

their routine follow-up at some time in the near future. One patient in the study was noted as having had symptoms for two months before her recurrent disease was detected at a routine attendance. She had not reported these symptoms because she was prepared to wait until she attended the clinic.

Most general practitioners are aware that their patients are often unhappy with their routine consultations in the surgical outpatient department. Not only are the hospital waiting rooms overcrowded but also the consultation is usually cursory and is often undertaken by the most junior member of the hospital team. The examining doctor may never have seen the patient before, and it is not uncommon for a patient to be given conflicting advice on consecutive visits because she has been seen by different doctors.

The resources of our health service are finite, and if our figures are representative of the UK as a whole then the time of the surgical team might be more usefully spent elsewhere.

We thank the surgeons and the staff of the records department of the County Hospital, Hereford, for their help.

<sup>1</sup> Cochrane JPS, Williams JT, Faber RG, Slack WW. Value of outpatient follow-up after curative surgery for carcinoma of the large bowel. *Br Med J* 1980;280:593-5.

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## Red cell indices and iron stores in patients undergoing haemodialysis

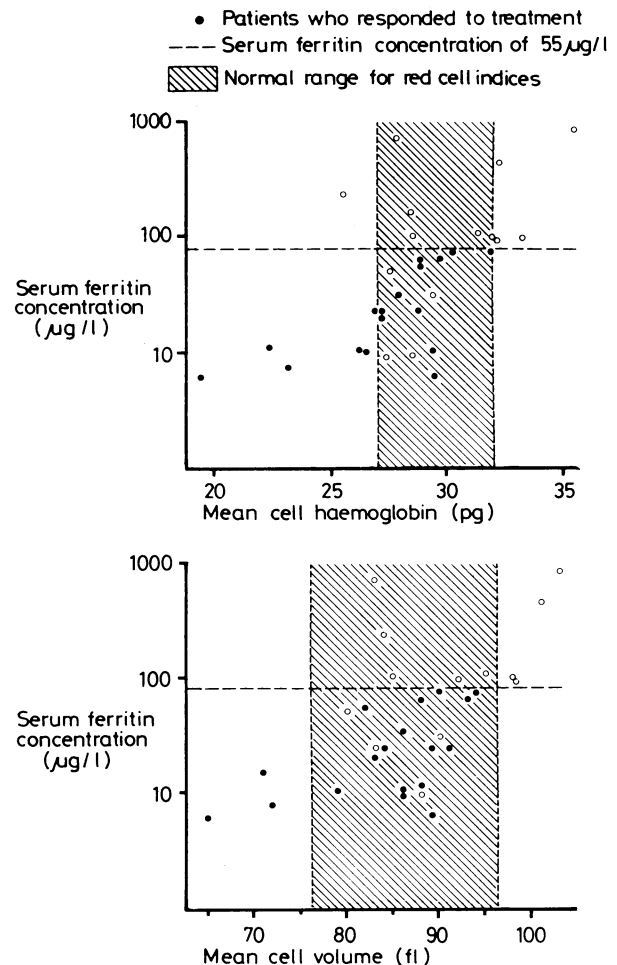
Serum ferritin concentrations correlate well with iron stores in patients with chronic renal failure.<sup>1,2</sup> It has been suggested that the red cell indices, mean cell haemoglobin (MCH) and volume (MCV), are also correlated with serum ferritin concentrations.<sup>4</sup> MCH and MCV are easier to measure than the serum ferritin concentration and therefore we have examined their value in detecting lack of iron and predicting response to iron treatment in patients undergoing haemodialysis.

### Patients, methods, and results

A total of 131 patients (82 men, 49 women) either training for or undergoing home haemodialysis were studied. Their mean age was 44.6 years (range 14-68) and the mean time on dialysis 42 months (range <1-152). The patients underwent dialysis for 10 hours twice weekly using Meltec Maxi multipoint dialysers (surface area 1.0 m<sup>2</sup>). Other details of management are published elsewhere.<sup>3</sup> Serum ferritin concentration was measured using a radioimmunoassay method (GammaDab, Clinical Assays). The normal ranges were: men 25-150 µg/l, women 15-80 µg/l; and values in iron deficiency anaemia were <10 µg/l. An excellent correlation was shown between serum ferritin concentration and bone marrow stainable iron in 32 of our patients. Haemoglobin concentration, MCV, and MCH were determined using a Coulter S counter. All values for serum ferritin were log transformed for statistical analysis.

In the whole population the mean value for MCH was 29.8 pg (range 19.3 to 36.9) and for MCV 91 fl (range 65-107). There was a significant correlation between MCH and serum ferritin concentration ( $r=0.550$ ,  $n=131$ ,  $p<0.001$ ; regression equation— $\log \text{ferritin}=0.121 \text{ MCH}-1.288$ ). The relation between MCV and serum ferritin concentration was similar ( $r=0.529$ ,  $n=131$ ,  $p<0.001$ ; regression equation— $\log \text{ferritin}=0.046 \text{ MCV}-1.854$ ).

The change in haemoglobin concentration after parenteral iron treatment with 1-1.5 g of iron dextran was monitored in 31 patients with stable haemoglobin concentrations. They received no blood transfusions and suffered no extraordinary blood loss during the study. An increase in haemoglobin concentration of at least 1 g/dl, measured four to six weeks after treatment and sustained thereafter, was regarded as an indication of response to iron. A mean increase in haemoglobin concentration of 2.5 g/dl (range 1.0-4.2) occurred in 18 patients. The association between MCH-MCV and serum ferritin concentration in the treated patients ( $r=0.616$  and  $r=0.568$ ;  $p<0.001$  respectively) was similar to that observed in the entire population under study. The relations between serum ferritin concentration and pretreatment MCH and MCV in the patients receiving parenteral iron treatment are shown in the figure.



Relation between serum ferritin concentration and pretreatment MCH and MCV values in 31 patients receiving parenteral iron treatment.

### Comment

Both MCH and MCV are positively correlated with serum ferritin concentration, and hence with iron stores, as has been previously shown.<sup>4</sup> We showed earlier<sup>3</sup> that iron treatment was likely to increase haemoglobin concentration (>1 g/dl) in patients undergoing haemodialysis with serum ferritin concentrations of up to 55 µg/l. The data presented here indicate that low MCH or MCV values may be used to confirm iron deficiency. Of the 18 patients who responded to iron treatment, however, 12 had MCH concentrations and 15 MCV concentrations within the respective normal ranges. Therefore neither MCH nor MCV is a reliable indicator of iron deficiency or of response to iron treatment in patients undergoing haemodialysis.

<sup>1</sup> Hussein S, Prieto J, O'Shea M, Hoffbrand AV, Bailod RA, Moorhead JF. Serum ferritin assay and iron status in chronic renal failure and haemodialysis. *Br Med J* 1975;1:546-8.

<sup>2</sup> Beallo R, Dallman PR, Schoenfeld PY, Humphreys MH. Serum ferritin and iron deficiency in patients on chronic haemodialysis. *Trans Am Soc Artif Intern Organs* 1976;22:73-9.

<sup>3</sup> Lynn KL, Mitchell TR, Shepperd J. Serum ferritin concentration in patients receiving maintenance haemodialysis. *Clin Nephrol* 1980;14:124-7.

<sup>4</sup> Gokal R, Millard PR, Weatherall DJ, Callender STE, Ledingham JGG, Oliver DO. Iron metabolism in haemodialysis patients. A study of the management of iron therapy and overload. *Q J Med* 1979;48:369-91.

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