Overview

Useful For
Monitoring exposure to organophosphorus insecticides
Monitoring patients with liver disease, particularly those undergoing liver transplantation
Identifying patients who are homozygous or heterozygous for an atypical gene and have low levels of pseudocholinesterase

Method Name
Photometric, AcetylthiocholineSubstrate

NY State Available
Yes

Specimen

Specimen Type
Serum

Necessary Information
Patient's age and sex are required.

Specimen Required

Patient Preparation: For cases of prolonged apnea following surgery, wait 24 hours before obtaining specimen.

Container/Tube:
Preferred: Serum gel
Acceptable: Red top

Specimen Volume: 1 mL

Collection Instructions:
1. Serum gel tubes should be centrifuged within 2 hours of collection.
2. Red-top tubes should be centrifuged and aliquoted within 2 hours of collection.

Specimen Minimum Volume
0.25 mL

Reject Due To

| Gross hemolysis | Reject |

Specimen Stability Information
Test Definition: PCHES
Pseudocholinesterase, Total, S

<table>
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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>Serum</td>
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**Clinical and Interpretive**

**Clinical Information**

Serum cholinesterase, often called pseudocholinesterase (PCHE), is distinguished from acetylcholinesterase or "true cholinesterase," by both location and substrate.

Acetylcholinesterase is found in erythrocytes, in the lungs and spleen, in nerve endings, and in the gray matter of the brain. It is responsible for the hydrolysis of acetylcholine released at the nerve endings to mediate transmission of the neural impulse across the synapse.

PCHE, the serum enzyme, is also found in liver, pancreas, heart, and white matter. Its biological role is unknown.

The organophosphorus-containing insecticides are potent inhibitors of the true cholinesterase and also cause depression of PCHE. Low values of PCHE are also found in patients with liver disease. In general, patients with advanced cirrhosis and carcinoma with metastases will show a 50% to 70% decrease. Essentially normal values are seen in chronic hepatitis, mild cirrhosis, and obstructive jaundice.

PCHE metabolizes the muscle relaxants succinylcholine and mivacurium, and therefore, alterations in PCHE will influence the physiologic effect of these drugs.

In normal individuals (approximately 94% of the population) certain drugs and other agents, such as dibucaine and fluoride, will almost completely inhibit the PCHE activity.

A small number of individuals (<1% of the population) have been shown to have genetic variants of the enzyme, and cannot metabolize the muscle relaxants succinylcholine and mivacurium and experience prolonged apnea. These individuals generally have low levels of PCHE, which is not inhibited by dibucaine or fluoride. These individuals are either homozygotes or compound heterozygotes for an atypical gene(s) controlling PCHE.

Simple heterozygotes have also been identified who show intermediate enzyme values and inhibition.

**Reference Values**

**Males**

> or =18 years: 3,100-6,500 U/L

**Females**

18-49 years: 1,800-6,600 U/L

> or =50 years: 2,550-6,800 U/L

Reference values have not been established for patients that are <18 years of age.
Interpretation

Patients with normal pseudocholinesterase (PCHE) activity show 70% to 90% inhibition by dibucaine, while patients homozygous for the abnormal allele show little or no inhibition (0%-20%) and usually low levels of enzyme.

Heterozygous patients have intermediate PCHE levels and response to inhibitors.

The atypical gene is inherited in an autosomal recessive pattern. In a positive patient, family members should be tested.

Decreasing or low levels may indicate exposure to organophosphorus insecticides, as long as liver disease and an abnormal allele have been ruled out.

Cautions

There are some homozygous and heterozygous individuals who are sensitive to succinylcholine although their total pseudocholinesterase (PCHE) values are normal. A dibucaine inhibition test is necessary to confirm the presence of the abnormal allele in these individuals.

Not useful for the differential diagnosis of jaundice.

Certain drugs and anesthetic agents may inhibit PCHE activity. Therefore, it is recommended that blood specimens be drawn 24 to 48 hours post-operatively on those patients who have experienced prolonged apnea after surgery.

Clinical Reference


Performance

Method Description

The substrate, acetylthiocholine, is cleaved by pseudocholinesterase (PCHE) into acetate and thiocholine. The thiocholine reacts with dithiobisnitrobenzoic acid (Ellman's reagent) to form the yellow-colored 5-mercapto-2-nitrobenzoic acid which is monitored at 405 nm. The rate of color formation is directly proportional to the PCHE activity.(McQueen MJ: Clinical and analytical consideration in the utilization of cholinesterase measurements. Clin Chim Acta 1995;237:91-105)

PDF Report

No

Day(s) and Time(s) Test Performed

Monday through Sunday; Continuously

Analytic Time

Same day/1 day
Test Definition: PCHES
Pseudocholinesterase, Total, S

Maximum Laboratory Time
2 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 has been cleared or approved by the U.S. Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information
82480

LOINC® Information

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