2.1±4.03). These patients also received 18 transfusions (5.1%) in the absence of clinical detrimental factors, exhibiting good increments (group 5, median CCI: 10.35±4.93). These results are summarized in Figure 1.

Only one patient had anti-HPA (anti-HPA-5b) antibodies coexistent with anti-HLA antibodies. Two patients with anti-HLA antibodies each received two random platelet transfusions which were effective. Antibodies with broad reactivity against non-allelomorphic platelet glycoprotein epitopes (autoantibody-like) were found in 9 out 98 patients. These patients were given 13 transfusions overall, all resulting to be effective (median CCI, 12.0±3.08).

The overall post-transfusion recovery, clustered according to the kind of preparation and the age of the platelet concentrate prior to transfusion (from day 1 up to day 5), is depicted in Figure 2. Recovery decreased over storage time. The difference between day 1 and the following days was not significant until day 3 for AP-PC (p=0.009) and day 4 for BC-PC (p=0.019). The day-by-day recovery difference between AP-BC and BC-PC was never statistically significant. Albeit insignificant, the slight recovery difference observed at day 1 between PA-PC and PC-BC could be because HLA compatible PA-PC are administered more frequently to the immunized patients on day 1 after collection.

The prevalence of patients with immune (7.1%) or clinical (9.1%) refractoriness was similar. The detrimental effect of clinical and immunologic factors on post-transfusion recovery was identical. When clinical detrimental factors were absent, or when compatible platelets were administered to alloimmunized patients, a similar recovery was obtained. The few alloimmunized patients (7.1%) received as many as 40.5% of the platelet concentrates. Taken together these data strongly support the need to provide compatible platelet concentrates to alloimmunized patients. No recovery at all can be expected when patients with active clinical detrimental factors are transfused, thus the clinical value of these transfusions remains to be ascertained.

Autoantibody-like antibodies do not affect the recovery after platelet transfusion. Anti-HPA antibodies seem to have minor effects on refractoriness. The presence of anti-HLA antibodies does not necessarily equate to platelet transfusion refractoriness. Platelets from pooled random donors and single donor apheresis have quite similar effects. These two last conclusions confirm the results reported in the TRAP study.[7]

Considering the very low infection risk now achieved, the efficacy of the means to reduce alloimmunization, and the insignificant difference of the recovery provided by PA-PC and BC-PC, the putative advantage of providing hematologic patients by default with platelet-aphereses, should be critically reconsidered.

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Results of an allogeneic non-myeloablative stem cell transplantation program in patients with chronic myelogenous leukemia

Chronic myelogenous leukemia (CML) is a deceptive leukemia because in its chronic phase it evolves with a rather benign phenotype; however, its invariable transformation to the acute blast crisis endows the disease with its true malignant character. The ultimate goal of the treatment of CML is to induce cytogenetic and molecular remissions; cytogenetic remissions can be obtained with interferon, but molecular remissions can only be achieved with allogeneic bone marrow transplantation (BMT).[1] We present here the results of allografting a group of 21 patients with CML, using non-myeloabative stem cell transplants (NST).

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All patients with Philadelphia (Ph1) chromosome and/or BCR/ABL (p210) positive CML allografted in both the Centro de Hematología y Medicina Interna de Puebla (Puebla, Mexico) and in the Hospital Universitario de Monterrey (Monterrey, Mexico) were prospectively accrued in the study. All patients were transplanted within one year after diagnosis, all had received hydroxyurea and 10 had also received interferon. The donor was an HLA-identical sibling in all instances. A simplification of the low intensity conditioning regimens used by Giralt *et al.*[2] and Slavin *et al.*[3] was employed as previously described[4-5] using oral busulphan, iv cyclophosphamide, iv fludarabine, oral cyclosporin and iv methotrexate. Donor lymphocyte infusions were used 100 days after the allografts only if no evidences of GVHD were present or if there were data of leukemic activity or relapse. Twenty one patients with CML were allografted; eleven in chronic, six in blastic and four in accelerated phase. Median age of the patients was 43 years, with a range of 20 to 61; 13 were 40 or more years-old (Table 1). All patients engrafted successfully. Patients developed chimerism 15-51 days (median 30) after the

Table 1. Salient features of the 21 patients with CML given allogeneic non-myeloablative stem cell transplants.

No.	Sex	Age	Phase	aGVHD	cGVHD	Time	Status
1	F	51	BP	No	–	2	sepsis, D
2	F	41	CP	Yes	–	2	HR, A
3	F	37	CP	Yes	–	2	HR, A
4	M	29	CP	Yes	–	2	HR,MR,aGVHD,D
5	M	40	CP	Yes	Yes	3	HR, MR, A
6	M	46	BP	Yes	No	3	HR, rel, D
7	M	61	BP	Yes	Yes	3	HR, aGVHD, D
8	F	58	BP	Yes	Yes	6	HR, MR,rel, D
9	F	50	BP	Yes	Yes	7	HR, MR, A
10	F	52	CP	No	Yes	8	HR, MR, A
11	M	54	CP	No	No	8	HR, MR, rel, D
12	M	47	CP	No	Yes	11	HR, MR, A
13	M	28	CP	No	Yes	11	HR, MR, A
14	M	50	AP	No	Yes	12	HR, MR, A
15	M	20	AP	No	Yes	13	HR, MR, A
16	M	35	BP	Yes	Yes	13	HR, MR, A
17	M	45	CP	Yes	No	13	HR, MR, rel, D
18	M	43	CP	No	Yes	20	HR, MR, A
19	M	39	CP	Yes	No	20	HR, MR, A
20	F	24	AP	No	No	24	HR, MR, A
21	M	35	AP	Yes	Yes	25	HR, MR, A

F = female; M = male; CP = chronic phase; BP = blastic phase; AP = accelerated phase; aGVHD = acute graft versus host disease; cGVHD = chronic graft versus host disease; time = time in moths after the allograft; A = alive; D = dead; HR = hematologic remission; MR = molecular remission; rel = relapse.

allografts. The follow-up periods range between 2 and 25 (median 8) months. Seven patients (33%) have died: one as a result of a bacterial infection, two as a result of acute graft versus host disease (GVHD), whereas four relapsed 3-12 (median 7) months after the allograft and died. Two relapsed patients were given unsuccesfully donor lymphocyte infusions. The median post-transplant overall survival of the patients is above 750 days, the 750-day survival being 60%. Four of 6 patients grafted in blast phase died. Twelve patients (57%) developed acute GVHD (in nine cases grades I-II and in three grades III-IV) which was fatal in two, and 12/17 (70%) individuals have developed limited chronic GVHD. All the patients achieved clinical and hematological remissions; disappearance of the BCR/ABL fusion transcript could be recorded in 15, 26 to 139 days (median 102) after the allograft. In 14 individuals (66%), the procedure could be completed fully on an outpatient setting. The 100-day mortality was 9% (2/21) and transplant-related mortality was 14% (3/21), in two instances due to GVHD. Treatment options for patients with CML are allogeneic BMT, hydroxyurea, busulfan, interferon-alpha based regimens, STI-571;[6] however, the only really curative treatment modality for these patients is allogeneic BMT. Lowering costs of the treatment of patients with hematological malignancies is critical in developing countries; in México, the approximate cost of one-year treatment of a patient with CML is: hydroxyurea 1,400 USD, interferon 7,800 USD and STI-571 31,000 USD.[7] On the other hand, the median cost of a NST in our experience is 18,000 USD,[4-5, 7-8] a figure substantially lower than that of the conventional BMT in the United States (300,000 USD).[4,5] Because of economic restraints, we have elected to offer all CML patients with a match NST instead of conventional allogeneic BMT, regardless of their ages or clinical conditions. It is clear that none of the patients reported here could have afforded the cost of a conventional BMT. Using conventional allogeneic BMT, the long-term survival rates for CML patients less than 40 years is around 70-80%.[6,9] Using our method to conduct NST, we have found a 24-month disease free survival of 60% in these patients, 10 of whom were over 45 years and seven over 50 years. Advantages of NST over conventional BMT include that it can be offered to aged or debilitated individuals, conducted on an outpatient basis with no transfusion support and being considerably cheaper;[2-5,8] there is data suggesting that NST may be associated with a lower relapse rate than conventional allografting.[10] Because of its cost, NST may be considered an early treatment option in countries where limited resources currently prevent usual allogeneic BMT; role-definition and appropriate timing for this therapeutic approach in CML patient is required.

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