



Helix Comprehensive Pharmacogenomics (PGx) Panel

Patient Name: Jane Doe	Patient ID: 0123456	Order Date: 2025-04-29
Date of Birth: 01/01/1990	Helix ID: Test12345	Report Date: 2025-04-29
Sex Assigned at Birth: Female	Provider Name: Client Client	
Specimen Type: WHOLE BLOOD	Collection Date: 2025-01-23	

Note: This report is intended for use by a medical professional. Please discuss any adjustments to your medication with your treating provider.

Drug Summary

(Cancer) Antiemetics	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Ondansetron (Zofran®)	✓			
Tropisetron (Novaban®)	✓			

(Cancer) Antifungals	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Voriconazole (Vfend®)	✓			

(Cancer) Antineoplastics	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Gefitinib (Iressa®)	✓			
Mercaptopurine (Purixan®)	✓			
Tamoxifen (Soltamox®)			⚠	
Thioguanine (Tabloid®)	✓			

(Cancer) Fluoropyrimidines	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Capecitabine (Xeloda®)				?
Fluorouracil (Efudex®, Adrucil®)				?
Tegafur (Tegsuno®)				?

(Cancer) Immunosuppressants	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Azathioprine (Imuran®, Azasan®)	✓			
Tacrolimus (Prograf®)	✓			

(Cancer) Uric Acid Inhibitors	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Allopurinol (Zyloprim®, Aloprim®)		⚠		

(Cardiovascular) Antiarrhythmics	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Flecainide (Tambocor®)		⚠		
Propafenone (Rhythmol SR®)		⚠		

(Cardiovascular) Anticoagulants	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Warfarin (Coumadin®, Jantoven®)				?



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(Cardiovascular) Antiplatelets	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Clopidogrel (Plavix®)	✓			

(Cardiovascular) Beta blockers	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Metoprolol (Lopressor®, ToprolXL®)	✓			

(Cardiovascular) Statins	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Atorvastatin (Lipitor®, Atorvaliq®)	✓			
Fluvastatin (LescolXL®)		⚠		
Lovastatin (Mevacor®, Altoprev®)	✓			
Pitavastatin (Livalo®, Zypitamag®)	✓			
Pravastatin (Pravachol®)	✓			
Rosuvastatin (Crestor®, Ezallor Sprinkle®)	✓			
Simvastatin (Zocor®, FloLipid®)	✓			

(Mental Health) Anticonvulsants	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Brivaracetam (Briviact®)	✓			
Carbamazepine (Tegretol®)	✓			
Lamotrigine (Lamictal®)	✓			
Oxcarbazepine (Trileptal®)	✓			



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(Mental Health) Antidepressants	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Amitriptyline (Elavil®)		⚠️		
Citalopram (Celexa®)	✅			
Clomipramine (Anafranil®)		⚠️		
Desipramine (Norpramin®)		⚠️		
Doxepin (Sinequan®)		⚠️		
Escitalopram (Lexapro®)	✅			
Fluvoxamine (Luvox®)	✅			
Imipramine (Tofranil®)		⚠️		
Nortriptyline (Pamelor®)		⚠️		
Paroxetine (Paxil®)		⚠️		
Sertraline (Zoloft®)	✅			
Trimipramine (Surmontil®)		⚠️		
Venlafaxine (Effexor®)	✅			
Vortioxetine (Trintellix®)	✅			

(Mental Health) Antipsychotics	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Aripiprazole (Abilify®)	✅			
Brexpiprazole (Rexulti®)	✅			
Clozapine (Clozaril®)	✅			
Haloperidol (Haldol®)	✅			
Iloperidone (Fanapt®)	✅			
Pimozide (Orap®)		⚠️		
Quetiapine (Seroquel®)	✅			
Risperidone (Risperdal®)	✅			
Thioridazine (Mellaril®)	✅			

(Mental Health) Anxiolytics	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Clobazam (Onfi®)	✅			

(Mental Health) Non-stimulants	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Atomoxetine (Strattera®)		⚠️		



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(Mental Health) Opioids & related medications	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Lofexidine (Lucemyra®)	✓			
(Mental Health) Stimulants	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Amphetamine (Adderall®)	✓			
(Mental Health) Other	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Deutetrabenazine (Austedo®)	✓			
Flibanserin (Addyi®)	✓			
Valbenazine (Ingrezza®)	✓			
(Pain) NSAIDs	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Celecoxib (CeleBREX®, Elyxyb®)	✓			
Flurbiprofen (Ansaid®)	✓			
Ibuprofen (Advil®, Motrin®)	✓			
Lornoxicam (Xefo®)	✓			
Meloxicam (Mobic®, Vivlodex®)	✓			
Piroxicam (Feldene®)	✓			
Tenoxicam (Mobiflex®)	✓			
(Pain) Opioids & related medications	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Codeine	✓			
Hydrocodone (Hycodan®, Vicodin®)	✓			
Oliceridine (Olinvyk®)	✓			
Tramadol (Ultram®, Conzip®)	✓			
(PPIs) Proton Pump Inhibitors	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Dexlansoprazole (Dexilant®)		⚠		
Lansoprazole (Prevacid®)		⚠		
Omeprazole (Prilosec®)		⚠		
Pantoprazole (Protonix®)		⚠		



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(Other) Aminoglycoside antibacterials	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Amikacin (Arikayce®)	✓			
Gentamicin (Garamycin®)	✓			
Kanamycin (Kantrex®)	✓			
Plazomicin (Zemdri®)	✓			
Streptomycin	✓			
Tobramycin (Tobrex®)	✓			

(Other) Antivirals	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Abacavir (Ziagen®)	✓			

(Other) Interferons	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Peginterferon alfa-2a (Pegasys®)	✓			
Peginterferon alfa-2b (PegIntron®)	✓			

Legend

SYMBOL	IMPLICATION
⚠️	Major gene-drug interaction, consider different drug
⚠️	Major gene-drug interaction, consider reduced or increased dose
✓	No recommended action
?	Impact not determined, consider standard dose and alter as needed



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Gene Summary

GENE	RESULT	STATUS
ABCB1, rs1045642	C/C	rs1045642 C homozygote
ABCB1, rs1128503	C/C	rs1128503 C homozygote
ABCB1, rs2032582	G/G	rs2032582 G homozygote
ABCG2, rs2231142	C/A	Decreased function
AT1C, rs4673993	T/T	Variant absent
COMT, rs4680	G/A	rs4680 A carrier
CYP2C Cluster	G/G	Variant absent
CYP2C19	*1/*1	Normal Metabolizer
CYP2C9	*1/*2	Intermediate Metabolizer
CYP2D6	*1/*4	Intermediate Metabolizer
CYP3A4	*1/*1	Normal Metabolizer
CYP3A5	*3/*3	Poor Metabolizer
CYP4F2	*1/*3	Deficient
DPYD	N/A	Indeterminate
F2, c.*97G>A	G/G	Variant absent
F5, c.1601G>A (p.Arg534Gln)	G/G	Variant absent
GRK4, rs1024323	N/A	Indeterminate
HLA-B*15:02	ABSENT	HLA-B: *15:02 negative
HLA-B*57:01	ABSENT	HLA-B: *57:01 negative
IFNL3, rs8099917	T/T	Variant absent
IFNL3/IFNL4, rs12979860	C/C	Variant absent
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent
MTHFR, c.1286A>C (p.Glu429Ala)	A/A	Variant absent
MTHFR, c.665C>T (p. Ala222Val)	T/T	Detected, homozygous
NUDT15	*1/*1	Normal Metabolizer
OPRM1, rs1799971	A/G	rs1799971 G carrier
SLC19A1, rs1051266	G/G	rs1051266 G homozygote
SLCO1B1	*14/*37	Normal Function
TPMT	*1/*1	Normal Metabolizer
VKORC1, rs9923231	C/T	rs9923231 T carrier



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Drug Details

(Cancer) Antiemetics

 **Ondansetron** (Zofran®) Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

 **Tropisetron** (Novaban®) Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

(Cancer) Antifungals

 **Voriconazole** (Vfend®) Normal response expected

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

(Cancer) Antineoplastics

 **Gefitinib** (Iressa®) Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

 **Mercaptopurine** (Purixan®) Normal response expected

Gene	Result	Status
NUDT15	*1/*1	Normal Metabolizer
TPMT	*1/*1	Normal Metabolizer

 **Tamoxifen** (Soltamox®) Consider alternative medication

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer



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✓ Thioguanine (Tabloid®)

Normal response expected

Gene	Result	Status
NUDT15	*1/*1	Normal Metabolizer
TPMT	*1/*1	Normal Metabolizer

Limited Evidence Drug-Gene Associations

⚠ Pazopanib (Votrient®)

Limited Evidence

Gene	Result	Status
HLA-B*57:01	ABSENT	HLA-B: *57:01 negative

(Cancer) Fluoropyrimidines

⚠ Capecitabine (Xeloda®)

Metabolizer Impact Unknown

Gene	Result	Status
DPYD	N/A	Indeterminate

⚠ Fluorouracil (Efudex®, Aduvicol®)

Metabolizer Impact Unknown

Gene	Result	Status
DPYD	N/A	Indeterminate

⚠ Tegafur (Tegsuno®)

Metabolizer Impact Unknown

Gene	Result	Status
DPYD	N/A	Indeterminate

(Cancer) Immunosuppressants

✓ Azathioprine (Imuran®, Azasan®)

Normal response expected

Gene	Result	Status
NUDT15	*1/*1	Normal Metabolizer
TPMT	*1/*1	Normal Metabolizer



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✔ Tacrolimus (Prograf®)

Normal response expected

Gene	Result	Status
CYP3A5	*3/*3	Poor Metabolizer

Limited Evidence Drug-Gene Associations

❓ Methotrexate (Rasuvo®, Otrexup®)

Limited Evidence

Gene	Result	Status
ATIC, rs4673993	T/T	Variant absent
MTHFR, c.665C>T (p. Ala222Val)	T/T	Detected, homozygous
SLC19A1, rs1051266	G/G	rs1051266 G homozygote

(Cancer) Platelet-stimulating agents

Limited Evidence Drug-Gene Associations

❓ Avatrombopag (Doptelet®)

Limited Evidence

Gene	Result	Status
F5, c.1601G>A (p.Arg534Gln)	G/G	Variant absent

❓ Eltrombopag (Promacta®)

Limited Evidence

Gene	Result	Status
F5, c.1601G>A (p.Arg534Gln)	G/G	Variant absent

❓ Lusutrombopag (Mulpleta®)

Limited Evidence

Gene	Result	Status
F5, c.1601G>A (p.Arg534Gln)	G/G	Variant absent

(Cancer) Uric Acid Inhibitors



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 **Allopurinol** (Zyloprim®, Aloprim®) Increase dose

Gene	Result	Status
ABCG2, rs2231142	C/A	Decreased function

(Cardiovascular) Antiarrhythmics

 **Flecainide** (Tambocor®) Use caution

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

 **Propafenone** (Rhythmol SR®) Use caution

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Limited Evidence Drug-Gene Associations

 **Digoxin** (Lanoxin®) Limited Evidence

Gene	Result	Status
ABCB1, rs1045642	C/C	rs1045642 C homozygote
ABCB1, rs1128503	C/C	rs1128503 C homozygote
ABCB1, rs2032582	G/G	rs2032582 G homozygote

 **Quinidine** (Quinidex®) Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

(Cardiovascular) Anticoagulants



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Warfarin (Coumadin®, Jantoven®)

Metabolizer Impact Unknown

Gene	Result	Status
CYP2C Cluster	G/G	Variant absent
CYP2C9	*1/*2	Intermediate Metabolizer
CYP4F2	*1/*3	Deficient
VKORC1, rs9923231	C/T	rs9923231 T carrier

(Cardiovascular) Antihypertensives

Limited Evidence Drug-Gene Associations

Losartan (Cozaar®)

Limited Evidence

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer
CYP3A4	*1/*1	Normal Metabolizer

(Cardiovascular) Antiplatelets

Clopidogrel (Plavix®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

(Cardiovascular) Beta blockers

Metoprolol (Lopressor®, Toprol XL®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Limited Evidence Drug-Gene Associations

Atenolol (Tenormin®)

Limited Evidence

Gene	Result	Status
GRK4, rs1024323	N/A	Indeterminate



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Carvedilol (Coreg®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Nebivolol (Bystolic®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Propranolol (Inderal®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Timolol (Timoptol®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

(Cardiovascular) Statins

Atorvastatin (Lipitor®, Atorvaliq®)

Normal response expected

Gene	Result	Status
SLCO1B1	*14/*37	Normal Function

Fluvastatin (Lescol XL®)

Use caution

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer
SLCO1B1	*14/*37	Normal Function

Lovastatin (Mevacor®, Altoprev®)

Normal response expected

Gene	Result	Status
SLCO1B1	*14/*37	Normal Function



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✔ Pitavastatin (Livalo®, Zypitamag®)

Normal response expected

Gene	Result	Status
SLCO1B1	*14/*37	Normal Function

✔ Pravastatin (Pravachol®)

Normal response expected

Gene	Result	Status
SLCO1B1	*14/*37	Normal Function

✔ Rosuvastatin (Crestor®, Ezallor Sprinkle®)

Normal response expected

Gene	Result	Status
ABCG2, rs2231142	C/A	Decreased function
SLCO1B1	*14/*37	Normal Function

✔ Simvastatin (Zocor®, FloLipid®)

Normal response expected

Gene	Result	Status
SLCO1B1	*14/*37	Normal Function

(Mental Health) Anticonvulsants

✔ Brivaracetam (Briviact®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

✔ Carbamazepine (Tegretol®)

Normal response expected

Gene	Result	Status
HLA-B*15:02	ABSENT	HLA-B: *15:02 negative

✔ Lamotrigine (Lamictal®)

Normal response expected

Gene	Result	Status
HLA-B*15:02	ABSENT	HLA-B: *15:02 negative



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Oxcarbazepine (Trileptal®)

Normal response expected

Gene	Result	Status
HLA-B*15:02	ABSENT	HLA-B: *15:02 negative

(Mental Health) Antidepressants

Amitriptyline (Elavil®)

Decrease dose

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer
CYP2D6	*1/*4	Intermediate Metabolizer

Citalopram (Celexa®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

Clomipramine (Anafranil®)

Decrease dose

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer
CYP2D6	*1/*4	Intermediate Metabolizer

Desipramine (Norpramin®)

Decrease dose

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Doxepin (Sinequan®)

Decrease dose

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer
CYP2D6	*1/*4	Intermediate Metabolizer

Escitalopram (Lexapro®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer



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Fluvoxamine (Luvox®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Imipramine (Tofranil®)

Decrease dose

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer
CYP2D6	*1/*4	Intermediate Metabolizer

Nortriptyline (Pamelor®)

Decrease dose

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Paroxetine (Paxil®)

Decrease dose

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Sertraline (Zoloft®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

Trimipramine (Surmontil®)

Decrease dose

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer
CYP2D6	*1/*4	Intermediate Metabolizer

Venlafaxine (Effexor®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer



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✔ Vortioxetine (Trintellix®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Limited Evidence Drug-Gene Associations

⚠ Amoxapine (Asendin®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

⚠ Bupropion (Wellbutrin®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

⚠ Desvenlafaxine (Pristiq®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

⚠ Duloxetine (Cymbalta®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

⚠ Fluoxetine (Prozac®)

Limited Evidence

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer
CYP2D6	*1/*4	Intermediate Metabolizer

⚠ Levomilnacipran (Fetzima®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer



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?

Maprotiline (Ludiomil®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

?

Mirtazapine (Remeron®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer
CYP3A4	*1/*1	Normal Metabolizer

?

Protriptyline (Vivactil®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

?

Trazodone (Desyrel®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

?

Vilazodone (Viibryd®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

(Mental Health) Antipsychotics

✓

Aripiprazole (Abilify®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

✓

Brexipiprazole (Rexulti®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer



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Specimen Type: WHOLE BLOOD	Collection Date: 2025-01-23	

Clozapine (Clozaril®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Haloperidol (Haldol®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Iloperidone (Fanapt®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Pimozide (Orap®)

Decrease dose

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Quetiapine (Seroquel®)

Normal response expected

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

Risperidone (Risperdal®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Thioridazine (Mellaril®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Limited Evidence Drug-Gene Associations



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Aripiprazole (Abilify®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

Brexpiprazole (Rexulti®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

Cariprazine (Vraylar®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

Clozapine (Clozaril®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer
MTHFR, c.1286A>C (p.Glu429Ala)	A/A	Variant absent

Iloperidone (Fanapt®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

Lurasidone (Latuda®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

Olanzapine (Zyprexa®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer
MTHFR, c.1286A>C (p.Glu429Ala)	A/A	Variant absent



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Paliperidone (Invega®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Perphenazine (Trilafon®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Pimozide (Orap®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

Ziprasidone (Geodon®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

(Mental Health) Anxiolytics

Clobazam (Onfi®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

Limited Evidence Drug-Gene Associations

Alprazolam (Xanax®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

Buspirone (BuSpar®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer



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Clonazepam (Klonopin®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

Diazepam (Valium®)

Limited Evidence

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer
CYP3A4	*1/*1	Normal Metabolizer

Triazolam (Halcion®)

Limited Evidence

Gene	Result	Status
CYP3A4	*1/*1	Normal Metabolizer

(Mental Health) Non-stimulants

Atomoxetine (Strattera®)

Use caution

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Limited Evidence Drug-Gene Associations

Viloxazine (Qelbree®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

(Mental Health) Opioids & related medications

Lofexidine (Lucemyra®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer



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Limited Evidence Drug-Gene Associations

Naloxone (Evzio®, Narcan®)

Limited Evidence

Gene	Result	Status
COMT, rs4680	G/A	rs4680 A carrier
OPRM1, rs1799971	A/G	rs1799971 G carrier

(Mental Health) Stimulants

Amphetamine (Adderall®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Limited Evidence Drug-Gene Associations

Methylphenidate (Ritalin®, Concerta®)

Limited Evidence

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

(Mental Health) Other

Deutetrabenazine (Austedo®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Flibanserin (Addyi®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

Valbenazine (Ingrezza®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer



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Limited Evidence Drug-Gene Associations

 Eszopiclone (Lunesta®)			Limited Evidence
Gene	Result	Status	
CYP3A4	*1/*1	Normal Metabolizer	

 Flibanserin (Addyi®)			Limited Evidence
Gene	Result	Status	
CYP2C9	*1/*2	Intermediate Metabolizer	
CYP2D6	*1/*4	Intermediate Metabolizer	

 Lithium (Lithobid®)			Limited Evidence
Gene	Result	Status	
ABCB1, rs2032582	G/G	rs2032582 G homozygote	

 Zolpidem (Ambien®)			Limited Evidence
Gene	Result	Status	
CYP3A4	*1/*1	Normal Metabolizer	

(Pain) NSAIDs

 Celecoxib (CeleBREX®, Elyxib®)			Normal response expected
Gene	Result	Status	
CYP2C9	*1/*2	Intermediate Metabolizer	

 Flurbiprofen (Ansaid®)			Normal response expected
Gene	Result	Status	
CYP2C9	*1/*2	Intermediate Metabolizer	



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Ibuprofen (Advil®, Motrin®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Lornoxicam (Xefo®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Meloxicam (Mobic®, Vivlodex®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Piroxicam (Feldene®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Tenoxicam (Mobiflex®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Limited Evidence Drug-Gene Associations

Aceclofenac (Preservex®)

Limited Evidence

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Diclofenac (Zipsor®, Zorvolex®)

Limited Evidence

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer



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Indomethacin (Indocin®, Tivorbex®)

Limited Evidence

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Lumiracoxib (Prexige®)

Limited Evidence

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Metamizole

Limited Evidence

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Nabumetone (Relafen®)

Limited Evidence

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Naproxen (Aleve®, Naprelan®)

Limited Evidence

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

(Pain) Opioids & related medications

Codeine

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Hydrocodone (Hycodan®, Vicodin®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer



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✓ **Oliceridine** (Olinvyk®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

✓ **Tramadol** (Ultram®, Conzip®)

Normal response expected

Gene	Result	Status
CYP2D6	*1/*4	Intermediate Metabolizer

Limited Evidence Drug-Gene Associations

? **Alfentanil** (Alfenta®)

Limited Evidence

Gene	Result	Status
OPRM1, rs1799971	A/G	rs1799971 G carrier

? **Buprenorphine** (Buprenex®, Butrans®, Probuphine®)

Limited Evidence

Gene	Result	Status
COMT, rs4680	G/A	rs4680 A carrier
CYP3A4	*1/*1	Normal Metabolizer
OPRM1, rs1799971	A/G	rs1799971 G carrier

? **Fentanyl**

Limited Evidence

Gene	Result	Status
COMT, rs4680	G/A	rs4680 A carrier
CYP3A4	*1/*1	Normal Metabolizer
OPRM1, rs1799971	A/G	rs1799971 G carrier

? **Hydromorphone** (Dilaudid®)

Limited Evidence

Gene	Result	Status
COMT, rs4680	G/A	rs4680 A carrier
OPRM1, rs1799971	A/G	rs1799971 G carrier

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Morphine

Limited Evidence

Gene	Result	Status
COMT, rs4680	G/A	rs4680 A carrier
OPRM1, rs1799971	A/G	rs1799971 G carrier

Oxycodone (Oxycontin®)

Limited Evidence

Gene	Result	Status
COMT, rs4680	G/A	rs4680 A carrier
CYP2D6	*1/*4	Intermediate Metabolizer
OPRM1, rs1799971	A/G	rs1799971 G carrier

Sufentanil (Sufenta®)

Limited Evidence

Gene	Result	Status
COMT, rs4680	G/A	rs4680 A carrier
CYP3A4	*1/*1	Normal Metabolizer
CYP3A5	*3/*3	Poor Metabolizer
OPRM1, rs1799971	A/G	rs1799971 G carrier

(Pain) Tranquilizers

Limited Evidence Drug-Gene Associations

Carisoprodol (Soma®)

Limited Evidence

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

(PPIs) Proton Pump Inhibitors

Dexlansoprazole (Dexilant®)

Use caution

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer



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 **Lansoprazole** (Prevacid®)

Use caution

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

 **Omeprazole** (Prilosec®)

Use caution

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

 **Pantoprazole** (Protonix®)

Use caution

Gene	Result	Status
CYP2C19	*1/*1	Normal Metabolizer

(Other) Aminoglycoside antibacterials

 **Amikacin** (Arikayce®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

 **Gentamicin** (Garamycin®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

 **Kanamycin** (Kantrex®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent



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✔ **Plazomicin** (Zemdri®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

✔ **Streptomycin**

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

✔ **Tobramycin** (Tobrex®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

(Other) Antivirals

✔ **Abacavir** (Ziagen®)

Normal response expected

Gene	Result	Status
HLA-B*57:01	ABSENT	HLA-B: *57:01 negative

(Other) Contraceptives

Limited Evidence Drug-Gene Associations

⚠ **Hormonal contraceptives**

Limited Evidence

Gene	Result	Status
F2, c.*97G>A	G/G	Variant absent
F5, c.1601G>A (p.Arg534Gln)	G/G	Variant absent

(Other) Interferons



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✔ Peginterferon alfa-2a (Pegasys®)

Normal response expected

Gene	Result	Status
IFNL3/IFNL4, rs12979860	C/C	Variant absent

✔ Peginterferon alfa-2b (PegIntron®)

Normal response expected

Gene	Result	Status
IFNL3/IFNL4, rs12979860	C/C	Variant absent

Limited Evidence Drug-Gene Associations

? Peginterferon alfa-2a (Pegasys®)

Limited Evidence

Gene	Result	Status
IFNL3, rs8099917	T/T	Variant absent

? Peginterferon alfa-2b (PegIntron®)

Limited Evidence

Gene	Result	Status
IFNL3, rs8099917	T/T	Variant absent



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Methods and Limitations

Data were generated from extracted DNA using the validated Helix Exome+ assay by the Helix clinical laboratory. The Exome+ assay is based on target enrichment followed by next generation sequencing using paired end reads on an Illumina DNA sequencing system. Star alleles were determined using a proprietary algorithm which performs variant calling and then determines star allele solutions based on a combination of defining SNPs and exon-level copy number.

Metabolizer status was determined based on star allele solutions according to CPIC guidelines, with the following exceptions:

(1) metabolizer status was set as Indeterminate if a novel nonsense or truncating novel mutation was observed within the gene, (2) metabolizer status was set as Indeterminate if the combination of defining SNPs and copy number suggested a novel star allele solution, and (3) if more than two copies of a gene were detected then metabolizer status was set as Indeterminate. Drug/gene considerations were limited to guidelines published by FDA, CPIC, or PharmGKB.

Phasing could not be performed for genotypes, and therefore in some cases the star allele solution could not be disambiguated between two or more equally likely possibilities. In these cases, if the metabolizer status was the same regardless of possible star allele solutions, the more common star allele solution was provided along with the metabolizer status. If the metabolizer status was different for the equally-likely star allele solutions, the star alleles were reported as Unknown and the metabolizer status was considered Indeterminate.

All samples were sequenced and interpreted in Helix's CLIA-certified (#05D2117342) and CAP-accredited (#9382893) laboratory in San Diego, California. These tests have not been cleared or approved by the U.S. Food and Drug Administration.

The reportable range includes the following results: ABCB1: rs2032582, rs1128503, rs1045642; ABCG2: rs2231142; ATIC: rs4673993; COMT: rs4680; CYP2C cluster: rs12777823; CYP2C9: *1-*61; CYP2C19: *1-*19, *22-*26, *28-*39; CYP2D6: *1-*15, *4N, *17-*65, *68-*75, *81, *83-*114; CYP3A4: *1-*24, *26, *28-*38; CYP3A5: *1, *3, *6-*9; CYP4F2: *1, *3; DPYD: *1, *2A, *3, *4, *6-*8, *9B, *10-*13, HapB3, rs150036960, rs72549310, rs80081766, rs150385342, rs141462178, rs200562975, rs2297595, rs139834141, rs6670886, rs115232898, rs72549308, rs72549307, rs45589337, rs146356975, rs150437414, rs145112791, rs201018345, rs183385770, rs143154602, rs72549305, rs75017182, rs140602333, rs143815742, rs61622928, rs200064537, rs764666241, rs142512579, rs186169810, rs72975710, rs144395748, rs57918000, rs199549923, rs72549304, rs111858276, rs138391898, rs148994843, rs190951787, rs142619737, rs201615754, rs59086055, rs138616379, rs145773863, rs147601618, rs17376848, rs3918289, rs55971861, rs138545885, rs137999090, rs145548112, rs146529561, rs60511679, rs112766203, rs56005131, rs199634007, rs200687447, rs60139309, rs201035051, rs55674432, rs147545709, rs67376798, rs141044036, rs145529148, rs72547602, rs72547601, rs202144771, rs139459586, rs140114515, rs148799944, rs114096998; F2: c.*97G>A; F5: c.1601G>A (p.Arg534Gln); GRK4: rs1024323; HLA-B*15:02, *57:01; IFNL3: rs8099917; IFNL3 / IFNL4: rs12979860; MT-RNR1: rs267606617, rs267606618, rs267606619; MTHFR: c.1286A>C (p.Glu429Ala), c.665C>T (p. Ala222Val); NUDT15: *1-*20; OPRM1: rs1799971; SLC19A1: rs1051266; SLCO1B1: *1-*16, *19, *20, *23-*34, *36-*44, *47-*49; TPMT: *1, *2, *3A, *3B, *3C, *4-*44; VKORC1: rs9923231. Sensitivity may be reduced for the CYP2D6*13 allele.

Results are based on: Abacavir, HLA-B*57:01 (FDA Section 1, CPIC A); Allopurinol, ABCG2 (PGKB 1A); Amikacin, MT-RNR1 (CPIC A); Amitriptyline, CYP2C19, CYP2D6 (CPIC A); Amphetamine, CYP2D6 (FDA Section 1); Aripiprazole, CYP2D6 (FDA Section 1); Atomoxetine, CYP2D6 (FDA Section 1); Atorvastatin, SLCO1B1 (CPIC A); Azathioprine, NUDT15, TPMT (FDA Section 1, CPIC A); Brexpiprazole, CYP2D6 (FDA Section 1); Brivaracetam, CYP2C19 (FDA Section 1); Capecitabine, DPYD (FDA Section 1, CPIC A); Carbamazepine, HLA-B*15:02 (FDA Section 1; CPIC A); Celecoxib, CYP2C9 (FDA Section 1); Citalopram, CYP2C19 (FDA Section 1; CPIC A); Clobazam, CYP2C19 (FDA Section 1); Clomipramine, CYP2C19, CYP2D6 (PGKB 1A); Clopidogrel, CYP2C19 (FDA Section 1); Clozapine, CYP2D6 (FDA Section 1); Codeine, CYP2D6 (FDA Section 1, CPIC A); Desipramine, CYP2D6 (PGKB 1A); Deutetrabenazine, CYP2D6 (FDA section 1); Dexlansoprazole, CYP2C19 (PGKB 1A); Doxepin, CYP2C19, CYP2D6 (PGKB 1A); Escitalopram, CYP2C19 (CPIC A); Flecainide, CYP2D6 (PGKB 1A); Flibanserin, CYP2C19 (FDA Section 1); Fluorouracil, DPYD (FDA Section 1, CPIC A); Flurbiprofen, CYP2C9 (FDA Section 1); Fluvastatin, CYP2C9, SLCO1B1 (CPIC A); Fluvoxamine, CYP2D6 (PGKB 1A); Gefitinib, CYP2D6 (FDA Section 1); Gentamicin, MT-RNR1 (CPIC A); Haloperidol, CYP2D6 (PGKB 1A); Hydrocodone, CYP2D6 (PGKB 1A); Ibuprofen, CYP2C9 (PGKB 1A); Iloperidone, CYP2D6 (FDA Section 1); Imipramine, CYP2C19, CYP2D6 (PGKB 1A); Kanamycin, MT-RNR1 (CPIC A); Lamotrigine, HLA-B*15:02 (PGKB 1A; DPWG); Lansoprazole, CYP2C19 (PGKB 1A; CPIC A); Lofexidine, CYP2D6 (FDA section 1); Lornoxicam, CYP2C9 (PGKB 1A); Lovastatin, SLCO1B1 (CPIC A); Meloxicam, CYP2C9 (FDA Section 1); Mercaptopurine, NUDT15, TPMT (FDA Section 1, CPIC A); Metoprolol, CYP2D6 (PGKB 1A); Nortriptyline, CYP2D6 (CPIC A); Olliceridine, CYP2D6 (FDA Section 1); Omeprazole, CYP2C19 (PGKB 1A; CPIC A); Ondansetron, CYP2D6 (CPIC A); Oxcarbazepine, HLA-B*15:02 (CPIC A); Pantoprazole, CYP2C19 (FDA Section 1; CPIC A); Paroxetine, CYP2D6 (CPIC A; Phenoconverter); Peginterferon alfa-2a, IFNL3 / IFNL4 (CPIC A); Peginterferon alfa-2b, IFNL3 / IFNL4 (CPIC A); Pimozide, CYP2D6 (FDA section 1); Piroxicam, CYP2C9 (FDA Section 1); Pitavastatin, SLCO1B1 (CPIC A); Plazomicin, MT-RNR1 (CPIC A); Pravastatin, SLCO1B1 (CPIC A); Propafenone, CYP2D6 (FDA Section 1); Quetiapine, CYP3A4 (PGKB 1A; DPWG; FDA label); Risperidone, CYP2D6 (PGKB 1A; DPWG); Rosuvastatin, ABCG2, SLCO1B1 (CPIC A); Sertraline, CYP2C19 (CPIC A); Simvastatin, SLCO1B1 (CPIC A); Streptomycin, MT-RNR1 (CPIC A);



Helix Comprehensive Pharmacogenomics (PGx) Panel

Patient Name: Jane Doe	Patient ID: 0123456	Order Date: 2025-04-29
Date of Birth: 01/01/1990	Helix ID: Test12345	Report Date: 2025-04-29
Sex Assigned at Birth: Female	Provider Name: Client Client	
Specimen Type: WHOLE BLOOD	Collection Date: 2025-01-23	

Tacrolimus, CYP3A5 (FDA Section 1); Tamoxifen, CYP2D6 (CPIC A); Tegafur, DPYD (PGKB 1A); Tenoxicam, CYP2C9 (PGKB 1A); Thioguanine, NUDT15, TPMT (FDA Section 1, CPIC A); Thioridazine, CYP2D6 (FDA section 1); Tobramycin, MT-RNR1 (CPIC A); Tramadol, CYP2D6 (FDA Section 1, CPIC A); Trimipramine, CYP2C19, CYP2D6 (PGKB 1A); Tropisetron, CYP2D6 (CPIC A); Valbenazine, CYP2D6 (FDA section 1); Venlafaxine, CYP2D6 (FDA section 1); Voriconazole, CYP2C19 (FDA Section 1, CPIC A); Vortioxetine, CYP2D6 (FDA section 1; CPIC A); Warfarin, CYP2C cluster (PGKB 1A); Warfarin, CYP2C9, CYP4F2, VKORC1 (FDA Section 1, CPIC A).

Disclaimer

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Result Notations

<https://www.fda.gov/medical-devices/precision-medicine/table-pharmacogenetic-associations>
<https://cpicpgx.org/guidelines>
<https://www.pharmgkb.org/guidelineAnnotations>

Report Signed By

Kenneth David Becker, PhD, HCLD, CQ, CGMBS

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