marked expression of HLA-DR together with the decrease in CD10 and decrease in the mean intensity of fluorescence of CD15 and CD16 on neutrophils, suggest the presence of NG with immaturity features in patients receiving G-CSF for neutropenia secondary to intensification chemotherapy. An alternative significance for increased HLA-DR expression could be a higher proliferating activity of NG after treatment, also confirmed by the higher CD71 expression.

Several changes in the expression of neutrophil antigens following G-CSF administration (i.e. increased CD11b, CD66b, CD64, CD18, CD35, CD32, CD13, CD16 and CD45) have been observed, but this expression usually returns to normal after several hours.[1,2,6-8] Some of these changes indicate an enhanced adherence and phagocytic capacities. Our study confirms that NG after G-CSF administration also express the CD71 antigen, indicative of their active proliferation.[9] We also observed an increase in CD14 expression in NG of ALL patients after G-CSF administration, as previously mentioned.[7,10] and such a receptor may be important for achieving efficient response to infections caused by Gram-negative bacteria. Different from other studies in which normal human volunteers treated with G-CSF have been employed,[1,2] our control subjects did not receive G-CSF. However, the phenotypic profile of NG in control subjects was the same as that of ALL patients before chemotherapy, strongly suggesting that the phenotypic changes observed in the same ALL patients after G-CSF administration were due to the effect of this cytokine on NG. The results of our study suggest that after G-CSF administration there is not only an increase in NG number and an enhancement of the functional properties,[11,12] but also that these NG carry features of immature phenotype. The biologic significance of this feature remains to be ascertained.

Key words

Acute lymphoblastic leukemia, G-CSF, neutrophil granulocytes, surface antigens

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Treatment of chronic myeloid leukemia in relapse after umbilical cord blood transplantation

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Umbilical cord blood (UCB) is increasingly used as a source of hematopoietic progenitor cells for allotransplantation. Donor-derived buffy coat cells are considered optimal treatment for leukemia relapses after transplantation of allogeneic bone marrow. Experience with relapses after UCB transplants are sparse. Here we report a girl who received an UCB transplant for chronic myeloid leukemia, relapsed after three years,

failed to respond to donor buffy coat cells, but achieved a complete hematologic, cytogenetic, and molecular remission on interferon-α.

Since the first umbilical cord blood transplantation (UCBT) performed in 1988, over 230 patients received this form of hematopoietic cell transplant.[1,2] We reported the first UCBT for Philadelphia chromosome positive (Ph^{+}) chronic myeloid leukemia (CML).[3] Here we present the follow-up of this patient who relapsed 3 years post-transplant, failed to respond to donor buffy coat cells, but achieved a second complete remission on interferon. To our knowledge this kind of treatment in a recipient of UCBT has not been published previously.

In July 1991 we performed an UCBT for Ph^{+} CML in a 28-month-old girl. The donor was her HLA-identical sister. Conditioning was performed with cyclophosphamide and total body irradiation. She received 8.7×10^{7}/kg nucleated cells. GM-CSF was administered because of slow granulocyte recovery. Otherwise the transplant course was uneventful, and she became transfusion independent after 50 days. At that time cytogenetic analyses and blood group testing showed donor type hematopoiesis. The patient is a native of Bosnia and being caught in the turmoil of war, did not appear for control until end of 1993. At that time blood counts and cytogenetic analyses were normal. However, in July 1994 while hematologically still in remission a molecular and cytogenetic relapse occurred. *bcr2/abl2* transcript was detected using reverse transcription and PCR (RT-PCR). Besides t(9;22), t(12;18) was found. The percentage of Ph^{+} metaphases increased, so we decided to treat her with donor derived buffy coat cells. In January 1995 she received the following buffy coat cells from her original donor who was at that time four years old: 5.7×10^{8}/kg nucleated cells, 4.0×10^{8}/kg CD3, 2.5×10^{8}/kg CD4, and 1.2×10^{8}/kg $CD8^{+}$ cells. We observed no signs of GvHD. Blood counts and rate of Ph^{+} metaphases remained unchanged. In September 1995, eight months after buffy coat infusions, interferon-α, 3,000,000 U/day five days per week, was started. Molecular (RT-PCR) and cytogenetic analyses were done in regular intervals. In January 1996 a complete molecular and cytogenetic remission was obtained. Six years after UCBT and 20 months after starting interferon she is well, still in complete molecular and cytogenetic remission, and with normal blood counts.

The optimal treatment of leukemia in relapse after UCBT is unknown.[4] Donor buffy coat infusion is an effective treatment for CML in relapse after marrow transplantation.[5-7] Although interferon is often added, it is unknown whether it increases the response rate. Results are better if the buffy coat is used earlier, i.e. before hematological relapse.[8] The response to buffy coat can occur up to six months after infusion. Therefore it seems that our patient did not respond to buffy coat infusion, but to treatment with interferon-α. It is tempting to speculate that this is due to the immaturity of T-cells present in the blood of the four-year-old donor, and that additional extrinsic interferon was necessary to achieve a sufficient graft-versus-leukemia effect. Still, this remains a completely unproven hypothesis, perhaps meriting further studies.

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Key words

Chronic myeloid leukemia, umbilical cord blood transplantation, interferon-α.

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