Overview

Useful For
Evaluation of individuals with Coombs-negative nonspherocytic hemolytic anemia, episodic or chronic

Rapid testing to assess glucose-6-phosphate dehydrogenase (G6PD) enzyme capacity prior to Rasburicase or other therapies that may cause hemolysis or methemoglobinemia in G6PD deficient patients

May aid in the creation of a comprehensive patient profile and can ensure appropriate patient monitoring for developing anemia

Testing Algorithm
The following algorithms are available in Special Instructions:

- Newborn Screen Follow-up for Glucose-6-Phosphate Dehydrogenase (G-6-PD) Deficiency

For more information, see Newborn Screening Act Sheet Glucose-6-Phosphate Dehydrogenase Deficiency in Special Instructions.

Special Instructions

Method Name
KineticSpectrophotometry(KS)

NY State Available
Yes

Specimen

Specimen Type
Whole Blood ACD-B

Specimen Required
Container/Tube:

Preferred: Yellow top (ACD solution B)

Acceptable: Lavender top (EDTA) or yellow top (ACD solution A)

Specimen Volume: 6 mL

Collection Instructions: Send specimen in original tube. Do not transfer blood to other containers.

Forms
If not ordering electronically, complete, print, and send a Benign Hematology Test Request Form (T755) with the specimen.
**Test Definition: G6PD**

G-6-PD, QN, RBC

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**Specimen Minimum Volume**
1 mL

**Reject Due To**

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<th>Gross hemolysis</th>
<th>Reject</th>
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**Specimen Stability Information**

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<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
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<tbody>
<tr>
<td>Whole Blood ACD-B</td>
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**Clinical and Interpretive**

**Clinical Information**

Hemolytic disease may be associated with deficiency of erythrocyte enzymes. The most commonly encountered is a deficiency of glucose-6-phosphate dehydrogenase (G6PD).

The $G6PD$ locus is on the X chromosome, thus, clinically significant G6PD deficiency is an X-linked recessive disorder and most often seen in hemizygous males.(1) Females are most commonly asymptomatic heterozygotes; however, due to the prevalence of the disorder, affected homozygous or compound heterozygous females occur in ethnic groups where prevalence is high. In addition, elderly women heterozygotes can develop deficiency due to differential X-skewing with age.(2) More than 400 molecular variants of G6PD are known, and the clinical and laboratory features of G6PD deficiency vary accordingly.(1,3) With some variants, there is chronic, life-long hemolysis, but much more commonly, the condition is asymptomatic and only results in susceptibility to acute hemolytic episodes, which may be triggered by some medications, ingestion of fava beans, or stressor events including viral or bacterial infections. G6PD deficiency is also associated with neonatal hyperbilirubinemia.

The common $G6PD$ variants occur in specific ethnic groups. Thus, knowledge of the ethnic background of the patient is important. G6PD deficiency has very high frequency in Southeast Asians and is the most common cause of hemolytic disease of the newborn in Southeast Asian neonates. It is also seen in persons of African and Mediterranean descent.

Rasburicase therapy is contraindicated in patients with G6PD deficiency. FDA guidelines state to screen patients at higher risk for G6PD deficiency (eg, patients of African or Mediterranean ancestry) prior to starting therapy.(4)

Deficiency can be assessed by enzymatic and/or genetic assays. Due to limitations of genetic testing, in most cases it is preferential to perform G6PD enzyme testing to assign $G6PD$ status.(5) However, enzyme activity can be affected by recent red blood cell transfusion, marked reticulocytosis and very high white blood cell count. In these settings, genotyping may be useful for correlation with the red blood cell enzyme level.(6)

Due to historic issues with other similar antimalarial medications, it is sometimes questioned if hydroxychloroquine (HCQ) or chloroquine (CQ) therapy may trigger acute hemolytic episodes in some G6PD subtypes. Data is limited in this regard. Available published data did not find hemolytic episodes associated with HCQ therapy in G6PD deficient African American(7) or CQ therapy in G6PD deficient African(8) patients. Both studied populations were assumed to have mild forms of the disorder and data regarding these medications in populations with more severe G6PD phenotypes is lacking. While patients receiving HCQ do not routinely need G6PD levels checked before initiating therapy.
therapy, testing may be considered in patients who are from ethnic backgrounds with high G6PD variant rates such as those from Mediterranean, African, or Asian descent.

Reference Values

> or =12 months: 8.8-13.4 U/g Hb

Reference values have not been established for patients who are <12 months of age.

Interpretation

The World Health Organization (WHO) classification of glucose-6-phosphate dehydrogenase (G6PD) deficiency is historically based on enzyme activity level and in most cases enzyme activity level is sufficient. Accurate classification requires correlation with clinical, and in certain cases, genetic data. WHO class I (chronic) and class II (episodic) variants are associated with baseline enzyme levels less than 10% of mean normal. (1,3) Enzyme levels between 10% and 60% of mean normal can be seen in class III (episodic) variants or female carrier states. Enzyme levels greater than 60% are considered sufficient and can be seen in normal persons, female carrier states or G6PD variants with subclinical effect (WHO class IV). Although G6PD deficiency is an X-linked recessive disorder and most often seen in hemizygous males, some females are affected. In addition, elderly women heterozygotes can develop deficiency due to differential X-skewing with age. (2) It is important to note that clinically significant G6PD deficiency can be masked in the setting of significant reticulocytosis, markedly elevated WBC count or recent red blood cell transfusion. If any of these are present in the setting of a history of neonatal, chronic or episodic jaundice or anemia, genotyping for G6PD genetic alterations is recommended. If desired, please order G6PDB / Glucose-6-Phosphate Dehydrogenase (G6PD) Full Gene Sequencing, Varies.

Cautions

Clinically significant glucose-6-phosphate dehydrogenase (G6PD) deficiency can be masked in the setting of significant reticulocytosis, markedly elevated white blood cell count or recent red blood cell transfusion.

Clinical Reference


Performance

Method Description
Glucose-6-phosphate dehydrogenase (G6PD) in a hemolysate catalyzes the oxidation of glucose-6-phosphate to 6-phosphogluconate. Concomitantly, nicotinamide adenine dinucleotide phosphate (NADP) is changed to its reduced form (NADPH), a reaction measured spectrophotometrically. (Beutler E: Red Cell Metabolism: A Manual of Biochemical Methods. Third edition. New York, Grune and Stratton, 1984, pp 68-71)

PDF Report
No

Day(s) and Time(s) Test Performed
Monday through Sunday

Analytic Time
1 day

Maximum Laboratory Time
4 days

Specimen Retention Time
7 days

Performing Laboratory Location
Rochester

Fees and Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their Regional Manager. For assistance, contact Customer Service.

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 U.S. Food and Drug Administration.

CPT Code Information
82955

LOINC® Information

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<th>Order LOINC Value</th>
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<tr>
<td>G6PD</td>
<td>G-6-PD, QN, RBC</td>
<td>32546-4</td>
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## Test Definition: G6PD

G-6-PD, QN, RBC

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