Overview

Useful For

Identifying individuals with an increased risk of hypersensitivity reactions to abacavir, based on the presence of the human leukocyte antigen HLA-B*57:01 allele

Identifying individuals taking pazopanib who have an increased risk of elevated alanine aminotransferase (ALT) levels based of the presence of the human leukocyte antigen HLA-B*57:01 allele

Testing Algorithm

See Abacavir Hypersensitivity Testing and Initial Patient Management Algorithm in Special Instructions.

For additional information regarding pharmacogenomic genes and their associated drugs, see the Pharmacogenomic Associations Tables in Special Instructions.

Special Instructions

- Informed Consent for Genetic Testing
- Abacavir Hypersensitivity Testing and Initial Patient Management Algorithm
- Multiple Whole Blood EDTA Genotype Tests
- Pharmacogenomic Associations Tables
- Informed Consent for Genetic Testing (Spanish)

Method Name

Qualitative Allele-Specific Real-Time Polymerase Chain Reaction (PCR)

NY State Available

Yes

Specimen

Specimen Type

Varies

Specimen Required

Multiple whole blood EDTA genotype tests can be performed on a single specimen. See Multiple Whole Blood EDTA Genotype Tests in Special Instructions for a list of tests that can be ordered together.

Submit only 1 of the following specimens:

- **Specimen Type:** Whole blood

- **Container/Tube:** Lavender top (EDTA)

- **Specimen Volume:** 3 mL

Collection Instructions:

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

**Specimen Stability Information**: Ambient (preferred) 9 days/Refrigerated 30 days

**Specimen Type**: Saliva

**Supplies**: Saliva Swab Collection Kit (T786)

**Patient Preparation**: Patient should not eat, drink smoke, or chew gum 30 minutes prior to collection.

**Container/Tube**: Saliva Swab Collection Kit (T786)

**Specimen Volume**: 1 swab

**Collection Instructions**: Collect and send specimen per kit instructions.

**Specimen Stability Information**: Ambient 30 days

**Specimen Type**: DNA

**Container/Tube**: 2 mL screw top tube

**Specimen Volume**: 100 mcL (microliters)

**Collection Instructions**:

1. The preferred volume is 100 mcL at a concentration of 50 ng/mcL.

2. Include concentration and volume on tube.

**Specimen Stability Information**: Frozen (preferred) 1 year/Ambient/Refrigerated

**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. If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:

   - *Pharmacogenomics Test Request* (T797)
   - *Therapeutics Test Request* (T831)

**Specimen Minimum Volume**

Blood: 0.4 mL
Saliva: 1 swab
Reject Due To
All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Stability Information

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<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
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<tbody>
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Clinical and Interpretive

Clinical Information

The human leukocyte antigen (HLA) genes help the immune system recognize and respond to foreign substances (such as viruses and bacteria). The HLA-B gene encodes a class 1 HLA molecule in the major histocompatibility complex (MHC), which acts by presenting peptides to immune cells. There are more than 1,500 different HLA-B alleles identified, one of which is the HLA-B*57:01 allele. Frequency of the HLA-B*57:01 allele varies with ethnicity, with a frequency of 6% to 7% in European populations, and up to 20% in Southwest Asian populations.

The HLA-B*57:01 allele has been associated with hypersensitivity to abacavir, a highly effective nucleoside analog reverse-transcriptase inhibitor used to treat HIV infection and AIDS. Per the Clinical Pharmacogenomics Implementation Consortium (CPIC) dosing guidelines for abacavir and HLA-B, individuals who are positive for the HLA-B*57:01 allele are at an increased risk for abacavir hypersensitivity and it is not recommended for use in treating these individuals.

Hypersensitivity reactions, which generally occur during the first 6 weeks of treatment, are often nonspecific and include skin rashes, gastrointestinal symptoms (eg, nausea, vomiting, diarrhea, and abdominal pain), and respiratory symptoms. Fatalities have been reported with abacavir hypersensitivity. Prospective testing for the HLA-B*57:01 genotype and excluding HLA-B*57:01-positive individuals from treatment with abacavir decreases the incidence of abacavir hypersensitivity.

Pazopanib is a kinase inhibitor indicated for the treatment of patients with advanced renal cell carcinoma and advanced soft tissue sarcoma who have received prior chemotherapy. In clinical trials with pazopanib, hepatotoxicity was observed, manifested as increases in serum transaminases such as alanine aminotransferase (ALT), aspartate aminotransferase (AST), and bilirubin. This hepatotoxicity can be severe and fatal. Patients older than 65 years are at greater risk for hepatotoxicity. Transaminase elevations occur early in the course of treatment (92.5% of all transaminase elevations of any grade occurred in the first 18 weeks).

HLA-B*57:01 carriers who are taking pazopanib are at increased risk of elevated ALT levels. (1,2) According to the FDA label for pazopanib, in an analysis of data from 31 clinical studies of pazopanib administered as either monotherapy or in combination with other agents, elevation in ALT to levels greater than 3 times the upper limit of normal occurred in 32% (42/133) of HLA-B*57:01 allele carriers as compared to 19% (397/2101) of noncarriers. Furthermore, elevation in ALT to levels greater than 5 times the upper limit of normal occurred in 19% (25/133) of HLA-B*57:01 allele carriers and in 10% (213/2101) of noncarriers. All patients taking pazopanib should have hepatic function monitored, regardless of HLA-B*57:01 carrier status, and administration of pazopanib should be interrupted, reduced, or discontinued according to recommendations in the FDA label if hepatic function is impaired.

UGT1A1 genotype is also relevant to pazopanib-induced hyperbilirubinemia and testing may also be warranted. See U1A1V / UDP-Glucuronosyl Transferase 1A1 TA Repeat Genotype, UGT1A1.
Reference Values
Negative

An interpretive report will be provided.

Interpretation
Positivity for human leukocyte antigen allele HLA-B*57:01 confers high risk for hypersensitivity to abacavir and higher risk of elevated alanine aminotransferase (ALT) levels in patient taking pazopanib.

See Abacavir Hypersensitivity Testing and Initial Patient Management Algorithm in Special Instructions.

For additional information regarding pharmacogenomic genes and their associated drugs, see the Pharmacogenomic Associations Tables in Special Instructions. This resource also includes information regarding enzyme inhibitors and inducers, as well as potential alternate drug choices.

Cautions
Samples may contain donor DNA if obtained from patients who received heterologous blood transfusions or allogeneic hematopoietic stem cell transplantation. Results from samples obtained under these circumstances may not accurately reflect the recipient's genotype. For individuals who have received blood transfusions, the genotype usually reverts to that of the recipient within 6 weeks. The impact of hematopoietic stem cell transplantation on risk of abacavir hypersensitivity reactions is not defined in the literature.

The FDA recommends screening for the HLA-B*57:01 allele before initiating therapy with abacavir. Genotyping is also critical when there is a clinical history of, or when the physician suspects, an abacavir hypersensitivity reaction. However, FDA guidance states that, regardless of HLA-B*57:01 status, abacavir should be permanently discontinued if hypersensitivity cannot be ruled out, even when other diagnoses are possible. Although the negative predictive value of the test is high, a negative HLA-B*57:01 result does not preclude the development of a hypersensitivity response to abacavir and cannot substitute for clinical vigilance whenever abacavir therapy is administered. Since symptoms of abacavir hypersensitivity are often nonspecific and can imitate other conditions commonly seen in HIV patients on antiretroviral therapy, the phenotypic diagnosis of abacavir hypersensitivity can be challenging. There is significant variability among patients identified as hypersensitive to abacavir. Not all individuals who are positive for HLA-B*57:01 will have a hypersensitivity reaction.

All patients taking pazopanib should have hepatic function monitored, regardless of HLA-B*57:01 carrier status, and administration of pazopanib should be interrupted, reduced, or discontinued according to recommendations in the FDA label if hepatic function is impaired.

Rare or novel variants may be present that could lead to false-negative or false-positive results. There may be rare or novel HLA-B alleles that could interfere with this assay. There are, as yet, no data indicating whether any other allele or subtypes are associated with abacavir hypersensitivity or pazopanib hepatotoxicity.

Supportive Data
Sensitivity of this assay for detecting the human leukocyte antigen HLA-B*57:01 allele approaches 100% with specificity near 96.(3)

Clinical Reference

Test Definition: HL57V
HLA-B 5701 Genotype, PGx


Performance

Method Description
Genomic DNA is extracted from the sample. Amplification for the HLA-B*57:01 allele and an internal control gene is performed by real-time PCR in the presence of SYBR Green, which fluoresces when bound to double-stranded DNA. A genotype is assigned based on the allele-specific SYBR Green fluorescent signals that are detected. (Hammond E, Mamotte C, Nolan D, Mallal S: HLA-B*5701 typing: evaluation of an allele-specific polymerase chain reaction melting assay. Tissue Antigens 2007 Jul;70[1]:58-61)

PDF Report
No

Day(s) and Time(s) Test Performed
Monday, Wednesday through Friday; 9 a.m.

Analytic Time
1 day (Not reported Saturday or Sunday)

Maximum Laboratory Time
5 days

Specimen Retention Time
Whole Blood/Saliva: 2 weeks; Extracted DNA: 2 months

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**

81381

**LOINC® Information**

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