PATIENT INFORMATION	SPECIMEN DETAILS	PROVIDER INFORMATION
NAME : Sample Report,Comprehensive	**SPECIMEN TYPE**: Buccal Swab	**ORDERING PHYSCIAN**: Doctor Test
ACC # : 5678	**COLLECTION DATE:** 2/27/2024 12:34 PM	
DOB : 1/1/2001	**RECEIVED DATE:**	**PROVIDER**:
SEX :	**REPORT DATE :** 2/27/2024	

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 - Comprehensive Panel Report

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Current Patient Medications: All provided medications as of 2/27/2024

alprazolam (Xanax)	**alprazolam (Xanax) - Standard Precautions (CYP3A4: Normal Metabolizer, CYP3A5: Normal Metabolizer)**
atorvastatin (Lipitor, Caduet)	**atorvastatin (Lipitor, Caduet) - Standard Precautions (CYP3A4: Normal Metabolizer, CYP3A5: Normal Metabolizer, SLCO1B1: Normal Function)**
Suboxone (buprenorphine and naloxone)	**Suboxone (buprenorphine and naloxone) - Standard Precautions (CYP3A4: Normal Metabolizer, CYP3A5: Normal Metabolizer)**

*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.

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Condition Risk Factor

Antipsychotic-Induced Hyperprolactinemia, Tardive Dyskinesia, Weight Gain
ANKK1
A/G
Increased Risk of Addiction

This genotype is associated with mental illness and addictive behaviors. This genotype is associated with altered dopamine function and antipsychotic-induced weight gain.

Antipsychotic-Induced Hyperprolactinemia, Tardive Dyskinesia, Weight Gain
DRD2 (rs1799978)
C/C
Poor Responder

Schizophrenics with the CC genotype and are treated with risperidone may be less likely to have a clinical response as compared to patients with the TC or TT genotype.

Platelet Reactivity
ITGB3
C/T
Increased Risk of Cardiovascular Disease and Certain Cancers

Glycoprotein IIIa (GPIIIa) or the beta subunit of the platelet membrane adhesive protein receptor complex GP IIb/IIIa is coded by the ITGB3 gene, and is a surface protein found in various tissues, participating in cell-surface mediated signaling and cell adhesion. Patients with genotype have an increased risk of cardiovascular disease and certain cancers.

Type III Hyperlipoproteinemia
APOE
E2/E3
Normal Risk

Patient has APOE e2/e3 genotype, which is associated with lower LDL-C levels and a decreased risk of coronary heart disease compared to those with e3/e3 genotype.

Type III Hyperlipoproteinemia/Alzheimer's disease
APOE
E2/E3
Normal Risk

Patient has APOE e2/e3 genotype, which is associated with lower LDL-C levels and a decreased risk of coronary heart disease compared to those with e3/e3 genotype.

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 Leiden. Patients with this genotype (C/C) are associated with a normal risk of developing an abnormal blood clot.

Hyperhomocysteinemia - Thrombosis
MTHFR
CC-677/AA-1298
Normal Function

This genotype predicts normal 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. Normal ability to convert dietary folate into active methylfolate. This genotype is associated with normal plasma homocysteine levels and no homocysteine-related increased risk of premature cardiovascular disease.

Potentially Impacted Medications:

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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		glipizide (Glucotrol) glyburide (Diabeta) tolbutamide (Orinase) glimepiride (Amaryl)		
Anti-Infectives		clarithromycin (Biaxin) erythromycin (E-Mycin) indinavir (Crixivan) nelfinavir (Viracept) ritonavir (Norvir) saquinavir (Invirase) telithromycin (Ketek)	efavirenz (Sustiva)	
Cardiovascular	**Antianginal**	ranolazine (Ranexa)		
Cardiovascular	**Antihypertensive**	timolol (Blocadren) diltiazem (Cardizem) carvedilol (Coreg) felodipine (Plendil) propanolol (Inderal) lercanidipine (Zanidip) amlodipine (Norvasc) metoprolol (Lopressor, Toprol) nebivolol (Bystolic) nifedipine (Adalat, Procardia) nisoldipine (Sular) nitrendipine		
Cardiovascular	**Antiarrhythmic**	propafenone (Rythmol) amiodarone (Cordarone) dofetilide (Tikosyn) flecainide (Tambocor) quinidine (Various brands)		
Cardiovascular	**Cholesterol Lowering**	lovastatin (Mevacor) pravastatin (Pravachol) rosuvastatin (Crestor) simvastatin (Zocor) fluvastatin (Lescol) atorvastatin (Lipitor, Caduet)		
Cardiovascular	**Anticoagulant**	ticargelor (Brilinta) clopidogrel ++ (Plavix) rivaroxaban (Xarelto)	warfarin (Coumadin)	
Cholinesterase Inhibitors		Rivastigmine (Exelon) Galantamine (Razadyne, Reminyl) Donepezil (Aricept)		
Gastrointestinal		esomeprazole (Nexium) lansoprazole (Prevacid) omeprazole (Prilosec) pantoprazole (Protonix) rabeprazole (Aciphex)		

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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) zafirlukast (Accolate)		
Neuropsychiatric	**Antipsychotic**	thioridazine (Mellaril) ziprasidone (Geodon) Iloperidine (Fanapt) clozapine (Clozaril) promazine (Sparine) quetiapine (Seroquel) risperidone (Risperdal) perphenazine (Trilafon) Olanzapine [Zyprexa] aripiprazole (Abilify) asenapine (Saphris) chlorpromazine (Thorazine) lurasidone (Latuda) haloperidol (Haldol)		
Neuropsychiatric	**ADHD Drug / Stimulant**		atomoxetine (Strattera) amphetamine (Adderall) Dextroamphetamine	
Neuropsychiatric	**Anticonvulsant**	phenytoin (Dilantin) carbamazepine (Various brands) zonisamide (Zonegran)		
Neuropsychiatric	**Precognitive Drug**	tacrine (Cognex)		
Neuropsychiatric	**Anxiolytic**	midazolam (Versed) alprazolam (Xanax) buspirone (BuSpar) triazolam (Halcion) zolpidem (Ambien) phenobarbital diazepam (Valium)		
Neuropsychiatric	**Antidepressant**	amitriptyline (Elavil) mirtazapine (Remeron) nefazodone (Serzone) nortriptyline (Aventyl,Pamelor) Escitalopram [Lexapro] fluoxetine (Prozac) imipramine (Tofranil) citalopram (Celexa) clomipramine (Anafranil) desipramine (Norpramin) desvenlafaxine (Pristiq) paroxetine (Paxil) doxepin (Sinequan, Silenor, Prudoxin, Zonalon) trazodone (Oleptro) venlafaxine (Effexor) vilazodone (Viibryd)	sertraline (Zoloft) buproprion	

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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
Neuropsychiatric	**Pain Management**	duloxetine (Cymbalta) tiagabine (Gabitril)		
Oncology		docetaxel (Taxotere) vincristine (Vincasar, Oncovin)	ifosfamide	
Other		caffeine theophylline sildenafil (Viagra)		
Pain Management	**Neuropsychiatric**	Buprenorphine Suboxone (buprenorphine and naloxone)	methadone	
Pain Management		Dexlansoprazole alfentanil (Alfenta) carisoprodol++ (Soma) celecoxib (Celebrex) codeine++ cyclobenzaprine (Flexaril) fentanyl (Actiq, Duragesic, Sublimaze) hydrocodone++ ibuprofen (Advil, Motrin) lidocaine (xylocaine, various brands) naproxen (Aleve) oxycodone++ (Oxycontin) ropivacaine (Naropin) tapentadol (Nucynta) tizanidine (Zanaflex) tramadol++ (Ultram) zolmitriptan (Zomig)	meperidine (Demerol)	
Steroids		estradiol progesterone testosterone		

++ 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)

efavirenz (Sustiva)	**Potential risk (CYP3A4: Normal Metabolizer, CYP3A5: Normal Metabolizer, CYP2B6: Intermediate Metabolizer)**
ifosfamide	**Potential risk (CYP3A4: Normal Metabolizer, CYP3A5: Normal Metabolizer, CYP2B6: Intermediate Metabolizer)**
meperidine (Demerol)	**Potential risk (CYP3A4: Normal Metabolizer, CYP3A5: Normal Metabolizer, CYP2C19: Normal Metabolizer, CYP2B6: Intermediate Metabolizer, OPRM1: Normal Responder)**
methadone	**Potential risk (CYP3A4: Normal Metabolizer, CYP2D6: Normal Metabolizer, CYP3A5: Normal Metabolizer, CYP2C19: Normal Metabolizer, CYP2C9: Normal Metabolizer, CYP2B6: Intermediate Metabolizer, OPRM1: Normal Responder)**

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buproprion	**Potential risk (CYP2B6: Intermediate Metabolizer)**
sertraline (Zoloft)	**Potential risk (CYP3A4: Normal Metabolizer, CYP2D6: Normal Metabolizer, CYP3A5: Normal Metabolizer, CYP2C19: Normal Metabolizer, CYP2C9: Normal Metabolizer, CYP2B6: Intermediate Metabolizer)**
warfarin (Coumadin)	**Potential risk (CYP2C9: Normal Metabolizer, VKORC1: Low Sensitivity, CYP4F2: Normal Warfarin)**

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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
ANKK1 A/G	**Increased Risk of Addiction**	This genotype is associated with mental illness and addictive behaviors. This genotype is associated with altered dopamine function and antipsychotic-induced weight gain.
DRD2 (rs1799978) C/C	**Poor Responder**	Schizophrenics with the CC genotype and are treated with risperidone may be less likely to have a clinical response as compared to patients with the TC or TT genotype.
ITGB3 C/T	**Increased Risk of Cardiovascular Disease and Certain Cancers**	Glycoprotein IIIa (GPIIIa) or the beta subunit of the platelet membrane adhesive protein receptor complex GP IIb/IIIa is coded by the ITGB3 gene, and is a surface protein found in various tissues, participating in cell-surface mediated signaling and cell adhesion. Patients with genotype have an increased risk of cardiovascular disease and certain cancers.

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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
ABCB1 A/G	**Intermediate Activity**	The ABCB1 gene encodes for P-glycoprotein, an efflux pump that removes both endogenous and exogenous molecules from the interior of the cell by pumping them outside of the cell. The P-GP pump, also called the multi-drug resistance pump, is found in the intestinal epithelium, the kidneys, and the liver, and is a major contributor to the blood brain barrier. Intermediate P-GP activity results in lower than normal intracellular concentrations of molecules that are its substrates and can affect drug response and toxicity.
ABCG2 G/G	**Impaired Function**	ATP-binding cassette subfamily G2 (ABCG2) encodes breast cancer resistance protein (BCRP), which is an active efflux transporter of xenobiotics and therapeutic agents. This genotype is associated with impaired transporter function which can lead to decreased drug clearance leading to drug accumulation and potential dose-related adverse effects. Drugs affected by ABCG2 include gefitinib, imatinib, rosuvastatin, and fluvastatin.
ADRA2A (rs1800544) C/C	**Decreased Response**	Patients with this genotype show decreased clinical response to methylphenidate in treatment of ADHD than those carrying the G allele. Adverse side effects such as increased blood pressure may be greater in these patients as compared to those carrying a copy of the G allele.
COMT A/G	**Decreased Activity**	This genotype is associated with a decrease in COMT activity. Patient may have increased sensitivity to stimulant medications and other drugs that affect norepinephrine and dopamine release. Lower doses of these medications should be tried upon initiation of therapy.
CYP2B6 *1/*6	**Intermediate Metabolizer**	The patient is an intermediate metabolizer (IM). A less than normal rate of metabolic enzyme activity is anticipated. Potential for adverse drug reaction exist. Please consult drug labeling for further dosing guidance.
CYP2C8 *1/*1	**Variable Metabolizer**	This genotype predicts substrate-dependent metabolic enzyme activity for the enzyme controlled by this gene. For some drugs such as paclitaxel and ibuprofen, metabolic activity is decreased resulting in increased potential for drug accumulation and adverse drug reactions. For some drugs such as pioglitazone and rosiglitazone, metabolic activity is increased, resulting in decreased drug exposure and decreased clinical effectiveness.
EPHX1 T/C	**Intermediate Metabolizer**	Subjects with this genotype may have decreased EPHX1 metabolic activity as compared to subjects with the TT genotype. Patients with the TC genotype and Epilepsy may require a decreased dose of carbamazepine as compared to patients with the the CC genotype. Patients with the TC genotype and ovarian cancer who are treated with chemotherapy involving cisplatin and cyclophosphamide may have an increased risk of grade 1-4 nephrotoxicity as compared to patients with the TT genotype. Other genetic and clinical factors may also influence metabolism.
GRIK4 C/T	**Intermediate Responder**	Patients with the CT genotype may have an increased clinical response to citalopram, and possibly other SSRIs, as compared to patients with TT gentotypes.

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HTR2C (rs3813929) C/C	**Increased Risk**	Patients with this genotype who are treated with atypical antipsychotics may have a increased risk of developing metabolic syndrome as compared to patients lacking a C allele. Other genetic and clinical factors may also influence a patient's risk for developing metabolic syndrome.
VKORC1 C/C	**Low Sensitivity**	Higher warfarin doses may be required to produce the desired anticoagulant effect. Excessive anticoagulant activity is associated with an increased risk of serious bleeding.

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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
APOE E2/E3	**Normal Risk**	This diplotype is not associated with a significantly increased risk of cardiovascular disease.
CYP1A2 *1A/*1L	**Normal Metabolizer**	This genotype predicts normal metabolic activity for the enzyme controlled by this gene.
CYP2C19 *1/*1	**Normal Metabolizer**	This genotype predicts normal metabolic activity for the enzyme controlled by this gene.
CYP2C9 *1/*1	**Normal Metabolizer**	This genotype predicts normal metabolic activity for the enzyme controlled by this gene.
CYP2D6 *1x2/*29	**Normal Metabolizer**	This genotype predicts normal metabolic activity for the enzyme controlled by this gene.
CYP3A4 *1/*1A	**Normal Metabolizer**	The expected metabolic activities for the enzymes controlled by these genes are shown at left. CYP3A4 and CYP3A5 are so similar that they generally affect the same drugs. If you are normal for one of these genes, then you can expect to metabolize these drugs normally. If you are impaired for both of these genes, then there is increased potential for drug accumulation and adverse drug reactions.
CYP3A5 *1/*1	**Normal Metabolizer**	The expected metabolic activities for the enzymes controlled by these genes are shown at left. CYP3A4 and CYP3A5 are so similar that they generally affect the same drugs. If you are normal for one of these genes, then you can expect to metabolize these drugs normally. If you are impaired for both of these genes, then there is increased potential for drug accumulation and adverse drug reactions.
CYP4F2 C/C	**Normal Warfarin**	This genotype is not associated with the need for higher warfarin doses to achieve therapeutic level of anticoagulation.
DPYD DPYD: *1/*1 HapB3: C/C rs67376798: T/T rs115232898: G/G	**Normal Metabolizer**	The fluoropyrimidine anticancer drug 5-fluorouracil (5-FU) and its oral prodrug capecitabine are frequently used in the treat- ment 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 genotype associated with normal activity for the DPD enzyme.
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.
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.
HTR2A (rs6311) A/G	**Decreased Toxicity**	Patients with this phenotype are less likely to have adverse drug effects related SSRI therapy and less likely to have antipsychotic-related tardive dyskinesia as compared to paients carrying a copy of the T allele.

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HTR2A (rs7997012) G/G	**Increased Response**	Patients with this phenotype may have an increased response to antidepressants as compared to patients with the AA genotype. Patients with this phenotype are also less likely to have adverse drug reactions to olanzapine therapy than carriers of the G allele.
HTR2C (rs1414334) G/G	**Decreased Risk**	Patients with this genotype who are treated with atypical antipsychotics may have a decreased, but not absent, risk of developing metabolic syndrome as compared to patients with the carrying the C allele. Other genetic and clinical factors may also influence a patient's risk for developing metabolic syndrome.
MTHFR CC-677/AA-1298	**Normal Function**	This genotype predicts normal 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. Normal ability to convert dietary folate into active methylfolate. This genotype is associated with normal plasma homocysteine levels and no homocysteine-related increased risk of premature cardiovascular disease.
NUDT15 *1/*1	**Normal Activity**	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.
OPRM1 A/A	**Normal Responder**	Normal opiate receptor function expected. Morphine and other active opiates (e.g., oxymorphone, fentanyl) should produce a usual analgesic response.
SLCO1B1 *1A/*1A	**Normal Function**	No increased risk of statin-induced myopathy expected at low to moderate doses.
TPMT *1/*1	**Normal Metabolizer**	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 normal thiopurine exposure and the usual risk of thiopurine-induced myelosuppression. Dose as directed.

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SUMMARY OF YOUR UNDEFINED RISK GENES

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

Undefined Risk Genes

Gene (Genotype)	Phenotype (Gene expression)	What it means
C11orf65 (rs11212617) A/C	**Enhanced Response**	Somewhat increased likelihood of treatment success with metformin.

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DETAILED EXPLAINATION OF YOUR CYP2D6 GENE

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

Normal Risk

Gene (Genotype	Phenotype (Gene expression)	What it means
CYP2D6 *1x2/*29	**Normal Metabolizer**	This genotype predicts normal metabolic activity for the enzyme controlled by this gene.

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), propanolol (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)

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DETAILED EXPLAINATION OF YOUR CYP3A4 and CYP3A5 GENE

The following is a detailed explaination of your CYP3A4 and CYP3A5 gene, inclusing your genotype, phenotype, and a common medicines metabolized by the gene.

Normal Risk (CYP3A4) **Normal Risk (CYP3A5)**

Gene	Phenotype (Gene expression)	What it means
CYP3A4 *1/*1A	**Normal Metabolizer**	The expected metabolic activities for the enzymes controlled by these genes are shown at left. CYP3A4 and CYP3A5 are so similar that they generally affect the same drugs. If you are normal for one of these genes, then you can expect to metabolize these drugs normally. If you are impaired for both of these genes, then there is increased potential for drug accumulation and adverse drug reactions.
CYP3A5 *1/*1	**Normal Metabolizer**	The expected metabolic activities for the enzymes controlled by these genes are shown at left. CYP3A4 and CYP3A5 are so similar that they generally affect the same drugs. If you are normal for one of these genes, then you can expect to metabolize these drugs normally. If you are impaired for both of these genes, then there is increased potential for drug accumulation and adverse drug reactions.

Common Medicines Metabolized by CYP3A4 and CYP3A5

Drug Type	Generic Name (Brand Name)
Antidiabetic	glipizide (Glucotrol) *, glyburide (Diabeta)
Anti-Infective	clarithromycin (Biaxin), efavirenz (Sustiva), erythromycin (E-Mycin), indinavir (Crixivan), nelnavir (Viracept), ritonavir (Norvir), saquinavir (Invirase), telithromycin (Ketek)
Cardiovascular	amiodarone (Cordarone), amlodipine (Norvasc), atorvastatin (Lipitor, Caduet), carvedilol (Coreg) *, clopidogrel (Plavix) *, diltiazem (Cardizem), dofetalide (Tikosyn), felodipine (Plendil), fluvastatin (Lescol) *, lercanidipine (Zanidip), losartan (Cozaar), lovastatin (Mevacor), nifedipine (Adalat, Procardia), nisoldipine (Sular), nitrendipine, propafenone (Rythmol), quinidine (Various brands), ranolazine (Ranexa), rivaroxaban (Xarelto), simvastatin (Zocor), ticagreglor (Brilinta)
Gastrointestinal	esomeprazole (Nexium), lansoprazole (Prevacid), omeprazole (Prilosec) *, pantoprazole (Protonix) *, rabeprazole (Aciphex)
Hormonal / Endocrine	estradiol, hydrocortisone, progesterone, testosterone
Impotence	sildenafil (Viagra)
Immunosuppressant	cyclosporine (Gengraf), tacrolimus (Prograf)
Immunomodulation	cyclophosphamide (Cytoxan) *, ifosfamide, zafirlukast (Accolate) *
Neuropsychiatric	alprazolam (Xanax), amphetamine (Adderall) *, aripiprazole (Abilify), atomoxetine (Strattera) *, buspirone (Buspar), carbamazepine (Tegretol, Various brands), chlorpromazine (Thorazine) *, citalopram (Celexa) *, clomipramine (Anafranil) *, clozapine (Clozaril) *, desvenlafaxine (Pristiq), diazepam (Valium), escitalopram (Lexapro) *, fluoxetine (Prozac) *, haloperidol (Haldol), iloperidone (Fanapt), lurasidone (Latuda), midazolam (Versed), mirtazapine (Remeron), nefazodone (Serzone), paroxetine (Paxil) *, perphenazine (Trilafon), phenytoin (Dilantin) *, promazine (Sparine), quetiapine (Seroquel), sertraline (Zoloft) *, thioridazine (Mellaril), tiagabine (Gabitril), trazodone (Oleptro), triazolam (Halcion), venlafaxine (Effexor) *, vilazodone (Viibryd), ziprasidone (Geodon), zolpidem (Ambien), zonisamide (Zonegran)
Oncological	docetaxel (Taxotere), tamoxifen (Nolvades) *, vincristine (Vincasar, Oncovin)

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Pain	alfentanil (Alfenta), codeine *, cyclobenzaprine (Flexeril), fentanyl (Actiq, Duragesic, Sublimaze), hydrocodone *, ibuprofen *, lidocaine (xylocaine, various) *, meperidine (Demerol), methadone, oxycodone (Oxycontin), ropivacaine (Naropin) *, tizanidine (Zanaflex) *, 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 EXPLAINATION OF YOUR CYP2C9 GENE

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

Normal Risk

Gene	Phenotype (Gene expression)	What it means
CYP2C9 *1/*1	**Normal Metabolizer**	This genotype predicts normal metabolic activity for the enzyme controlled by this gene.

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)

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PATIENT INFORMATION
NAME : Sample Report,Comprehensive
ACC # : 5678
DOB : 1/1/2001
SEX :

DETAILED EXPLAINATION OF YOUR CYP1A2 GENE

The following is a detailed explaination of your CYP1A2 gene, inclusing your genotype, phenotype, and a common medicines metabolized by the gene.

Normal Risk

Gene	Phenotype (Gene expression)	What it means
CYP1A2 *1A/*1L	**Normal Metabolizer**	This genotype predicts normal metabolic activity for the enzyme controlled by this gene.

Common Medicines Metabolized by CYP1A2

Drug Type	Generic Name (Brand Name)
Miscellaneous	caffeine, carvedilol (Coreg) *, clopidogrel (Plavix) *, estradiol, propranolol (Inderal), ritonavir (Norvir) *, theophylline
Neuropsychiatric	amphetamine (Adderall) *, asenapine (Saphris), clomipramine (Anafranil) *, clozapine (Clozaril), duloxetine (Cymbalta), mirtazapine (Remeron, olanzapine (Zyprexa), paroxetine (Paxil) *, perphenazine (Trilafon) *, promazine (Sparine) tacrine, (Cognex) tiagabine (Gabitril) *, thioridazine (Mellaril), ziprasidone (Geodon) *
Pain and Local Anesthetics	cyclobenzaprine (Flexeril), naproxen (Aleve), tizanidine (Zanaflex), zolmitriptan (Zomig), lidocaine (xylocaine, various brands), ropivacaine (Naropin)

++ 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)

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PATIENT INFORMATION
NAME : Sample Report,Comprehensive
ACC # : 5678
DOB : 1/1/2001
SEX :

DETAILED EXPLAINATION OF YOUR CYP2C19 GENE

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

Normal Risk

Gene	Phenotype (Gene expression)	What it means
CYP2C19 *1/*1	**Normal Metabolizer**	This genotype predicts normal metabolic activity for the enzyme controlled by this gene.

Common Medicines Metabolized by CYP2C19

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 (Analafril) *, 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)

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PATIENT INFORMATION
NAME : Sample Report,Comprehensive
ACC # : 5678
DOB : 1/1/2001
SEX :

DETAILED EXPLAINATION OF YOUR CYP2B6 GENE

The following is a detailed explaination of your CYP2B6 gene, inclusing your genotype, phenotype, and a common medicines metabolized by the gene.

Increased Risk

Gene	Phenotype (Gene expression)	What it means
CYP2B6 *1/*6	**Intermediate Metabolizer**	The patient is an intermediate metabolizer (IM). A less than normal rate of metabolic enzyme activity is anticipated. Potential for adverse drug reaction exist. Please consult drug labeling for further dosing guidance.

Common Medicines Metabolized by CYP2B6

Drug Type	Generic Name (Brand Name)
Miscellaneous	bupropion, clopidogrel (Plavix) *, cyclophosphamide (Cytoxan)++, efavirenz (Sustiva), ibuprofen (Advil, Motrin) *, ifosfamide meperidine, methadone (Demerol) , sertraline (Zoloft), 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)

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PATIENT INFORMATION
NAME : Sample Report,Comprehensive
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DOB : 1/1/2001
SEX :

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

ABCB1:	
ABCG2:	
ADRA2A (rs1800544):	
ANKK1:	A, G
APOE:	E1, E2, E3, E4
C11orf65 (rs11212617):	
COMT:	A, G
CYP1A2:	*1A, *1C, *1D, *1E, *1F, *1J, *1K, *1L, *1V, *1W
CYP2B6:	*1, *5, *7, *9, *18, *22
CYP2C19:	*1, *2, *3, *4, *5, *6, *7, *8, *9, *10, *17
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
CYP3A4:	*1, *2, *3, *12, *17, *22
CYP3A5:	*1, *2, *3, *3B, *6, *7, *8, *9
CYP4F2:	
DPYD:	
DRD2 (rs1799978):	
EPHX1:	
Factor II:	A, G
Factor V Leiden:	C, T
GRIK4:	
HTR2A (rs6311):	
HTR2A (rs7997012):	
HTR2C (rs1414334):	
HTR2C (rs3813929):	
ITGB3:	
MTHFR:	A1298C, C677T
NUDT15:	
OPRM1:	A, G
SLCO1B1:	*1A, *5
TPMT:	
VKORC1:	C, T

FINAL REPORT REVIEWED AND RELEASED BY:

Omni Health Diagnostics
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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.

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PATIENT INFORMATION CARD

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

Patient: Sample Report,Comprehensive
DOB: 1/1/2001
Requisition ID 5678

Pharmacogenetic Test Summary

ABCG2	/	Impaired Function
APOE	E2/E3	Normal Risk
CYP1A2	*1A/*1L	Normal Metabolizer
CYP2C19	*1/*1	Normal Metabolizer
CYP2C9	*1/*1	Normal Metabolizer
CYP3A4	*1/*1A	Normal Metabolizer
CYP4F2	/	Normal Warfarin
DRD2 (rs1799978)	C/C	Poor Responder
Factor II	G/G	Normal Risk
GRIK4	C/T	Intermediate Responder
HTR2A (rs7997012)	G/G	Increased Response
HTR2C (rs3813929)	C/C	Increased Risk
MTHFR	CC-677/AA-1298	Normal Function
OPRM1	A/A	Normal Responder
TPMT	*1/*1	Normal Metabolizer
ABCB1	A/G	Intermediate Activity
C11orf65 (rs11212617)	A/C	Enhanced Response
ANKK1	A/G	Increased Risk of Addiction
COMT	A/G	Decreased Activity
CYP2B6	*1/*6	Intermediate Metabolizer
CYP2C8	/	Variable Metabolizer
CYP2D6	/	Normal Metabolizer
CYP3A5	*1/*1	Normal Metabolizer
DPYD	G/G	Normal Metabolizer
EPHX1	T/C	Intermediate Metabolizer
Factor V Leiden	C/C	Normal Risk
HTR2A (rs6311)	/	Decreased Toxicity
HTR2C (rs1414334)	G/G	Decreased Risk
ITGB3	C/T	Increased Risk of Cardiovascular Disease and Certain Cancers
NUDT15	*1/*1	Normal Activity
SLCO1B1	*1A/*1A	Normal Function
VKORC1	C/C	Low Sensitivity
ADRA2A (rs1800544)	C/C	Decreased Response

Fold

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