Preleukapheresis peripheral blood CD34+ cells predict progenitor cell collection yield and the necessary number of procedures to undergo.

Sir,

We evaluated the peripheral blood (PB) CD34+ cell content as a predictive parameter of the leukapheresis CD34+ cell yield. Regression analysis showed that a preleukapheresis CD34+ cell concentration of ≥ 40/µL predicted a yield of ≥2×10^6 CD34+ cells/kg by a single leukapheresis (r = 0.83, p = 0.0001). In addition, CD34+ cell concentrations in preleukapheresis PB ≤ 30/µL and ≤ 15/µL were associated with the need for at least two (p = 0.0028) or at least three (p = 0.02) procedures respectively in order to obtain ≥ 2×10^6 CD34+ cells/kg.

We studied CD34+ cell concentration in preleukapheresis PB samples and CD34+ cell yield in a number of aphereses to investigate whether these parameters are related. The aim of our work was: a) to establish a statistical relationship between both parameters which would allow us to calculate the threshold concentration of immediate preleukapheresis PB CD34+ cells necessary to obtain ≥ 2×10^6/kg CD34+ cells in a single apheresis; b) to determine the number of procedures necessary to obtain ≥2×10^6 CD34+ cells/kg.

CD34+ cells were analyzed in PB samples in patients mobilized either with rH-G-CSF or following chemotherapy plus rH-G-CSF. Underlying diseases were: breast carcinoma (n = 56), Hodgkin’s disease (n = 5), non-Hodgkin’s lymphoma (n = 12), multiple myeloma (n = 13), acute leukemia (n = 4) and CML (n = 1).

Processing of samples was performed as reported elsewhere with FITC-conjugated CD34 (anti-HPCA-2; Becton Dickinson, Mountain View, CA, USA). Fifty thousand mononuclear cells were analyzed in each sample.

The median concentration of CD34+ cells in preleukapheresis PB samples was 11.96/µL (range: 0.9-1035). The median CD34+ cell count per leukapheresis was 0.61×10^6/kg (range: 0.03-22.51). The results obtained for these parameters are summarized in Table 1.

Preleukapheresis PB CD34+ cell counts showed a strong correlation with harvested CD34+ cell counts per kilogram (r = 0.83, p = 0.0001). Linear regression analysis based on 218 paired samples (Figure 1) showed that a preleukapheresis CD34+ cell concentration ≥40/µL predicted that ≥2×10^6 CD34+ cells/kg could be collected by a single leukapheresis. The same analysis showed that target yields of ≥1.5, ≥1 and ≥0.75×10^6 CD34+ cells/kg could be predicted with preleukapheresis PB CD34+ cells/µL of ≥ 30, ≥ 16 and ≥11, respectively.

We applied Student’s t test to compare PB CD34+ cell counts in patients who had undergone one, two or more and three or more procedures. In this analysis, we found that mean PB CD34+ cell concentrations ≤ 30/µL and ≤ 15/µL were associated with the need to perform at least two (p = 0.0028) or at least three (p = 0.02) apheresis procedures, respectively, to obtain ≥2×10^6 CD34+ cells/kg.

In PBSCA, the estimation of CD34+ cell yield prior to initiating apheresis procedures has both clinical and economic implications. In the present study, patients with a variety of underlying diseases, pre-mobilization treatments and mobilization schedules

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<tr>
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<th>PB CD34+ (Cell/ml)</th>
<th>Apheresis CD34+ (Cell x10^6/kg)</th>
<th>Correlation</th>
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<tbody>
<tr>
<td>All aphereses</td>
<td>11.96 (0.9-1035)</td>
<td>0.61 (0.03-22.51)</td>
<td>r=0.83</td>
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<td>lin</td>
<td>p&lt;0.0001</td>
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<tr>
<td>Apheresis 1</td>
<td>9.35 (1.42-1035)</td>
<td>0.71 (0.03-22.51)</td>
<td>r=0.91</td>
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<td>lin</td>
<td>p&lt;0.0001</td>
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<tr>
<td>Apheresis 2</td>
<td>13.93 (0.9-162.13)</td>
<td>0.76 (0.03-12.68)</td>
<td>r=0.84</td>
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<td>lin</td>
<td>p&lt;0.0001</td>
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Figure 1. Linear regression analysis of CD34+ cells/µL and yield of CD34+ cells/kg. A number of CD34+ cells ≥ 40/µL in the peripheral blood is highly predictive for the collection of ≥2×10^6 CD34+ cells/kg in a standard apheresis procedure of 10 liters.
were evaluated. Regardless of the previous variables, a preleukapheresis PB CD34<sup>+</sup> cell concentration ≥ 40/μL was significantly related to the collection of at least 2 X 10<sup>6</sup> CD34<sup>+</sup> cells/kg in a single apheresis, as previously reported. In addition to the above data, we found that to obtain a target number of 2 X 10<sup>6</sup> CD34<sup>+</sup> cells/kg, PB CD34<sup>+</sup> cell concentrations ≤ 30/μL are associated with the need for at least two leukapheresis procedures and PB concentrations ≤ 15/μL are associated with the need for at least three procedures. In conclusion, our study shows that preleukapheresis PB CD34<sup>+</sup> cell concentration can be used to guide PBPC harvest by predicting both the total CD34<sup>+</sup> cell yield and the number of aphereses needed to be undergone.

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Phenotypic changes in neutrophils after rhG-CSF administration in non-Hodgkin's lymphoma patients undergoing PBSC transplantation or conventional chemotherapy

Sir,

rhG-CSF induces several phenotypic changes in neutrophils. Increased HLA-DR expression and decreased CD10 expression have recently been described in neutrophils from some patients after rhG-CSF therapy. We evaluated these parameters in 12 non-Hodgkin’s lymphoma patients undergoing either PBSC transplantation after high-dose chemotherapy or conventional chemotherapy. The appearance of an HLA-DR-positive neutrophil subpopulation, along with a marked decrease in CD10 expression, was confirmed. However, despite this immature phenotype, rhG-CSF-induced neutrophils displayed enhanced phagocytosis and chemiluminescence.

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