

**TEST CHANGE**

**Warfarin Sensitivity (CYP2C9, CYP2C cluster, CYP4F2, VKORC1) Genotyping  
3001541, WARF PAN**

**Specimen Requirements:**

**Patient Preparation:**

**Collect:** Lavender (EDTA), Pink (K2EDTA), or Yellow (ACD Solution A or B).

**Specimen Preparation:** Transport 3 mL whole blood. (Min: 1 mL)

**Transport Temperature:** Refrigerated.

**Unacceptable Conditions:** Plasma or serum. Specimens collected in sodium heparin or lithium heparin. Frozen specimens in glass collection tubes.

**Remarks:**

**Stability:** Ambient: 72 hours; Refrigerated: 1 week; Frozen: 1 month

**Methodology:** Polymerase Chain Reaction (PCR)/Fluorescence Monitoring

**Performed:** Varies

**Reported:** 5-10 days

**Note:** Whole blood is the preferred specimen. Saliva samples that yield inadequate DNA quality and/or quantity will be reported as inconclusive if test performance does not meet laboratory-determined criteria for reporting.

**CPT Codes:** 81227; 81355; 81479

**New York DOH Approval Status:** This test is New York DOH approved.

**Interpretive Data:**

[Refer to report](#)

[This test was developed and its performance characteristics determined by ARUP Laboratories. It has not been cleared or approved by the US Food and Drug Administration. This test was performed in a CLIA certified laboratory and is intended for clinical purposes.](#)

[Counseling and informed consent are recommended for genetic testing. Consent forms are available online. Background Information for Warfarin Sensitivity \(CYP2C9, CYP2C cluster, CYP4F2, VKORC1\) Genotyping:](#)

[Characteristics: Warfarin sensitivity can lead to a life-threatening overdose event such as excessive bleeding. Genetic variation is recognized to explain a large proportion of variability in](#)

warfarin dose requirements. This test may predict individual warfarin sensitivity and non-standard dose requirements. The cytochrome P450 (CYP) isozyme 2C9 is involved in the metabolism of many drugs. Variants in the gene that codes CYP2C9 may influence pharmacokinetics of substrates such as warfarin, and may predict or explain nonstandard dose requirements, therapeutic failure, or adverse reactions. Variants in the *VKORC1* and *CYP4F2* genes may predict sensitivity to warfarin. The *CYP2C* cluster variant, rs12777823, common in people of African descent, with a minor allele frequency of approximately 25 percent, is found to be associated with warfarin dose in this population. Genetic information and nongenetic factors can be used in combination with warfarin dose calculators, such as through [www.WarfarinDosing.org](http://www.WarfarinDosing.org).  
Inheritance: Autosomal codominant.

Cause: *CYP2C9* and *CYP2C* cluster variants are associated with reduced dose requirements. The *VKORC1*\*2 allele is associated with reduced expression of the warfarin target, vitamin K epoxide reductase (*VKOR*), and a reduced dose requirement. The *CYP4F2* variant is associated with an increased dose requirement.

Variants Tested: See the "Additional Technical Information" document.

Clinical Sensitivity: Genetic factors and known non-genetic factors account for approximately 50 percent of the variability in warfarin dose.

Methodology: Polymerase chain reaction (PCR) and fluorescence monitoring.

Analytical Sensitivity and Specificity: Greater than 99 percent.

Limitations: Only the targeted *CYP2C9*, *CYP2C* cluster, *CYP4F2*, and *VKORC1* variants will be detected by this panel, and assumptions about phase and content are made to assign alleles.

Publicly available sources such as the [www.pharmvar.org](http://www.pharmvar.org) or [www.pharmgkb.org](http://www.pharmgkb.org) provide guidance on phenotype predictions and allele frequencies. Diagnostic errors can occur due to rare sequence variations. Risk of therapeutic failure or adverse reactions with *CYP2C9* substrates may be affected by genetic and nongenetic factors that are not detected by this test. This result does not replace the need for therapeutic drug or clinical monitoring.

Please note the information contained in this report does not contain medication recommendations, and should not be interpreted as recommending any specific medications. Any dosage adjustments or other changes to medications should be evaluated in consultation with a medical provider.

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Reference Interval:

By report

**HOTLINE NOTE: There is a component change associated with this test. One or more components have been added or removed. Refer to the Hotline Test Mix for interface build information.**