

A better path forward

Genomind Pharmacogenetic Report

Patient:	Test Patient	Sample ID:	7524640209
Patient DOB:	12/25/1985	Accession ID:	250750
Ordering Clinician:	Genomind Clinician	Sample Collection Date:	3/19/2023
Sample Type:	Buccal	Sample Received Date:	3/20/2023
Assay Ordered:	Genomind PGx (v3.2)	Report Date:	4/19/2023 3:19 PM

Electronically Signed By
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The Genomind PGx Report is intended to provide genetic information to healthcare professionals which may aid in the prescribing of medications for individuals with mental illness and associated comorbidities.*

Personalized Consultation Available for Clinicians

A complimentary consultation, performed by our expert psychopharmacologists, is included with all Genomind PGx Reports. Consultations can be scheduled directly from the [Genomind Precision Health Platform](#).

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*Disclaimer: This report is designed to be adjunctive to a complete patient assessment, including but not limited to proper diagnosis, clinical history, assessment of concomitant co-morbidities and medications, family history, and other factors. Prescribers should be familiar with the approved indications, warnings, precautions, and other sections of the drug manufacturer's prescribing information, as well as relevant clinical practice guidelines. Prescribers should not rely solely on this report in making prescribing decisions. The understanding of the relationship between specific genes and pharmacokinetics or pharmacodynamics changes periodically, and this report will not be updated to reflect new findings. For more information on gene-drug associations, please reference PharmGKB, CPIC, PharmVar or the FDA Table of Pharmacogenetic Associations or Pharmacogenomic Biomarkers.

Gene Results Overview

Pharmacokinetic Genes (Drug Metabolism / Drug Absorption)	Gene	Genotype	Phenotype	Impact
	ABCB1	A/A	NF	Normal exposure is expected
	ABCB1 C3435T	G/G	NF	Normal exposure is expected
	ABCG2	T/T	PF	Increased exposure to certain medications
	CYP1A2	*1B/H7	NM	Normal metabolism is expected
	CYP2B6	*1/*1	NM	Normal metabolism is expected
	CYP2C19	*2/*3	PM	Risk of increased (↑) drug levels
	CYP2C9	*1/*3	IM	Risk of increased (↑) drug levels
	CYP2D6	*1/*1	NM	Normal metabolism is expected
	CYP3A4/5	*1/*1, *3/*3	NA	Normal metabolism is expected
	SLCO1B1	*1/*1	NF	Normal exposure is expected
	UGT1A4	*1a/*3b	UM	Risk of decreased (↓) drug levels
	UGT2B15	*1/*2	NM	Normal metabolism is expected

Pharmacodynamic Genes (Drug Targets / Mechanisms)	Antidepressant Response		
	Gene	Result	Result
	BDNF	Val/Met	More pronounced effect to exercise; Possible higher odds of response to SNRIs
	HTR2A	G/G	No known significant clinical impact
	MTHFR	C677T: C/T A1298C: A/C	Reduced MTHFR activity and methylfolate production
	SLC6A4	L(A)/S	Higher odds of gastrointestinal side effects with SSRIs in individuals of European descent
	Attention-deficit/hyperactivity disorder Response		
	Gene	Result	Result
	ADRA2A	C/C	Lower odds of response to methylphenidate for inattentive symptoms of ADHD
	COMT	Val/Met	No known significant clinical impact
	Antipsychotic Response and Tolerability		
	Gene	Result	Result
	DRD2	C/C	No known significant clinical impact
	HTR2C	C/C	No known significant clinical impact
	MC4R	A/A	Higher risk of weight gain with certain 2nd generation antipsychotics
	Other		
	Gene	Result	Result
	ANK3	C/C	No known significant clinical impact
	CACNA1C	G/G	No known significant clinical impact
	GRIK1	A/A	No known significant clinical impact
	HLA-A *31:01	Positive	Higher risk of skin reactions with carbamazepine
	HLA-B *15:02	Negative	No known significant clinical impact
	OPRM1	A/A	No known significant clinical impact

Gene-Drug Associations

Class	Medication	Pharmacogenetic Associations	Drug Level	Pharmacokinetics
ANTIDEPRESSANTS				
SSRIs	Citalopram (Celexa®)	 Monitor for gastrointestinal side effects in individuals of European descent (SLC6A4) CPIC Consider alternative or 50% reduction in maintenance dose. DPWG Up to 65 years old: Max dose is 20 mg/day. 65 years or older: Max dose is 10 mg/day.		2C19 , ABCB1
	Escitalopram (Lexapro®)	 Monitor for gastrointestinal side effects in individuals of European descent (SLC6A4) CPIC Consider alternative or 50% reduction in maintenance dose. DPWG Up to 65 years old: Max dose is 10 mg/day. 65 years and older: Max dose is 5 mg/day.		2C19 , ABCB1
	Fluoxetine (Prozac®)	 Monitor for gastrointestinal side effects in individuals of European descent (SLC6A4)		2D6, 2C9
	Fluvoxamine (Luvox®)	 Monitor for gastrointestinal side effects in individuals of European descent (SLC6A4)		2D6, 1A2, ABCB1
	Paroxetine (Paxil®)	 Monitor for gastrointestinal side effects in individuals of European descent (SLC6A4)		2D6, ABCB1
	Sertraline (Zoloft®)	 Monitor for gastrointestinal side effects in individuals of European descent (SLC6A4) CPIC Consider a lower starting dose, slower titration, and 50% lower maintenance dose or select alternative. DPWG Max dose: 75 mg/day		2C19 , 2B6, ABCB1
SNRIs	Desvenlafaxine (Pristiq®)			
	Duloxetine (Cymbalta®)			1A2, 2D6
	Levomilnacipran (Fetzima®)			3A4/5
	Venlafaxine (Effexor®)			2D6, 2C19 , 3A4/5, ABCB1



Alert/Caution



PGx Guided Options



Reduced Drug Exposure with 1A2 Inducers



Do Not Initiate



See Gene-Drug Association footnotes for more information

Gene-Drug Associations

Class	Medication	Pharmacogenetic Associations	Drug Level	Pharmacokinetics
ANTIDEPRESSANTS				
Other	Bupropion (Wellbutrin®)			2B6
	Dextromethorphan/Bupropion (Auvelity®)			2B6, 2D6, 3A4/5
	Esketamine (Spravato®)			2B6
	Mirtazapine (Remeron®)			2D6, 3A4/5, 1A2
	Nefazodone			3A4/5
	Trazodone (Desyrel®, Oleptro®)			3A4/5, 2D6
	Vilazodone (Viibryd®)			3A4/5
TCAs	Vortioxetine (Trintellix®)			2D6, 3A4/5
	Amitriptyline (Elavil®)	CPIC Avoid use. If use warranted, consider 50% reduction of standard starting dose.		2D6, <u>2C19</u> , ABCB1
	Clomipramine (Anafranil®)	CPIC Avoid use. If use warranted, consider 50% reduction of standard starting dose.		2D6, 1A2, <u>2C19</u>
	Desipramine (Norpramin®)			2D6
	Doxepin (Sinequan®)	CPIC Avoid use. If use warranted, consider 50% reduction of standard starting dose.		2D6, <u>2C19</u>
	Imipramine (Tofranil®)	CPIC Avoid use. If use warranted, consider 50% reduction of standard starting dose.		2D6, <u>2C19</u>
	Nortriptyline (Pamelor®)			2D6, ABCB1
MAOIs	Trimipramine (Surmontil®)	CPIC Avoid use. If use warranted, consider 50% reduction of standard starting dose.		2D6, <u>2C19</u> , ABCB1
	Phenelzine (Nardil®)			
	Selegiline (Eldepryl®, Emsam®)			2B6
	Tranylcypromine (Parnate®)			



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Reduced Drug Exposure with 1A2 Inducers



Do Not Initiate



See Gene-Drug Association footnotes for more information

Gene-Drug Associations

Class	Medication	Pharmacogenetic Associations	Drug Level	Pharmacokinetics
MOOD STABILIZERS/ANTICONVULSANTS				
	Carbamazepine (Equetro®, Tegretol®)	 Do not initiate therapy: Higher risk of drug induced skin reactions (HLA-A *31:01) CPIC		3A4/5
	Gabapentin (Neurontin®)			
	Lamotrigine (Lamictal®)			<u>UGT1A4, ABCG2</u>
	Lithium (Lithobid®, Eskalith®)			
	Oxcarbazepine (Trileptal®, Oxtellar®)			
	Pregabalin (Lyrica®)			
	Topiramate (Topamax®)			ABCB1
	Valproate (Depakote®, Depakene®)			<u>2C9</u>



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Reduced Drug Exposure with 1A2 Inducers



Do Not Initiate



See Gene-Drug Association footnotes for more information

Gene-Drug Associations

Class	Medication	Pharmacogenetic Associations	Drug Level	Pharmacokinetics
ANTIPSYCHOTICS				
2nd Generation Antipsychotics	Aripiprazole (Abilify®)	 Higher risk of weight gain (MC4R)		2D6, 3A4/5, ABCB1
	Asenapine (Saphris®)			1A2, UGT1A4
	Brexiprazole (Rexulti®)	 Higher risk of weight gain (MC4R)		2D6, 3A4/5
	Cariprazine (Vraylar®)			3A4/5
	Clozapine (Clozaril®)	 Higher risk of weight gain (MC4R)		1A2, 2D6, ABCB1
	Iloperidone (Fanapt®)	 Higher risk of weight gain (MC4R)		2D6, 3A4/5
	Lumateperone (Caplyta®)			3A4/5
	Lurasidone (Latuda®)			3A4/5
	Olanzapine (Zyprexa®)	 Higher risk of weight gain (MC4R)		1A2, ABCB1
	Olanzapine/Samidorphan (Lybalvi®)	 Higher risk of weight gain (MC4R)		1A2, 3A4/5, ABCB1
	Paliperidone (Invega®)	 Higher risk of weight gain (MC4R)		
	Pimavanserin (Nuplazid®)			3A4/5
	Quetiapine (Seroquel®)	 Higher risk of weight gain (MC4R)		3A4/5
	Risperidone (Risperdal®)	 Higher risk of weight gain (MC4R)		2D6, 3A4/5, ABCB1
	Ziprasidone (Geodon®)			3A4/5



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Reduced Drug Exposure with 1A2 Inducers



Do Not Initiate



See Gene-Drug Association footnotes for more information

Gene-Drug Associations

Class	Medication	Pharmacogenetic Associations	Drug Level	Pharmacokinetics
ANTIPSYCHOTICS				
1st Generation Antipsychotics	Chlorpromazine (Thorazine®)			2D6
	Fluphenazine (Prolixin®)			2D6
	Haloperidol (Haldol®)			2D6, 3A4/5
	Loxapine (Adasuve®, Loxitane®)			
	Perphenazine (Trilafon®)			1A2, 2D6
	Pimozide (Orap®)			2D6, 3A4/5
	Thioridazine (Mellaril®)			2D6
	Thiothixene (Navane®)			1A2
	Trifluoperazine (Stelazine®)		↓	1A2, <u>UGT1A4</u>
ANXIOLYTICS				
	Alprazolam (Xanax®)			3A4/5
	Buspirone (Buspar®)			3A4/5
	Chlordiazepoxide (Librium®)			3A4/5, UGT2B15
	Clonazepam (Klonopin®)			3A4/5
	Diazepam (Valium®)		↑	<u>2C19</u> , 3A4/5, UGT2B15
	Hydroxyzine (Vistaril®)			
	Lorazepam (Ativan®)			UGT2B15
	Oxazepam (Serax®)			UGT2B15
	Temazepam (Restoril®)			UGT2B15



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Reduced Drug Exposure with 1A2 Inducers



Do Not Initiate



See Gene-Drug Association footnotes for more information

Gene-Drug Associations

Class	Medication	Pharmacogenetic Associations	Drug Level	Pharmacokinetics
ADHD MEDICATIONS				
Dopaminergic Stimulants	Amphetamine-Dextroamphetamine (Adderall®, Evekeo®)			2D6
	Dexmethylphenidate (Focalin®)	 Moderately lower odds of response (ADRA2A)		
	Dextroamphetamine (Dexedrine®)			2D6
	Lisdexamfetamine (Vyvanse®)			2D6
	Methylphenidate (Ritalin®, Concerta®)	 Moderately lower odds of response (ADRA2A)		
Other	Atomoxetine (Strattera®)			2D6
	Clonidine (Kapvay®)			
	Guanfacine (Intuniv®)			3A4/5
	Viloxazine (Qelbree®)			2D6
SUPPLEMENTS				
	L-methylfolate (Deplin®)	 May benefit from methylfolate supplementation (MTHFR)		
SLEEP MODULATORS				
	Armodafinil (Nuvigil®)			3A4/5, ABCB1
	Daridorexant (Quviviq®)			3A4/5
	Eszopiclone (Lunesta®)			3A4/5
	Lemborexant (Dayvigo®)			3A4/5
	Modafinil (Provigil®)			3A4/5, ABCB1
	Ramelteon (Rozerem®)			1A2, 2C19 , 3A4/5
	Suvorexant (Belsomra®)			3A4/5
	Zaleplon (Sonata®)			3A4/5
	Zolpidem (Ambien®)			1A2, 3A4/5



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Reduced Drug Exposure with 1A2 Inducers



Do Not Initiate



See Gene-Drug Association footnotes for more information

Gene-Drug Associations

Class	Medication	Pharmacogenetic Associations	Drug Level	Pharmacokinetics
PAIN				
Non-opioid analgesics	Acetaminophen (Tylenol®)			UGT2B15
	Celecoxib (Celebrex®)	CPIC Initiate with lowest standard starting dose and titrate with caution.		2C9
	Diclofenac (Voltaren®, Cataflam®)			2C9
	Flurbiprofen (Ansaid®)	CPIC Initiate with lowest standard starting dose and titrate with caution.		2C9
	Ibuprofen (Advil®, Motrin®)	CPIC Initiate with lowest standard starting dose and titrate with caution.		2C9
	Ketorolac (Toradol®)			
	Meloxicam (Mobic®)	CPIC Initiate 50% of the lowest standard starting dose and titrate dose to clinical effect or 50% of max dose.		2C9
	Naproxen (Aleve®, Naprosyn®)			2C9
	Piroxicam (Feldene®)	CPIC Choose alternative not significantly impacted by CYP2C9.		2C9
Opioid analgesics	Alfentanil (Alfenta®)			3A4/5
	Codeine			2D6, ABCB1
	Fentanyl (Duragesic®)			3A4/5, ABCB1
	Hydrocodone			2D6, 3A4/5
	Hydromorphone (Dilaudid®)			
	Methadone (Methadose®)			2B6, 3A4/5
	Morphine (MS Contin®)			ABCB1
	Oxycodone (Oxycontin®)			2D6, 3A4/5, ABCB1
	Oxymorphone			
	Tapentadol (Nucynta®)			
	Tramadol (Ultram®)			2D6, 3A4/5, ABCB1



Alert/Caution



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Reduced Drug Exposure with 1A2 Inducers



Do Not Initiate



See Gene-Drug Association footnotes for more information

Gene-Drug Associations

Class	Medication	Pharmacogenetic Associations	Drug Level	Pharmacokinetics
MISCELLANEOUS				
	Buprenorphine (Butrans®)			3A4/5
	Buprenorphine/Naloxone (Suboxone®)			3A4/5
	Cannabidiol (CBD) (Epidiolex®)			3A4/5, 2C19
	Deutetrabenazine (Austedo®)			2D6
	Dextromethorphan/Quinidine (Nuedexta®)			2D6, 3A4/5, 2B6
	Naltrexone (Vivitrol®)			
	Phenytoin/Fosphenytoin (Dilantin®, Cerebyx®)	CPIC Use standard starting or loading dose. For subsequent doses, use around 25% less than standard maintenance dose.		2C19, 2C9 , ABCB1
	Valbenazine (Ingrezza®)			3A4/5, 2D6
STATINS				
	Atorvastatin (Lipitor®)			3A4/5, SLCO1B1, ABCB1, ABCG2
	Fluvastatin (Lescol®)	CPIC Use ≤ 40 mg/day as a starting dose and adjust doses based on disease-specific guidelines.		2C9 , SLCO1B1
	Lovastatin (Mevacor®)			3A4/5, SLCO1B1
	Pitavastatin (Livalo®)			SLCO1B1
	Pravastatin (Pravachol®)			SLCO1B1
	Rosuvastatin (Crestor®)	CPIC Use ≤ 20 mg as a starting dose and adjust doses based on disease-specific and specific population guidelines.		ABCG2 , SLCO1B1
	Simvastatin (Zocor®)			3A4/5, SLCO1B1



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Reduced Drug Exposure with 1A2 Inducers



Do Not Initiate



See Gene-Drug Association footnotes for more information

Gene-Drug Association Footnotes

[1] Multiple competing CYP450 genotypes may impact this drug. Refer to Genomind's Precision Medicine Software for a more complete evaluation of this gene-drug interaction

Risk for change in drug exposure:



Higher Risk



Moderate Risk



Lower Risk

References for the drug interaction summary are available upon request

Pharmacokinetic Gene Variations

Gene Results	THERAPEUTIC IMPLICATIONS	GUIDE	CLINICAL IMPACT
CYP2C9 IM <i>*1/*3</i> [Intermediate activity]	Intermediate metabolizer: Risk of elevated serum levels and drug interactions, or decreased production of active metabolites A dose adjustment or alternate therapy may be considered		May have altered blood levels with medications metabolized by CYP2C9
CYP2C19 PM <i>*2/*3</i> [Low activity]	Poor metabolizer: Risk of elevated serum levels and drug interactions, or decreased production of active metabolites A dose adjustment or alternate therapy may be considered		May have altered blood levels with medications metabolized by CYP2C19
UGT1A4 UM <i>*1a/*3b</i> [High activity]	Ultrarapid metabolizer: Risk of decreased serum levels, and possible adverse events associated with increased active metabolites A dose adjustment or alternate therapy may be considered		May have altered blood levels with medications metabolized by UGT1A4
ABCG2 PF T/T [Poor function]	ATP Binding Cassette G2 (ABCG2) codes for an efflux pump that normally regulates intestinal absorption and biliary excretion of some drugs. Variability in this efflux pump can impact the serum levels of several medications. - This genotype is associated with poor function of ABCG2 and increased serum levels of some medications - A dose adjustment or alternate therapy may be considered		Increased exposure to medications affected by ABCG2
CYP1A2 NM <i>*1B/H7</i> [Normal activity]	Variations in the CYP1A2 liver enzyme can result in altered drug metabolism and unexpected drug serum levels This genotype confers normal activity - Each of the CYP1A2 variants detected in this patient sample is well characterized, although this specific combination of alleles has not been formally named. We have adopted a modified (*)star allele naming system that identifies all the variants detected for this gene. (Adapted from Soyama et al 2005. PMID: 15770072; Gunes et al 2009. PMID: 19450128)		Normal metabolism is expected (other factors may influence metabolism)
CYP2B6 NM <i>*1/*1</i> [Normal activity]	Variations in the CYP2B6 liver enzyme can result in altered drug metabolism and unexpected drug serum levels This genotype confers normal activity		Normal metabolism is expected (other factors may influence metabolism)
CYP2D6 NM <i>*1/*1</i> [Normal activity]	Variations in the CYP2D6 liver enzyme can result in altered drug metabolism and unexpected drug serum levels This genotype confers normal activity		Normal metabolism is expected (other factors may influence metabolism)
CYP3A4 <i>*1/*1</i> CYP3A5 <i>*3/*3</i> [Normal activity]	Variations in the CYP3A4/5 liver enzymes can result in altered drug metabolism and unexpected drug serum levels 3A5 non-expresser - CYP3A activity is determined by the sum activity of the CYP3A family of genes; in adults the most influential are 3A4 and 3A5 This genotype confers normal activity		Normal metabolism is expected (other factors may influence metabolism)



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Pharmacokinetic Gene Variations

Gene Results	THERAPEUTIC IMPLICATIONS	GUIDE	CLINICAL IMPACT
UGT2B15 NM <i>*1/*2</i> [Normal activity]	<i>Variations in the UGT2B15 liver enzyme can result in altered drug metabolism and unexpected drug serum levels</i> This genotype confers normal activity		Normal metabolism is expected (other factors may influence metabolism)
ABCB1 (rs2032583) A/A [Normal function]	<i>ATP Binding Cassette B1 (ABCB1) encodes for an efflux pump that reduces the intestinal absorption and blood-brain barrier penetration of certain drugs</i> This genotype is associated with normal function of ABCB1 and normal drug absorption		Normal function is expected (other factors may influence drug exposure)
ABCB1 (rs1045642) G/G [Normal function]	<i>ATP Binding Cassette B1 (ABCB1) encodes for an efflux pump that reduces the intestinal absorption and blood-brain barrier penetration of certain drugs</i> This genotype is associated with normal function of ABCB1 and normal drug absorption		Normal function is expected (other factors may influence drug exposure)
SLCO1B1 NF <i>*1/*1</i> [Normal function]	<i>Solute Carrier Organic Anion Transporter 1B1 (SLCO1B1) codes for a transporter that normally facilitates hepatic uptake of several drugs. Variability in the function of this transporter can alter systemic concentrations of statins and other medications.</i> This genotype is associated with normal function of SLCO1B1 and normal hepatic uptake of statins and other medications		Normal function is expected (other factors may influence drug exposure)



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Pharmacodynamic Gene Variations

Gene Results	THERAPEUTIC IMPLICATIONS	GUIDE	CLINICAL IMPACT
BDNF Val/Met [Altered BDNF secretion]	<i>Brain-derived Neurotrophic Factor (BDNF) is a protein involved in neuronal development and neural plasticity</i> - Studies have shown that Met carriers of European descent with depression may have a poorer response to SSRIs and improved response to duloxetine, venlafaxine, and clomipramine; further studies need to confirm these findings - Exercise has been linked to improvements in cognition and stress response, with Met carriers showing a more pronounced response		Consider increased levels of physical activity/exercise if clinically appropriate SNRIs may be considered if clinically indicated
MTHFR C677T: C/T A1298C: A/C [~55% reduction]	<i>Methylenetetrahydrofolate Reductase (MTHFR) is an enzyme responsible for the conversion of folic acid to methylfolate, which is a cofactor needed for serotonin, norepinephrine and dopamine synthesis</i> - Risk for reduced MTHFR enzyme activity and reduced methylfolate production L-methylfolate supplementation of SSRIs and SNRIs may result in greater symptom reduction compared to SSRIs/SNRIs alone in major depressive disorder. BMI greater than or equal to 30 and/or high C-reactive protein (CRP) have been associated with greater response to adjunctive L-methylfolate in SSRI-resistant depression. - L-methylfolate may be an effective monotherapy for patients with major depressive disorder and MTHFR polymorphisms [B/C] [3]		L-methylfolate may be considered if clinically indicated
ADRA2A C/C [Decreased response]	<i>Alpha-2A Adrenergic Receptor (ADRA2A) is a receptor which plays an important role in norepinephrine signaling</i> - ADRA2A is involved in response to methylphenidate - This genotype is associated with a reduced response to methylphenidate for inattentive symptoms of ADHD in children and adolescents as compared to G allele carriers [4]		Assess alternatives to methylphenidate for ADHD if clinically appropriate
HLA-A *31:01 Positive [Increased risk of skin reactions]	<i>Major histocompatibility complex, class I, A (HLA-A) is part of a cluster of genes known as the Human Leukocyte Antigen complex</i> - Certain variants greatly increase risk of drug induced skin reactions including Stevens–Johnson syndrome/toxic epidermal necrolysis (SJS/TEN), drug reaction with eosinophilia and systemic symptoms (DRESS), and maculopapular exanthema (MPE) This genotype is associated with increased risk of skin reactions with carbamazepine [A] [1A]		Do not initiate carbamazepine
MC4R A/A [High weight gain risk]	<i>Melanocortin 4 Receptor (MC4R) is a receptor that plays a central role in the control of food intake</i> Risk of increased weight gain and metabolic changes with certain 2nd generation antipsychotics [C] [3] Higher risk: clozapine; olanzapine Medium risk: aripiprazole; brexpiprazole, iloperidone; paliperidone; olanzapine/samidorphan; quetiapine; risperidone Lower risk: asenapine; cariprazine; lumateperone; lurasidone; ziprasidone	 	Higher risk of weight gain and metabolic changes with various 2nd generation antipsychotics Anti-obesity interventions may be considered if clinically indicated
SLC6A4 L(A)/S [Intermediate activity]	<i>Serotonin Transporter (SLC6A4) is a synaptic transporter protein responsible for serotonin reuptake</i> In individuals of European descent, greater risk of side effects, particularly gastrointestinal side effects with SSRIs		Increased monitoring for adverse effects with SSRIs



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[A] [A/B] [B] [B/C] [C] [C/D] [D] CPIC® level of evidence

<https://cpicpgx.org/prioritization/#leveldef>

[1A] [1B] [2A] [2B] [3] [4] PharmGKB level of evidence

<https://www.pharmgkb.org/page/clinAnnLevels>

Pharmacodynamic Gene Variations

Gene Results	THERAPEUTIC IMPLICATIONS	GUIDE	CLINICAL IMPACT
HTR2A G/G [Normal response]	<i>Serotonin Receptor 2A (HTR2A) is a serotonin receptor which is a target for several serotonergic drugs</i> This genotype confers normal activity		No known significant clinical impact
COMT Val/Met [Normal activity]	<i>Catechol-O-Methyltransferase (COMT) is an enzyme responsible for breakdown of dopamine in the frontal cortex of the brain</i> - COMT is involved in response to stimulants This genotype confers normal activity		No known significant clinical impact
HLA-B *15:02 Negative [Normal]	<i>Major histocompatibility complex, class I, B (HLA-B) is part of a cluster of genes known as the Human Leukocyte Antigen complex</i> - Certain variants greatly increase risk of drug induced skin reactions This genotype is associated with normal risk of skin reactions with carbamazepine, oxcarbazepine, phenytoin, fosphenytoin and lamotrigine		Normal risk of skin reactions with carbamazepine, oxcarbazepine, phenytoin, fosphenytoin, and lamotrigine
DRD2 C/C [Normal activity]	<i>Dopamine Receptor D2 (DRD2) is a receptor activated by dopamine in the brain</i> - DRD2 is involved in response to antipsychotics This genotype confers normal activity		No known significant clinical impact
HTR2C C/C [Standard weight gain risk]	<i>Serotonin Receptor 2C (HTR2C) is a receptor involved in the regulation of satiety</i> - Some 2nd generation antipsychotics act by blocking this receptor - Patients with the C/C genotype have standard risk of weight gain with 2nd generation antipsychotics; C/C is the most common genotype Higher risk: clozapine; olanzapine Medium risk: aripiprazole; brexpiprazole; iloperidone; olanzapine/samidorphan; paliperidone; quetiapine; risperidone Lower risk: asenapine; cariprazine; lumateperone; lurasidone; ziprasidone		No known significant clinical impact
ANK3 C/C [Normal activity]	<i>Sodium Channel (ANK3) is a protein that plays a role in sodium ion channel function and is involved in excitatory signaling in the brain</i> This genotype confers normal activity		No known significant clinical impact
CACNA1C G/G [Normal activity]	<i>Calcium Channel (CACNA1C) is a subunit of L-type voltage gated calcium channels which are involved in excitatory signaling in the brain</i> This genotype confers normal activity		No known significant clinical impact
OPRM1 A/A [Normal activity]	<i>μ-Opioid Receptor (OPRM1) is an opioid receptor which is affected by endogenous and exogenous opioids</i> - OPRM1 is involved in response to opioids This genotype confers normal activity		No known significant clinical impact
GRIK1 A/A [Normal activity]	<i>Glutamate Receptor Kainate 1 (GRIK1) is an excitatory neurotransmitter receptor</i> This genotype confers normal activity		No known significant clinical impact



Alert/Caution



PGx Guided Options

[A] [A/B] [B] [B/C] [C] [C/D] [D] CPIC® level of evidence
<https://cpicpgx.org/prioritization/#leveldef>

[1A] [1B] [2A] [2B] [3] [4] PharmGKB level of evidence
<https://www.pharmgkb.org/page/clinAnnLevels>

Depression Summary

	Alert / Caution	Standard Options	PGx Guided Options
SSRIs	Citalopram Escitalopram Fluoxetine Sertraline	Paroxetine	
SNRIs		Desvenlafaxine Duloxetine Levomilnacipran Venlafaxine	
Other		Bupropion Dextromethorphan/Bupropion Mirtazapine Nefazodone Trazodone Vilazodone Vortioxetine	
TCAs		Amitriptyline Desipramine Doxepin Imipramine Nortriptyline Trimipramine	

- Do Not Initiate
- Decreased Efficacy
- Side Effects Risk
- Drug Exposure
- Decreased Sensitivity
- Increased Efficacy
- Weight Gain
- Reduced Drug Exposure with 1A2 Inducers

Diagnosis specific summaries are available for the diagnoses of depression, anxiety & related disorders, bipolar disorder, schizophrenia, pain management and ADHD. The provided pages in this report are the closest fit for this individual's diagnosis, as provided to us. All summaries, however, are available to you on the [Genomind Precision Health Platform](#).

Depression Augmentation Summary

Alert / Caution			Standard Options			PGx Guided Options		
			Aripiprazole					
			Brexpiprazole					
			Cariprazine					
			ECT					
			Esketamine					
						Exercise		
						L-methylfolate		
		Olanzapine/Fluoxetine						
			Phenelzine					
			Quetiapine					
			Selegiline					
			TMS					
			Tranlycypromine					
			VNS					

- Do Not Initiate
 Decreased Sensitivity
- Decreased Efficacy
 Increased Efficacy
- Side Effects Risk
 Weight Gain
- Drug Exposure
 Reduced Drug Exposure with 1A2 Inducers

Test Methodology/Literature References

Test Methodology

This test was developed and performance characteristics were validated in the Genomind clinical laboratory. This test has not been cleared or approved by the U.S. Food and Drug Administration (FDA). This test is used for clinical purposes and should not be regarded as investigational or for research use. Genomind's laboratory is certified under the Clinical Laboratory Improvement Amendments (CLIA), as qualified to perform high complexity clinical laboratory testing. Genomind performed the testing using standard and custom TaqMan reagents for all variants. The test results are intended to be used as prognostic and not diagnostic and are not intended as the sole means for patient management decisions.

Test Methodology Limitations: Factors influencing the amount and quality of DNA extracted include but are not limited to the amount of buccal cells extracted, patient oral hygiene, collection technique, and the presence of dietary or microbial sources of nucleic acids and nucleases. DNA quality and quantity are subject to matrix dependent influences. PCR inhibitors, extraneous DNA and nucleic acid degrading enzymes are all factors which may affect the evaluation of assay results. Some single nucleotide polymorphism (SNP) assays are problematic due to multiple base repeats and other sequence aberrations, which may hinder proper amplification and analysis. DNA purity can influence the assay. SLC6A4 contains many polymorphisms, and the assay was developed and validated according to the current available scientific information. For pharmacogenetic tests like the Genomind Pharmacogenetic Report, undetected genetic and/or non-genetic factors such as drug-drug interactions may impact the phenotype. In liver transplant recipients, certain genotypes of the donor liver may not be the same as those of the recipient. In these cases, it may be necessary to account for both the donor and recipient genotypes when evaluating drug metabolism genes. However, studies to date have been inconclusive as to the relative influence of the donor and recipient genotypes. The Genomind Pharmacogenetic Report is based on a current understanding of the clinical relevance of the variant identified, penetrance, phenotype predictions, and recurrence risks.

Variants tested include ABCB1 C3435T rs1045642; ABCB1 rs2032583; ABCG2 rs2231142, ADRA2A rs1800544; ANK3 rs10994336; BDNF rs6265; CACNA1C rs1006737; COMT rs4680; CYP1A2 *1B, *1C, *1D, *1E, *1F, *1K and *11; CYP2B6 *4, *5, *6 and *9; CYP2C19 *2, *3, *4, *5, *6, *7, *8, *9, *10, *17, and *35; CYP2C9 *2, *3, *4, *5, *6, *8, *11, *13, and *27; CYP2D6 *2, *3, *4, gene deletion (*5), gene duplication, *6, *7, *8, *9, *10, *11, *12, *14, *15, *17, *29 and *41; CYP3A4 *22; CYP3A5 *3, *6, *7; DRD2 rs1799732; GRIK1 rs2832407; HLA-B*15:02 presence and HLA-A*31:01 presence detected by qPCR; HTR2A rs7997012; HTR2C rs3813929; MC4R rs489693; MTHFR rs1801131 and rs1801133; OPRM1 rs1799971; SLC6A4 rs25531 and rs63749047; SLCO1B1*5, UGT2B15 rs1902023; and UGT1A4 rs2011425. Other known variants that are not listed are not detected and will not be included in the test report.

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Literature References

Summaries of references are available upon request of Genomind's comprehensive literature summary [April 2023 (V3.2)].

<https://genomind.com/providers/genomind-pgx-literature-review/>