Serum Ferritin in Patients on Maintenance Hemodialysis

D.	Dino	Docci ^a
F.	Fausto	Turci ^a
G.	Giovanni	Salvi ^a
L.	Leonida	Cenciotti ^b
E.	Enzo	Pistocchi ^b

^aServizio di Emodialisi e ^bLaboratorio Analisi, Ospedale Provinciale M. Bufalini, Cesena, Italia

Dr. Dino Docci, Servizio di Emodialisi, Ospedale Provinciale M. Bufalini, I-47023 Cesena (Italy)

Dear Sir,

We would like to compare our data on serum ferritin (SF) in hemodialysis patients [1] with those recently reported by Marco-Franco et al. [2].

65 patients (33 males, 32 females; age range 18–75 years, mean 51.5) undergoing maintenance hemodialysis were studied. Average time on dialysis was 38.9 months (range 2–142). To evaluate SF behavior in the basal state, patients who had received iron supplements within 6 months or blood transfusions within 1 month before the study were not included. Serum ferritin was measured by radioimmunoassay (Liso-phase RIA System Ferritin kit, Lepetit S.p.A.). Using this method, basal SF was detected in 78 normal adults at a mean $\pm$ SD concentration of 103.3 ± 73.6 ng/ml (range 13–361), with a significant difference between males (136.5 ± 83.8 ng/ml, $n = 42$) and females (64.5 ± 42.6 ng/ml, $n = 36$) ($p < 0.001$).

Our findings show the mean SF concentrations to be higher in hemodialysis patients than in controls (247.9 ± 225.5 ng/ml, range 13–798, $p < 0.001$), with no significant difference as far as sex, age and underlying nephropathy are concerned. With regard to the other hematological parameters, log SF correlated negatively with total iron-binding capacity ($r = -0.34$, $p < 0.01$) and positively with transferrin saturation ($r = 0.37$, $p < 0.01$); no definite correlation with serum iron was found ($r = 0.21$, $p < 0.1$). Serum ferritin increased further following intravenous iron load (0.6 g in 1 month): from 235.7 ± 228.9 to 380.7 ± 216.3 ng/ml ($n = 28$, $p < 0.001$).

Although statistically significant and extended to all patients, this increase in SF concentration was dishomogenous, ranging from 11 to 417 ng/ml (mean 145.1), and did not correlate clearly with basal SF levels ($r = -0.30$, $p < 0.1$).

In agreement with previous reports, Marco-Franco et al. [2] observed that SF tended to be higher in those patients who had been on dialysis for longer periods of time.

This tendency has been generally referred to iron overload due to excessive iron therapy or, as stressed by Marco-Franco et al. [2], to multiple blood transfusions over the years. We found, on the contrary, an inverse relationship between log SF and time on dialysis ($r = -0.31$, $p < 0.05$).

This finding, which seemingly has never been reported by others, shows progressive iron depletion in our dialysis population due to inadequate administration of iron supplements.

Parenthetically, till now our patients have received an average of 1 g intravenous iron yearly, in

the face of losses that have been estimated as being up to 2 g/year [3]. The average transfusion requirement was 0.19 units/patient/month. Other factors affecting SF (i. e. liver disease, inflammatory disorders) excluded, the 'hyperferri-tinemia' found in our patients might therefore reflect an abnormal ferritin kinetics due to uremia per se, as previously suggested [4]. The variable response of SF to known doses of parenteral iron and the lack of correlation with basal levels [1,4], as well as the relatively high SF concentrations associated with iron deficiency in hemodialysis patients [5], seem to support this assumption.

We would like to raise another question about the last conclusion drawn by Marco-Franco et al. [2]. In our patients, the mean hemoglobin concentration increased significantly at 1–2 months after the intravenous iron load (from 9.3 ± 1.33 to 9.98 ± 1.5 g/dl, $p < 0.001$). In agreement with other authors [4], when the change in hemoglobin concentration was plotted against basal SF, a close relationship was found ($r = -0.72$, $p < 0.001$). All the patients with basal SF less than 65 ng/ml showed a positive response to parenteral iron administration, as documented by a mean increase in hemoglobin concentration (Δ Hb) of 1.34 ± 0.23 g/dl ($n = 7$, $p < 0.001$). A significant Δ Hb, however, could also be detected in the patients with basal SF ranging from 65 to 160 ng/ml (0.96 ± 0.64 g/dl, $n = 10$, $p < 0.01$). The effect of iron administration on hemoglobin concentration was negligible when basal SF ex-

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ceeded 160 ng/ml (Δ Hb = 0.1 ± 0.32 g/dl, $n = 11$, NS). Despite the above-mentioned pathophysiological reservations, the close relationship between basal SF and Δ Hb following iron administration proves the reliability of SF measurement as a determinant of iron requirement. Conversely, these results clearly show the 'major' role of iron deficiency in the multifactorial pathogenesis of anemia in low SF hemodialysis patients. On the basis of our findings, and in substantial agreement with previous reports [5], by maintaining SF levels between 65 and 160 ng/ml, it is possible to minimize the risk of iron deficiency or iron overload in hemodialysis patients.

References

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