

**James Doe**

 DOB: 1956-01-01  
 Clinician: Ima Test  
 Order No: SA0000001-A01

 Sample Analysis: Jan. 28, 2022 11:25 EST  
 Sample Collection: Jan. 01, 2022 22:13 EST

**For patients, consult your healthcare provider prior to any medication or dose changes.**
*This pharmacogenomics report is based on genotypes analyzed by Phenomics Health and the patient's currently available medication list to support clinical treatment decisions.*
**\*Current medications: ARIPIPRAZOLE, ATORVASTATIN, CLOPIDOGREL, ESCITALOPRAM, GLIPIZIDE, METOPROLOL, TRAMADOL**
**Cardiovascular, Metabolic,  
and Gastrointestinal Agents**
**Antidepressants  
and Anxiolytics**
**Analgesics and  
Other CNS Agents**
**Antipsychotics and  
Anticonvulsants**
**PRESCRIBE AS DIRECTED**

Amlodipine (Norvasc®)  
 Amiodarone (Cordarone®,  
 Pacerone®)  
 Apixaban (Eliquis®)  
 Atenolol (Tenormin®)  
**\*Atorvastatin (Lipitor®)**  
 Bisoprolol (Zebeta®)  
 Carvedilol (Coreg®)  
 Dexlansoprazole (Dexilant®)  
 Esomeprazole (Nexium®)  
 Fluvastatin (Lescol®)  
 Glimepiride (Amaryl®)  
**\*Glipizide (Glucotrol®)**  
 Glyburide (Diabeta®,  
 Micronase®)  
 Labetalol (Normodyne®,  
 Trandate®)  
 Losartan (Cozaar®)  
 Nebivolol (Bystolic®)  
 Nifedipine (Procardia® XL)  
 Ondansetron (Zofran®)  
 Propranolol (Inderal®)  
 Rabeprazole (AcipHex®)  
 Rivaroxaban (Xarelto®)  
 Rosuvastatin (Crestor®)  
 Simvastatin (Zocor®)  
 Ticagrelor (Brilinta®)  
 Toremide (Demadex®)  
 Tropisetron (Novoban®)  
 Valsartan (Diovan®)  
 Verapamil (Calan®, Isoptin®,  
 Verelan®)

Alprazolam (Xanax®)  
 Amoxapine (Asenden®)  
 Bupropion (Wellbutrin SR®)  
 Buspirone (BuSpar®)  
 Citalopram (Celexa®)  
 Clobazam (Onfi®)  
 Clonazepam (Klonopin®)  
 Desvenlafaxine (Pristiq®)  
 Diazepam (Valium®)  
 Duloxetine (Cymbalta®)  
**\*Escitalopram (Lexapro®)**  
 Esketamine (Spravato®)  
 Eszopiclone (Lunesta®)  
 Ketamine (Ketalar®)  
 Lorazepam (Ativan®)  
 Fluoxetine (Prozac®)  
 Fluvoxamine (Luvox®)  
 Imipramine (Tofranil®)  
 Mirtazapine (Remeron®)  
 Oxazepam (Serax®)  
 Paroxetine (Paxil®)  
 Protriptyline (Vivactil®)  
 Temazepam (Restoril®)  
 Trazodone (Desyrel®)  
 Trimipramine (Surmontil®)  
 Zolpidem (Ambien®)

Buprenorphine (Subutex®)  
 Celecoxib (Celebrex®)  
 Clonidine (Catapres®)  
 Dexmethylphenidate (Focalin®)  
 Dextroamphetamine (Adderall®)  
 Diclofenac (Voltaren®)  
 Fentanyl (Sublimaze®)  
 Flurbiprofen (Ansaid®)  
 Guanfacine (Intuniv®)  
 Hydromorphone (Exalgo®)  
 Ibuprofen (IBU, Motrin®)  
 Indomethacin (Indocin SR)  
 Lidexamphetamine (Vyvanse®)  
 Lofexidine (Lucemyra®)  
 Lornoxicam (Xefocam®)  
 Meloxicam (Mobic®)  
 Methadone (Dolophine®,  
 Methadose®)  
 Methylphenidate (Concerta®)  
 Morphine (MS Contin®)  
 Naloxone (Narcan®)  
 Naltrexone (ReVia®)  
 Naproxen (Naprosyn®)  
 Oxycodone (Roxicodone®)  
 Piroxicam (Feldene®)  
 Tenoxicam (Mobiflex®)

Carbamazepine (Eptol®,  
 Tegretol®)  
 Cariprazine (Vraylar®)  
 Chlorpromazine (Thorazine®)  
 Clozapine (Clozaril®,  
 FazaClo®)  
 Fluphenazine (Prolixin®)  
 Lurasidone (Latuda®)  
 Olanzapine (Zyprexa®)  
 Paliperidone (Invega®)  
 Phenytoin (Dilantin®)  
 Pimozide (Orap®)  
 Primidone (Mysoline®)  
 Quetiapine (Seroquel®)  
 Risperidone (Risperdal®)  
 Thioridazine (Mellaril®)  
 Topiramate (Topamax®,  
 Topiragen®)

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Gastrointestinal Agents**
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**Analgesics and  
Other CNS Agents**
**Antipsychotics and  
Anticonvulsants**
**MAJOR GENE-DRUG INTERACTIONS**

<b>*Clopidogrel (Plavix®)</b>	<b>3,5</b>	Amitriptyline (Elavil®)	<b>5</b>	Donepezil (Aricept®)	<b>4</b>	Brexipiprazole (Rexulti®)	<b>4</b>
Lovastatin (Mevacor®)	<b>2</b>	Clomipramine (Anafranil®)	<b>5</b>	Codeine (Fioricet®)	<b>4</b>	Brivaracetam (Briviact®)	<b>4</b>
Meclizine (Antivert®, Bonine®)	<b>4</b>	Desipramine (Norpramin®)	<b>2,5</b>	<b>*Tramadol (Ultram®)</b>	<b>3</b>	Fosphenytoin (Cerebyx®)	<b>1,2,4</b>
Metoclopramide (Reglan®)	<b>2,4</b>	Vilazodone (Viibryd®)	<b>3</b>			Haloperidol (Haldol®)	<b>4</b>
Pravastatin (Pravachol®)	<b>2</b>					Iloperidone (Fanapt®)	<b>2,4</b>
Repaglinide (Prandin®)	<b>2</b>					Lamotrigine (Lamictal®)	<b>3</b>
Timolol (Betimol®)	<b>4</b>					Ziprasidone (Geodon®)	<b>3</b>

**MODERATE GENE-DRUG INTERACTIONS**

Diltiazem (Cardizem®, Diltzac®, Taztia XT®, Tiazac®)	<b>3,5</b>	Doxepin (Sinequan®)	<b>1,4</b>	Amphetamine(Adderall®)	<b>2,4</b>	<b>*Aripiprazole (Abilify®)</b>	<b>2,4</b>
Flecainide (Tambocor®)	<b>4</b>	Nortriptyline (Pamelor®)	<b>5</b>	Atomoxetine (Strattera®)	<b>2,4</b>	Oxcarbazepine (Trileptal®)	<b>1,2</b>
Irbesartan (Avapro®)	<b>4</b>	Sertraline (Zoloft®)	<b>4</b>	Hydrocodone (Lorcet HD®, Lortab®, Norco®)	<b>3</b>	Perphenazine (Trilafon®)	<b>2,4</b>
Lansoprazole (Prevacid®)	<b>4</b>	Venlafaxine (Effexor XR®)	<b>4</b>	Galantamine	<b>4</b>	Valproic Acid (Depakene®)	<b>2</b>
<b>*Metoprolol (Lopressor®)</b>	<b>4</b>	Vortioxetine (Trintellix®)	<b>4</b>	Lithium (Eskalith®, Lithobid®)	<b>2</b>		
Nateglinide (Starlix®)	<b>2</b>						
Omeprazole (Zofran®)	<b>4</b>						
Pantoprazole (Protonix®)	<b>4</b>						
Propafenone (Rythmol®)	<b>4</b>						
Ranolazine (Ranexa®)	<b>4</b>						
Warfarin (Coumadin®, Jantoven®)	<b>3</b>						

**CLINICAL IMPACT**

- Medication is contraindicated by the FDA for this genotype.
- Genotype may result in higher risk for adverse drug reactions.
- Genotype may result in reduced efficacy.
- Higher systemic concentrations may require lower doses.
- Lower systemic concentrations may require higher doses.
- Medication efficacy is based on clinical values other than genotype.

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MEDICATIONS AFFECTED BY MAJOR INTERACTIONS

Medication	Genes	Recommendations	Source
Amitriptyline	CYP2C19, CYP2D6	Avoid use. If warranted, consider a 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.	CPIC
Brexiprazole	CYP2D6	Use half the standard dose.	DPWG
	DRD2	May cause significant variability in response. Avoid use.	Ref 8
Brivaracetam	CYP2C19	May have higher systemic concentrations and higher adverse reaction risk.	FDA
Clomipramine	CYP2C19, CYP2D6	Avoid use. If warranted, consider a 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.	CPIC
*Clopidogrel	CYP2C19	Consider alternative antiplatelet therapy (e.g., prasugrel, ticagrelor).	CPIC
Codeine	CYP2D6	Avoid codeine use because of possibility of diminished analgesia. If opioid use is warranted, consider a non-tramadol opioid.	CPIC
	OPRM1	May cause a decrease in drug efficacy	Ref 10, 11
Desipramine	CYP2D6	Avoid use. If warranted, consider a 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.	CPIC
Donepezil	CYP2D6	Alters systemic concentration	FDA
Fosphenytoin	CYP2C9, HLA-B	If patient is phenytoin-naïve, do not use phenytoin/ fosphenytoin. Avoid carbamazepine and oxcarbazepine.	CPIC
Haloperidol	CYP2D6	Reduce dose by 50% or select alternative drug (e.g., flupenthixol, fluphenazine, quetiapine, olanzapine, clozapine).	DPWG
Iloperidone	CYP2D6	Greater risk for higher systemic concentrations and higher adverse reaction risk (QT prolongation). Reduce dose by 50%.	FDA

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Medication	Genes	Recommendations	Source
Lamotrigine	ABCB1	May cause a variable drug response. Consider an alternative	Ref 1, 2, 3
Lovastatin	SLCO1B1	May increase risk of statin-related myopathy	CPIC
Meclizine	CYP2D6	May affect systemic concentrations. Monitor for adverse reactions.	FDA
Metoclopramide	CYP2D6	Potential increase in the risk for adverse reactions, reduce dose.	FDA
Omeprazole	CYP2C19	Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.	CPIC
Pravastatin	CYP3A4	May reduce drug response	CPIC
Repaglinide	SLCO1B1	May cause an increased risk of adverse drug reaction. Consider an alternative.	Ref 4, 5
Timolol	CYP2D6	May require a lower dose due to increased systemic concentrations	Ref 6
<b>*Tramadol</b>	CYP2D6	Avoid use because of possibility of diminished analgesia. If opioid use is warranted, consider a non-codeine opioid.	CPIC
Vilazodone	ABCB1	May require a lower dose due to an increase in drug exposure	Ref 7, 8
Ziprasidone	DRD2	May cause a decrease in drug efficacy	Ref 8, 9

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**MEDICATIONS AFFECTED BY MODERATE INTERACTIONS**

Medication	Genes	Recommendations	Source
Amphetamine	CYP2D6	May affect systemic concentrations and adverse reaction risk. Consider lower starting dosage or use alternative agent.	FDA
<b>*Aripiprazole</b>	CYP2D6	Reduce maximum dose to 10 mg/day or 300mg/month (67% of the maximum recommended dose).	DPWG
Atomoxetine	CYP2D6	CHILD: Initiate with a dose of 0.5 mg/kg/day and if no clinical response and in the absence of adverse events after 2 weeks, consider a proportional dose increase. If unacceptable side effects are present at any time, consider a reduction in dose. ADULT: Initiate with a dose of 40 mg/day and if no clinical response and in the absence of adverse events after 2 weeks increase dose to 80 mg/day. If response is inadequate after 2 weeks consider a proportional dose increase. If unacceptable side effects are present at any time, consider a reduction in dose.	CPIC
Diltiazem	CYP3A5	May require a lower dose due to decreased drug metabolism	Ref 15, 20
Doxepin	CYP2C19, CYP2D6	Avoid use. If warranted, consider a 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.	CPIC
Flecainide	CYP2D6	Reduce the dose to 50% of the standard dose and record an ECG.	DPWG
Galantamine	CYP2D6	Results in higher systemic concentrations. Titrate dosage based on tolerability.	FDA
Hydrocodone	CYP2D6	Use label recommended age- or weight-specific dosing. If no response and opioid use is warranted, consider non-codeine and non-tramadol opioid.	CPIC
Irbesartan	CYP2C9	May require a lower dose due to decreased drug metabolism	Ref 16, 19, 30
Lansoprazole	CYP2C19	Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.	CPIC
Amphetamine	DRD2	May affect systemic concentrations and adverse reaction risk. Consider lower starting dosage or use alternative agent.	FDA
Lithium	CACNA1C	May cause an increased risk of adverse drug reaction. Avoid use	Ref 17, 22, 24, 28
<b>*Metoprolol</b>	CYP2D6	If a gradual reduction in heart is desired, or in the event of symptomatic bradycardia, increase the dose in smaller steps and/or prescribe no more than 25% of the standard dose.	DPWG

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Medication	Genes	Recommendations	Source
Nateglinide	SLCO1B1	May cause an increased risk of adverse drug reaction. Consider an alternative.	Ref 3, 4
Nortriptyline	CYP2D6	Avoid use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6 (e.g., escitalopram). If a nortriptyline is warranted, consider a 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.	CPIC
Omeprazole	CYP2C19	Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.	CPIC
Oxcarbazepine	HLA-B	If patient is oxcarbazepine naïve, do not use oxcarbazepine.	CPIC
Pantoprazole	CYP2C19	Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.	CPIC
Perphenazine	CYP2D6	Greater risk of side effects due to higher drug concentrations	FDA
Propafenone	CYP2D6	Reduce the dose to 30% of the standard dose, perform an ECG and monitor plasma concentrations.	DPWG
Ranolazine	CYP2D6	May cause increased systemic concentrations and risk of adverse drug reaction. Consider an alternative	Ref #
Sertraline	CYP2C19	Initiate therapy with recommended starting dose (25mg/d or 50mg/d, depending on age and indication).	CPIC
	HTR2A	May cause an increased risk of adverse drug reaction. Consider an alternative	Ref 6, 8, 9
Valproic Acid	CPS1	May cause an increased risk of severe adverse drug reaction. Avoid use	Ref 20
RefVenlafaxine	CYP2D6	Select alternative drug not predominantly metabolized by CYP2D6 (e.g., escitalopram) or reduce the dose and monitor patient's plasma metabolite level.	DPWG
Vortioxetine	CYP2D6	Greater risk of higher systemic concentrations. The maximum recommended dose is 10 mg/d.	FDA
Warfarin	VKORC1, CYP2C9,	Calculate warfarin dose using a validated pharmacogenetic algorithm (e.g., <a href="http://warfarindosing.org">http://warfarindosing.org</a> ).	CPIC
	CYP4F2	May require a 5 - 10% increase in dose among individuals of European ancestry	

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## PATIENT GENETICS

Gene	Genotype	Phenotype
ABCB1		A/A, A/A, A/A Normal Function
ADRA2A	rs1800544	C/C Decreased Function
BDNF		C/C Normal Function
CACNA1C		G/G, G/G Normal Function
COMT	rs4680	A/A Decreased Function
CPS1		T/T Normal Function
CYP1A2		*1/*1 Normal Function
CYP2B6		*1/*1 Normal Function
CYP2C9		*1/*1 Normal Function
CYP2C19		*1/*1 Normal Function
CYP2D6	rs1135840, rs16947	2N *1/*2 Increased Function
CYP3A4		*1/*1 Normal Function
CYP3A5		*1/*1 Normal Function
CYP4F2		*1/*1 Normal Function
DRD2		T/T Normal Function
GRIK1		C/C Normal Function
GRIK4	rs1954787	C/C Increased Function
HLA-A	rs1061235	*31:01 Increased Risk
HLA-B	rs10484555, rs144012689	*15:02 Increased Risk
HTR2A		C/C, G/G, C/C, C/C, G/G, G/G Normal Function
HTR2C		C/C, C/C Normal Function
MC4R		C/C Normal Function
OPRM1	rs1799971	G/G Decreased Function
SLCO1B1	rs4149056	*5/*5 Decreased Function
UGT1A1	rs35350960	*27/*27 Decreased Function
UGT2B15		*1/*1 Normal Function
VKORC1	rs9923231	*2/*2 Decreased Function

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## TEST PANEL INFORMATION

The PredictScript™ diagnostic assay is based on evidence from clinical trials and scientific literature. Detailed information about references is available upon request, and from [www.phenomicshealth.com/references](http://www.phenomicshealth.com/references). Results from studies of the genetic basis of drug response variation and adverse drug events have been examined in hundreds of thousands of curated patient samples and updated based on measures of scientific and clinical validity. In parallel, ongoing pharmacometabolomic analyses from the Company's proprietary PreciMed® diagnostic platform can help power improvements in accuracy and inform the validation of the PredictScript™ assay.

Primary information on single nucleotide polymorphisms (SNPs), copy number variants (CNVs), and other genome variants were referenced from clinical significance Reference SNP reports of the National Center for Biotechnology Information (NCBI), National Library of Medicine (NLM), and National Institutes of Health (NIH)<sup>9</sup>. These include results from the Human Genome Variation Society<sup>10</sup>, the reference genome browser of the University of California Santa Cruz<sup>11</sup>, and the Clinical Genome consortium<sup>5</sup>.

Genotypes specified by rsID numbers are informed by the NCBI of the NIH and, where applicable, star (\*) alleles as described on Phenomics Health Inc. web portal. All genotype data are translated from star allele nomenclature into rsID numbers, based on standards used in clinical genetics<sup>6,7</sup>. Star alleles are also provided to increase usability; however, star allele haplotypes and diplotypes were derived based on patients of European ancestry and may not be applicable to all patients. Assignment of variants to specific genes is provided for reference only, as polymorphisms located in a specified gene may not always be indicative of the function of the gene in which it is located.

The following genetic variants are evaluated in this test: CYP1A2 (rs762551, rs2069514, rs12720461, rs35694136, rs2069526, rs72547511, rs72547513, rs11631198, rs2093434, rs2470890, rs2134688, rs3818740); CYP2B6 (rs2279343, rs3745274, rs28399499, rs11083595, rs8109525, rs2054675); CYP2C9 (rs1799853, rs1057910, rs56165452, rs28371686, rs9332131, rs7900194, rs28371685, rs9332239); CYP2C19 (rs4244285, rs4986893, rs28399504, rs56337013, rs12248560, rs77957608, rs61886222); CYP2D6 (rs28371706, rs1065852, rs1135840, rs16947, rs3892097, rs769258, rs5030862, rs201377835, rs5030867, rs765776661, rs5030656, rs35742686, rs72549353, rs5030655, rs774671100, rs1080985, rs59421388, rs28371725); CYP3A4/CYP3A5 (rs2740574, rs35599367, rs776746, rs10264272, rs17161937, rs41303343); CYP4F2 (rs2108622); ABCB1 (rs1128503, rs2032582, rs1045642); ADRA2A (rs1800544); BDNF (rs6265); CACNA1C (rs3819536, rs2007004); COMT (rs4680); CPS1 (rs715); DRD2 (rs1799978); GRIK1 (rs2832407); GRIK4 (rs1954787, rs12800734); HLA-A (rs1116221, rs2523979, rs1061235); HLA-B (rs10484555, rs144012689); HTR2A (rs6311, rs6305, rs9316233, rs2770296, rs6313, rs6314); HTR2C (rs3813929, rs518147); MC4R (rs489693); OPRM1 (rs1799971); SLCO1B1 (rs4149056); UGT1A1 (rs4148323, rs35350960, rs887829); UGT2B15 (rs1902023); and VKORC1 (rs9923231).

This test does not provide medical advice and is not approved by the U.S. Food & Drug Administration (FDA). Information on pharmacogene variants specified by the FDA<sup>1,2</sup>, Clinical Pharmacogenetics Implementation Consortium (CPIC)<sup>3</sup>, and Dutch Pharmacogenetics Working Group (DPWG) of the European Medicines Agency<sup>4</sup>, including genes involved in absorption, distribution, metabolism, and excretion (ADME), are sourced from Sequence2Script<sup>12</sup>. Further information provided by this test may be based on Phenomics Health's interpretation of scientific literature and the pharmacokinetic and pharmacodynamic properties of drugs sourced outside of Sequence2Script. The information provided in this report is believed to be current, accurate, and consistent with available scientific literature and the described research. This information may not necessarily be clinically validated for any specific patient population. The pharmacogenomic technology and report is used to support clinical decisions. The healthcare professional directly managing the patient's care is responsible for all decisions made regarding said patient's care, including prescribing decisions made with consideration for the patient's genetic information.

This test was performed by a lab with CLIA #23D2194915 and approved by the Laboratory Director Srinivas Narayan, Ph.D.

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**PATIENT PHARMACOGENE CARD**



## Patient Pharmacogenomic Gene-Drug Interaction Card

Jane Doe

MAJOR GENE-DRUG INTERACTIONS

<p><b><u>Cardiometabolic and Gastrointestinal Agents</u></b></p> <ul style="list-style-type: none"> <li>Clopidogrel</li> <li>Lovastatin</li> <li>Mecizine</li> <li>Metoclopramide</li> <li>Omeprazole</li> <li>Pravastatin</li> <li>Repaglinide</li> <li>Timolol</li> </ul>	<p><b><u>Analgesics and Other CNS Agents</u></b></p> <ul style="list-style-type: none"> <li>Donepezil</li> <li>Codeine</li> <li>Tramadol</li> </ul>
<p><b><u>Antidepressants and Anxiolytics</u></b></p> <ul style="list-style-type: none"> <li>Amitriptyline</li> <li>Clomipramine</li> <li>Desipramine</li> <li>Vilazodone</li> </ul>	<p><b><u>Antipsychotics and Anticonvulsants</u></b></p> <ul style="list-style-type: none"> <li>Fosphenytoin</li> <li>Haloperidol</li> <li>Iloperidone</li> <li>Lamotrigine</li> <li>Ziprasidone</li> </ul>

FOR USE BY HEALTHCARE PROFESSIONALS ONLY

This card contains information about medications that should be avoided based on your genetics. This may help your healthcare provider make clinical decisions for your medication therapy to avoid certain gene-drug interactions.

Do NOT stop or change your medication or dosage without discussing with your healthcare provider

This test was developed and its performance characteristics determined by Phenomics Health Inc. It has not been cleared or approved by the FDA. The laboratory is regulated under CLIA as qualified to perform high-complexity testing. This test is used for clinical purposes, though results should not be intended for use as a sole means for a clinical diagnosis or patient management decisions. It should not be regarded as investigational or for research.