To the Editor:

Two papers concerning some features of erythropoiesis after bone marrow transplantation in patients with bone marrow failure appeared in BLOOD in 1976. In the first (August et al.), there were some figures in which there was clearcut evidence of restoration of erythropoiesis. Examining these pictures it seemed, however, that the erythroblasts presented some dyserythropoietic features, i.e., multinucleanity and nuclear dysmorphism. In the second, Alter et al. reported on the transient fetal pattern of erythrocytes in seven patients after bone marrow transplantation. Recently, Marmont, too, has reported that the first stage of restored erythropoiesis in a transplanted aplastic patient was very dysmorphic in type. These reports were particularly interesting for me. In fact, my own research has allowed me to demonstrate the diffuse polymorphic, dyserythropoietic features of human fetal hepatic hemopoiesis. They were represented by a richness of reticuloerythoblastic islets as well as remarkable signs of dyserythropoiesis, i.e., multinucleanity and generalized dysmorphic karyorrhexis. It was also pointed out that the reticuloerythroblastic islets were characterized by the phenomenon of erythropagocytosis. These formations were never "nursing" cells. Both pictures were expressions of a high degree of ineffective erythropoiesis, but this phenomenon in fetal hepatic hemopoiesis had to be regarded as "teleologic" and not pathologic.

The concept emerging from the research of August et al. and Alter et al. that the first stage of a successful bone marrow engraftment develops quite like normal fetal erythropoiesis finds its explanation in my studies. I think we can therefore conclude that the significance of the dyserythropoietic picture in successful bone marrow transplantation is the same as that of fetal hepatic erythropoiesis.

NEVIO QUATTRIN, M.D.
Head, Department of Hematology and Social Centers for Genotypical Hemoglobinopathies and Leukemias
Cardarelli Hospital
Naples, Italy

REFERENCES

4. Quattrin N, Dini E, De Rosa L: Dyserythropoietic features of human foetal erythropoiesis and their significance, in: Leukemia and


Dyserythropoietic Features in Normal Fetal Hepatic Hemopoiesis: Reply No. 1

To the Editor:

The picture of fetal erythropoiesis which we saw following bone marrow transplantation was heterogeneous and incomplete, and thus we ascribed it to "stress erythropoiesis." Although it had fetal features, the pattern was not as clearcut as that of fetal hepatic hemopoiesis.

BLANCHE P. ALTER, M.D.
Division of Hematology-Oncology
The Children's Hospital Medical Center
Boston, Mass.

Dyserythropoietic Features in Normal Fetal Hepatic Hemopoiesis: Reply No. 2.

To the Editor:

We are responding to Dr. Quatrin's comments upon the paper by August et al. regarding the pattern of erythropoiesis during regeneration of the bone marrow following transplantation. We have recently studied the sequential changes in bone marrow morphology following nine transplants in children. We agree in substance with the comments in Dr. Quatrin's first paragraph, namely, that dyserythropoiesis does occur in the first colonies of hematopoiesis following transplantation. Subsequent biopsies have indicated, however, that within a matter of a few weeks this picture is replaced by a much more normal type of erythropoiesis regardless of the nature of the disease for which the transplantation has been done.

We are not in agreement, however, with the concept that human fetal hepatic hematopoiesis normally has a similar type of dyserythropoiesis. As illustrated in the classical 1909 article by Maximow and in other publications by one of us (M.H.B.), the hematopoiesis in the embryonic liver is indeed very regular in its appearance: the islands of erythropoietic tissue have a normal ratio of the number of cells to the degree of maturation; erythropoiesis is erythroblastic and not intermediate nor truly megaloblastic in nature; there is not an excessive amount of karyorrhexis; and the islands or clones of erythroblasts are very evenly distributed throughout the liver. In contrast, if the embryo is subjected to a medium lethal dose of total-body irradiation prior to the onset of hepatic erythropoiesis, erythropoiesis is extremely abnormal and resembles closely the findings we have described following transplantation. This abnormal erythropoiesis also occurs during regeneration after aplastic anemia in patients successfully treated with testosterone, and in beginning remission in patients with acute leukemia who have been treated successfully by chemotherapeutic agents such as adriamycin, vincristine, and cytosine arabinoside.

MATTHEW H. BLOCK, M.D.
JERRY REEVES, M.D.
JOHN H. GITHENS, M.D.
CHARLES S. AUGUST, M.D.
University of Colorado Medical Center
Denver, Colo.
David Grant Medical Center
Travis Air Force Base, Calif.
University of Colorado Medical Center
Denver, Colo.
Children's Hospital of Philadelphia
Dyserythropoietic features in normal fetal hepatic hemopoiesis [letter]

N Quattrin