Clinical Policy: Ferriscan R2-MRI

Reference Number: LA.CP.MP.53 Coding Implications
Date of Last Revision: 12/22 Revision Log

See Important Reminder at the end of this policy for important regulatory and legal information.

Description
FerriScan® R2-MRI is a magnetic resonance imaging (MRI)-based solution for measuring liver iron concentration (LIC) in patients with iron overload.

Policy/Criteria
I. It is the policy of Louisiana Healthcare Connections that the FerriScan® R2-MRI is **medically necessary** for the measurement of liver iron concentration in suspected cases of iron overload due to the following conditions:
- **A.** Hereditary hemochromatosis;
- **B.** Iron-loading anemias with or without multiple transfusions:
  1. Thalassemia major or thalassemia intermedia;
  2. Sideroblastic anemia;
  3. Chronic hemolytic anemias (e.g., sickle cell disease);
  4. Inherited or acquired aplastic anemia;
  5. Myelodysplastic syndromes;
- **C.** Dietary iron overload;
- **D.** Iron overload in liver diseases:
  1. Hepatitis C or B;
  2. Alcohol-induced liver disease;
  3. Porphyria cutanea tarda;
  4. Fatty liver disease;
  5. Gestational alloimmune liver disease
- **E.** Neonatal iron overload;
- **F.** Aceruloplasminemia;
- **G.** Repeated hemin infusions for acute porphyrias.
- **H.** Hemodialysis for end stage renal failure.

Background
Iron overload is a potentially life-threatening problem that is commonly overlooked due to nonspecific symptoms that tend to develop slowly over time. Excess iron does not only affect the liver, but can also accumulate in, and damage other organs like the heart, skin and endocrine organs, as well as joints. Clinical issues resulting from excess iron include tissue damage, inflammation, and fibrosis. Left untreated, iron overload can result in organ toxicity, end-organ damage and dysfunction due to oxidative stress resulting in excess oxygen radicals and injury from tissue peroxidation. Once identified, iron overload is treated with phlebotomy and chelation therapy as well as exchange transfusion in sickle cell disease.[4,5]

Disorders associated with hepatic iron deposition include:[4,5]
- Hereditary hemochromatosis;
- Syndromes of ineffective erythropoiesis such as beta thalassemia, sideroblastic anemia and other inherited anemias;

- Chronic liver disease;
- Gestational alloimmune liver disease
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- Alcoholic liver disease;
- Hepatitis;
- Nonalcoholic fatty liver disease;
- Cirrhosis;
- Wilson disease;
- Porphyria cutanea tarda;
- Hematopoietic stem cell transplantation,
- Myelodysplastic syndrome,
- Dialysis;
- Blood transfusions for sickle cell disease.

FerriScan® is a non-invasive technology based on magnetic resonance imaging (MRI). It has a high sensitivity and specificity for the measurement of liver iron concentration (LIC) over the entire range encountered in clinical practice. It can be set up on most 1.5 Tesla MRI scanners, which are (the most common type of clinical scanner), and it was announced by Resonance Health in 2022 that FerriScan is now available on 3 Tesla MRI machines.[16]. FerriScan works by making a map of the liver iron concentrationLIC and calculatinges the mean LIC. The results are unaffected by the presence of fibrosis or cirrhosis. Image data is acquired on an MRI scanner and is electronically transmitted to a data analysis center. All data is analyzed to ensure correct acquisition and the LIC results are transmitted back to the originating MRI center.

Measurements have been shown to have a high degree of sensitivity and specificity for liver iron concentration LIC measured by biopsy. Ferriscan has become increasingly accurate in the determination of hepatic and cardiac iron deposition and is replacing direct tissue biopsy in the assessment of iron overload.[4] FerriScan images give information on liver iron distribution. The mean LIC value given in the FerriScan report is then used to guide chelation therapy.

The operational principle of the R2-MRI Analysis System is based on fitting signal decay curves to the image signal intensities (e.g. of the liver) at the different echo times for the magnetic resonanceMR data set on a voxel-by-voxel (3-D pixel) basis to determine transverse relaxation rate (R2) images. These may be further transformed by a defined calibration to provide a quantitative measure of liver iron concentrations.

Although magnetic resonance evaluation for hepatic iron concentration is improved compared with older programs, this type of imaging will not detect cellular liver damage due to iron overload.

The American College of Radiology's 2020 Practice Parameter for the performance of MRI of the liver states that indications for MRI of the liver include, but are not limited to, evaluation and noninvasive quantification of iron, fat, and fibrosis in chronic liver disease, such as hemochromatosis, hemosiderosis, nonalcoholic steatohepatitis, (NASH), and hepatitis in adults and pediatric patients. Additionally, multiple studies have confirmed the clinical utility of R2 MRI in the measurement of LIC for iron-overloading conditions such as thalassemia[8] and sickle

cell anemia.[9] A study of R2 MRI results vs. simulated liver biopsy results found R2 MRI to be superior to liver biopsy for serial LIC observations.[10] Furthermore, a review of the current state of liver iron quantification by MRI states that R2 MRI provides validated measurement of LIC, and has advantages over liver biopsy, in that it is non-invasive.[11]

The R2-MRI Analysis System (Inner Vision Biometrics PTY LTD) received ~~FDA~~ 510(k) clearance (K043271) from the United Stated Food and Drug Administration (FDA) on January 21, 2005. In January 2013, the FDA authorized the FerriScan R2-MRI to be marketed as an imaging companion diagnostic device for the safe and effective use of Exjade in patients with non-transfusion-dependent thalassemia.

Coding Implications

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CPT® Codes	Description
76498	Unlisted MRI procedure

~~ICD-10-CM Diagnosis Codes that Support Coverage Criteria~~

~~ICD-10-CM Code~~	~~Description~~
~~B16.0-B1.9~~	~~Acute hepatitis B~~
~~B17.10-B17.11~~	~~Acute hepatitis C~~
~~B18.0~~	~~Chronic viral hepatitis B, with delta -agent~~
~~B18.1~~	~~Chronic viral hepatitis B without delta-agent~~
~~B18.2~~	~~Chronic viral hepatitis C~~
~~B19.10-B19.11~~	~~Unspecified viral hepatitis B~~
~~B19.20-B19.21~~	~~Unspecified viral hepatitis C~~
~~D46.0~~	~~Refractory anemia without ring sideroblasts, so stated~~
~~D46.1~~	~~Refractory anemia with ring sideroblasts~~
~~D46.20-D46.22~~	~~Refractory anemia with excess of blasts~~
~~D56.1~~	~~Beta thalasemia~~
~~D61.01- D61.9~~	~~Other aplastic anemias and other bone marrow failure syndromes~~
~~D64.0~~	~~Hereditary sideroblastic anemia~~
~~D64.1~~	~~Secondary sideroblastic anemia due to disease~~
~~D64.2~~	~~Secondary sideroblastic anemia due to drugs and toxins~~
~~D64.3~~	~~Other sideroblastic anemia~~
~~D64.4~~	~~Congenital dyserythropoietic anemia~~
~~E80.1~~	~~Porphyria cutanea tarda~~

~~ICD-10-CM Code~~	~~Description~~
~~E83.10~~	~~Disorders of iron metabolism, unspecified~~
~~E83.110~~	~~Hereditary hemochromatosis~~
~~E83.111~~	~~Hemochromatosis due to repeated red blood cell transfusions~~
~~E83.118~~	~~Other hemochromatosis~~
~~K70.0-K70.9~~	~~Alcoholic liver disease~~
~~K76.0~~	~~Fatty (change of) liver, not elsewhere classified~~

Reviews, Revisions, and Approvals	Revision Date	Approval Date
Converted corporate to local policy.	08/15/2020	
References reviewed and updated. Replaced "member" with "member/enrollee" in all instances. Annual review. Added "Hemodialysis for end stage renal failure" as an indication. References reviewed and updated. Changed "review date" in the header to "date of last revision" and "date" in the revision log header to "revision date." Updated background with no clinical significance. Added "and may not support medical necessity" in coding implications. Reviewed by specialist.	2/22	2/22
Background updated with no impact on criteria. ICD-10 codes removed from policy. References reviewed and updated.	12/22	

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~~15.~~

Important Reminder

This clinical policy has been developed by appropriately experienced and licensed health care professionals based on a review and consideration of currently available generally accepted standards of medical practice; peer-reviewed medical literature; government agency/program approval status; evidence-based guidelines and positions of leading national health professional organizations; views of physicians practicing in relevant clinical areas affected by this clinical policy; and other available clinical information. LHCC makes no representations and accepts no liability with respect to the content of any external information used or relied upon in developing this clinical policy. This clinical policy is consistent with standards of medical practice current at the time that this clinical policy was approved.

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