To the Editor:

In previous correspondence to the editor, Mott and Gilkerson and Richman et al. have expanded on previous observations by Richman et al. and by our group concerning the possibilities and limitations of collecting stem cells from the peripheral blood. We would like to carry this discussion one step further by reporting our observations with two human subjects. These persons were serving as donors of bone marrow and buffy-coat cells for stem cell transfusion in the treatment of aplastic anemia and acute myelocytic leukemia. Of interest and pertinent to the present discussion are the following data.

As shown in Table 1, five leukaphereeses with the Aminco Celltrufuge were performed. Thus it is feasible to collect, during a 4-hr leukapheresis, on the order of 13 x 10^8 mononuclear cells (MNC) and 11 x 10^5 colony-forming units in agar (CFU-C). This result is an improvement over that which Mott et al. were able to collect and better than their predictions "under optimal conditions." In addition, it is noteworthy that there was no evidence that the number of CFU-C in the blood could be exhausted by such leukapheresis. The total amount of blood leukapheresed during the 4 hr was approximately 12,000 ml. The granulocyte contamination of the collected buffy-coat cell suspension was less than 10%.

Aliquots of the collected MNC were placed in Millipore diffusion chambers (1 x 10^6 MNC per chamber; 0.22-μm pore size), which were implanted into the peritoneal cavity of 650-R (midline body dose) whole-body x-irradiated mice. Granulocytic precursors appeared after 6 days, megakaryoblasts after 9 days, and erythrocytic precursors after 14 days, indicating the presence of cells in the buffy-coat cell suspension capable of differentiating along the pathways of the major hemopoietic cell lineages.

### Table 1. Procurement of Blood Mononuclear Cells (MNC) and Blood Colony-forming Units (CFU-C) from Two Normal Donors by Means of the Aminco Celltrufuge, and the Influence of Such Leukapheresis on the Number of MNC and CFU-C in the Peripheral Blood

<table>
<thead>
<tr>
<th>Donor</th>
<th>Leukapheresis No.</th>
<th>MNC/cu mm Blood Before Leukaph.</th>
<th>MNC/cu mm Blood After Leukaph.</th>
<th>CFU-C/ml Blood Before Leukaph.</th>
<th>CFU-C/ml Blood After Leukaph.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>10.8 (x 10^6)</td>
<td>7.4 (x 10^6)</td>
<td>2555</td>
<td>2520</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.7 (10^6)</td>
<td>11.0 (x 10^6)</td>
<td>2080</td>
<td>2001</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>17.0 (x 10^6)</td>
<td>15.8 (x 10^6)</td>
<td>2170</td>
<td>2301</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>10.6 (x 10^6)</td>
<td>11.8 (x 10^6)</td>
<td>3034</td>
<td>2380</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>15.5 (x 10^6)</td>
<td>10.7 (x 10^6)</td>
<td>1296</td>
<td>1643</td>
</tr>
</tbody>
</table>

Whether this result means that there is one homogeneous population of pluripotent stem cells or that there is a heterogeneous population of pluripotent and committed stem cells cannot be answered.

With respect to whether it is possible to increase the yield of stem cells during leukapheresis, we would like to reiterate our findings in a canine model.4 By extraplication, this result would approach 18 x 10⁶ MNC for a 12-liter apheresis. Although the concentration of peripheral blood CFU-C in normal donors has a wide range (2.50 CFU-C/2 x 10⁵ MNC),¹ one could anticipate collection of between 2 x 10⁵ and 4 x 10⁶ CFU-C per 12-liter apheresis using this technique. Continuous- and semicontinuous-flow centrifugation thus appear to give comparable results. However, further comparative studies must be done to determine which procedure is more efficient and convenient.

The fact that the CFU-C concentration did not significantly decline during the 4-hr

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REFERENCES

Procurement of Human Blood Stem Cells by Continuous-Flow Centrifugation—Further Comment: Reply

To the Editor:

The observations of Körbling et al. further support the possibility of harvesting a bone marrow transplant “dose” of stem cells from the peripheral blood by leukapheresis.¹ ² These authors have been able to collect an average of 13 x 10⁶ mononuclear cells (MNC) and 11 x 10⁵ granulocytic colony-forming units (CFU-C) in a 4-hr, 12-liter apheresis using continuous-flow centrifugation (Aminco Celltrifuge). We have presented data showing that 0.9 x 10⁵ MNC can be obtained per 600 ml of blood processed using semicontinuous-flow centrifugation (Haemonetics model 30).³ By extrap
Procurement of human blood stem cells by continuous-flow centrifugation—further comment [letter]

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