

A Guide to Interpretation of Iron Studies

Overview

Iron studies are often ordered in the setting of suspected cases of iron deficiency or iron overload. Assessment of iron stores is helpful in the patient who presents with non-specific symptoms of lethargy.

Depending on the laboratory platform, assessment of iron studies includes measurement of:

Test	Interpretation / Notes
Serum iron	Considerable variation occurs within a day in individuals, and assessment of serum iron alone provides little helpful clinical information.
Serum transferrin (or total iron binding capacity; TIBC) / Transferrin saturation	Iron is bound to transferrin in the plasma. Total iron binding capacity (TIBC) is a direct measure of transferrin level. Transferrin levels are reduced in inflammation. Transferrin saturation is particularly helpful in assessing early iron overload, with levels >55% (males) or >50% (females) indicative of overload (a fasting level gives a more accurate assessment).
Serum ferritin	A small amount of circulating serum ferritin reflects body iron stores, and is now well established in assessment of iron stores. Normal range 15–300 ug/l (reference ranges vary by method). Levels <15 ug/l reflect absent/reduced iron stores. Elevated levels may reflect iron overload but are also increased in liver disease, inflammation, or malignant disease — in the presence of inflammation, a level >100 ug/l generally excludes iron deficiency.
Soluble transferrin receptor	Transferrin receptors are present on cell surfaces and are responsible for the internalisation of transferrin, resulting in intracellular release of iron. In the absence of adequate iron stores, expression of transferrin receptors increases. Soluble transferrin receptor closely reflects iron stores and is not affected by the inflammatory process; increased levels are also found in conditions of increased red cell turnover (e.g. haemolysis).

Interpreting Patterns Across Conditions

Interpretation of iron studies can be confusing, with a number of the measures affected by iron therapy and acute phase response. See the table below. The “most helpful” test suggestion for each condition described is shown in bold.

	Iron deficiency	Anaemia of chronic disease	Iron deficiency + inflammation	Acute phase response	Iron overload
Serum iron	Decreased	Decreased	Decreased	Decreased	Increased
Serum transferrin / TIBC	Increased	Decreased	Decreased (low normal)	Decreased	Decreased or normal
Transferrin saturation	Decreased	Decreased	Normal or decreased	Decreased	Increased
Serum ferritin	Decreased	Normal (>100 ug/l)	“Normal”	Increased	Increased

Soluble transferrin receptor	Increased	Normal	Increased	Normal	Decreased
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References

1. Dacie and Lewis Practical Haematology, 10th edition. Churchill Livingstone, Philadelphia, 2006.
2. Weiss G, Goodnough L. Anemia of Chronic Disease. New England Journal of Medicine 2005;352:1011-1023.

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Further Questions?

The information presented in this fact sheet is intended as a general guide only.

Patients should seek further advice and information about **iron studies interpretation** and their individual condition from their treating haematologist or doctor.

For additional information about blood disorders and their treatment, or to contact one of our specialist haematologists, visit the Melbourne Haematology website:

www.melbournehaematology.com.au