Mobilization of peripheral blood progenitor cells with G-CSF alone in lymphoma patients: steady-state circulating progenitor cell count predicts the autograft yield

Nowadays the first choice procedure to collect hematopoietic progenitor cells for autografts is the harvest of peripheral blood progenitor cells (PBPC) mobilized with cytokines, associated or not with chemotherapy. A large amount of data is available on factors affecting mobilization, such as sex, age, number of previous chemotherapy regimens, radiotherapy, and exposure to fludarabine.1-3 The individual response to mobilization is, however, highly variable from patient to patient and only a few studies have investigated biological parameters that could predict successful mobilization of PBPC for a single patient when a given regimen is employed. Findings of this study show that when G-CSF is used as a single mobilizing agent, the baseline PBPC has a predictive value.

Sir,

We investigated some steady state parameters in 41 patients (21 F, 20 M) affected by non-Hodgkin’s (n=31) and Hodgkin’s (n=10) lymphoma. The patients had a median age of 40 years (range 15-58) and all patients had been homogenously treated and mobilized at a median time of 4 months (range 2-19) from the end of a single line of chemotherapy. At the time of the harvest all patients were in partial or complete remission and none had bone marrow involvement. Total nucleated cells (TNC), CD34+ cells and CFU-GM were evaluated in PB and bone marrow (BM) the day before starting a mobilization protocol consisting of a daily G-CSF dose of 16 µg/kg, given as a single subcutaneous injection from day -3. PB CD34+ cells were monitored from day 0 and leukaphereses were performed with PB CD34+ cells ≥ 10/µL and continued until at least 2.5 x 10^6/kg b.w. CD34+ cells were collected. Steady-state PB and BM characteristics are summarized in Table 1. There were no significant differences between patients with non-Hodgkin’s and Hodgkin’s lymphoma (data not shown). Baseline BM TNC, CD34+ cell count and CFU-GM/mL did not correlate with the yield of the harvest evaluated as CD34+ cells collected/kg b.w. Otherwise steady-state PB CD34+ cell count and

![Figure 1. Relationship between steady-state CD34+ peripheral blood and bone marrow characteristics.](image)

### Table 1. Baseline peripheral blood and bone marrow characteristics.

<table>
<thead>
<tr>
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<th>Peripheral Blood</th>
<th>Bone Marrow</th>
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<tbody>
<tr>
<td><strong>TNC x10^6/mL</strong></td>
<td>median 5</td>
<td>median 22.9</td>
</tr>
<tr>
<td><strong>range</strong></td>
<td>3-11.8</td>
<td>range 4.7-72.8</td>
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<tr>
<td><strong>CD34+ x10^6/mL</strong></td>
<td>median 1.25</td>
<td>median 83.16</td>
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<tr>
<td><strong>range</strong></td>
<td>0-16</td>
<td>range 1.1-763</td>
</tr>
<tr>
<td><strong>CFU-GM/mL</strong></td>
<td>median 10.6</td>
<td>median 576</td>
</tr>
<tr>
<td><strong>range</strong></td>
<td>0-224</td>
<td>range 69-7000</td>
</tr>
</tbody>
</table>

**TNC:** total nucleated cells; **CFU-GM:** colony-forming units granulocyte macrophage.

![Graph](image)
CFU-GM/mL did have a predictive value on collection ($r^2 = 0.51, p = 0.0001$ for PB CD34+ cell count as shown in Figure 1; $r^2 = 0.57, p = 0.0001$ for CFU-GM, data not shown).

A large number of studies proved that the quantification of CD34+ cells mobilized in PB is the most reliably factor predicting an adequate harvest. Only a few authors investigated baseline parameters able to reflect mobilization capacities in single patients. Freuhauf et al. in 1995 found that steady state PBPC counts allow estimation of the yield of mobilization when G-CSF is used in association with chemotherapy; the same authors recently confirmed this finding in a larger group of patients. Paralleling the results of Husson et al. and Haug et al. our data prove that also when G-CSF is used as a single mobilizing agent the baseline PBPC count has a predictive value.

The amount of steady-state circulating CD34+ cells before mobilization probably reflects the BM reserves which can depend on some individual characteristics and/or of therapy-induced microenvironment damage. The simple and fast flow-cytometric evaluation of circulating PBPC can help to recognize poor mobilizers, identifying patients eligible for second attempts of mobilization or for experimental collection protocols using combinations of growth factors (e.g. G-CSF + stem cell factor) or alternative harvesting procedures (e.g. cytokine-activated BM).

Stefania Grimaz, Daniela Damiani, Mariagrazia Michieli, Michele Baccarani
Department of Bone Marrow Transplantation, Udine University, Udine, Italy

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Correspondence
Daniela Damiani, M.D., Hematology Division, p.le Santa Maria della Misericordia, 33100 Udine, Italy. Phone: international +39-0432-559662- Fax international +39-0432-559661.

References