

Why is accurate monitoring of liver iron important?

The liver and the heart in iron overload

The liver is the primary site of iron storage in the body in either primary iron overload, caused by excessive dietary absorption or secondary iron overload as a result of a requirement for regular blood transfusions. Liver iron concentration (LIC) therefore, is the standard reference method for measuring body iron and the most validated predictor of the risks a particular patient faces from the complications of iron toxicity.¹

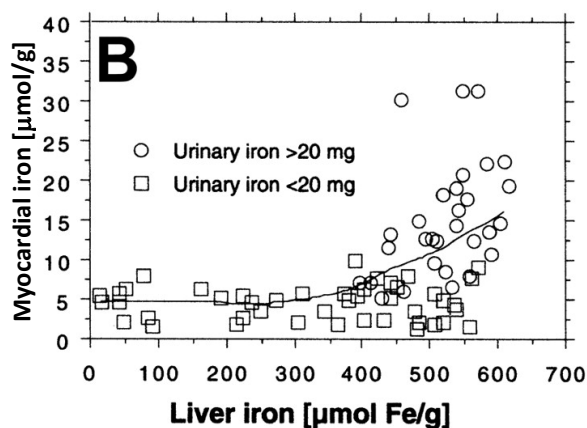
The accumulation of hepatic iron can result in fibrosis and cirrhosis of the liver.

In certain disease groups, most notably β thalassemia major, once iron has deposited to a certain threshold in the liver, it will then deposit in other endocrine organs and the heart where it can rapidly result in cardiac failure and death. It is therefore particularly important that regular and accurate monitoring of LIC, such as by FerriScan R2 MRI, is available to inform clinician's treatment decisions on these patients. In this way, the FerriScan LIC result serves as an early warning system and helps to ensure that cardiac iron loading is avoided.

The relationship between liver and cardiac iron

It has been established that there is a relationship between liver and heart iron, but this relationship is longitudinal rather than cross-sectional.² High hepatic iron concentration is associated with cardiac iron overload.³

Heart iron lags behind liver iron, both as the site of iron loading and in its removal when chelation is undertaken. Therefore measurements of cardiac iron alone do not provide clinicians with a complete picture of a patient's body iron loading. While a patient may exhibit no existing cardiac iron loading, a measurement of their LIC may indicate that liver damage is already occurring and an imminent danger of cardiac iron deposition.



14 subjects with transfusional iron overload and uncomplicated chelation history

Jensen et al (2003) *Blood* 101, 4632-4639



"FerriScan is our preferred tool for determining Liver Iron Concentration as it has greater sensitivity and specificity to other MRI methods, providing a quantitative value which gives better guidance in monitoring.

FerriScan has regulatory approval and offers a quality assured service. We use FerriScan to screen patients for iron overload and to optimise any chelation treatment required through accurate monitoring."

Professor Swee Lay Thein, FRCPath, FRCP, DSc, FMedSci

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Determining LIC

While regular tests for serum ferritin provide a useful indication of trending in total body iron, they have been found to demonstrate poor accuracy in β thalassemia major,⁴ thalassaemia intermedia⁵ and sickle cell disease.⁶ Therefore, although there is a broad correlation between serum ferritin level and liver iron, the prediction of iron loading from serum ferritin can be unreliable.⁷

The role of accurate LIC determination has been recognised by leading clinicians internationally, who have now included it in their protocols for the management of iron-loaded patients. These are available for download on the Clinician Information page of the FerriScan website at www.ferriscan.com

Patient outcomes

Monitoring of iron stores has been shown to improve patient outcomes including cardiac disease-free survival.⁸ Provision of a complete picture of a patient's body iron loading better informs clinician decisions on the initiation of an appropriate chelation regime and regular review of total body iron provides reliable data on which to determine dosage adjustments.

Numerous studies have indicated profound differences in survival between poorly-chelated and well-chelated patients.^{9,10,11}

The FerriScan Process and Report

FerriScan is a non-invasive R2-MRI technology. It requires a scan time of only approximately 10 minutes. Scan data is securely transmitted to Resonance Health's quality-controlled central analysis facility.

The FerriScan Report is made available to the referring MRI Centre within two business days of the scan data being submitted. In addition to an LIC measurement, the FerriScan Report provides the clinician with the necessary information to be able to judge the patient's risk of complications.

Liver Iron Concentration thresholds in Transfusional Iron Overload

Extract from Olivieri et al, Blood 1997; 89, 739-61

LIC Range	Clinical Relevance
0.17-1.8 mg Fe/g dw	Normal range in non-disease patients in healthy population
3.2-7.0 mg Fe/g dw	Suggested optimal range of LIC for chelation therapy in transfusional iron loading
7.0-15.0 mg Fe/g dw	Increased risk of complications
> 15.0 mg Fe/g dw	Greatly increased risk of cardiac disease and early death in patients with transfusional iron overload

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March 2011