Effect on Hemoglobin F Synthesis by Erythropoietin in Patients with Anemia of End-Stage Renal Disease Maintained by Chronic Hemodialysis

F. Salvati a
P. Strippoli b
M. Barchetti c
A. Scatizzi d

a Department of General Medicine, Civil Hospital Renzetti, Lanciano; b Clinical Pathology Laboratory, Department of Nephrology; c S.S. Annunziata Regional Hospital, Taranto, Italy

Dr. Filippo Salvati, Via Guido Rosato 52, I-66034 Lanciano/Chieti (Italy)

Dear Sir,

It is known that massive stimulation of baboon and human erythroid cells in culture with erythropoietin results in γ chain synthesis [1]. In patients with sickle cell anemia, erythropoietin stimulates F reticulocyte formation in vitro, and its use in the treatment of sickle cell anemia has been suggested to induce increases in hemoglobin (Hb) F levels with inhibition of polymerization of deoxy-hemoglobin S as a therapeutic goal. Other authors demonstrated that in patients with heterozygous β thalassemia under dialysis treatment, there was an increase in γ chain synthesis in vitro (even if not significant) after a therapy with recombinant human erythropoietin (rh-EPO), which has been generally accepted as an effective treatment for anemia in patients with chronic renal failure treated by hemodialysis. The aim of the present study was to investigate the effects of the rh-EPO therapy on the different fractions of Hb, with particular interest in the possible increase in Hb F production, with a consequently enhanced tendency towards hemolysis.

Seventeen dialysis patients (11 males, 6 females) under treatment with rh-EPO for more than 12 months with good therapeutic response (actual mean Hb = 10 g/dl) were investigated for the different Hb fractions before and after rh-EPO therapy. The mean age was 45.5 years (range 22-75), the mean duration of hemodialysis was 6.5 years (range 1-15). rh-EPO was administered in 12 patients 3 times/week intravenously (mean dose was 50 U/kg b.w.) and in 5 patients 3 times/week subcutaneously (mean dose 24 U/kg b.w.). All the laboratory data were collected before and after 12 months of therapy from the beginning of the rh-EPO therapy. Hb, red blood cell count (RBC), white blood cell count (WBC), platelets (Pt) and hematocrit (Ht) were determined with Technicon H1 (USA). Hb A2 was tested by column chromatography (Sibar Diagnostici, Italy), Hb F was determined with radial immunodiffusion (Helena Laboratories, USA). Hb electrophoresis was performed on acetic cellulose (Helena Laboratories, USA), reticulocytes and F reticulo-cytes were detected with the microscopic method.
At the beginning of the study, 16 patients had a normal Hb electrophoretic profile, 1 patient had Hb A₂ = 4.6% (heterozygous ß thalassemia). The other laboratory data showed the following values (mean ± SD): Hb = 7.0 ± 0.7 g/dl; Hct = 21.3 ± 2.2%; Pt = 143.2 ± 48.0·10³/mm³; WBC = 4,860.7 ± 1,468.5·10³/mm³; RBC = 2,470.3 ± 417.2·10³/mm³; reticulocytes = 26.0 ± 14.6%; F reticulocytes = 0.1%; Hb F = 0.5%. At the end of the study, there were significant differences in mean values ± SD of Hb (9.2 ± 1.2 g/dl, p = 0.001), Hct (30.3 ± 2.9%; p = 0.001), RBC (3,252.0 ± 161.1·10³/mm³, p = 0.001), reticulocytes (37.3 ± 18.9). There was no significant difference between the values of Hb F, Hb A₂ and F reticulocytes at the beginning and at the end of the study. All the electrophoretic profiles were not significantly altered at the end of the study.

Hemodialysis patients under rh-EPO therapy can determine: (a) no increment of production of any Hb different from normal; (b) that the percentage of Hb A₁ does change and (c) that there is no enhanced tendency to hemolysis in these patients in which red cell survival is lower than in normal subjects.

Reference


© 1992 S. Karger AG, Basel
0028-2766/92/
0603-0371 $2.75/0