

**PATIENT INFORMATION**

**NAME :** Report,Hematology  
**ACC # :** P241070006  
**DOB :** 1/1/2001  
**SEX :**

**SPECIMEN DETAILS**

**SPECIMEN TYPE:** Buccal Swab  
**COLLECTION DATE:** 4/16/2024 4:17 PM  
**RECEIVED DATE:** 4/16/2024 4:21 PM  
**REPORT DATE :** 4/16/2024

**PROVIDER INFORMATION**

**ORDERING PHYSICIAN:** Doctor Test  
**PROVIDER:**



# Pharmacogenomic Test

Thank you for choosing Omni Health Diagnostics Test. This report contains four color-coded sections to easily show whether there is a genetic predisposition that may affect the patient's response to drugs or indicate the potential for adverse effects.



### Rx Medication Review

a list of prescribed drugs and any gene or drug interactions



### Drug Guide

a drug focused report by therapeutic category



### Summary of Genes Tested

a summary of your results for all genes tested.



### Detailed Explanation of Findings

a more informative view of drug and gene relationships

This is a matrix of all drugs currently prescribed and contemplated. The matrix determines if there is any drug-to-drug or drug-to-gene interaction for the medications provided. Visit the online portal to view how any changes to these drugs may impact risk of drug-to-drug or drug-to-gene interactions.





We illustrate the impact of the tested genes on the most commonly prescribed medications. Simply identify therapeutic category of interest and review the impact of genetics on these drugs listed by medication name (both brand and generic). The impact of genetics as shown in the drug guide is derived by considering ALL tested genes that are relevant for each listed drug (also called combinatorial pharmacogenetics).

We show the patient's genotype and phenotype for each of the genes tested. This summary helps to quickly understand how your genes are impacting your medication's effectiveness.

We look at each gene separately and explains how the genotype and phenotype may impact drug responses. For each tested gene, the report shows how the phenotype impacts drugs, along with a list of the most commonly prescribed drugs affected by each gene.

## Molecular PGX PGx - Hematology/Oncology Panel Report

**Current Patient Medications:** All provided medications as of 4/16/2024

	<b>Avapritinib</b>	<b>Avapritinib - Standard Precautions</b> Major *DDI: Midostaurin
	<b>Lenalidomide</b>	<b>Lenalidomide - Standard Precautions</b> Major *DDI: Ofatumumab
	<b>Midostaurin</b>	<b>Midostaurin - Standard Precautions</b> Major *DDI: Avapritinib
	<b>Ofatumumab</b>	<b>Ofatumumab - Standard Precautions</b> Major *DDI: Lenalidomide

\*Note: DDI = Drug-Drug Interactions as found by DrugBank

### GUIDANCE LEVELS



A medication has potentially reduced efficacy, increased toxicity or the patient has an increased risk for the indicated condition.



Guidelines exist for adjusting dosage, increased vigilance or the patient has a moderate risk for indicated condition.



The medication can be prescribed according to standard regimens or the patient's risk for the indicated condition is not increased.

## Condition Risk Factor



### Hyperhomocysteinemia - Thrombosis

MTHFR  
CC-677/AC-1298  
Impaired Function

This genotype predicts impaired function of the enzyme methylenetetrahydrofolate reductase (MTHFR). This enzyme plays a crucial role in converting dietary folate into methylfolate, the active form of this critical B vitamin. Impaired MTHFR function is associated with methylfolate deficiency which can lead to impaired neurotransmitter synthesis and other biochemical abnormalities. Patients with these MTHFR variants are associated with improved depression treatment outcomes with L-methylfolate treatment adjunctive to SSRI/SNRI therapy. This genotype is also associated with increased plasma homocysteine levels which may be associated with an increased risk of premature cardiovascular disease. Dietary supplementation with L-methylfolate supplements may be beneficial to your health.



### Thrombosis/Thrombophilia (Factor II)

Factor II  
G/G  
Normal Risk

The patient is wildtype for Factor II Prothrombin. Patients with this genotype (G/G) are associated with a normal risk of developing an abnormal blood clot.



### Thrombosis/Thrombophilia (Factor V Leiden)

Factor V Leiden  
C/C  
Normal Risk

The patient is wildtype for Factor V Prothrombin. Patients with this genotype (C/C) are associated with a normal risk of developing an abnormal blood clot.

## Potentially Impacted Medications:

### DRUG GUIDE

These lists of drugs are categorized to reflect whether a genetic predisposition indicates that there may be issues with regard to drug response or adverse effects.

Category	Drug Class	Standard Precaution	Use With Caution	Consider Alternatives
Antidiabetic		glyburide (Diabeta, Micronase) Repaglinide (Prandin, Prandimet)	Nateglinide (Starlix) Chlorpropamide (Diabinese) glimepiride (Amaryl) glipizide (Glucotrol) tolbutamide (Orinase)	
Anti-Infectives		ritonavir (Norvir) indinavir (Crixivan) clarithromycin (Biaxin) efavirenz (Sustiva) erythromycin (E-Mycin) saquinavir (Invirase) telithromycin (Ketek) nelfinavir (Viracept)		
Cardiovascular	Antianginal	ranolazine (Ranexa)		
	Antiarrhythmics	Amiodarone (Nexterone, Pacerone) Disopyramide (Norpace) dofetilide (Tikosyn) Sotalol (Betapace, Sorine, Sotylize)	propafenone (Rythmol) quinidine (Quinidine)	flecainide (Tambacor) Mexiletine (Mexitil)

## DRUG GUIDE

These lists of drugs are categorized to reflect whether a genetic predisposition indicates that there may be issues with regard to drug response or adverse effects.

Category	Drug Class	Standard Precaution	Use With Caution	Consider Alternatives
	<b>Anticoagulants</b>	clopidogrel ++ (Plavix) Prasugrel (Effient) rivaroxaban (Xarelto) ticargelol (Brilinta) Vorapaxar (Zontivity) Apixaban (Eliquis) Betrixaban (Bevyxxa)	warfarin (Coumadin, Jantoven)	
	<b>Antihypertensive</b>	amlodipine (Norvasc) Atenolol (Tenormin) Bisoprolol (Zebeta) diltiazem (Cardizem) felodipine (Plendil) Labetalol (Normodyne, Trandate) lercanidipine (Zanidip) nifedipine (Adalat, Procardia) nisoldipine (Sular) nitrendipine (Baypress) Olmesartan (Benicar) Telmisartan (Micardis) Valsartan (Diovan, Entresto)	losartan (Cozaar, Hyzaar) Irbesartan (Avapro) Candesartan cilexetil (Atacand) Azilsartan medoxomil (Edarbi, Edarbyclor)	carvedilol (Coreg) timolol (Blocadren) metoprolol (Lopressor, Toprol) nebivolol (Bystolic) propranolol (Inderal)
	<b>Cholesterol Lowering</b>	lovastatin (Mevacor, Altoprev, Advior) pravastatin (Pravachol) rosuvastatin (Crestor) simvastatin (FloLip, Zocor) atorvastatin (Lipitor, Caduet)	fluvastatin (Lescol)	
<b>Cholinesterase Inhibitors</b>	Memantine (Namenda)			Rivastigmine (Exelon) Donepezil (Aricept) Galantamine (Razadyne, Reminyl)
<b>Gastrointestinal</b>	Dexlansoprazole (Dexilant, Kapidex) esomeprazole (Nexium) lansoprazole (Prevacid) omeprazole (Prilosec) pantoprazole (Protonix) rabeprazole (Aciphex)			
	<b>Antiemetics</b>	Aprepitant (Emend-oral) Granisetron (Sancuso, Sustol) Ondansetron (Zofran, Zuplenz) Rolapitant (Varubi)	Dronabinol (Marinol)	Metoclopramide (Reglan) Dolasetron (Anzemet)

## DRUG GUIDE

These lists of drugs are categorized to reflect whether a genetic predisposition indicates that there may be issues with regard to drug response or adverse effects.

Category	Drug Class	Standard Precaution	Use With Caution	Consider Alternatives
Immunological		cyclosporine (Gengraf) hydrocortisone tacrolimus (Prograf, Protopic)	zafirlukast (Accolate)	
	<b>Cholinergic Agonists</b>		Cevimeline (Evoxac)	
	<b>Selective Immunosuppressants</b>		Siponimod (Mayzent)	
Infections	<b>Antifungals</b>	Fluconazole (Diflucan) Itraconazole (Sporanox) Voriconazole (Vfend)		
Miscellaneous Metabolic Agents				Eliglustat (Cerdelga)
Neuropsychiatric	<b>ADHD Drug</b>	Guanfacine (Intuniv) Lisdexamfetamine (Vyvanse) Methylphenidate (Ritalin, Aptensio XR, Concerta, Metadate, Quillivant ER)	Clonidine (Kapvay)	amphetamine (Adderall, Evekeo) atomoxetine (Strattera) Dextroamphetamine (Dexadrine)
	<b>Antiaddictives</b>			Lofexidine (Lucemyra)
	<b>Anticonvulsants</b>	tiagabine (Gabitril) carbamazepine (Tegretol, Carbatrol, Eptitol) Felbamate (Felbatol) Lamotrigine (Lamictal) Levetiracetam (Keppra) Oxcarbazepine (Trileptal, Oxtellar XR) Topiramate (Topamax) Valproic acid (Topamax) zonisamide (Zonegran) Pregabalin (Lyrica)	Primidone (Mysoline) phenytoin (Dilantin)	
	<b>Antidepressant</b>	sertraline (Zoloft) trazodone (Oleptro) vilazodone (Viibryd) desvenlafaxine (Pristiq) bupropion (Wellbutrin, Zyban) mirtazapine (Remeron) nefazodone (Serzone)	imipramine (Tofranil) Trimipramine (Surmontil) escitalopram (Lexapro) citalopram (Celexa) clomipramine (Anafranil)	doxepin (Sinequan, Silenor, Prudoxin, Zonalon) desipramine (Norpramin) amitriptyline (Elavil) Vortioxetine (Trintellix) Maprotiline (Ludiomil) venlafaxine (Effexor) fluoxetine (Prozac, Sarafem) Fluvoxamine (Luvox) nortriptyline (Aventyl,Pamelor) paroxetine (Paxil, Brisdelle) Protriptyline (Vivactil)

## DRUG GUIDE

These lists of drugs are categorized to reflect whether a genetic predisposition indicates that there may be issues with regard to drug response or adverse effects.

Category	Drug Class	Standard Precaution	Use With Caution	Consider Alternatives
	<b>Antiemetics</b>			Meclizine (Antivert)
	<b>Antipsychotic</b>	clozapine (Clozaril) Cariprazine (Vraylar) lurasidone (Latuda) olanzapine (Zyprexa) promazine (Sparine) ziprasidone (Geodon)	aripiprazole (Abilify, Aristada) asenapine (Saphris) Brexpiprazole (Rexulti) quetiapine (Seroquel) haloperidol (Haldol) perphenazine (Trilafon)	Fluphenazine (Prolixin) loperidine (Fanapt) Pimozide (Orap) chlorpromazine (Thorazine) risperidone (Risperdal) thioridazine (Mellaril)
	<b>Anxiolytic</b>	zolpidem (Ambien) alprazolam (Xanax) buspirone (BuSpar) Clobazam (Onfi) Clonazepam (Klonopin) diazepam (Valium) midazolam (Versed) triazolam (Halcion)	phenobarbital	
	<b>Other</b>	Valbenazine (Ingrezza)		Dextromethorphan (Nuedexta) Tetrabenazine (Xenazine)
	<b>Pain Management</b>		duloxetine (Cymbalta)	
	<b>Precognitive Drug</b>		tacrine (Cognex)	
<b>Oncology</b>		docetaxel (Taxotere) ifosfamide (Ifex) vincristine (Vincasar, Oncovin)		
<b>Other</b>		caffeine theophylline (Theo-24, Elixophylline, Theochron)		
<b>Pain Management</b>		Acetylsalicylic acid (Aspirin)		
	<b>Muscle Relaxant</b>	cyclobenzaprine (Flexaril, Amrix) Methocarbamol (Robaxin) tizanidine (Zanaflex)	Milnacipran (Savella)	
	<b>NSAID</b>	Acetaminophen (Tylenol) Ketorolac (Toradol) Nabumetone (Relafen) ropivacaine (Naropin)	Diclofenac (Voltaren) Flurbiprofen (Ansaïd, Ocufen) ibuprofen (Advil, Motrin) Indomethacin (Indocin, Tivorbex) naproxen (Aleve) Piroxicam (Feldene) Meloxicam (Mobic)	celecoxib (Celebrex)

## DRUG GUIDE

These lists of drugs are categorized to reflect whether a genetic predisposition indicates that there may be issues with regard to drug response or adverse effects.

Category	Drug Class	Standard Precaution	Use With Caution	Consider Alternatives
Rheumatology	<b>Opioids</b>	methadone (Dolophine) alfentanil (Alfenta) Buprenorphine (Butrans, Buprenex) buprenorphine/naloxone (Suboxone, Zubsolv, Bunavail) carisoprodol++ (Soma) fentanyl (Actiq, Duragesic, Sublimaze) Hydromorphone (Dilaudid, Exalgo) meperidine (Demerol) Morphine (MS Contin) Oxymorphone (Opana, Numorphan)	tapentadol (Nucynta)	hydrocodone++ (Vicodin) codeine++ (Codeine, Fioricet with codeine) Benzhydrocodone (Apadaz) oxycodone++ (Oxycontin, Percocet) tramadol++ (Ultram)
	<b>Other</b>	lidocaine (xylocaine, Lidoderm) zolmitriptan (Zomig)		
	<b>Anti Hyperuricemics/Anti-Gout</b>	Colchicine (Mitigare) Febuxostat (Uloric)		
	<b>Immunomodulators</b>	Apremilast (Otezla) Leflunomide (Arava) Tofacitinib (Xeljanz)		
	<b>Steroids</b>	estradiol testosterone	progesterone	
	<b>Urologicals</b>	<b>5-Alpha Reductase Inhibitors</b> Finasteride (Proscar)		
		<b>Alpha-Blockers</b> Doxazosin (Cardura) Silodosin (Rapaflo) Terazosin (Hytrin)		Tamsulosin (Flomax)
		<b>Antispasmodics for OAB</b> Darifenacin (Enablex) Oxybutynin (Ditropan) Solifenacin (Vesicare)	Mirabegron (Myrbetriq)	Tolterodine (Tolterodine)
		<b>Erectile Dysfunction</b> sildenafil (Viagra) Tadalafil (Cialis) Vardenafil (Levitra) Avanafil (Stendra)		

++ Pro-drug; may not be effective in Poor Metabolizers due to inability to metabolize and produce active metabolite

\* The enzyme encoded by this gene is a minor metabolic pathway for this drug (of minor clinical importance)






**venlafaxine (Effexor)**

**High Risk ( CYP2D6: Poor Metabolizer)**

	<b>nortriptyline (Aventyl,Pamelor)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>nebivolol (Bystolic)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>Maprotiline (Ludiomil)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>timolol (Blocadren)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>doxepin (Sinequan, Silenor, Prudoxin, Zonalon)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>paroxetine (Paxil, Brisdelle)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>amitriptyline (Elavil)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>Fluvoxamine (Luvox)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>propranolol (Inderal)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>fluoxetine (Prozac, Sarafem)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer, CYP2C9: Intermediate Metabolizer)</b>
	<b>Protriptyline (Vivactil)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>carvedilol (Coreg)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer, CYP2C9: Intermediate Metabolizer)</b>
	<b>Vortioxetine (Trintellix)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>desipramine (Norpramin)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>
	<b>metoprolol (Lopressor, Toprol)</b>	<b>High Risk ( CYP2D6: Poor Metabolizer)</b>



	<b>imipramine (Tofranil)</b>	<b>Potential risk ( CYP2D6: Poor Metabolizer)</b>
	<b>progesterone</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>glimepiride (Amaryl)</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>duloxetine (Cymbalta)</b>	<b>Potential risk ( CYP2D6: Poor Metabolizer)</b>
	<b>fluvastatin (Lescol)</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>citalopram (Celexa)</b>	<b>Potential risk ( CYP2D6: Poor Metabolizer)</b>
	<b>glipizide (Glucotrol)</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>tacrine (Cognex)</b>	<b>Potential risk ( CYP2D6: Poor Metabolizer)</b>
	<b>tolbutamide (Orinase)</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>Candesartan cilexetil (Atacand)</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>Trimipramine (Surmontil)</b>	<b>Potential risk ( CYP2D6: Poor Metabolizer)</b>
	<b>Chlorpropamide (Diabinese)</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>Irbesartan (Avapro)</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>phenobarbital</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>escitalopram (Lexapro)</b>	<b>Potential risk ( CYP2D6: Poor Metabolizer)</b>

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	<b>clomipramine (Anafranil)</b>	<b>Potential risk ( CYP2D6: Poor Metabolizer)</b>
	<b>losartan (Cozaar, Hyzaar)</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>Nateglinide (Starlix)</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>
	<b>Azilsartan medoxomil (Edarbi, Edarbyclor)</b>	<b>Potential risk ( CYP2C9: Intermediate Metabolizer)</b>

## SUMMARY OF YOUR EXTREME RISK GENES

The following is a summary of findings, including your genotype and phenotype for each of your Extreme risk genes.

### Extreme Risk Genes

Gene (Genotype)	Phenotype (Gene expression)	What it means
CYP2D6 *4/*5	Poor Metabolizer	This genotype predicts markedly reduced or no metabolic activity for the enzyme controlled by this gene. High risk for drug accumulation and adverse drug reactions. ++ Caution should be observed with pro-drugs, e.g., codeine. Little or no active metabolite formation is expected and a full effect of the drug is not expected.

## SUMMARY OF YOUR INCREASED RISK GENES

The following is a summary of findings, including your genotype and phenotype for each of your Increased risk genes.

### Increased Risk Genes

Gene (Genotype)	Phenotype (Gene expression)	What it means
<b>CYP2C8</b> *1/*3	<b>Intermediate Metabolizer</b>	This genotype predicts less than normal metabolic enzyme activity for the enzyme controlled by this gene. Increased potential for drug accumulation and adverse drug reactions
<b>CYP2C9</b> *1/*2	<b>Intermediate Metabolizer</b>	This genotype predicts less than normal metabolic enzyme activity for the enzyme controlled by this gene. Increased potential for drug accumulation and adverse drug reactions.
<b>DPYD</b> DPYD: *1/*2 HapB3: C/C rs67376798: T/T	<b>Intermediate Metabolizer</b>	The fluoropyrimidine anticancer drug 5-fluorouracil (5-FU) and its oral prodrug capecitabine are frequently used in the treatment of a variety of cancers, including breast, colorectal, head and neck and gastric cancer. The dihydropyrimidine dehydrogenase enzyme (DPD), encoded by the gene DPYD, converts the active drug 5-FU into an inactive metabolite. This patient has a mutation that results in reduced DPD activity which may result in decreased clearance of the active drug 5-FU leading to increased drug exposure and adverse side effects. Consider reducing initial dose by 25% and monitor closely for adverse effects and clinical efficacy.
<b>MTHFR</b> CC-677/AC-1298	<b>Impaired Function</b>	This genotype predicts impaired function of the enzyme methylenetetrahydrofolate reductase (MTHFR). This enzyme plays a crucial role in converting dietary folate into methylfolate, the active form of this critical B vitamin. Impaired MTHFR function is associated with methylfolate deficiency which can lead to impaired neurotransmitter synthesis and other biochemical abnormalities. Patients with these MTHFR variants are associated with improved depression treatment outcomes with L-methylfolate treatment adjunctive to SSRI/SNRI therapy. This genotype is also associated with increased plasma homocysteine levels which may be associated with an increased risk of premature cardiovascular disease. Dietary supplementation with L-methylfolate supplements may be beneficial to your health.
<b>TPMT</b> *1/*2	<b>Intermediate Metabolizer</b>	The TPMT gene codes for the metabolizing enzyme thiopurine methyltransferase, a key inactivation pathway for the thiopurine drugs azathioprine, 6-mercaptopurine and thioguanine. This genotype is associated with increased thiopurine exposure and elevated risk of thiopurine-induced myelosuppression. These patients may not be candidates for thiopurine treatment. Thiopurine drugs are not advised, however if used, thiopurine drug dose should be reduced.

## SUMMARY OF YOUR NORMAL RISK GENES

The following is a summary of findings, including your genotype and phenotype for each of your Normal risk genes.

### Normal Risk Genes

Gene (Genotype)	Phenotype (Gene expression)	What it means
<b>Factor II G/G</b>	<b>Normal Risk</b>	The patient is wildtype for Factor II Prothrombin. Patients with this genotype (G/G) are associated with a normal risk of developing an abnormal blood clot.
<b>Factor V Leiden C/C</b>	<b>Normal Risk</b>	The patient is wildtype for Factor V Prothrombin. Patients with this genotype (C/C) are associated with a normal risk of developing an abnormal blood clot.
<b>NUDT15 *1/*1</b>	<b>Normal Activity</b>	Patients with this phenotype may be at a decreased risk of developing leukopenia when treated with mercaptopurine or azathioprine as compared to patients with lower activity phenotypes.

## DETAILED EXPLANATION OF YOUR CYP2D6 GENE

The following is a detailed explanation of your CYP2D6 gene, including your genotype, phenotype, and a common medicines metabolized by the gene.

### Extreme Risk

Gene (Genotype)	Phenotype (Gene expression)	What it means
CYP2D6 *4/*5	Poor Metabolizer	This genotype predicts markedly reduced or no metabolic activity for the enzyme controlled by this gene. High risk for drug accumulation and adverse drug reactions. ++ Caution should be observed with pro-drugs, e.g., codeine. Little or no active metabolite formation is expected and a full effect of the drug is not expected.

### Common Medicines Metabolized by CYP2D6

Drug Type	Generic Name (Brand Name)
Anti-Infectives	indinavir (Crixivan) *, ritonavir (Norvir) *
Cardiovascular	carvedilol (Coreg), flecainide (Tambocor), lercandipine (Zandip), metoprolol (Lopressor,Toprol), nebivolol (Bystolic), propafenone (Rythmol), propranolol (Inderal), quinidine (various brands), timolol (Blocadren)
Neuropsychiatric	amitriptyline (Elavil), amphetamine (Adderall), aripiprazole (Abilify), asenapine (Saphris), atomoxetine (Strattera), bupropion (Wellbutrin), chlorpromazine (Thorazine), citalopram (Celexa) *, clomipramine (Anafranil), desipramine (Norpramin), desvenlafaxine (Pristiq)*, doxepin (Sinequan, Silenor,Prudoxin, Zonalon), duloxetine (Cymbalta), escitalopram (Lexapro), fluoxetine (Prozac),haloperidol (Haldol), iloperidone (Fanapt), imipramine (Tofranil), mirtazapine (Remeron) *, nortriptyline (Aventyl,Pamelor), olanzapine (Zyprexa) *, paroxetine (Paxil), perphenazine (Trilafon), quetiapine (Seroquel) *, risperidone (Risperdal), sertraline (Zoloft) *, tacrine (Cognex), thioridazine (Mellaril), trazadone (Oleptro) *, venlafaxine (Effexor)
Oncologic	tamoxifen ++
Pain	celecoxib (Celebrex) *, codeine++, cyclobenzaprine (Flexeril) *, hydrocodone++ ibuprofen *, methadone *, oxycodone++ (Oxycontin), tiagabine (Gabitril) *, tramadol++ (Ultram)

++ Pro-drug; may not be effective in Poor Metabolizers due to inability to metabolize and produce active metabolite

\* The enzyme encoded by this gene is a minor metabolic pathway for this drug (of minor clinical importance)

## DETAILED EXPLANATION OF YOUR CYP2C9 GENE

The following is a detailed explanation of your CYP2C9 gene, including your genotype, phenotype, and a common medicines metabolized by the gene.

### Increased Risk

Gene	Phenotype (Gene expression)	What it means
CYP2C9 *1/*2	Intermediate Metabolizer	This genotype predicts less than normal metabolic enzyme activity for the enzyme controlled by this gene. Increased potential for drug accumulation and adverse drug reactions.

### Common Medicines Metabolized by CYP2C9

Drug Type	Generic Name (Brand Name)
Anti-Infectives	efavirenz (Sustiva) *
Cardiovascular	carvedilol (Coreg) *, clopidogrel (Plavix) *, fluvastatin (Lescol), glimepiride (Amaryl), glipizide (Glucotrol), glyburide (Diabeta), losartan (Cozaar), rosuvastatin (Crestor), tolbutamide (Orinase), warfarin (Coumadin)
Immunomodulation	zarlukast (Accolate)
Neuropsychiatric	fluoxetine (Prozac) *, phenytoin (Dilantin), phenobarbital
Oncology	tamoxifen (Nolvadex) *
Other	sildenafil (Viagra) *
Pain	carisoprodol celecoxib (Celebrex), ibuprofen (Advil, Motrin), methadone *, naproxen (Aleve), tapentadol (Nucynta)
Steroids	progesterone

++ Pro-drug; may not be effective in Poor Metabolizers due to inability to metabolize and produce active metabolite

\* The enzyme encoded by this gene is a minor metabolic pathway for this drug (of minor clinical importance)

## DETAILED EXPLANATION OF YOUR CYP2C19 GENE

The following is a detailed explanation of your CYP2C19 gene, including your genotype, phenotype, and a common medicines metabolized by the gene.

Gene	Phenotype (Gene expression)	What it means
<b>Common Medicines Metabolized by CYP2C19</b>		
Drug Type	Generic Name (Brand Name)	
Antivirals, Hormones, and Anti-Diabetics	efavirenz (Sustiva) *, nelfinavir (Viracept), progesterone *, tolbutamide (Orinase) *	
GERD	esomeprazole (Nexium), lansoprazole (Prevacid), omeprazole (Prilosec), pantoprazole (Protonix), rabeprazole (Aciphex)	
Neuropsychiatric	citalopram (Celexa), clomipramine (Anafranil) *, diazepam (Valium), doxepin (Sinequan, Silenor, Prudoxin, Zonalon), escitalopram (Lexapro), imipramine (Tofranil), paroxetine (Paxil) *, perphenazine (Trilafon) *, phenobarbital, phenytoin (Dilantin), sertraline (Zoloft), venlafaxine (Effexor) *, vilazodone (Viibryd) *	
Oncologic	tamoxifen ++	
Pain	carisoprodol ++ (Soma), ibuprofen *, meperidine (Demerol), methadone, tapentadol (Nucynta)	

++ Pro-drug; may not be effective in Poor Metabolizers due to inability to metabolize and produce active metabolite

\* The enzyme encoded by this gene is a minor metabolic pathway for this drug (of minor clinical importance)

## METHOD SUMMARY

Genetic analysis was performed via Real-Time Polymerase Chain Reaction (PCR). Genotyping for Single Nucleotide Polymorphism (SNP) was performed using TaqMan® SNP Genotyping Assays, following the extraction of the DNA. For CYP2D6, a separate and distinct PCR reaction was performed, using a TaqMan® Copy Number Assay, to measure the number of CYP2D6 copies. The genetic variation and mutation analysis was performed at Omni Health Diagnostics in accordance with the protocols developed by Omni Health Diagnostics. This test is a Laboratory Developed Test (LDT) and has not been approved by the U.S. Food & Drug Administration.

## LOCI / MUTATIONS TESTED

**CYP2C8:**

**CYP2C9:** \*1, \*2, \*3, \*4, \*5, \*6, \*11

**CYP2D6:** \*1, \*2, \*3, \*4, \*5, \*6, \*7, \*8, \*9, \*10, \*12, \*14, \*17, \*29, \*41

**DPYD:**

**Factor II:** A, G

**Factor V Leiden:** C, T

**MTHFR:** A1298C, C677T

**NUDT15:**

**TPMT:**



**FINAL REPORT REVIEWED AND RELEASED BY:**

Omni Health Diagnostics  
 Lab Director: Akhtar Afshan Ali  
 Address: 1840 N Greenville Suite 176 Richardson, TX 75081  
 Richardson 75081 TX  
 Phone:  
 CLIA #: 45D2089485

**Limitation:** This test will not detect all the known alleles that result in altered or inactive tested genes. This test does not account for all individual variations in the individual tested. Absence of a detectable gene mutation does not rule out the possibility that a patient has different phenotypes due to the presence of an undetected polymorphism or due to other factors such as drug-drug interactions, comorbidities and lifestyle habits. This assay does not detect the decreased activity CYP2C9\*8 (rs7900194) allele and may potentially misclassify CYP2C9 intermediate or poor metabolizers as normal metabolizers. CYP2C9\*8 is most prevalent in African populations with an allele frequency of up to 5% (Pratt VM, et al. J Mol Diagn. 2019).

**Methodology:** PCR based assays detect listed alleles, including all common and most rare variants with known clinical significance at analytical sensitivity and specificity >99%. The assays were developed to detect polymorphisms in genes encoding drug metabolism enzymes (DMEs) and associated transport proteins. This panel provides coverage of essential, commonly studied markers within CYP2D6, CYP2C9, CYP2C19, and other important DME and clinical research genes.

**SmartPGx 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. The pharmacogenetic assay involves use of reporting software and genotype-phenotype associations performed by SmartPGx. The software has not been evaluated by the Food and Drug Administration. The software, and the report generated by the software, is not intended to diagnose, treat, cure, or prevent any disease. A qualified designee within the lab uses SmartPGx to generate and subsequently review the report. The pharmacogenetic report is one of multiple pieces of information that clinicians should consider in guiding their therapeutic choice for each patient. It remains the responsibility of the health-care provider to determine the best course of treatment for a patient. Adherence to dose guidelines does not necessarily assure a successful medical outcome.

The information contained in this report is intended to be interpreted by a licensed physician or other licensed healthcare professional. This report is not intended to take the place of professional medical advice. Decisions regarding use of prescribed medications must be made only after consulting with a licensed physician or other licensed healthcare professional, and should consider each patient's medical history and current treatment regimen.

**PATIENT INFORMATION CARD**

This is summary genetic report for your patient to share with other healthcare providers. Card can be cut out along dashed line, and carried with the patient.



<b>Patient:</b> Report,Hematology	<b>DOB:</b> 1/1/2001	<b>Requisition ID</b> P241070006
<b>Pharmacogenetic Test Summary</b>		
CYP2C8	/	Intermediate Metabolizer
CYP2D6	*4/*5	Poor Metabolizer
Factor II	G/G	Normal Risk
MTHFR	CC-677/AC-1298	Impaired Function
TPMT	*1/*2	Intermediate Metabolizer

CYP2C9	*1/*2	Intermediate Metabolizer
DPYD	G/A	Intermediate Metabolizer
Factor V Leiden	C/C	Normal Risk
NUDT15	*1/*1	Normal Activity

↑ **Fold**