32.5 x 10^9/l). Reference values for normal adults and older children are about 1.1 – 6.1% (mean 3.4%) and 3.1 – 16.4 X 10^9/L (mean 8.6 X 10^9/L). Test reproducibility is good with CVs ranging from 2% to 11% for high and moderately low (44,000/ul) platelet counts respectively. Samples stored at 40C are stable for up to 48 hours.

References:
6. Zucker ML, et.al Lab Hem April 2006. IPF indicator of marrow engraftment following transplantation

![Illustration from reference #3.](image1)

**Fig 1.** Optical platelet scattergrams from a healthy individual with a normal IPF and a patient with a high IPF. Mature platelets appear as blue dots, green dots represent the IPF with increased cell volume and higher fluorescence intensity compared to mature platelets.

![Illustration from reference #3.](image2)

**Fig 3.** Mean and range of IPF% results in all patient groups studied. Antenatal = third trimester pregnancy samples, ITP < 50 = patients with a platelet count less than $50 \times 10^9/L$. Chemo = patients undergoing chemotherapy.

**CME Series**

**Sponsored by Department of Pathology & Laboratory Medicine**

**Date:** Tuesday, December 19, 2006  
**Time:** Noon – 13:00  
**Location:** Lab Conference Room 2206.10 WT  
**Speaker:** Marilyn Hamilton, MD, PhD  
**Topic:** von Willibrand’s Disease