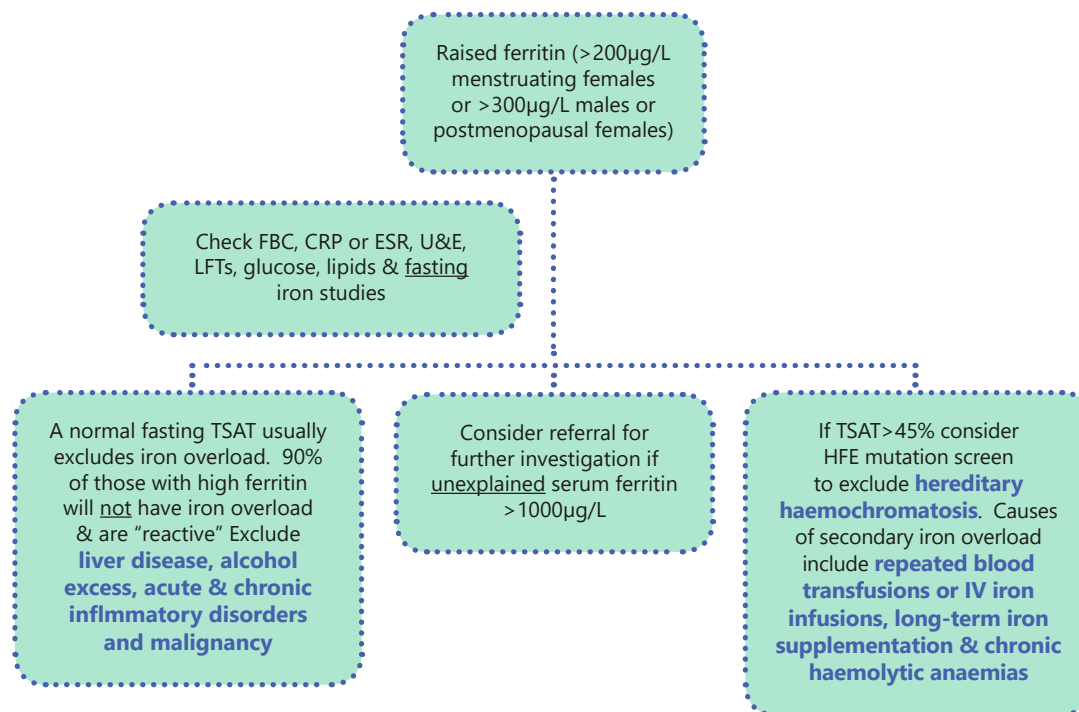


What are Iron Studies?

- **Ferritin** is the intracellular storage form of iron and is the best investigation for suspected iron deficiency anaemia (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 & 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 & malignancy
- **Transferrin saturation (TSAT)** is the proportion of iron-binding sites of transferrin occupied by iron. A high TSAT is a sensitive & specific test for iron overload (e.g. haemochromatosis) whereas low values are poorly specific for iron deficiency (pregnancy, OCP use & chronic illness lower TSAT without iron deficiency)



Tips on Requesting Iron Studies

- Iron studies should be measured on a fasting morning sample as serum iron levels undergo diurnal variation & 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
 - Check CRP if serum ferritin is normal or high with low serum iron or TSAT
- Do not assume all microcytic anaemias are IDAs – check ferritin levels
 - Low ferritin is diagnostic of IDA
 - However, a normal/high ferritin does not exclude iron deficiency. In such cases, check serum iron & transferrin on a fasting sample – low serum iron & transferrin $\geq 3g/L$ 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

Condition	MCV (NR 80-96fL)	Ferritin (NR 20-300µg/L males & postmenopausal women, 15-200µg/L menstruating females)	Serum Iron (NR 14-32µmol/L)	Transferrin (NR 2-4g/L)	Transferrin Saturation (NR 12-45% females & 15-50% males)
Iron deficiency anaemia	↓	↓	↓	↑	↓
Anaemia of chronic disease	↓ or ↔	↑ or ↔	↓	↓	↓ or ↔
Iron overload e.g. haemochromatosis	↑ or ↔	↑	↑	↓	↑

References

1. "Interpreting raised serum ferritin levels" BMJ 2015;351:h3692
2. "Interpreting iron studies" BMJ 2017;357:j2513