Circulating Immature Cell Counts on the Harvest Day Predict the Yields of CD34⁺ Cells Collected After Granulocyte Colony-Stimulating Factor Plus Chemotherapy-Induced Mobilization of Peripheral Blood Stem Cell

To the Editor:

Autologous peripheral blood stem cell (PBSC) transplantation (PBSCT) has been increasingly used and may replace autologous bone marrow transplantation for treatment of cancer patients with high-dose chemotherapy. Granulocyte-macrophage progenitors (colony-forming units—granulocyte-macrophage) and CD34⁺ cells have been preferentially used to quantitate PBSC contents of apheresis products to ensure rapid engraftment after PBSCT. However, it is difficult to determine the optimal timing for harvesting the maximum number of PBSC. We have observed that circulating immature cells (CIC), identified morphologically as myeloblasts, promyelocytes, myelocytes, metamyelocytes, and erythroblasts in May-Giemsa-stained peripheral blood (PB) smears, often increase during PBSC mobilization induced by chemotherapy and granulocyte colony-stimulating factor (G-CSF). We were particularly interested to know whether the measurement of CIC could be used to determine the optimal timing for PBSCT harvests because CIC is easily and quickly performed on routine blood counts.

We investigated whether the yield of CD34⁺ cells in PBSCT harvests could be predicted by CIC number on the day of harvest. Between 1994 and 1996, 64 patients undergoing PBSCT harvests were entered into this study after informed consent was obtained (Table 1). No patient had any evidence of bone marrow involvement at the time of PBSCT harvest. Thirty-seven patients were treated with high-dose etoposide (500 mg/m² for 3 days or 300 mg/m² for 3 days plus 300 mg/m² of carboplatinum on day 1). G-CSF was started on the day of nadir of neutrophils at a dose of 5 μg/kg intravenously or 2 μg/kg subcutaneously. Blood samples were obtained for white blood cells (WBC) counts with leukocyte differentials each day that an increase in WBC counts was documented. Conventional leukocyte differential of 100 WBC was performed on PB smears by technicians who were not informed of this study. CIC counts were calculated by multiplying a percentage of CIC by each corresponding WBC count. PBSCT harvests were performed using a Spectra (Cobe Laboratories, Lakewood, CA), as described, when WBC and platelet counts were rapidly increasing and greater than 3 × 10⁹/L and 30 × 10⁹/L, respectively. The median processed blood volume per apheresis was 150 mL/kg, ranging from 120 to 200 mL/kg. Flow cytometric analysis for CD34⁺ cells was performed as described.

A total of 93 PBSCT aphereses were performed in 64 patients (Table 2). The median percentage and count of CIC on the harvest day were 6% (range, 0% to 55%) and 1.1 × 10⁹/L (range, 0 to 28.1 × 10⁹/L), respectively. The median number of CD34⁺ cells harvested per apheresis was 4.7 × 10⁹/kg (range, 0 to 73.5 × 10⁹/kg). Numbers of CD34⁺ cells in PBSCT products were plotted against the corresponding number of CIC in PB on each harvest day (Fig 1). CIC counts correlated significantly with the numbers of CD34⁺ cells per kilogram collected (Pearson’s rank correlation analysis; r = 0.59, P < .001). In contrast, numbers of WBC or monocytes in PB were not correlated with the yields of CD34⁺ cells (data not shown).

Our study indicates that measurements of CIC count are useful for predicting the yields of CD34⁺ cells harvested. Rapid increases in numbers of WBC, monocytes, and platelets are common clinical determinants for the timing of PBSC harvests, but they are less than quantitative and their meaning is uncertain. In fact, our data show that WBC counts and monocytes counts do not predict the yields of CD34⁺ cells harvested. An increase of WBC count is predictive after G-CSF administration, but the ratio of immature to mature neutrophils varies enormously. Our results suggest that PBSCT harvests will not be successful if pri-
REFERENCES


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RH Gene Structure: Reassignment of Two Exon-Exon Junctions

To the Editor:

In a recent article, Cheng-Han Huang compared RH hybrid genes from dCCee and DCW-phenotypes and claimed that two exon-exon junctions that we described in previous studies were misidentified.

We have now resequenced the exon4/exon5 junction, and we do agree that the boundary needs be set to nucleotide positions 634/635 (nt +1 is the A residue of the ATG initiation codon). In contrast, we disagree with the proposed exon6/exon7 boundary that Huang identifies at nucleotide positions 940/941. We have previously sug-
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