LAB GENOMICS
11160 Warner Ave. Suite #415
Fountain Valley Ca 92708
Phone: (714) 438-1009 Fax: (714) 438-2484
CLIA # 055D2026572

PREDICTIVE | PREVENTATIVE | PERSONALIZED

Pgx Panel Created for: JANE DOE

Patient:	**Patient Name**	DOB:	**Patient DoB**
Accession #:	**9 Digit ID for Lab Purposes**	Gender:	**M/F**
Collection Date:	**Date Swabs Collected**	Received Date:	**Date Arrived in Lab**
Ordered By:	**Doctor Name**	Report Generated:	**Date Report Created**

Patient Medications

Current Medication List: **List of the patient's current medications Ex: Carvedilol, Glipizide, Plavix, Reglan**

The results of the test with implications on the patient's current medications are listed below:

Medications Affected by Patient Genetic Results **Results are either Actionable or Informative with minor explanation**

✓	**Carvedilol (Coreg)**	Normal Sensitivity to Carvedilol (CYP2D6 *1/*2 Normal Metabolizer)	***Carvedilol can be prescribed at standard label recommended-dosage and administration. Careful titration is recommended with monitoring until a favorable response is achieved.
✓	**Glipizide (Glucotrol)**	Normal Sensitivity to Glipizide (CYP2C9 *1/*1 Normal Metabolizer)	****Glipizide can be prescribed according to standard label recommended-dosage and administration (dose titration in response to plasma levels of glucose/glycosylated hemoglobin).
⚠	**Plavix (Clopidogrel)**	Increased Response to Clopidogrel (CYP2C19 *1/*17 Rapid Metabolizer)	***Clopidogrel can be prescribed at standard label-recommended dosage. Individuals with the *17 allele may have an increased risk of bleeding while taking clopidogrel.
✓	**Reglan (Metoclopramide)**	Normal Response to Metoclopramide (CYP2D6 *1/*2 Normal Metabolizer)	****Metoclopramide can be prescribed at standard label recommended-dosage and administration.

Patient Medications for which there is no clinically established Pharmacogenetic Guidance*:

Recognized drugs: **Drugs that are identified by RxNorms Drug List**
Unrecognized drugs: **Misspelled or unidentifiable drugs**

* Medications that are metabolized by multiple enzymes, or by enzymes which activity varies very little among individuals are expected to be less sensitive to the pharmacogenetic markers detected by this assay.

Guidance Levels

🚩 **Action must be taken. Reduced efficiency or toxicity may be occurring and it is advised to switch to an alternative drug**

⚠ **Action must be taken to adjust dosing or monitor with increased vigilance as they are more susceptible to side effects or may need a higher dosage to be effective**.

✓ **Medication can be prescribed using normal dosing guidelines**.

Evidence Levels

***Actionable** – **Publications support the action that can be taken**

****Informative** – **Documentation should be taken as additional information is needed. It is up to the doctor to take the proper action based upon current guidelines.**

Both Actionable and Informative may change as more scientific data arises and is published.

Risk Management

LAB GENOMICS
11160 Warner Ave. Suite #415
Fountain Valley Ca 92708
Phone: (714) 438-1009 Fax: (714) 438-2484
CLIA # 055D2026572

Detail of possible risks the patient may have. Green check marks indicate no increased risks. Yellow signs indicate possible risks currently/in the future. Red flags mean that there are immediate problems.

Thrombophilia
No Increased Risk of Thrombosis

The patient does not carry the Factor V Leiden G1691A mutation or Factor II G20210A mutation (wild-type).

The patient's risk of thrombosis is not increased (average risk of clotting is about 1 in 1000 for anyone in a year).

However, because this test cannot find all of the inherited reasons for abnormal clotting, other factors may affect this risk assessement.

Unless other genetic and/or circumstantial risk factors are present (ex: smoking, obesity…), estrogen-containing contraceptive and hormone replacement therapy can be used by the patient.

Hyperhomocysteinemia
No Increased Risk of Hyperhomocysteinemia

The patient does not carry the MTHFR C677T or the MTHFR A1298C mutations (wild-type). MTHFR enzyme activity is normal.

With a normal MTHFR activity, this patient is unlikely to have elevated plasma levels of homocysteine which is a known risk factor for cardiovascular diseases and thrombosis. Unless other risk factors are present, the patient is not expected to have an increased risk for venous thromboembolism (VTE).

MTHFR Enzyme Activity is normal.

Hyperlipidemia/Atherosclerotic Cardiovascular Disease
No increased risk of hyperlipidemia/atherosclerotic vascular disease

The patient is negative for the APOE 388 T>C (Arg112Cys) and 526 C>T (Cys158Arg) mutations. The patient's genotype is wild-type which is the most common genotype in the general population (frequency: >60%). A patient with wild type genotype does not have a defect in the apolipoprotein E (APOE) which is an integral structure of lipoprotein particles that have critical roles in blood lipid metabolism and transport. Defects in APOE can increase a person's risk for developing atherosclerosis and development of cardiovascular disease.

A patient with wild type genotype does not have a defect in the apolipoprotein E (APOE) which is an integral structure of lipoprotein particles that have critical roles in blood lipid metabolism and transport. Defects in APOE can increase a person's risk for developing atherosclerosis and development of cardiovascular disease.

No action is needed when a patient in normolipidemic.

Platelet Hyperactivity
Possible Altered Response to Aspirin

The patient carries two ITGB3 176T>C (Leu59Pro) mutations.

Preliminary studies have found an association between the 176T>C mutation of the integrin β3 gene and the possible resistance to the antithrombotic effects of aspirin. However, because the variability in response to antiplatelet drugs is multi-factorial and is not caused by single gene mutations, testing for the ITGB3 mutation alone should not be used as a diagnostic tool.

LAB GENOMICS

11160 Warner Ave. Suite #415
Fountain Valley Ca 92708
Phone: (714) 438-1009 Fax: (714) 438-2484
CLIA # 055D2026572

Potentially Impacted Medications

Category	Standard Precautions	Use With Caution	Consider Alternatives
Angiotensin II Receptor Antagonists	Irbesartan (Avapro)		
Antianginal Agents	Ranolazine (Ranexa)		
Antiarrhythmics	Flecainide (Tambocor) Mexiletine (Mexitil) Propafenone (Rythmol)		
Anticoagulants	Apixaban (Eliquis) Dabigatran Etexilate (Pradaxa) Fondaparinux (Arixtra) Rivaroxaban (Xarelto)	Warfarin (Coumadin)	
Antiplatelets	Prasugrel (Effient) Ticagrelor (Brilinta) Vorapaxar (Zontivity)	Clopidogrel (Plavix)	
Beta Blockers	**Carvedilol (Coreg)** Labetalol (Normodyne, Trandate) Metoprolol (Lopressor) Nebivolol (Bystolic) Propranolol (Inderal) Timolol (Timoptic)		
Statins	Atorvastatin (Lipitor) Fluvastatin (Lescol) Lovastatin (Mevacor) Pitavastatin (Livalo) Pravastatin (Pravachol) Rosuvastatin (Crestor) Simvastatin (Zocor)		

List of common drugs based upon the panel selected for testing

(i.e. Cardio, Comprehensive, Pain Management, etc.)

Drugs that can be used normally are listed in the green column

Drugs that may be used but altered dosing or increased vigilance are placed in the yellow column

Drugs that should be avoided are listed in the red column

11160 Warner Ave. Suite #415
Fountain Valley Ca 92708
Phone: (714) 438-1009 Fax: (714) 438-2484
CLIA # 055D2026572

Dosing Guidance

Apixaban (Eliquis) Normal Response to Apixaban

Drug name with minor genetic information

Indication that the guidance is Informative

****Pharmacogenetic guidance:** Apixaban is not extensively metabolized and only ~ 20 % of the dose is metabolized primarily by CYP3A4 and CYP3A5 with minor contributions from CYP1A2 and CYP2J2. This drug is a substrate for the efflux transport proteins P-gp (ABCB1) and BCRP (ABCG2). While these enzymes and transporters are polymorphic, genetic variations are unlikely to have a clinically significant impact on apixaban exposure and no genotype-based dosing adjustments are recommended. **Polypharmacy guidance:** Exposure to apixaban increases by 100% when co-administered with ketoconazole, a strong CYP3A/P-gp inhibitior. This translates into an increased bleeding risk (70% increase). Hence, for patients receiving 5 mg twice daily, apixaban dose should be decreased to 2.5 mg twice daily when it is coadministered with drugs that are strong dual inhibitors of CYP3A4 and P-gp (e.g., ketoconazole, itraconazole, ritonavir, or clarithromycin). In patients already taking 2.5 mg twice daily, coadministration of apixaban with strong dual inhibitors of CYP3A4 and P-gp should be avoided. No dose adjustment is recommended when co-administered with moderate inhibitors. Co-administration with rifampin, a strong CYP3A/P-gp inducer results in halving of exposure to apixaban. There is no clinical experience at these reduced exposures. Hence, concomitant administration of strong CYP3A/P-gp inducers should be avoided.

Dosing Guidelines with explanations

Atorvastatin (Lipitor) Normal Myopathy Risk (SLCO1B1 521T>C TT Normal Transporter Function)

Green check marks mean the drug can be used normally

****Atorvastatin plasma concentrations are not expected to increase and unless other genetic or circumstantial risk factors are present, atorvastatin can be prescribed at standard FDA-recommended starting doses and adjusted based on disease-specific guidelines; (other myopathy predisposing factors include advanced age (≥65), uncontrolled hypothyroidism, renal impairment, high statin dose, comedications and female gender).

Atorvastatin (Lipitor) Normal Response to Atorvastatin (CYP3A4 *1/*1 Normal Metabolizer)

****The genotype result indicates that the patient does not carry the CYP3A4*22 allele (this allele is associated with a decreased CYP3A4 enzyme activity). The patient is expected to achieve an optimal lipid control goal with standard atorvastatin dose requirements.

Carvedilol (Coreg) Normal Sensitivity to Carvedilol (CYP2D6 *1/*2 Normal Metabolizer)

***Carvedilol can be prescribed at standard label recommended-dosage and administration. Careful titration is recommended with monitoring until a favorable response is achieved.

Clopidogrel (Plavix) Increased Response to Clopidogrel (CYP2C19 *1/*17 Rapid Metabolizer)

***Clopidogrel can be prescribed at standard label-recommended dosage. Individuals with the *17 allele may have an increased risk of bleeding while taking clopidogrel.

Yellow sign indicates that increased vigilance or altered dosing is required if the drug is being used

Indication that the guidance is Actionable

LAB GENOMICS
11160 Warner Ave. Suite #415
Fountain Valley Ca 92708
Phone: (714) 438-1009 Fax: (714) 438-2484
CLIA # 055D2026572

PREDICTIVE | PREVENTATIVE | PERSONALIZED

Test Details

Subunits of DNA | Patient's Genetic Results | Observed Effect of Genotype | Specific parts of the gene tested

Gene	Genotype	Phenotype	Alleles Tested
Apolipoprotein E	ε3/ε3	No Increased Risk of Hyperlipidemia/Atherosclerotic Vascular Disease	ε2, ε4
CYP2C19	*1/*17	Rapid Metabolizer *	*2, *3, *4, *4B, *5, *6, *7, *8, *9, *17
CYP2C9	*1/*1	Normal Metabolizer *	*2, *3, *4, *5, *6, *11
CYP2D6	*1/*2	Normal Metabolizer *	*2, *3, *4, *4M, *6, *7, *8, *9, *10, *12, *14A, *14B, *17, *29, *35, *41, *5 (gene deletion), XN (gene duplication)
CYP3A4	*1/*1	Normal Metabolizer *	*1B, *2, *3, *12, *17, *22
CYP3A5	*3/*3	Poor Metabolizer *	*1D, *2, *3, *3C, *6, *7, *8, *9
Factor II	20210G>A GG	Normal Thrombosis Risk	20210G>A
Factor V Leiden	1691G>A GG	Normal Thrombosis Risk	1691G>A
ITGB3	176T>C CC	Increased Platelet Reactivity	176T>C
MTHFR	677C>T CC	Normal MTHFR Activity	677C>T
MTHFR	1298A>C AA	Normal MTHFR Activity	1298A>C
SLCO1B1	521T>C TT	Normal Transporter Function	*1B, *5, *15
VKORC1	-1639G>A G/A	Intermediate Warfarin Sensitivity	-1639G>A

The CYP 450 (noted as CYPXXX) deals with 80% of all drug breakdown in the liver

Factors, ITGB3, MTHFR, SLCO1B1, VKORC1, APOE all deal with cardiovascular diseases.

For more information please refer to the monographs.

Other variants not listed are not detected.

Disclaimer: The information presented on this report is provided as general educational health information. The Content is not intended to be a substitute for professional medical advice, diagnosis, or treatment. Only a physician, pharmacist or other healthcare professional should advise a patient on the use of the medications prescribed.

Disclaimer indicating that this is an informative report and that any action should first be check with and approved by the doctor

Limitations due to possible inhibitions may be present

Limitations: Genotyping result does not eliminate the necessity to account for non-genetic factors that can influence dose requirements for medications that are metabolized by the CYP450 enzymes. CYP450 1A2, 2C9, 2C19, 2D6, 3A4, 3A5, and VKORC SLCO1B1, CYP2B6, ApoE activity is dependent upon hepatic and renal function status. Consider the results of testing and dose adjustments in the context of renal and hepatic function in addition to clinical condition. CYP450 1A2, 2C9, 2C19, 2D6, 3A4, 3A5, and VKORC, SLCO1B1, CYP2B6, ApoE activity can be altered by co-administered inhibitors or inducers. It is important to interpret the testing result in the context of other co administered drugs. Consult drug label for dosing guidance. DNA testing does not replace the need for clinical and therapeutic drug monitoring.

Technical Specifications: Laboratory specimens were analyzed by Real time PCR to recognize specific genotype alleles for CYP450 1A2, 2C9, 2C19, 2D6, 3A4, 3A5, and VKORC, ApoE, SLCO1B1, CYP2B6 and Factor V, II and MTHFR

RUO: Performance characteristics of these assay were determined by Lab Genomics, LLC. This test is used for clinical purpose only. These tests are not cleared by USA food and drug administration.

Laboratory Certification: CLIA # 055D2026572

Approved by Laboratory Director: Wenxue Xing, MD

*** Metabolizer deals with how fast drugs breakdown.**

Rapid breakdown too quickly to be effective. Suggest increasing dosing or changing drug

Poor metabolizer breakdown the drugs too slowly so they stay longer, leading to harmful damage. Suggest decreasing dosing or changing drug.