Interpreting Iron Studies in Primary Care

Medscape UK X Guidelines
Primary Care Hacks

Author: Dr Kevin Fernando, GP Partner, North Berwick Health Centre; Content Advisor, Medscape Global and UK. Email: kfernando@webmd.net

What Are Iron Studies?

- **Ferritin** reflects total body iron stores and is the best investigation for suspected IDA. Ferritin is an acute phase protein so can be falsely elevated or normal in inflammatory disorders, liver disease, alcohol excess, and malignancy when in reality iron stores are low
- **Transferrin** is the main iron transport protein that controls the level of free iron. It increases in IDA to maximise use of available iron and reduces in iron overload
- **Serum iron** is the level of circulating iron bound to transferrin. Serum iron levels are highly variable and affected by dietary intake, inflammation, infection, and malignancy
  - an isolated low serum iron level has poor diagnostic specificity for iron deficiency
- **Transferrin saturation (TSAT)** is the proportion of iron-binding sites of transferrin occupied by iron. A high TSAT (>50%) is a sensitive and specific test for iron overload (e.g. haemochromatosis), whereas low values are poorly specific for iron deficiency
  - pregnancy, COCP use, and chronic illness all lower TSAT without iron deficiency.

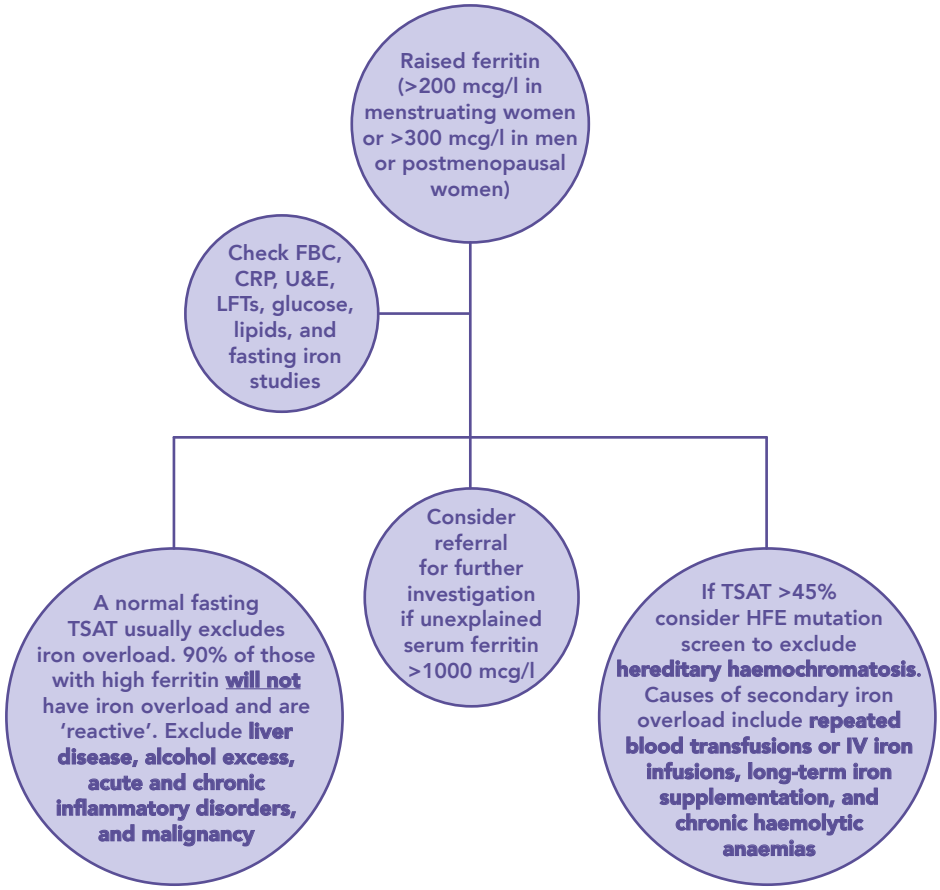
Top Tips and Pitfalls to Avoid When Interpreting Iron Studies

- Iron studies should be measured on a **fasting morning sample** as serum iron levels undergo diurnal variation and may rise with food ingestion, temporarily increasing TSAT
- Individuals should **not be tested during acute illness** where iron levels may fall and artificially lower TSAT
- A normal or high serum ferritin can be secondary to infection, inflammation, liver disease, or cancer, and therefore mask the presence of iron deficiency
  - check CRP to exclude underlying inflammation
- **Do not assume all microcytic anaemias are IDAs**—check ferritin levels
  - low ferritin is diagnostic of IDA
  - however, as mentioned above, a normal or high ferritin does not exclude iron deficiency. In such cases, check serum iron and transferrin on a fasting sample—low serum iron and transferrin ≥3 g/l are then diagnostic of IDA
- If the cause of a high ferritin is unclear, the most useful test to differentiate true iron overload from other causes is TSAT.

Management of Iron Deficiency

- Iron deficiency requires a full diagnostic work-up and consideration of further tests to exclude conditions such as colorectal malignancy
- Iron supplements were habitually dosed up to three times daily, but recent studies have demonstrated that a single daily dose or alternate-day dosing can help to optimise iron absorption
- Prescribe a 65 mg elemental iron tablet daily (e.g. ferrous sulphate 200 mg) and continue treatment for 3 months after iron deficiency is corrected to allow stores to be replenished
- If this is not tolerated, reduce dose to one tablet on alternate days or consider an alternative preparation with lower elemental iron content
- Ferrous fumarate contains more elemental iron (65 mg) per tablet than ferrous sulphate (60 mg) so it is unlikely to be better tolerated. Try ferrous gluconate instead (35 mg)
- Drug interactions can affect iron absorption (e.g. calcium tablets in the short term), so discontinue or separate timing where possible; recent evidence suggests that adjunctive vitamin C does not improve tolerability or absorption.

Managing Raised Serum Ferritin Levels



Interpreting Iron Studies

Condition	MCV (NR 80–96 fl)	Ferritin (NR 20–300 mcg/l in men and postmenopausal women, 15–200 mcg/l in menstruating women)	Serum Iron (NR 14–32 mcmol/l)	Transferrin (NR 2–4 g/l)	Transferrin Saturation (NR 12–45% in women and 15–50% in men)
Iron deficiency anaemia	↓	↓	↓	↑	↓
Anaemia of chronic disease	↓ or ↔	↑ or ↔	↓	↓	↓ or ↔
Iron overload e.g. haemochromatosis	↑ or ↔	↑	↑	↓	↑

↑ = Raised ↓ = Lowered ↔ = Unchanged

COCP=combined oral contraceptive pill; **CRP**=C-reactive protein; **FBC**=full blood count; **HFE**=human homeostatic iron regulator protein; **IDA**=iron deficiency anaemia; **IV**=intravenous; **LFT**=liver function test; **MCV**=mean corpuscular volume; **NR**=normal range; **TSAT**=transferrin saturation; **U&E**=urea and electrolytes

For references, and to view this Primary Care Hack online, go to: medscape-uk.co/Hack-ironstudies

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