

Overview

Useful For

Second-tier test for confirming a diagnosis of galactosemia (indicated by enzymatic testing or newborn screening)

Carrier testing family members of an affected individual of known genotype (has mutations included in the panel)

Resolution of Duarte variant and Los Angeles (LA) variant genotypes

Testing Algorithm

Tests for the presence of the following 14 mutations in the *GALT* gene: -119_-116delGTCA, D98N, S135L, T138M, M142K, F171S, Q188R, L195P, Y209C, K285N, N314D, Q344K, c.253-2A>G, and 5 kb deletion.

See [Galactosemia Testing Algorithm](#) in Special Instructions.

Special Instructions

- [Molecular Genetics: Congenital Inherited Diseases Patient Information](#)
- [Informed Consent for Genetic Testing](#)
- [Galactosemia Testing Algorithm](#)
- [Blood Spot Collection Card-Spanish Instructions](#)
- [Blood Spot Collection Card-Chinese Instructions](#)
- [Informed Consent for Genetic Testing \(Spanish\)](#)
- [Galactosemia-Related Test List](#)
- [Blood Spot Collection Instructions](#)

Highlights

[Galactose-1-Phosphate Uridyltransferase \(GALT\)](#) enzyme analysis is recommended as a first-tier test. See [GALT/ Galactose-1-Phosphate Uridyltransferase \(GALT\), Blood](#) for more information

This test is recommended for individuals with an enzyme value less than 24.5 nmol/h/mg of hemoglobin.

Testing can be used to confirm a diagnosis of or for carrier screening for galactosemia.

If results of the GALT enzyme analysis and this test are discordant, then GALTM / GALT Gene, Full Gene Analysis, Varies could be considered.

Method Name

Multiplex Polymerase Chain Reaction (PCR)-Based Assay Utilizing the Agena Mass ARRAY Platform

NY State Available

Yes

Specimen**Specimen Type**

Varies

Shipping Instructions

Specimen preferred to arrive within 96 hours of draw.

Specimen Required

Multiple whole blood tests for galactosemia can be performed on 1 specimen. Prioritize order of testing when submitting specimens. See [Galactosemia-Related Test List](#) in Special Instructions for a list of tests that can be ordered together.

Patient Preparation: A previous bone marrow transplant from an allogenic donor will interfere with testing. Call 800-533-1710 for instructions for testing patients who have received a bone marrow transplant.

Submit only 1 of the following specimens:

Preferred:

Specimen Type: Whole blood

Container/Tube:

Preferred: Lavender top (EDTA) or yellow top (ACD)

Acceptable: Any anticoagulant

Specimen Volume: 3 mL

Collection Instructions:

1. Invert several times to mix blood.
2. Send specimen in original tube.

Specimen Stability Information: Ambient (preferred)/Frozen/Refrigerated

Acceptable:

Specimen Type: Blood spot

Supplies: Card - Blood Spot Collection (Filter Paper) (T493)

Container/Tube:

Preferred: Collection card (Whatman Protein Saver 903 Paper)

Acceptable: Ahlstrom 226 filter paper or Blood Spot Collection Card

Specimen Volume: 2 to 5 Blood spots

Collection Instructions:

1. An alternative blood collection option for a patient >1 year of age is finger stick.
2. Let blood dry on the filter paper at ambient temperature in a horizontal position for 3 hours.
3. Do not expose specimen to heat or direct sunlight.
4. Do not stack wet specimens.
5. Keep specimen dry.

Specimen Stability Information: Ambient (preferred)/Refrigerated

Additional Information:

1. For collection instructions, see [Blood Spot Collection Instructions](#) in Special Instructions.
2. For collection instructions in Spanish, see [Blood Spot Collection Card-Spanish Instructions](#) (T777) in Special Instructions.
3. For collection instructions in Chinese, see [Blood Spot Collection Card-Chinese Instructions](#) (T800) in Special

Instructions.

Forms

1. [New York Clients-Informed consent is required.](#) Document on the request form or electronic order that a copy is on file. The following documents are available in Special Instructions:

-[Informed Consent for Genetic Testing](#) (T576)

-[Informed Consent for Genetic Testing-Spanish](#) (T826)

2. [Molecular Genetics: Congenital Inherited Diseases Patient Information](#) (T521) in Special Instructions

Reject Due To

All specimens will be evaluated by Mayo Clinic Laboratories for test suitability.

Specimen Minimum Volume

Blood: 1 mL

Blood Spots: 3

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Varies	Ambient (preferred)		
	Frozen		
	Refrigerated		

Clinical & Interpretive**Clinical Information**

Classical galactosemia is an autosomal recessive disorder of galactose metabolism caused by mutations in the galactose-1-phosphate uridylyltransferase (*GALT*) gene. The complete or near complete deficiency of the *GALT* enzyme is life threatening. If left untreated, complications include liver failure, sepsis, mental retardation, and death. Galactosemia is treated by a galactose-free diet, which allows for rapid recovery from the acute symptoms and a generally good prognosis. Despite adequate treatment from an early age, children with galactosemia remain at increased risk for developmental delays, speech problems, and abnormalities of motor function. Females with galactosemia are at increased risk for premature ovarian failure. The prevalence of classic galactosemia is approximately 1 in 30,000.

Duarte variant galactosemia (compound heterozygosity for the Duarte mutation, N314D and -119_-116delGTCA in cis [on the same chromosome], and a classic mutation in trans [on the opposite chromosome]) is generally associated with

higher levels of enzyme activity (5%-20%) than classic galactosemia (<5%); however, this may be indistinguishable by newborn screening assays. Typically, individuals with Duarte variant galactosemia have a milder phenotype but are also often treated with a low-galactose diet during infancy. The Los Angeles (LA) variant, which consists of N314D without the presence of -119_-116delGTCA, is associated with normal levels of GALT enzyme activity.

Newborn screening, which identifies potentially affected individuals by measuring total galactose (galactose and galactose-1-phosphate) and/or determining the activity of the GALT enzyme, varies from state to state. The diagnosis of galactosemia is established by follow-up quantitative measurement of GALT enzyme activity. If enzyme levels are indicative of carrier or affected status, molecular testing for common *GALT* mutations may be performed. If 1 or both disease-causing mutations are not detected by targeted mutation analysis and biochemical testing has confirmed the diagnosis of galactosemia, sequencing of the *GALT* gene is available to identify private mutations.

The *GALT* gene maps to 9p13. Several disease-causing mutations are common in patients with classic galactosemia (G/G genotype). The most frequently observed is the Q188R classic mutation. This mutation accounts for 60% to 70% of classical galactosemia alleles. The S135L mutation is the most frequently observed mutation in African Americans and accounts for approximately 50% of the mutant alleles in this population. The K285N mutation is common in those of eastern European descent and accounts for 25% to 40% of the alleles in this population. The L195P mutation is observed in 5% to 7% of classical galactosemia. The 5 kb deletion is common in individuals of Ashkenazi Jewish descent. The Duarte mutation (N314D and -119_-116delGTCA) is observed in 5% of the general United States population. The rest of the mutations detected by this method (ie, D98N, S135L, T138M, M142K, F171S, Y209C, and Q344K) are all uncommon, but known to be recurrent in the general population.

These mutations, in addition to the LA variant, are included in GAL14 / Galactosemia Gene Analysis (14-Mutation Panel) and in GCT / Galactosemia Reflex, Blood. See [Galactosemia Testing Algorithm](#) in Special Instructions for additional information. Refer to Galactosemia: Current Testing Strategy and Aids for Test Selection, Mayo Clinic Laboratories Communique 2005 May;30(5) for more information regarding diagnostic strategy.

Reference Values

An interpretive report will be provided.

Interpretation

An interpretive report will be provided.

Results should be interpreted in the context of biochemical results.

Cautions

This assay will not detect all of the mutations that cause galactosemia. Therefore, the absence of a detectable mutation does not rule out the possibility that an individual is a carrier of or affected with this disease.

Test results should be interpreted in the context of clinical findings, family history, and other laboratory data. Errors in our interpretation of results may occur if information given is inaccurate or incomplete.

Rare polymorphisms exist that could lead to false-negative or false-positive results. If results obtained do not match the clinical findings, additional testing should be considered.

In rare cases, DNA alterations of undetermined significance may be identified.

Many disorders may present with symptoms similar to those associated with galactosemia. Therefore, biochemical testing is recommended to establish the diagnosis of galactosemia prior to DNA analysis.

Clinical Reference

1. Elsas LJ 2nd, Lai K: The molecular biology of galactosemia. *Genet Med* 1998 Nov-Dec;1(1):40-48
2. Kaye CI, Committee on Genetics, Accurso F, et al: Newborn screening fact sheets. *Pediatrics* 2006 Sep;118(3):e934-963
3. Novelli G, Reichardt JK: Molecular basis of disorders of human galactose metabolism: past, present, and future. *Mol Genet Metab* 2000 Sep-Oct;71(1-2):62-65

Performance

Method Description

A PCR-based assay utilizing Agena Mass Array platform is used to test for the presence of the following 14 mutations in the *GALT* gene: -119_-116delGTCA, D98N, S135L, T138M, M142K, F171S, Q188R, L195P, Y209C, K285N, N314D, Q344K, c.253-2A>G, and 5 kb deletion.(Unpublished Mayo method)

PDF Report

No

Specimen Retention Time

Whole Blood: 2 weeks (if available) Extracted DNA: 3 months

Performing Laboratory Location

Rochester

Fees & Codes

Test Classification

This test was developed, and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

81401-GALT (galactose-I-phosphate uridylyltransferase) (eg, galactosemia), full gene sequence

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
GAL14	Galactosemia Gene Analysis	42318-6

Result ID	Reporting Name	LOINC®
52878	Result Summary	50397-9
52879	Result	82939-0
52880	Interpretation	69047-9
52881	Specimen	31208-2
52882	Source	31208-2
52883	Method	85069-3
52884	Released By	18771-6