

Local Coverage Determination (LCD): MoIDX: Molecular RBC Phenotyping (L36167)

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Contractor Information

CONTRACTOR NAME	CONTRACT TYPE	CONTRACT NUMBER	JURISDICTION	STATE(S)
Noridian Healthcare Solutions, LLC	A and B MAC	01111 - MAC A	J - E	California - Entire State
Noridian Healthcare Solutions, LLC	A and B MAC	01112 - MAC B	J - E	California - Northern
Noridian Healthcare Solutions, LLC	A and B MAC	01182 - MAC B	J - E	California - Southern
Noridian Healthcare Solutions, LLC	A and B MAC	01211 - MAC A	J - E	American Samoa Guam Hawaii Northern Mariana Islands
Noridian Healthcare Solutions, LLC	A and B MAC	01212 - MAC B	J - E	American Samoa Guam Hawaii Northern Mariana Islands
Noridian Healthcare Solutions, LLC	A and B MAC	01311 - MAC A	J - E	Nevada
Noridian Healthcare Solutions, LLC	A and B MAC	01312 - MAC B	J - E	Nevada
Noridian Healthcare Solutions, LLC	A and B MAC	01911 - MAC A	J - E	American Samoa California - Entire State Guam Hawaii Nevada Northern Mariana Islands

LCD Information

Document Information

LCD ID

Original Effective Date

L36167

For services performed on or after 04/01/2016

LCD Title

MoIDX: Molecular RBC Phenotyping

Revision Effective Date

For services performed on or after 11/01/2019

Proposed LCD in Comment Period

N/A

Revision Ending Date

N/A

Source Proposed LCD

DL36167

Retirement Date

N/A

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Notice Period Start Date

02/11/2016

Notice Period End Date

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CMS National Coverage Policy

Title XVIII of the Social Security Act (SSA), §1862(a)(1)(A), states that no Medicare payment shall be made for

items or services that “are not reasonable and necessary for the diagnosis or treatment of illness or injury or to improve the functioning of a malformed body member.”

42 Code of Federal Regulations (CFR) §410.32 Diagnostic x-ray tests, diagnostic laboratory tests, and other diagnostic tests: Conditions.

Coverage Guidance

Coverage Indications, Limitations, and/or Medical Necessity

This policy provides limited-coverage for molecular phenotyping of erythrocyte antigens performed on the HEA BeadChip™ (Immucor, Warren, NJ), a single nucleotide polymorphisms (SNP)-based microarray test. This high-throughput molecular assay received FDA PMA approval in May, 2014 and is the only IVD- approved molecular test to characterize human red blood cell (RBC) antigens.

Many clinically significant antigens are encoded by alleles defined by SNPs. This assay identifies 35 antigens and 3 phenotypic variants across 11 blood groups (Rh, Kell, Duffy, Kidd, MNS, Lutheran, Dombrock, Landsteiner-Wiener, Diego, Colton and Scianna). Genomic DNA targets isolated from whole blood are amplified and fluorescent signals are interpreted by online software as specific alleles and probable antigen phenotype. This test does not evaluate patient antibody status.

For more than ten years, RBC genotyping has been applied mainly to mass screen donors in blood centers. American Rare Donor Program, a consortium of the American Red Cross and American Association of Blood Banks (AABB) accredited immunohematology reference laboratories have used molecular genotype information for several years to identify antigen negative blood units from donor for patients with antibodies. Blood centers also use molecular technology to genotype donors for certain antigens (e.g., Dombrock) that are hard to ascertain because of antisera unavailability or weak potency.

Hemagglutination is the most common serologic method of determining a RBC phenotype. In this technique, the patient’s RBCs are tested with antisera specific for the antigens of interest. However, hemagglutination testing cannot be used if a patient has a positive direct antiglobulin test (DAT), or if direct agglutination typing sera is not available for the antigen. In addition, serologic phenotyping is invalid in the transfused patient who may have persistent donor RBCs in circulation. Because molecular genotyping is not subject to the limitations of serologic testing, it has become a useful tool in large hospital transfusion services.

As early as 1999, Legler et al demonstrated disparate molecular Rh phenotyping in 7 of 27 patients compared to serologic typing. Soon afterwards, Reid and others demonstrated that DNA from blood samples could be used to genotype patients who had recently been transfused. Castilho et al confirmed the unreliability of serologic testing when they showed that 6 of 40 molecular genotypes differed from serologic phenotypes in multiply transfused sickle cell anemia (SCA) patients, and in 9 of 10 alloimmunized thalassemic patients. A number of investigators have replicated these findings, most notably Bakanay et al when they demonstrated genotypic and phenotypic discrepancies in 19 or 37 multi-transfused patients in multiple alleles. The discrepancies aided in the selection of antigen-matched blood products and improved RBC survival, ultimately improving patient care. A recent case report by Wagner emphasizes the usefulness of molecular testing over serologic testing in chronically transfused patients.

In a prospective observational study, Klapper et al. used the HEA BeadChip™ to provide extended human erythrocyte antigen (xHEA) phenotyped donor units and recipient patient samples. XHEA-typed units were assigned to pending transfusion requests using a web-based inventory management system to simulate blood order processing at four hospital transfusion services. The fraction of requests filled (FF) in 3 of 4 sites was > 95% when matching for ABO, D and known alloantibodies, with a FF of > 90% when additional matching for C, c, E, e, and K antigens. The most

challenging requests came from the fourth site where the FF was 62 and 51% respectively, even with a limited donor pool.

In a prospective observational study by Da Costa et al, 21 of 35 sickle cell anemia (SCA) patients had discrepancies or mismatches, mainly in the Rh, Duffy, Jk and MNS blood groups, between the genotype profile and the serologically-matched blood unit for multiple antigens. These authors report that their genotype-matching program resulted in elevated hemoglobin levels, increased time between transfusions and prevented the development of new alloantibodies.

Two recently published papers have shown the feasibility of routinely applying molecular blood banking techniques in a hospital transfusion service. Routine RBC testing has been implemented in a large tertiary care hospital in Los Angeles, CA to maximize efficient use of blood units. Patients with warm or cold reacting autoantibodies, patients with SCA and patients with antibodies that could not be identified were molecularly genotyped and received molecularly matched blood from the hospital's genotyped donor inventory.

At a large hospital in Cleveland, OH, pre-transfusion molecular typing is performed on chronically transfused patients, patients with autoantibodies, multiple antibodies, when no antigen specific antibody is available for testing and to solve laboratory discrepancies. The authors note that the major benefit of molecular typing is its application for patients who cannot be typed by serology due to an unsuitable sample. Valid results can be obtained even when they have been transfused within a few days of testing or have been massively transfused. Samples selected for molecular testing were based on an algorithm.

Two recent research studies have demonstrated that treatment with daratumumab, a CD38 monoclonal antibody, can bind to CD38 expressed on the surface of red blood cells (RBCs) and interferes with serologic testing, thereby preventing cross-match. False-positive reactions may persist for 2 to 6 months after infusion.

Medicare will cover pretransfusion molecular testing using the HEA BeadChip™ assay for the following categories of patients:

- Long term, frequent transfusions anticipated to prevent the development of alloantibodies (e.g. sickle cell anemia, thalassemia or other reason);
- Autoantibodies or other serologic reactivity that impedes the exclusion of clinically significant alloantibodies (e.g. autoimmune hemolytic anemia, warm autoantibodies, patient recently transfused with a positive DAT, high-titer low avidity antibodies, patients about to receive or on daratumumab therapy, other reactivity of no apparent cause);
- Suspected antibody against an antigen for which typing sera is not available; and
- Laboratory discrepancies on serologic typing (e.g. rare Rh D antigen variants)

Medicare does not expect molecular testing to be performed on patients undergoing surgical procedures such as

bypass or other cardiac procedures, hip or knee replacements or revisions, or patients with alloantibodies identifiable by serologic testing that are not expected to require long term, frequent transfusions.

The medical necessity for molecular RBC phenotyping must be documented in the patient's medical record.

Summary of Evidence

N/A

Analysis of Evidence (Rationale for Determination)

N/A

General Information

Associated Information

Documentation Requirements

The patient's medical record must contain documentation that fully supports the medical necessity for services included within this LCD. (See "Coverage Indications, Limitations, and/or Medical Necessity") This documentation includes, but is not limited to, relevant medical history, physical examination, and results of pertinent diagnostic tests or procedures.

Documentation supporting the medical necessity should be legible, maintained in the patient's medical record, and must be made available to the MAC upon request.

Sources of Information

References

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Bibliography

N/A

Revision History Information

REVISION HISTORY DATE	REVISION HISTORY NUMBER	REVISION HISTORY EXPLANATION	REASON(S) FOR CHANGE
11/01/2019	R5	<p>The LCD is revised to remove CPT/HCPCS codes in the Keyword Section of the LCD.</p> <p>At this time 21st Century Cures Act will apply to new and revised LCDs that restrict coverage which requires comment and notice. This revision is not a restriction to the coverage determination; and, therefore not all the fields included on the LCD are</p>	<ul style="list-style-type: none"> • Other (The LCD is revised to remove CPT/HCPCS codes in the Keyword Section of the LCD.)

REVISION HISTORY DATE	REVISION HISTORY NUMBER	REVISION HISTORY EXPLANATION	REASON(S) FOR CHANGE
		applicable as noted in this policy.	
11/01/2019	R4	<p>11/01/2019: This LCD is being revised in order to adhere to CMS requirements per Chapter 13, Section 13.5.1 of the Program Integrity Manual, to remove all coding from LCDs. There has been no change in coverage with this LCD revision.</p> <p>Regulations regarding billing and coding were removed from the CMS National Coverage Policy section of this LCD and placed in the related Billing and Coding: MoIDX: Molecular RBC Phenotyping A57444 article.</p> <p><i>At this time 21st Century Cures Act will apply to new and revised LCDs that restrict coverage which requires comment and notice. This revision is not a restriction to the coverage determination; and, therefore not all the fields included on the LCD are applicable as noted in this policy.</i></p>	<ul style="list-style-type: none"> • Provider Education/Guidance
11/01/2019	R3	<p>As required by CR 10901, all billing and coding information has been moved to the companion article, this article is linked to the LCD.</p> <p>At this time 21st Century Cures Act will apply to new and revised LCDs that restrict coverage which requires comment and notice. This revision is not a restriction to the coverage determination; and, therefore not all the fields included on the LCD are applicable as noted in this policy.</p>	<ul style="list-style-type: none"> • Revisions Due To Code Removal
02/01/2017	R2	<p>Added HCPCS code 0001U to CPT/HCPCS Group 1, effective February 1, 2017.</p> <p>11/08/2017: At this time 21st Century Cures Act will apply to new and revised LCDs that restrict coverage which requires comment and notice. This revision is not a restriction to the coverage determination; and, therefore not all the fields included on the LCD are applicable as noted in this policy.</p>	<ul style="list-style-type: none"> • Creation of Uniform LCDs With Other MAC Jurisdiction

REVISION HISTORY DATE	REVISION HISTORY NUMBER	REVISION HISTORY EXPLANATION	REASON(S) FOR CHANGE
04/01/2016	R1	<p>Added statement RBC phenotyping of MM patients eligible for daratumumab therapy (anti CD-38) because it interferes with serologic testing and included coverage for Medicare eligible patients "prior to and following treatment with anti-CD-38 therapy for MM.</p> <p>Added ICD-10 codes: C90.00, C90.01 and C90.02 and three (#'s 1, 5 and 12) additional sources of information under References.</p>	<ul style="list-style-type: none"> • Creation of Uniform LCDs With Other MAC Jurisdiction • Revisions Due To ICD-10-CM Code Changes

Associated Documents

Attachments

N/A

Related Local Coverage Documents

Article(s)

A57444 - Billing and Coding: MoIDX: Molecular RBC Phenotyping

A54865 - Response to Comments: MoIDX: Molecular RBC Phenotyping

LCD(s)

DL36135

- (MCD Archive Site)DL36167

- (MCD Archive Site)

Related National Coverage Documents

N/A

Public Version(s)

Updated on 01/29/2020 with effective dates 11/01/2019 - N/A

Updated on 12/04/2019 with effective dates 11/01/2019 - N/A

Updated on 10/08/2019 with effective dates 11/01/2019 - N/A

Updated on 11/09/2017 with effective dates 02/01/2017 - 10/31/2019

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Keywords

N/A