

AuraGen

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COMBINED PHARMACOGENOMICS · PD + PK REPORT

Pharmacodynamic & Pharmacokinetic Genomic Insights.

Integrating receptor-level drug response genetics with metabolic enzyme profiling across 62+ genes — actionable across psychiatry, cardiology, oncology, and beyond.

**Jane Patient · DOB 01/01/1980 · Female**

Report ID: AUR-2026-00123 · May 8, 2026 · Buccal Swab

Ordering: Dr. Alex Clinician, MD · General Hospital · Auragen PGx Pro (62+ genes)

ACTION REQUIRED BEFORE PRESCRIBING

ALERTS

Critical Alert Summary

● Consider Alternative	Carbamazepine (HLA-A *31:01+) · Azathioprine/Mercaptopurine (TPMT PM) · Succinylcholine/Mivacurium (BCHE PM)
↓ Drug Management	Tacrolimus – increase dose (CYP3A5 EM) · Bupropion – monitor (CYP2B6 PM) · Codeine/Opioids – caution (CYP2D6 PM)
! Use with Caution	All PPIs – reduced efficacy (CYP2C19 RM) · Carisoprodol (CYP2C19 RM) · NAT2-metabolised drugs (Poor acetylator)
✓ Normal Response	Simvastatin · Rosuvastatin · Warfarin · Allopurinol

RECEPTOR & RESPONSE GENETICS

Section I

Pharmacodynamic Gene Variations

Pharmacodynamic genes affect how the body responds to drugs at the receptor or target level. Variants may alter drug efficacy, sensitivity, or risk of adverse reactions independent of metabolism.

SLC6A4	PGx Guided: SSRIs
L(A)/L(A) · High Activity · Serotonin Transporter	
High-activity serotonin transporter genotype. Associated with improved remission odds and reduced SSRI side effects. SSRIs are a supported therapeutic option if clinically indicated.	
MTHFR	L-Methylfolate Supplementation
C677T: C/T · A1298C: A/C · Low-Intermediate Activity	
Reduced MTHFR enzyme activity. L-methylfolate supplementation alongside SSRIs/SNRIs may enhance symptom reduction in MDD. Methylfolate (5-MTHF) preferred over standard folic acid.	
ADRA2A	Caution: Methylphenidate
C/C · Decreased Stimulant Response	
Associated with reduced response to methylphenidate for ADHD. Consider alternatives including amphetamine-based agents.	
HLA-A *31:01	DO NOT INITIATE Carbamazepine
Positive · High Risk of Severe Skin Reactions	

Strongly associated with increased risk of SJS/TEN, DRESS, and MPE with carbamazepine. FDA and CPIC guidelines recommend against initiation. Document prominently in patient record — clinically critical finding.

MC4R

A/A · High Weight Gain Risk

Alert: 2nd-Gen Antipsychotics

Elevated risk of weight gain and metabolic changes with 2nd-generation antipsychotics. Highest risk with clozapine and olanzapine. Prefer lurasidone, cariprazine, or ziprasidone.

✓ **Normal Response / No Significant Interaction**

HTR2A G/G · BDNF Val/Val · COMT Val/Met · HLA-B *15:02 Negative · DRD2 C/C · OPRM1 A/A · 5HT2C C/C

METABOLISM & TRANSPORT GENETICS

Section II

Pharmacokinetic Gene Variations

Pharmacokinetic genes govern absorption, distribution, metabolism, and excretion of drugs. Variants in CYP450 enzymes and drug transporters can lead to altered serum drug levels and unexpected clinical outcomes.

Gene	Diplotype	Phenotype	Drug Classes Affected	Implication
CYP2B6	*6/*6	Poor Metabolizer	Bupropion, Esketamine, Selegiline, Methadone	↓ Metabolism — Elevated serum levels
CYP2D6	*4/*4	Poor Metabolizer	TCAs, SSRIs, Antipsychotics, Opioids, Beta-blockers, Atomoxetine	↓ Metabolism — Major impact across drug classes
CYP2C19	*1/*17	Rapid Metabolizer	PPIs, SSRIs (citalopram/escitalopram), Diazepam, Clopidogrel, Voriconazole	↑ Metabolism — Reduced drug efficacy
CYP1A2	*1A/*1A	Extensive Metabolizer	Clozapine, Olanzapine, Duloxetine, Fluvoxamine, Theophylline	Normal metabolism expected
CYP2C9	*1/*1	Extensive Metabolizer	NSAIDs, Warfarin, Celecoxib, Valproate, Phenytoin	Normal metabolism expected
CYP3A4/5	*1/*1 / *1A/*1A	Normal Activity	Tacrolimus, Benzodiazepines, Statins, Antipsychotics, Macrolides	Normal metabolism expected
NAT2	*5/*6/*12/*13	Poor Metabolizer	Isoniazid, Hydralazine, Procainamide, Sulfasalazine, Dapsone	↓ Acetylation — Elevated drug exposure
TPMT	*2/*2	Poor Metabolizer	Mercaptopurine, Azathioprine, Thioguanine	↓ Activity — Severe toxicity at standard doses
BCHE	c. 293A>G Hom GG	Poor Activity	Succinylcholine, Mivacurium	↓ Plasma cholinesterase — Prolonged drug effect
SLCO1B1	*1/*1	Normal Function	Simvastatin, Rosuvastatin, Statins	Normal hepatic uptake — Standard statin response
UGT1A1	*1/*28	Intermediate	Irinotecan, Nilotinib, Belinostat, Raltegravir	Mildly decreased UGT1A1 activity
CYP3A5	*1A/*1A	Normal/EM	Tacrolimus	Tacrolimus dose increase required per CPIC

THERAPEUTIC CLASS INTERACTIONS

Section III

Gene–Drug Interaction Summary

Antidepressants — SSRIs

Medication	PD Gene	PK Gene(s)	Exp.	Verdict
Citalopram (Celexa)	SLC6A4	CYP2C19, P-gp	↑	CYP2C19 RM: Caution
Escitalopram (Lexapro)	SLC6A4	CYP2C19, P-gp	↑	CYP2C19 RM: Caution
Fluoxetine (Prozac)	SLC6A4	CYP2D6, CYP2C9	↑	CYP2D6 PM: Elevated
Paroxetine (Paxil)	SLC6A4	CYP2D6, P-gp	↑	CYP2D6 PM: Elevated
Sertraline (Zoloft)	SLC6A4	CYP2C19, CYP2B6	↑	Monitor (CYP2C19 RM)

Antidepressants — SNRIs / Other

Medication	PK Gene(s)	Exp.	Verdict
Duloxetine (Cymbalta)	CYP1A2, CYP2D6	↑	CYP2D6 PM: Elevated
Venlafaxine (Effexor)	CYP2D6, CYP2C19	↑	CYP2D6 PM + CYP2C19 RM: Monitor
Bupropion (Wellbutrin)	CYP2B6	↑	CYP2B6 PM: Elevated — Dose adjust
Vortioxetine (Trintellix)	CYP2D6, CYP3A4	↑	Normal Response Expected

Antipsychotics — 2nd Generation

Medication	PD Gene	PK Gene(s)	Verdict
Clozapine (Clozaril)	MC4R	CYP1A2, CYP2D6	Highest Weight Risk + CYP2D6 PM: Caution
Olanzapine (Zyprexa)	MC4R	CYP1A2	Highest Weight Risk — Monitor metabolics
Aripiprazole (Abilify)	MC4R	CYP2D6, CYP3A4	High Weight Risk + CYP2D6 PM: Monitor
Risperidone (Risperdal)	MC4R	CYP2D6, CYP3A4	High Weight Risk + CYP2D6 PM: Elevated
Lurasidone (Latuda)	—	CYP3A4	Lower weight risk — Preferred option
Cariprazine (Vraylar)	—	CYP3A4	Lower weight risk — Preferred option

Pain Management — Opioids

Medication	PK Gene(s)	Exp.	Verdict
Codeine	CYP2D6, P-gp	↑	CYP2D6 PM: Reduced efficacy (prodrug)
Tramadol (Ultram)	CYP2D6, CYP3A4	↑	CYP2D6 PM: Reduced efficacy (prodrug)
Oxycodone (OxyContin)	CYP2D6, CYP3A4	↑	CYP2D6 PM: Elevated parent drug

Morphine	P-gp	—	Normal Response Expected
Fentanyl	CYP3A4	—	Normal Response Expected

Cardiology

Medication	PK Gene(s)	Exp.	Verdict
Simvastatin (Zocor)	SLCO1B1 *1/*1	—	Normal Response — Monitor myopathy
Rosuvastatin (Crestor)	SLCO1B1 *1/*1	—	Normal Response — Monitor myopathy
Carvedilol (Coreg)	CYP2D6	—	CYP2D6 PM: Elevated — Monitor HR/BP
Metoprolol (Lopressor)	CYP2D6	↑	CYP2D6 PM: Elevated — Monitor HR/BP
Clopidogrel (Plavix)	CYP2C19	—	CYP2C19 RM: Higher active metabolite
Warfarin	CYP2C9, VKORC1	—	Normal Response — Establish INR baseline

Oncology / Immunosuppression

Medication	PK Gene(s)	Exp.	Verdict
Mercaptopurine	TPMT *2/*2	↑	TPMT PM: REDUCE TO 10% DOSE
Azathioprine	TPMT *2/*2	↑	TPMT PM: CONSIDER ALTERNATIVE
Tacrolimus	CYP3A5 *1A/*1A	↓	CYP3A5 EM: INCREASE DOSE
Irinotecan	UGT1A1 *1/*28	—	Intermediate UGT1A1: Caution
Succinylcholine	BCHE Hom GG	—	BCHE PM: AVOID — Prolonged blockade

Gastroenterology — Proton Pump Inhibitors

Medication	PK Gene	Exp.	Verdict
Omeprazole (Prilosec)	CYP2C19 *1/*17	↑	CYP2C19 RM: Reduced efficacy
Esomeprazole (Nexium)	CYP2C19 *1/*17	↑	CYP2C19 RM: Reduced efficacy
Pantoprazole (Protonix)	CYP2C19 *1/*17	↑	CYP2C19 RM: Reduced efficacy
Lansoprazole (Prevacid)	CYP2C19 *1/*17	↑	CYP2C19 RM: Reduced efficacy

NOTABLE INTERACTIONS

Section IV

Drug–Drug Interaction Summary

Drug Pair	Severity	Clinical Management
Allopurinol + Mercaptopurine	MAJOR	Allopurinol inhibits xanthine oxidase. Reduce mercaptopurine to 1/3–1/4 dose. Monitor CBC closely.
Carbamazepine + Simvastatin	MAJOR	CYP3A4 inducer reduces simvastatin exposure. Switch to pravastatin or rosuvastatin.
Tacrolimus + Alcohol	MAJOR	Alcohol causes rapid release from tacrolimus ER formulations. No alcohol during therapy.

Simvastatin + Grapefruit Juice	MAJOR	Grapefruit inhibits CYP3A4. Avoid grapefruit entirely with simvastatin.
Carbamazepine + Omeprazole	MODERATE	Omeprazole may increase carbamazepine exposure. Monitor serum levels.

PATIENT CARRY CARD

Section V

Drug Metabolism Card

Summary of key liver enzyme and transporter genotypes. Carry this information when seeing any healthcare provider. References: FDA Table of Pharmacogenomic Biomarkers (fda.gov) · CPIC Guidelines (cpicpgx.org) · PharmGKB (pharmgkb.org)

Gene	Diplotype	Phenotype	Clinical Meaning
CYP1A2	*1A/*1A	Extensive Metabolizer	Normal Metabolism
CYP2B6	*6/*6	Poor Metabolizer	↓ Metabolism of bupropion, methadone, esketamine
CYP2C9	*1/*1	Extensive Metabolizer	Normal Metabolism
CYP2C19	*1/*17	Rapid Metabolizer	↑ Metabolism — Reduced PPI and SSRI efficacy
CYP2D6	*4/*4	Poor Metabolizer	↓ Metabolism — Major impact on many drug classes
CYP3A4/5	*1/*1 / *1A/*1A	Normal Activity	Normal Metabolism
NAT2	*5/*6/*12/*13	Poor Metabolizer	↓ Acetylation — Elevated isoniazid, hydralazine exposure
TPMT	*2/*2	Poor Metabolizer	↓ Metabolism — Thiopurine toxicity risk
BCHE	Hom GG	Poor Activity	↓ Plasma cholinesterase — Avoid succinylcholine
UGT1A1	*1/*28	Intermediate	Mildly decreased — Monitor irinotecan

Professional Use Only

This combined pharmacogenomics report integrates pharmacodynamic and pharmacokinetic data to assist healthcare professionals in medication selection and dosing decisions. Results are adjunctive and should not be relied upon solely on this report. Gene-drug interactions are aligned with CPIC, DPWG, and FDA guidelines as of the date at time of report generation. © 2026 AuraGen Wellness · auragenwellness.com