

## Clinical Policy: Ferriscan R2-MRI

Reference Number: CP.MP.53

Date of Last Revision: 10/22

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### Description

FerriScan<sup>®</sup> 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 Health Plans affiliated with Centene Corporation<sup>®</sup> that the FerriScan<sup>®</sup> 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.<sup>4,5</sup>

Disorders associated with hepatic iron deposition include<sup>4,5</sup>:

- Hereditary hemochromatosis;

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- Syndromes of ineffective erythropoiesis such as beta thalassemia, sideroblastic anemia and other inherited anemias;
- Chronic liver disease;
- Gestational alloimmune liver disease
- 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<sup>®</sup> 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.<sup>16</sup> FerriScan works by making a map of the LIC and calculating 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 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.<sup>4</sup> 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 resonance 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-

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MRI in the measurement of LIC for iron-overloading conditions such as thalassemia and sickle cell anemia.<sup>9</sup> A study of R2-MRI results vs. simulated liver biopsy results found R2-MRI to be superior to liver biopsy for serial LIC observations.<sup>10</sup> 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.<sup>11</sup>

The R2-MRI Analysis System (Inner Vision Biometrics PTY LTD) received 510(k) clearance (K043271) from the United States 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®	Description
76498	Unlisted MRI procedure

Reviews, Revisions, and Approvals	Revision Date	Approval Date
Policy developed	11/12	11/12
Changed Ferriscan from not medically necessary to medically necessary in cases of suspected iron overload. Added supporting background information. Added ICD-10 codes. Specialist reviewed.	10/16	11/16
Added "inherited or acquired" to B.4 Aplastic anemia. Added D.5 Gestational alloimmune liver disease, removed "chronic" from D. Iron overload in liver diseases. Removed E. African iron overload because this would be included under C. Dietary iron overload. Added G. Repeated hemin infusions for acute porphyrias.	11/17	11/17
References reviewed and updated. Codes reviewed and updated.	10/18	10/18
Changed "thalassemia major and thalassemia intermedia" to "thalassemia major or thalassemia intermedia." Changed "hepatitis C and B" to "hepatitis C or B"	12/18	
References reviewed and updated. Reviewed by specialist. Replaced codes D61.89 and D61.9 with expanded range of D61.01-D61.9.	10/19	10/19
References reviewed and updated. Replaced "member" with "member/enrollee" in all instances.	09/20	10/20

Reviews, Revisions, and Approvals	Revision Date	Approval Date
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. Reviewed by specialist.	10/21	10/21
Annual review. Background updated with no impact on criteria. ICD-10 codes removed from policy. References reviewed and updated.	10/22	10/22

### References

1. The American College of Radiology. ACR–SAR–SPR practice parameter for the performance of magnetic resonance imaging (MRI) of the liver. <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/MR-Liver.pdf>. Published 2020. Accessed September 22, 2022.
2. FerriScan® R2-MRI Fact Sheet. Resonance Health. <https://www.resonancehealth.com/images/files/FerriScan/FerriScan%20Fact%20Sheet%20Mar%202015.pdf>. Published March 2015. Accessed September 22, 2022.
3. Fischer R, Harmatz PR. Non-invasive assessment of tissue iron overload. *Hematology Am Soc Hematol Educ Program*. 2009;215 to 221. doi:10.1182/asheducation-2009.1.215
4. Bacon BR, Kwiatkowski JL. Approach to the Patient with Suspected Iron Overload. UpToDate. [www.uptodate.com](http://www.uptodate.com). Updated June 09, 2022. Accessed September 09, 2022.
5. Fiel, MI. Methods to determine hepatic iron content. UpToDate. [www.uptodate.com](http://www.uptodate.com). Updated January 24, 2022. Accessed September 20, 2022.
6. Taher A, Musallam KM, El Rassi F, et al. Levels of non-transferrin-bound iron as an index of iron overload in patients with thalassaemia intermedia. *Br J Haematol*. 2009;146(5):569 to 572. doi:10.1111/j.1365-2141.2009.07810.x
7. Kwiatkowski JL, Kim HY, Thompson AA, et al. Chelation use and iron burden in North American and British thalassemia patients: a report from the Thalassemia Longitudinal Cohort. *Blood*. 2012;119(12):2746 to 2753. doi:10.1182/blood-2011-04-344507
8. Wood JC, Pressel S, Rogers ZR, et al. Liver iron concentration measurements by MRI in chronically transfused children with sickle cell anemia: baseline results from the TWiTCH trial. *Am J Hematol*. 2015;90(9):806 to 810. doi:10.1002/ajh.24089
9. Wood JC, Zhang P, Rienhoff H, Abi-Saab W, Neufeld EJ. Liver MRI is more precise than liver biopsy for assessing total body iron balance: a comparison of MRI relaxometry with simulated liver biopsy results. *Magn Reson Imaging*. 2015;33(6):761 to 767. doi:10.1016/j.mri.2015.02.016
10. Hernando D, Levin YS, Sirlin CB, Reeder SB. Quantification of liver iron with MRI: state of the art and remaining challenges. *J Magn Reson Imaging*. 2014;40(5):1003 to 1021. doi:10.1002/jmri.24584
11. Tamary H, Dgany O. Congenital Dyserythropoietic Anemia Type 1. <https://www.ncbi.nlm.nih.gov/books/NBK5313/>. Published April 21, 2009. Accessed September 23, 2022.
12. d'Assignies G, Paisant A, Bardou-Jacquet E, et al. Non-invasive measurement of liver iron concentration using 3-Tesla magnetic resonance imaging: validation against biopsy. *Eur Radiol*. 2018;28(5):2022 to 2030. doi:10.1007/s00330-017-5106-3

13. Jhaveri KS, Kannengiesser SAR, Ward R, Kuo K, Sussman MS. Prospective Evaluation of an R2\* Method for Assessing Liver Iron Concentration (LIC) Against FerriScan: Derivation of the Calibration Curve and Characterization of the Nature and Source of Uncertainty in the Relationship. *J Magn Reson Imaging*. 2019;49(5):1467 to 1474. doi:10.1002/jmri.26313
14. Kowdley KV, Brown KE, Ahn J, Sundaram V. ACG Clinical Guideline: Hereditary Hemochromatosis [published correction appears in *Am J Gastroenterol*. 2019 Dec;114(12):1927]. *Am J Gastroenterol*. 2019;114(8):1202 to 1218. doi:10.14309/ajg.0000000000000315
15. Ghoti H, Rachmilewitz EA, Simon-Lopez R, et al. Evidence for tissue iron overload in long-term hemodialysis patients and the impact of withdrawing parenteral iron. *Eur J Haematol*. 2012;89(1):87 to 93. doi:10.1111/j.1600-0609.2012.01783.x
16. Resonance Health. FerriScan<sup>®</sup> Now Available on 3 Tesla (3T) MRI Scanning Machines. <https://company-announcements.afr.com/asx/rht/1bf849e5-0b9e-11ed-8ad3-be99ac8a3e10.pdf>. July 25, 2022. Accessed September 22, 2022.

### **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. The Health Plan 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. “Health Plan” means a health plan that has adopted this clinical policy and that is operated or administered, in whole or in part, by Centene Management Company, LLC, or any of such health plan’s affiliates, as applicable.

The purpose of this clinical policy is to provide a guide to medical necessity, which is a component of the guidelines used to assist in making coverage decisions and administering benefits. It does not constitute a contract or guarantee regarding payment or results. Coverage decisions and the administration of benefits are subject to all terms, conditions, exclusions and limitations of the coverage documents (e.g., evidence of coverage, certificate of coverage, policy, contract of insurance, etc.), as well as to state and federal requirements and applicable Health Plan-level administrative policies and procedures.

This clinical policy is effective as of the date determined by the Health Plan. The date of posting may not be the effective date of this clinical policy. This clinical policy may be subject to applicable legal and regulatory requirements relating to provider notification. If there is a discrepancy between the effective date of this clinical policy and any applicable legal or regulatory requirement, the requirements of law and regulation shall govern. The Health Plan retains the right to change, amend or withdraw this clinical policy, and additional clinical policies may be developed and adopted as needed, at any time.

This clinical policy does not constitute medical advice, medical treatment or medical care. It is not intended to dictate to providers how to practice medicine. Providers are expected to exercise

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professional medical judgment in providing the most appropriate care, and are solely responsible for the medical advice and treatment of members/enrollees. This clinical policy is not intended to recommend treatment for members/enrollees. Members/enrollees should consult with their treating physician in connection with diagnosis and treatment decisions.

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**Note: For Medicaid members/enrollees**, when state Medicaid coverage provisions conflict with the coverage provisions in this clinical policy, state Medicaid coverage provisions take precedence. Please refer to the state Medicaid manual for any coverage provisions pertaining to this clinical policy.

**Note: For Medicare members/enrollees**, to ensure consistency with the Medicare National Coverage Determinations (NCD) and Local Coverage Determinations (LCD), all applicable NCDs, LCDs, and Medicare Coverage Articles should be reviewed prior to applying the criteria set forth in this clinical policy. Refer to the CMS website at <http://www.cms.gov> for additional information.

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