SydPath
ST VINCENT'S PATHOLOGY

www.sydpath.com.au

IRON DEFICIENCY INFORMATION SHEET

PRESENTATION OF IRON DEFICIENCY

Iron deficiency occurs in several stages with anaemia as a late manifestation. Patients usually present with the insidious onset of anaemia, although the haemoglobin level correlates poorly with symptoms. If a patient has symptoms of easy fatigability or lethargy in the presence of a history suggestive of iron deficiency, it is reasonable to perform a ferritin estimation even if the FBC is normal. The blood film changes may be subtle and easily missed and even if the Hb level is within the normal range, it may be low for the particular patient.

DIAGNOSING IRON DEFICIENCY

Examination of the full blood count and blood film will usually suggest the diagnosis. The classical picture is that of a hypochromic/microcytic anaemia although in the early stages, careful examination of the blood film may show a small population of hypochromic/microcytic cells in a patient with normal red cell indices. It should be emphasised that not all hypochromic/microcytic anaemias are due to iron deficiency. The Red Cell Distribution Width (RDW) is a useful parameter in differentiating iron deficiency from thalassaemia minor by providing a measure of variation in red cell size. In thalassaemia minor, the RDW is usually normal as the population of cells are relatively uniform, whereas in iron deficiency, the value is usually >14.5%.

SERUM FERRITIN MEASUREMENT

Serum ferritin is the most useful test in the diagnosis of iron deficiency. In healthy people, it accurately reflects iron stores; a level below normal is diagnostic of iron deficiency. In an anaemic patient a normal level is less useful as many diseases, such as malignancy, liver disease and inflammatory diseases, cause a rise in ferritin independent of iron stores. In such patients, a low level can be considered to be diagnostic of iron deficiency and the diagnosis is virtually excluded if the level is above normal. In patients with indeterminate ferritin levels and anaemia, the gold standard for the assessment of storage iron is marrow aspiration and Prussian blue staining. Alternatively, a therapeutic trial of oral iron will confirm the diagnosis if a reticulocytosis (at one week) and a rise in haemoglobin (usually in the order of 0.5 to 1.0 g/week) are found.

SERUM IRON, TRANSFERRIN AND TRANSFERRIN SATURATION MEASUREMENT

Although measurement of serum iron, transferrin (a measure of serum total iron binding capacity) and transferrin saturation will show a characteristic pattern in iron deficiency, there is considerable overlap with values found in various disease states; therefore these measurements have only a supportive role in diagnosis. Although serum iron is often requested and is usually reduced in iron deficiency, it is raised by recent food intake (and, therefore, must be assessed on a fasting specimen) and is reduced in many common disorders which give rise to the anaemia of chronic disease. There is also a marked diurnal variation with lower levels occurring in the evening. Interpretation of a correctly collected

specimen also requires a knowledge of the transferrin level. The typical patterns of iron and transferrin in different disease states are shown in the table.

COMMON MISTAKES IN THE DIAGNOSIS OF IRON DEFICIENCY

- the misdiagnosis of other hypochromic microcytic anaemias as iron deficiency; iron therapy in these patients is inappropriate and potentially harmful
- the misinterpretation of serum iron studies (especially over-reliance on serum iron measurements) and the failure to request a serum ferritin
- the failure to investigate the cause of iron deficiency adequately.

Table 1. Reasons for Iron Deficiency in Groups at Risk

Women	• Increased loss of iron (e.g. menstrual bleeding and blood donation) • Increased iron requirements (e.g. pregnancy and breast feeding) • A combination of factors in teenagers (e.g. menstrual loss, poor diet and rapid growth)
Infants	• High iron requirements especially premature infants
Athletes	• Increased gastrointestinal blood loss • Iron loss in sweat and urine • Poor diet in some
Vegetarians	• Low iron diet
Elderly people	• Many factors e.g. poor diet and intercurrent gastrointestinal disease

Table 2: Stages of Iron Deficiency and their Detectable Laboratory Abnormalities

Stage 1	Depleted iron stores	Low ferritin Absent bone marrow iron
Stage 2	Latent iron deficiency	Low transferrin saturation Low serum iron Raised serum transferrin Normal haemoglobin
Stage 3	Iron deficiency	Low haemoglobin

Table 3. Typical Patterns of Serum Iron Studies in Hypochromic/Microcytic Anaemias

	Serum Iron	Transferrin	Saturation	Ferritin
Iron Deficiency	Low	High	Low	Low
Chronic Disease	Low	Low	Low	N or High
Thalassaemia	N	N	N	High