Autologous bone-marrow transplantation after intensive chemotherapy was effective for acute myeloid leukaemia


Question
In patients with acute myeloid leukaemia (AML) who have received 4 courses of intensive chemotherapy, does the addition of autologous bone-marrow transplantation (BMT) confer any benefit?

Design
Randomised controlled trial with 7-year follow-up.

Setting
163 institutions in the United Kingdom, New Zealand, and the Republic of Ireland.

Patients
Of 1131 patients who were eligible, 381 patients who were < 56 years of age (51% men), were in complete remission with AML, had received 4 courses of intensive chemotherapy, and did not have a human lymphocyte antigen (HLA)-matched sibling donor were included.

Intervention
After the third course of chemotherapy, all patients had harvesting of bone marrow containing a minimum of $1.0 \times 10^8$ mononuclear cells/kg, and after 1 more course of chemotherapy, they were allocated to autologous BMT ($n = 190$) or no further treatment ($n = 191$). Patients allocated to BMT received a preparative treatment of cyclophosphamide, 120 mg/kg divided over 2 days, and total-body irradiation in 1, 6, or 8 fractions.

Main outcome measures
Disease-free survival and overall survival at 7 years of follow-up. Additional analyses were done within age groups and prognostic risk groups.

Main results
Analysis was by intention to treat. The relapse risk was lowest in patients who received BMT compared with those who received no further treatment ($P < 0.001$) (Table). Disease-free survival and overall survival did not differ between groups (57% vs 45%, $P = 0.04$) (Table). More patients achieved a second remission after relapse in the no-further-treatment group than in the BMT group (59% vs 34%, $P = 0.002$). For patients who survived beyond 2 years, a survival benefit in favour of BMT was seen ($P = 0.006$).

Conclusion
Autologous bone-marrow transplantation after 4 courses of intensive chemotherapy reduced the risk for relapse and improved disease-free survival in patients with acute myeloid leukaemia.

Source of funding: Medical Research Council (UK).

For correspondence: Professor A.K. Burnett, Department of Haematology, University of Wales College of Medicine, Heath Park, Cardiff CF4 4XN, Wales, UK. FAX 44-1222-742914.

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>BMT</th>
<th>No further treatment</th>
<th>RRR (95% CI)</th>
<th>NNT (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relapse</td>
<td>34%</td>
<td>53%</td>
<td>36% (19 to 50)</td>
<td>5 (3 to 11)</td>
</tr>
<tr>
<td>Relapse or cancer-specific death</td>
<td>45%</td>
<td>57%</td>
<td>20% (2.4 to 35)</td>
<td>9 (5 to 80)</td>
</tr>
<tr>
<td>Death</td>
<td>40%</td>
<td>49%</td>
<td>18% (~3 to 35)</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

*Abbreviations defined in Glossary; RRR, NNT, and CI calculated from data in article.

Commentary
Leukaemia is the 7th leading cause of cancer death. 60% to 80% of adult patients with AML achieve complete remission (1, 2), but unfortunately, most relapse without further intensive consolidation. This well-designed study by Burnett and colleagues addresses whether further intensive consolidation with autologous BMT after 4 courses of intensive chemotherapy prolongs survival. At least 10 randomised trials have been published in the past decade comparing conventional chemotherapy with BMT (2, 3). In 1 trial (1), consolidation with high-dose cytosine arabinoside was shown to be substantially better than standard-dose chemotherapy, and in 3 trials (3), BMT offered no advantage over cytosine.

In Burnett and colleagues' study, only 34% of eligible patients were randomised, and only two thirds of those allocated to BMT received it. Although BMT offered a disease-free survival advantage, more patients who received BMT died in remission. BMT also led to excessive morbidity and mortality associated with delayed engraftment. As in other studies (2–4), the study by Burnett and colleagues did not show an advantage in overall survival and gave a relatively small RRR of 18%. Because patients can be salvaged with BMT after relapse if they have not had previous BMT, the authors suggest that BMT might best be reserved for salvage therapy in lower-risk adults and children in whom the consequences of late effect and infertility may be more evident. At present, the best strategy in terms of providing a survival advantage remains unclear.

Richard H.C. van der Jagt, MD
University of Ottawa
Ottawa, Ontario, Canada

References