

Why Use FerriScan[®] R2-MRI to Measure Liver Iron Concentration

Alternative MRI-based Measurements of Liver Iron Concentration

Several MRI-based methods have been developed to measure Live Iron Concentration (LIC). The most widely accepted are relaxometry methods based on measuring either R2 or T2*.

For measuring liver T2*, several different methods are used including (but not limited to) those described by:

- Anderson *et al*¹
- Wood *et al*²
- Hankins *et al*³
- Garbowski *et al*⁴
- Chan *et al*⁵
- Christoforidis *et al*⁶

For measuring liver R2, the FerriScan R2-MRI method^{7,8} has been most widely adopted.

FerriScan[®] R2-MRI is the only MRI liver iron concentration measurement technique to have been calibrated and validated against biopsy (i) across multiple scanners, (ii) in patients with different stages of fibrosis, and (iii) in both paediatrics and adults.

Key FerriScan Features

- ✓ FerriScan provides an accurate, validated MRI-based measurement of liver iron concentration
- ✓ FerriScan is non-invasive, requires no contrast agents and has a scan time of approximately 10 minutes
- ✓ FerriScan has high sensitivity and specificity for measuring LIC
- ✓ Image analysis and LIC reporting is performed at a central ISO 13485 certified Service Centre
- ✓ FerriScan has international regulatory clearance (USA, Europe, Australia)
- ✓ Results are available within a target time of two business days
- ✓ FerriScan can measure LIC over the entire range encountered in clinical practice³
- ✓ FerriScan results are clinically validated to be unaffected by inflammation, fibrosis or cirrhosis
- ✓ FerriScan requires no breath-hold and may therefore be used for paediatric patients
- ✓ Results are accurate, reliable and reproducible over time and between MRI centres and models of scanner
- ✓ There is no requirement for customers to purchase new software or hardware
- ✓ FerriScan is suitable for 1.5 Tesla MRI scanners
- ✓ FerriScan is charged per scan only

Comparison of Features of Studies Conducted Using FerriScan (R2-MRI) and T2* MRI

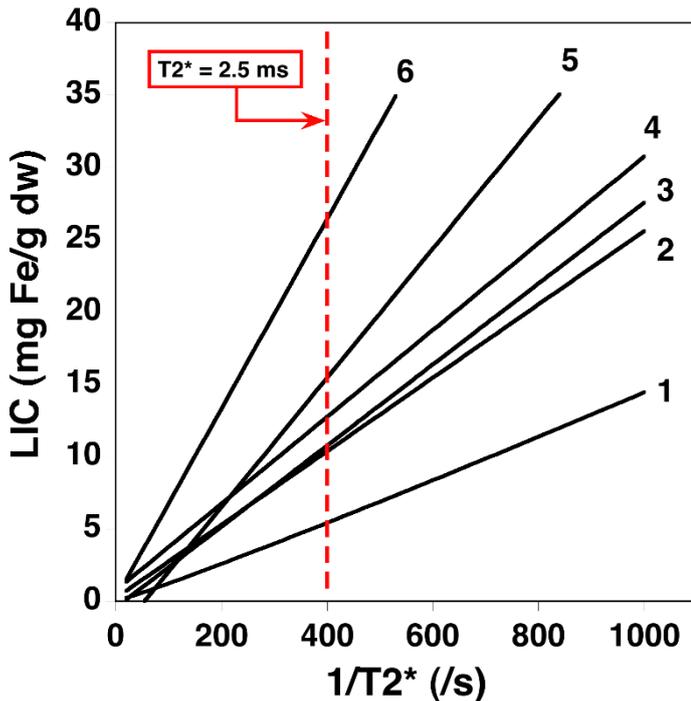
	FerriScan R2-MRI		Anderson <i>et al</i> ¹	Wood <i>et al</i> ²	Garbowski <i>et al</i> ³
	Study 1 ⁷	Study 2 ⁸			
Number of scanners	5	5	1	1	1
Number of biopsies	105	233	30	23	18
Max demonstrated LIC	43	47	23	33	30

As at October 2013

Key liver T2* Measurement Limitations

- ✘ Liver T2* techniques have typically been calibrated against biopsy LIC with data from a single scanner only
- ✘ Calibrations are not necessarily transferrable between different makes and models of scanners
- ✘ Data acquisition parameters are not standardised
- ✘ Data analysis techniques are not standardised and analyst training is required
- ✘ Not all liver T2* measurement methods have regulatory clearance

Range of LIC Results Produced by Different T2* Calibrations



For example, a T2* of 2.5 ms would give vastly different LIC depending on the calibration used:

Number on Graph	Published reference	LIC (mg/g dw)
1	Anderson et al, 2001	5.4
2	Wood et al, 2005	10.4
3	Hankins et al, 2009	10.7
4	Garbowski et al, 2009	12.7
5	Chan et al, 2010	15.4
6	Christoforidis et al, 2009	26.4

A review of the literature shows that, unlike FerriScan® R2-MRI, liver T2* methods generate data that are scanner and method dependent and hence are not sufficiently standardised to enable reliable liver iron concentration measurements using calibration curves published from other centres.

References

1. Anderson *et al* (2001) *Eur Heart J*, 22:2171-2179.
2. Wood *et al* (2005) *Blood*, 106: 1460-1465.
3. Hankins *et al* (2009) *Blood*, 113:4853-4855.
4. Garbowski *et al* (2009) *ASH Annual Meeting Abstracts*, 114(22): 2004.
5. Chan *et al* (2010) *ISMRM Conference abstract*.
6. Christoforidis *et al* (2009) *Eur J Haematol*, 82: 388-392.
7. St Pierre *et al* (2005) *Blood*; 105:855-861.
8. St Pierre *et al* (2013) *Magn Reson Med* doi: 10.1002/mrm.24854