

GeneDose Genetic Response Report



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This report combines (i) an analysis of the patient's DNA by GRI, identifying relevant genetic variants that are informative for medication efficacy, safety, and dosing, with (ii) an interpretation of the identified DNA variants by GRI to bring you immediately actionable clinical guidance regarding safer, more effective medications and dosages for the patient. The Medication Report section lists the type of PGx guidance present on FDA-approved drug labels. Medications with no established FDA PGx guidance are provided solely for educational purposes.

Patient: Doe, Jane
Date of Birth: Jan 01, 1990
Gender: Female

Physician: Dr. Example
Practice: Example Health Associates

Specimen type: Buccal swab
Sample ID: ex225

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Genetic Summary Information

† When multiple activities are listed, check information in Medication Report Details (Pg. 15) for specific medication of interest.
Uncertain = No known diplotype/result (name) or activity for this combination of genetic variants; Uninterpretable Genotype.

Genetic Summary

Gene	Result	Activity †
ABCG2	G G	Normal function
ADRA2A(C-1291G)	G G	Unknown Metabolizer
ANKK1	G G	Normal function
ApoE	ε3 ε3	See ApoE Genotype Info
ATM	C C	Increased likelihood of treatment success when taking metformin
COMT(Val158Met)	G G	Normal function
CYP1A2	*1A *1A	Normal metabolizer
CYP2B6	*1A *1A	Normal metabolizer
CYP2C19	*1 *1	Normal metabolizer
CYP2C8	*1 *1	Normal metabolizer
CYP2C9	*1 *1	Normal metabolizer
CYP2D6	*1A _{x2} *1A	Ultrarapid metabolizer
CYP3A4	*1B *1B	Ultrarapid metabolizer

ex225 - Doe, Jane - Reported Feb 06, 2022 - DRAFT

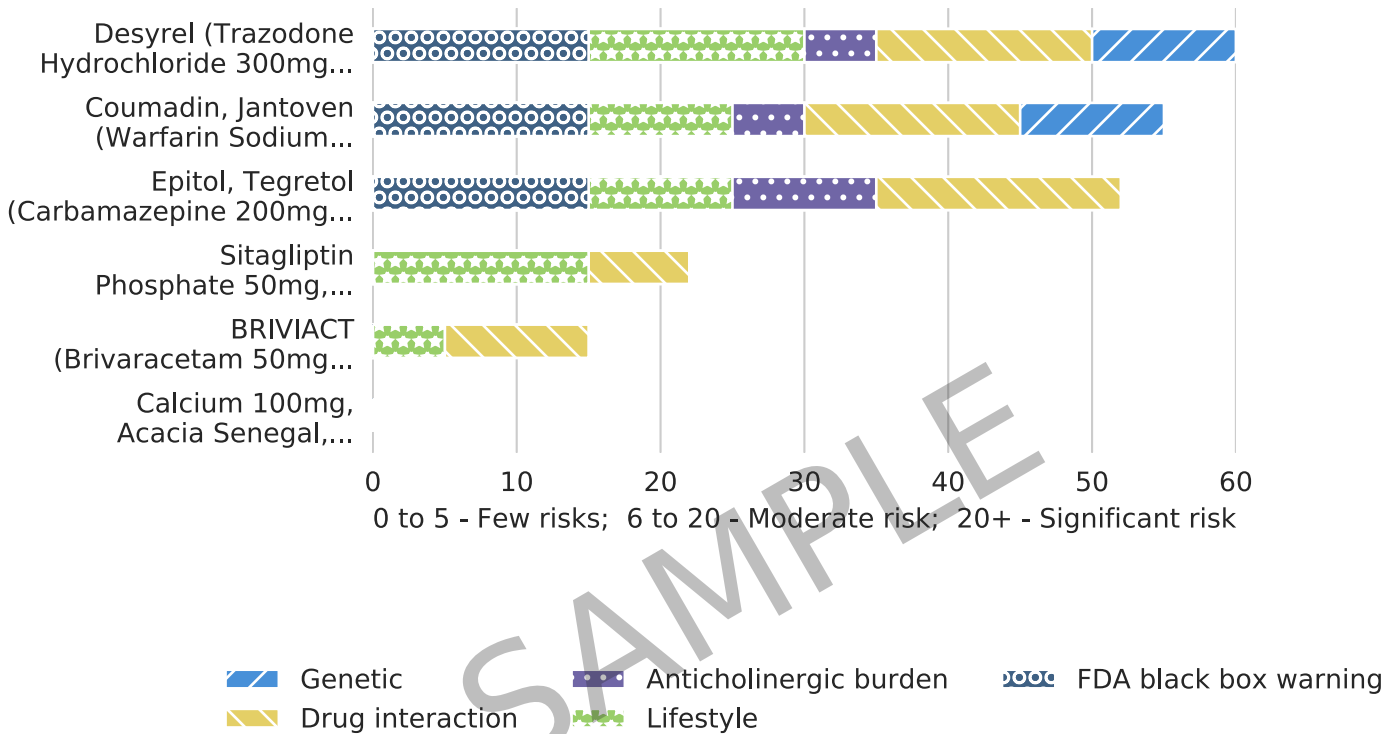
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Gene	Result	Activity †
CYP3A5	*1D *1D; or *1A *1A; or *1A *1D	Normal metabolizer
CYP4F2	*1 *1	Normal metabolizer
Factor V Leiden	Variant	See Thrombosis Profile
GRIK4	T T	Altered function
HLA-B*1502	WT WT	Negative
HTR2A	A A	Normal function
HTR2C(-759C>T)	C/C	Unknown Metabolizer
IFNL3	C C	Normal function
MTHFR	Uncertain Allele	See Thrombosis Profile
MTHFR (A1298C)	Uncertain Allele	See Thrombosis Profile
MTHFR (C677T)	Uncertain Allele	See Thrombosis Profile
OPRM1(A118G)	A A	Normal function
Prothrombin (F2)	Normal	See Thrombosis Profile
SLCO1B1	*1 *1	Normal liver uptake activity
TPMT	*1 *1	Normal metabolizer
VKORC1	*1 *1	Normal (with respect to Warfarin)

Current Regimen Risk Chart

This chart summarizes the various risk factors associated with each medication entered into GeneDose™ Live for Jane Doe. The length of each colored segment represents the relative contribution of a risk category (detailed in the below legend) to the overall risk associated with the use of a medication. For further information, consult the [Current Regimen Risk Details Pg. 4](#) section.



Current Regimen Risk Detail

Severe Risks

Black box warning for Coumadin, Jantoven (Warfarin Sodium 10mg Oral tablet) and bleeding

Black box warning for Desyrel (Trazodone Hydrochloride 300mg Oral tablet) and suicidal ideation

Black box warning for Epitol, Tegretol (Carbamazepine 200mg Oral tablet) and rash

Black box warning for Epitol, Tegretol (Carbamazepine 200mg Oral tablet) and aplastic anemia

Black box warning for Epitol, Tegretol (Carbamazepine 200mg Oral tablet) and agranulocytosis

Strong regimen anticholinergic burden

The cumulative effect of taking multiple medicines with anticholinergic properties termed as anticholinergic burden can adversely impact cognition, physical function and increase the risk of mortality.

Major Risks

Sitagliptin Phosphate 50mg, Simvastatin 40mg Oral tablet with Grapefruit Juice

- avoid combination unless benefit outweighs potential risk

Coadministration with grapefruit juice increases the peak serum concentrations and the AUC of lovastatin and may have a similar effect on simvastatin. Grapefruit juice should be avoided or minimized in patients taking simvastatin.

Desyrel (Trazodone Hydrochloride 300mg Oral tablet) with Grapefruit Juice

- avoid combination unless benefit outweighs potential risk

Advise patients to avoid grapefruit juice while taking trazodone due to increased trazodone exposure and associated adverse effects including QT prolongation.

Genetic warning for Coumadin, Jantoven (Warfarin Sodium 10mg Oral tablet)

Individuals with this combination of alleles may benefit from an increased dose of Warfarin. The FDA

table recommends a therapeutic dose of 5-7 mg/day.

Genetic warning for Desyrel (Trazodone Hydrochloride 300mg Oral tablet)

Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose, or using an alternative medication.

Moderate Risks

Coumadin, Jantoven (Warfarin Sodium 10mg Oral tablet) with Grapefruit Juice

- monitor for evidence of bleeding
- monitor international normalized ratio (INR) or prothrombin time

Closely monitor the INR if coadministration of warfarin with grapefruit/grapefruit juice is necessary as concurrent use may increase the exposure of warfarin leading to increased bleeding risk.

Coumadin, Jantoven (Warfarin Sodium 10mg Oral tablet) with Alcohol

- monitor for evidence of bleeding
- monitor international normalized ratio (INR) or prothrombin time

In studies of healthy subjects anticoagulated with warfarin, small to moderate amounts of wine do not alter the INR. Acute intoxication from ethanol may enhance the hypoprothrombinemic response to warfarin due to inhibition of warfarin's metabolism.

Sitagliptin Phosphate 50mg, Simvastatin 40mg Oral tablet with Alcohol

- monitor blood glucose concentration and for changes in glycemic control
- warn against driving or operating machinery or performing other hazardous tasks until drug effects are known

Patients should be advised to limit alcohol (ethanol) ingestion when treated with an antidiabetic agent. Ethanol inhibits gluconeogenesis, which can increase the risk for hypoglycemia. In some patients, hypoglycemia can be prolonged.

Desyrel (Trazodone Hydrochloride 300mg Oral tablet) with Alcohol

- avoid combination unless benefit outweighs potential risk
- warn against driving or operating machinery or performing other hazardous tasks until drug effects are known
- monitor for an increase in CNS depression

Trazodone may enhance the response to alcohol and other CNS depressants. Trazodone can have

significant sedative effects. The patient should be cautioned accordingly.

Epitol, Tegretol (Carbamazepine 200mg Oral tablet) with Grapefruit Juice

- consult literature

Grapefruit juice has been shown to increase carbamazepine peak and trough serum concentrations and the AUC by up to 40 percent. Grapefruit juice contains a compound that inhibits CYP3A4 in enterocytes. Increased sedation or other side effects may occur.

Epitol, Tegretol (Carbamazepine 200mg Oral tablet) with Alcohol

- warn against driving or operating machinery or performing other hazardous tasks until drug effects are known
- monitor for an increase in CNS depression

Because of its primary CNS effect, caution should be used when carbamazepine is taken with other centrally acting drugs such as ethanol.

BRIVIACT (Brivaracetam 50mg Oral tablet) with Alcohol

- monitor for an increase in CNS depression

The effects of ethanol on psychomotor function, alertness, attention span, body sway, saccadic reaction time, and memory may be increased during co-administration with brivaracetam.

Desyrel (Trazodone Hydrochloride 300mg Oral tablet) may reduce effect of BRIVIACT (Brivaracetam 50mg Oral tablet)

- monitor for altered clinical response to drug therapy
- dosage increase may be required

Trazodone can lower the seizure threshold of anticonvulsants. Patients may require increased concentrations of anticonvulsants to achieve equivalent effects if trazodone is added. Drowsiness may be additive.

BRIVIACT (Brivaracetam 50mg Oral tablet) may have its effect decreased by, and may increase effect of Epitol, Tegretol (Carbamazepine 200mg Oral tablet)

- monitor for signs of drug toxicity
- monitor for altered clinical response to drug therapy
- warn against driving or operating machinery or performing other hazardous tasks until drug effects are known
- dosage reduction may be required

Coadministration with carbamazepine may increase exposure to the active metabolite of carbamazepine, carbamazepine-epoxide. A 26% decrease in the plasma concentration of brivaracetam

has also been observed during co-administration.

Coumadin, Jantoven (Warfarin Sodium 10mg Oral tablet) may have their effect increased by Desyrel (Trazodone Hydrochloride 300mg Oral tablet)

- use combination with caution
- monitor patient clinically
- monitor for evidence of bleeding
- monitor international normalized ratio (INR) or prothrombin time

Patients should be instructed to monitor for signs and symptoms of bleeding while taking trazodone concurrently with anticoagulants and to promptly report any bleeding events to the practitioner. There is an increased risk of bleeding.

Epitol, Tegretol (Carbamazepine 200mg Oral tablet) may decrease concentration of Desyrel (Trazodone Hydrochloride 300mg Oral tablet)

- monitor for altered clinical response to drug therapy
- dosage increase may be required

Consider increasing the trazodone dose based on therapeutic response when coadministered with carbamazepine. Concurrent use may decrease trazodone exposure.

Sitagliptin Phosphate 50mg, Simvastatin 40mg Oral tablet may increase effect of Coumadin, Jantoven (Warfarin Sodium 10mg Oral tablet)

- use combination with caution
- monitor for evidence of bleeding
- monitor international normalized ratio (INR) or prothrombin time

Simvastatin can potentiate the anticoagulant effects of warfarin. Simvastatin should be prescribed cautiously in patients receiving warfarin, with appropriate INR monitoring.

Epitol, Tegretol (Carbamazepine 200mg Oral tablet) may reduce effect of Coumadin, Jantoven (Warfarin Sodium 10mg Oral tablet)

- monitor for altered clinical response to drug therapy
- monitor international normalized ratio (INR) or prothrombin time

Closely monitor the INR if coadministration of warfarin with carbamazepine is necessary as concurrent use may decrease the exposure of warfarin leading to reduced efficacy.

Minor Risks

Sitagliptin Phosphate 50mg, Simvastatin 40mg Oral tablet may have its concentration decreased by Eitol, Tegretol (Carbamazepine 200mg Oral tablet)

- monitor for altered clinical response to drug therapy

Carbamazepine, which is a CYP3A4 inducer, may decrease the efficacy of HMG-Co-A reductase inhibitors which are CYP3A4 substrates, including simvastatin.

SAMPLE

Thrombosis Profile

Tested Genes (Alleles)	Genotype	Predicted Phenotype	Clinical Guidance
Prothrombin (F2)	Normal	Variant alleles detected. It is important for individuals possessing this allelic variant to understand the clinical risks and the genetic implications of their result. Patients should be counseled by their physician or genetic counselor	Individuals homozygous for the Factor V Leiden mutation have an approximately 80-fold increased risk of venous thrombosis as compared to individuals without the mutation. Patients who are homozygous for either MTHFR variant may have a further increased risk for venous thrombosis if they also possess the Factor V Leiden 1691A allele.
Factor V Leiden	Homozygous variant		
MTHFR (A1298C)	Homozygous variant		
MTHFR (C677T)	Homozygous variant		

General Description

Genetic analyses of three genes (four alleles) considered to increase the risk for venous thrombosis were performed using molecular genetic techniques. The presence of the Prothrombin (Factor 2) gene allele 20210A and Factor V Leiden allele 1691A are risk factors for venous thrombosis. This risk may be further increased by the use of estrogen therapy, oral contraceptives, pregnancy, and surgery.

Patients who are homozygous for MTHFR 677T or MTHFR 1298C may have a further increased risk for venous thrombosis if they also possess the Factor V Leiden 1691A allele. However the MTHFR alleles alone do not predict a significant risk for venous thrombosis.

References and Useful Information:

- Factor V Leiden Working Group; ACMG Laboratory Quality Assurance Molecular Subcommittee of the ACMG Laboratory Quality Assurance Committee AMERICAN COLLEGE OF MEDICAL GENETICS; Standards and Guidelines for Clinical Genetics Laboratories; 2006 Edition
 - Middeldorp S, Henkens CM, Koopman MM, van Pampus ECM, Hamulyák K, van der Meer J, Prins MH, Büller HR. The incidence of venous thromboembolism in family members of patients with factor V Leiden mutation and venous thrombosis. *Ann Intern Med* 1998;128:15-20.
 - Vandenbroucke JP, Koster T, Briet E, Reitsma PH, Bertina RM, Rosendaal FR. Increased risk of venous thrombosis in oral contraceptive users who are carriers of factor V Leiden mutation. *Lancet* 1994;344:1453-1457.
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 - Reich LM, Bower M, Key NS. Role of the geneticist in testing and counseling for inherited thrombophilia. *Genet Med* 2003;5:133-143.
 - Tosetto A, Rodeghiero F, Martinelli I, De Stefano V, Missiaglia E, Chiusolo P, Mannucci PM. Additional genetic risk factors for venous thromboembolism in carriers of the factor V Leiden mutation. *Br J Haematol* 1998;103:871-876.
 - De Stefano V, Martinelli I, Mannucci PM, Paciaroni K, Chiusolo P, Casorelli I, Rossi E, Leone G. The risk of recurrent deep venous thrombosis among heterozygous carriers of both factor V Leiden and the G20210A prothrombin mutation. *N Engl J Med* 1999;341:801-806.
- M. Adams, P.D. Smith, D. Martin, J.R. Thompson, D. Lodwick, N.J. Samani. Genetic analysis of thermolabile methylenetetrahydrofolate reductase as a risk factor for myocardial infarction. *QJM*. 1996 Jun;89(6):437-44.

ApoE Genotype Information[†]

Tested Genes (Alleles)	Genotype	Predicted Phenotype	Clinical Guidance
ApoE (ε2, ε3, ε4)	ε3 ε3	Often associated with normal lipid metabolism.	Typical cardiovascular disease risk expected.

General Description

Genetic analysis in the ApoE gene was performed using molecular genetic techniques. The genotype is based on genotyping results for this patient at SNPs rs429358 and rs7412.

ApoE ε3 is the most common allele—found in about 60% of people. The presence of ε2 or ε4 alleles may be a risk factor for multiple conditions including cardiovascular disease. ApoE ε2 carriers may be more likely to develop familial dysbetalipoproteinemia or type III hyperlipoproteinemia.

† Predicted phenotype, clinical significance, relative risk, and interpretations reported for each genotype are associated with cardiovascular risk only. The interpretations should not be used to determine the relative risk of other diseases. Other factors important to understanding total risk should be considered.

Medication Summary

Cardiac			
Therapeutic Class	✓ Standard Precautions	⚠️ ⓘ Caution / Info	✖️ Change recommended
Antiarrhythmics		Flecainide Propafenone	
Anticoagulants	Acenocoumarol Warfarin (CYP4F2)	Warfarin	
Anticonvulsants	Phenytoin		
Antiplatelet Agents	Clopidogrel Prasugrel	Ticagrelor	
Beta Blockers	Nebivolol Propranolol	Carvedilol Metoprolol Timolol	
Statins	Simvastatin	Atorvastatin	

Gastroenterology			
Therapeutic Class	✔ Standard Precautions	⚠️ ⓘ Caution / Info	❌ Change recommended
Antidepressants	Mirtazapine	Trazodone	Amitriptyline Clomipramine Desipramine Doxepin Nortriptyline
Antiemetics			Ondansetron Tropisetron
Endocrine-Metabolic Agents			Eliglustat
Immunosuppressants	Azathioprine Mercaptopurine Thioguanine	Cyclosporine	
Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)	Celecoxib		
Proton Pump Inhibitors (PPIs)	Esomeprazole Rabeprazole	Dexlansoprazole Lansoprazole Omeprazole Pantoprazole	
Selective Serotonin Reuptake Inhibitors (SSRIs)	Citalopram Escitalopram		Paroxetine

Infectious Disease			
Therapeutic Class	✔ Standard Precautions	⚠️ ⓘ Caution / Info	❌ Change recommended
Antifungals	Voriconazole		Ketoconazole

Pain			
Therapeutic Class	✔ Standard Precautions	⚠️ ⓘ Caution / Info	❌ Change recommended
Analgesics, Opioid	Methadone (CYP2B6)		
Anticonvulsants	Brivaracetam Carbamazepine Clobazam Oxcarbazepine Phenytoin		
Antidepressants	Mirtazapine	Duloxetine	Amitriptyline

Pain			
Therapeutic Class	✔ Standard Precautions	⚠️ ⓘ Caution / Info	❌ Change recommended
	Moclobemide	Trazodone Venlafaxine Vortioxetine	Clomipramine Desipramine Doxepin Nortriptyline Protriptyline
Antipsychotics	Olanzapine		
Beta Blockers	Nebivolol Propranolol	Timolol	
Endocrine-Metabolic Agents			Eliglustat
Immunosuppressants	Azathioprine Mercaptopurine	Cyclosporine Tacrolimus	
Muscle Relaxants	Carisoprodol		
Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)	Celecoxib Diclofenac Flurbiprofen Ibuprofen Lornoxicam Meloxicam Piroxicam		
Opioids	Alfentanil Fentanyl (OPRM1) Hydromorphone Morphine Oxycodone (CYP3A5) Sufentanil	Buprenorphine Fentanyl Hydrocodone	Codeine Oxycodone Tramadol
Selective Serotonin Reuptake Inhibitors (SSRIs)	Citalopram Escitalopram Fluoxetine Sertraline	Fluvoxamine	Paroxetine




Psychotropic			
Therapeutic Class	✔ Standard Precautions	⚠️ ⓘ Caution / Info	❌ Change recommended
Anti-ADHD Agents	Amphetamine Dexmethylphenidate Dextroamphetamine Lisdexamfetamine Methylphenidate (COMT)	Atomoxetine Clonidine Methylphenidate (ADRA2A)	
Anticonvulsants	Brivaracetam		



Psychotropic			
Therapeutic Class	✓ Standard Precautions	⚠️ ⓘ Caution / Info	✖️ Change recommended
	Carbamazepine Clobazam Oxcarbazepine Phenytoin		
Antidementia Agents		Donepezil	
Antidepressants	Bupropion Mirtazapine Moclobemide	Duloxetine Trazodone Venlafaxine Vortioxetine	Amitriptyline Clomipramine Desipramine Doxepin Nortriptyline Protriptyline
Antipsychotics	Aripiprazole Flupenthixol Olanzapine	Brexpiprazole Clozapine Haloperidol Iloperidone Perphenazine Pimozide Quetiapine Risperidone Thioridazine Zuclopenthixol	
Anxiolytics	Diazepam	Alprazolam Buspirone Clonazepam	
Beta Blockers	Propranolol		
Central Monoamine-Depleting Agents		Tetrabenazine	
Central Nervous System Agents		Dextromethorphan- Quinidine	
Cholinesterase Inhibitors		Galantamine	
Hypnotics		Eszopiclone	
Selective Serotonin Reuptake Inhibitors (SSRIs)	Citalopram Escitalopram Fluoxetine Sertraline	Fluvoxamine	Paroxetine

Surgery			
Therapeutic Class	✓ Standard Precautions	⚠️ ⓘ Caution / Info	✖️ Change recommended
Anticholinergic Agents		Tolterodine	
Antiemetics			Ondansetron Tropisetron
Opioids	Fentanyl (OPRM1)	Fentanyl	




Other Drugs			
Therapeutic Class	✓ Standard Precautions	⚠️ ⓘ Caution / Info	✖️ Change recommended
Alpha-1 Blockers		Tamsulosin	
Anticholinergic Agents		Fesoterodine	
Antidiabetics	Gliclazide Glimepiride Glyburide Tolbutamide	Metformin Saxagliptin	
Anti-Retroviral Agents	Efavirenz Nevirapine		
Beta-3 Adrenergic Agonists	Mirabegron		
Cholinergic Agonists		Cevimeline	
Contraceptives			Estrogen-containing oral contraceptives
EGFR Inhibitors		Gefitinib	
Immunosuppressants		Sirolimus	
Vesicular monoamine transporter 2 inhibitor		Deutetrabenazine	
Xanthine Oxidase Inhibitor	Allopurinol		

Legend





-  Typical response is expected
-  Change recommended
-  Consider alternative therapy
















-  Additional information available
-  Response is uncertain











Clinical Evidence Level







-  Strong
-  Moderate
-  Emerging













Medication Report Details (by therapeutic class)














Drug	Finding	Recommendation	Concern	Evidence
Alpha-1 Blockers				
Tamsulosin (Flomax) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Analgesics, Opioid				
Methadone (CYP2B6) (Dolophine) <i>FDA drug label: Not established for PGx</i>	 CYP2B6: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		















Drug	Finding	Recommendation	Concern	Evidence
Anti-ADHD Agents				
Amphetamine (Adzenys, Evekeo) <i>FDA drug label: Not established for PGx</i>	 COMT(Val158Met): Normal function. Two normal function alleles.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Atomoxetine (Strattera) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Clonidine (Clonidine, Kapvay) <i>FDA drug label: Not established for PGx</i>	 ADRA2A(C-1291G): Two variant alleles detected.	Individuals with rs1800544 GG genotype may be at an increased risk of therapeutic failure due to increased metabolic clearance.	Efficacy	
Dexmethylphenidate (Focalin) <i>FDA drug label: Not established for PGx</i>	 COMT(Val158Met): Normal function. Two normal function alleles.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Dextroamphetamine (Zenzedi, Dexedrine) <i>FDA drug label: Not established for PGx</i>	 COMT(Val158Met): Normal function. Two normal function alleles.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Guanfacine (Tenex, Intuniv) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer status. Two alleles showing increased function.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose.	Efficacy	
Lisdexamfetamine (Vyvanse) <i>FDA drug label: Not established for PGx</i>	 COMT(Val158Met): Normal function. Two normal function alleles.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Methylphenidate (ADRA2A) (Concerta, Metadate, Ritalin, Ritalin LA, Quillivant, Daytrana, Methylin) <i>FDA drug label: Not established for PGx</i>	 ADRA2A(C-1291G): Two variant alleles detected.	Individuals with rs1800544 GG genotype may be at an increased risk of therapeutic failure due to increased metabolic clearance.	Efficacy	
















Drug	Finding	Recommendation	Concern	Evidence
Methylphenidate (COMT) (Concerta, Metadate, Ritalin, Ritalin LA, Quillivant, Daytrana, Methylin) <i>FDA drug label: Not established for PGx</i>	 COMT(Val158Met): Normal function. Two normal function alleles.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Antiarrhythmics				
Flecainide (Tambocor) <i>FDA drug label: Not established for PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Propafenone (Rythmol) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Monitor the patient's response to guide dosing, or consider using an alternative medication.	Efficacy	
Anticholinergic Agents				
Fesoterodine (Toviaz) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with lower plasma concentrations of the active medication. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Tolterodine (Detrol) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	












Drug	Finding	Recommendation	Concern	Evidence
Anticoagulants				
Acenocoumarol (Sintrom, Acitrom) <i>FDA drug label: Not established for PGx</i>	 CYP2C9: Normal metabolizer. Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Warfarin (Coumadin) <i>FDA drug label: Actionable PGx</i>	 Multigenic: VKORC1, CYP2C9: Two alleles showing normal activity.; Normal metabolizer. Two alleles showing normal activity.	Individuals with this combination of alleles may benefit from an increased dose of Warfarin. The FDA table recommends a therapeutic dose of 5-7 mg/day.	ADR & Efficacy	
Warfarin (CYP4F2) (Coumadin) <i>FDA drug label: Actionable PGx</i>	 Multigenic: CYP2C9, VKORC1, CYP4F2: Normal metabolizer. Two alleles showing normal activity.; Two alleles showing normal activity.; Normal function. Two alleles with normal activity.	Individuals with this combination of alleles may benefit from a standard therapeutic dose of warfarin. Consider a regimen of 4.1-5.9 mg/day (29-41 mg/week).	ADR & Efficacy	









Drug	Finding	Recommendation	Concern	Evidence
Anticonvulsants				
Brivaracetam <i>FDA drug label: Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Carbamazepine (Tegretol) <i>FDA drug label: Testing required</i>	 HLA-B*1502: Negative; Absence of *15:02 alleles.	Individuals with wild type alleles are expected to show typical response. No additional therapeutic recommendations.		
Clobazam (Onfi) <i>FDA drug label: Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Oxcarbazepine (Trileptal) <i>FDA drug label: Testing recommended</i>	 HLA-B*1502: Negative; Absence of *15:02 alleles.	Individuals with wild type alleles are expected to show typical response. No additional therapeutic recommendations.		
Phenytoin (Cerebyx) <i>FDA drug label: Actionable PGx</i>	 CYP2C9: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Antidementia Agents				
Donepezil (Aricept) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	













Drug	Finding	Recommendation	Concern	Evidence
Antidepressants				
Amitriptyline (Elavil) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	
Bupropion (Wellbutrin) <i>FDA drug label: Not established for PGx</i>	 ANKK1: Normal function. Two alleles with normal activity.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Clomipramine (Anafranil) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	
Desipramine (Norpramin) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	
Doxepin (Deptran) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	
Duloxetine (Cymbalta) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Imipramine (Tofranil) <i>FDA drug label: Actionable PGx</i>	 Multigenic: CYP2C19, CYP2D6: CYP2C19: Normal metabolizer. Two normal function alleles.	Multiple results from uncorrelated genes. CYP2C19: Typical response is expected; no additional therapeutic recommendations.; CYP2D6: Consider alternative therapy		















Drug	Finding	Recommendation	Concern	Evidence
Mirtazapine <i>FDA drug label: Not established for PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Typical response expected. No additional therapeutic recommendations.		
Moclobemide (Manerix, Aurorix, Amira, Clobemix, Depnil) <i>FDA drug label: Not established for PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Nortriptyline (Pamelor) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	
Protriptyline (Vivactil) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	
Trazodone (Oleptro, Desyrel) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose, or using an alternative medication.	Efficacy	
Venlafaxine (Effexor) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose, or using an alternative medication.	Efficacy	
Vortioxetine (Brintellix) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider adjusting the dose, or monitoring the patient's response to guide dosing.	Efficacy	















Drug	Finding	Recommendation	Concern	Evidence
Antidiabetics				
Gliclazide <i>FDA drug label: Not established for PGx</i>	 CYP2C9: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Glimepiride <i>FDA drug label: Not established for PGx</i>	 CYP2C9: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Glyburide (Glibenclamide) <i>FDA drug label: Not established for PGx</i>	 CYP2C9: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Metformin (Glucophage®) <i>FDA drug label: Not established for PGx</i>	 ATM: Enhanced response.	Increased drug efficacy likely.		
Saxagliptin (Onglyza) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose, or using an alternative medication.	Efficacy	
Tolbutamide (Orinase) <i>FDA drug label: Not established for PGx</i>	 CYP2C9: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Antiemetics				
Ondansetron (Zofran) <i>FDA drug label: Informative PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	
Tropisetron (Navoban, Setrovel) <i>FDA drug label: Not established for PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	











Drug	Finding	Recommendation	Concern	Evidence
Antifungals				
Ketoconazole (Nizoral) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	
Voriconazole (Vfend) <i>FDA drug label: Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Antineoplastic Agents				
Methotrexate (Rheumatrex, Trexall) <i>FDA drug label: Not established for PGx</i>	 MTHFR: Uncertain Allele	No recommendation for Methotrexate is available for this combination of variants/alleles.		
Antiplatelet Agents				
Clopidogrel <i>FDA drug label: Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Prasugrel <i>FDA drug label: Informative PGx</i>	 CYP2C19: Normal metabolizer. Two alleles showing normal activity.	Typical response expected. No additional therapeutic recommendations.		
Ticagrelor (Brilinta) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	















Drug	Finding	Recommendation	Concern	Evidence
Antipsychotics				
Aripiprazole (Abilify) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Brexpiprazole (Rexulti) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Clozapine <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Flupenthixol <i>FDA drug label: Not established for PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Typical response expected. No additional therapeutic recommendations.		
Haloperidol (Haldol) <i>FDA drug label: Not established for PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Iloperidone <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Olanzapine (Zalasta, Zyprexa) <i>FDA drug label: Not established for PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Typical response expected. No additional therapeutic recommendations.		



Drug	Finding	Recommendation	Concern	Evidence
Perphenazine (Trilafon) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Pimozide (Orap) <i>FDA drug label: Testing required</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Quetiapine (Seroquel) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose, or using an alternative medication.	Efficacy	
Risperidone (Risperdal) <i>FDA drug label: Informative PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Monitor the patient's response to guide dosing, or consider using an alternative medication.	Efficacy	
Thioridazine <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose, or using an alternative medication.	Efficacy	
Zuclopendixol <i>FDA drug label: Not established for PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. Be alert to lack of efficacy; consider alternative medication.	Efficacy	

Drug	Finding	Recommendation	Concern	Evidence
Anti-Retroviral Agents				
Efavirenz (Sustiva) <i>FDA drug label: Actionable PGx</i>	 CYP2B6: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Nevirapine (Viramune) <i>FDA drug label: Not established for PGx</i>	 CYP2B6: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Anxiolytics				
Alprazolam (Xanax, Niravam) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider adjusting the dose, or using an alternative medication.	Efficacy	
Buspirone (Buspar) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose, or using an alternative medication.	Efficacy	
Clonazepam (Klonopin) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Monitor the patient's response to guide dosing, or consider using an alternative medication.	Efficacy	
Diazepam <i>FDA drug label: Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Beta-3 Adrenergic Agonists				
Mirabegron (Myrbetriq) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with lower plasma concentrations of the active medication. No additional therapeutic recommendations.		












Drug	Finding	Recommendation	Concern	Evidence
Beta Blockers				
Carvedilol (Coreg) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose, or using an alternative medication.	Efficacy	
Metoprolol (Lopressor) <i>FDA drug label: Informative PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose, or using an alternative medication.	Efficacy	
Nebivolol (Bystolic) <i>FDA drug label: Informative PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Typical response expected. No additional therapeutic recommendations.		
Propranolol (Inderal) <i>FDA drug label: Informative PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Typical response expected. No additional therapeutic recommendations.		
Timolol (Blocadren) <i>FDA drug label: Not established for PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy.	Efficacy	
Central Monoamine-Depleting Agents				
Tetrabenazine (Xenazine) <i>FDA drug label: Testing required</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Central Nervous System Agents				
Dextromethorphan-Quinidine (Nuedexta) <i>FDA drug label: Testing recommended</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	





Drug	Finding	Recommendation	Concern	Evidence
Cholinergic Agonists				
Cevimeline (Evoxac) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Cholinesterase Inhibitors				
Galantamine (Razadyne, Razadyne ER, Nivalin, Lycoremime, Reminyl) <i>FDA drug label: Informative PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Contraceptives				
Estrogen-containing oral contraceptives <i>FDA drug label: Not established for PGx</i>	 F5: Two Leiden alleles	Individuals with these homozygous variant alleles frequently present with significantly increased risk of side effects. This medication should be avoided.	ADR	
EGFR Inhibitors				
Gefitinib (Iressa) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Endocrine-Metabolic Agents				
Eliglustat <i>FDA drug label: Testing required</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	

Drug	Finding	Recommendation	Concern	Evidence
Hypnotics				
Eszopiclone (Lunesta) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Monitor the patient's response to guide dosing, or consider using an alternative medication.	Efficacy	
Immunosuppressants				
Azathioprine (Imuran) <i>FDA drug label: Testing recommended</i>	 TPMT: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Cyclosporine (Gengraf, Neoral) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Mercaptopurine (Purinethol) <i>FDA drug label: Testing recommended</i>	 TPMT: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Sirolimus (Rapamune) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Tacrolimus (Prograf, Hecoria) <i>FDA drug label: Not established for PGx</i>	 CYP3A5: Two alleles showing normal activity.	Normal metabolizers of this medication may present with lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose; monitor the patient's response to guide dosing.	Efficacy	
Thioguanine (6-TG, Tabloid, Lanvis) <i>FDA drug label: Testing recommended</i>	 TPMT: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		















Drug	Finding	Recommendation	Concern	Evidence
Muscle Relaxants				
Carisoprodol (Soma) <i>FDA drug label:</i> <i>Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		

















SAMPLE









Drug	Finding	Recommendation	Concern	Evidence
Non-drug				
ABCG2	 ABCG2: Normal function. Two normal function alleles.	Typical response is expected; no additional therapeutic recommendations.		
ADRA2A(C-1291G)	 ADRA2A(C-1291G): Two variant alleles detected.	Uncertain phenotype		
ANKK1	 ANKK1: Normal function. Two alleles with normal activity.	Normal function. Two alleles with normal activity.		
ApoE	 ApoE: Often associated with normal lipid metabolism.	Typical cardiovascular disease risk expected.		
COMT(Val158Met)	 COMT(Val158Met): Normal function. Two normal function alleles.	No recommendation for COMT(Val158Met) is available for this combination of variants/alleles.		
CYP1A2	 CYP1A2: Normal metabolizer. Two alleles showing normal activity.	No additional therapeutic recommendations.		
CYP2B6	 CYP2B6: Normal metabolizer. Two normal function alleles.	No additional therapeutic recommendations.		
CYP2C8	 CYP2C8: Normal metabolizer. Two alleles showing normal activity.	Typical response is expected; no additional therapeutic recommendations.		
CYP4F2	 CYP4F2: Normal function. Two alleles with normal activity.	Normal function. Two alleles with normal activity.		
GRIK4	 GRIK4: Altered function. Two altered function alleles.	Altered function. Two alleles with altered activity.		
HTR2A	 HTR2A: Normal function. Two alleles with normal activity.	Normal function. Two alleles with normal activity.		
HTR2C(-759C>T)	 HTR2C(-759C>T): C/C	Uncertain phenotype		













Drug	Finding	Recommendation	Concern	Evidence
IFNL3	 IFNL3: Normal function. Two normal function alleles.	Typical response is expected; no additional therapeutic recommendations.		
MTHFR (A1298C)	 MTHFR (A1298C): Uncertain Allele	No recommendation for MTHFR (A1298C) is available for this combination of variants/alleles.		
MTHFR (C677T)	 MTHFR (C677T): Uncertain Allele	No recommendation for MTHFR (C677T) is available for this combination of variants/alleles.		
OPRM1(A118G)	 OPRM1(A118G): Normal function. Two alleles with normal activity.	Normal function. Two alleles with normal activity.		

















SAMPLE





Drug	Finding	Recommendation	Concern	Evidence
Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)				
Celecoxib (Celebrex) <i>FDA drug label: Actionable PGx</i>	 CYP2C9: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Diclofenac (Cataflam) <i>FDA drug label: Not established for PGx</i>	 CYP2C9: Normal metabolizer. Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Flurbiprofen (Ocufen) <i>FDA drug label: Actionable PGx</i>	 CYP2C9: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Ibuprofen (Motrin, Advil) <i>FDA drug label: Not established for PGx</i>	 CYP2C9: Normal metabolizer. Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Lornoxicam (Xefo) <i>FDA drug label: Not established for PGx</i>	 CYP2C9: Normal metabolizer. Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Meloxicam (Mobic) <i>FDA drug label: Actionable PGx</i>	 CYP2C9: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Piroxicam (Feldene) <i>FDA drug label: Actionable PGx</i>	 CYP2C9: Normal metabolizer. Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		

Drug	Finding	Recommendation	Concern	Evidence
Opioids				
Alfentanil (Rapifen, Alfenta) <i>FDA drug label: Not established for PGx</i>	 OPRM1(A118G): Normal function. Two alleles with normal activity.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Buprenorphine (Butrans, Buprenex) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer. Two increased function alleles.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Codeine <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus a significantly increased risk of side effects. This medication should be avoided.	ADR	
Fentanyl (Duragesic, Sublimaze) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultrarapid metabolizer status. Two alleles showing increased function.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Fentanyl (OPRM1) (Duragesic, Sublimaze) <i>FDA drug label: Not established for PGx</i>	 OPRM1(A118G): Normal function. Two alleles with normal activity.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Hydrocodone <i>FDA drug label: Not established for PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Be alert to adverse reactions; monitor the patient's response to guide dosing.	ADR	
Hydromorphone (Dilaudid) <i>FDA drug label: Not established for PGx</i>	 OPRM1(A118G): Normal function. Two alleles with normal activity.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Morphine (MS-IR) <i>FDA drug label: Not established for PGx</i>	 OPRM1(A118G): Normal function. Two alleles with normal activity.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		

Drug	Finding	Recommendation	Concern	Evidence
Oxycodone (Oxycontin) <i>FDA drug label: Not established for PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus a significantly increased risk of side effects. This medication should be avoided.	ADR	
Oxycodone (CYP3A5) (Oxycontin) <i>FDA drug label: Not established for PGx</i>	 CYP3A5: Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Sufentanil (Sufenta) <i>FDA drug label: Not established for PGx</i>	 OPRM1(A118G): Normal function. Two alleles with normal activity.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Tramadol (Ultracet, Ultram) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus a significantly increased risk of side effects. This medication should be avoided.	ADR	

Drug	Finding	Recommendation	Concern	Evidence
Proton Pump Inhibitors (PPIs)				
Dexlansoprazole (Kapidex, Dexilant) <i>FDA drug label:</i> <i>Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication may present with lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Monitor the patient's response to guide dosing; consider increasing the dose.	Efficacy	
Esomeprazole (Nexium) <i>FDA drug label:</i> <i>Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Lansoprazole (Prevacid) <i>FDA drug label:</i> <i>Informative PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication may present with lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Monitor the patient's response to guide dosing; consider increasing the dose.	Efficacy	
Omeprazole (Prilosec, Zegerid) <i>FDA drug label:</i> <i>Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication may present with lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Monitor the patient's response to guide dosing; consider increasing the dose.	Efficacy	
Pantoprazole (Protonix) <i>FDA drug label:</i> <i>Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication may present with lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Monitor the patient's response to guide dosing; consider increasing the dose.	Efficacy	
Rabeprazole (Aciphex) <i>FDA drug label:</i> <i>Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		

Drug	Finding	Recommendation	Concern	Evidence
Selective Serotonin Reuptake Inhibitors (SSRIs)				
Citalopram (Celexa) <i>FDA drug label: Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Escitalopram (Lexapro) <i>FDA drug label: Actionable PGx</i>	 CYP2C19: Normal metabolizer. Two alleles showing normal activity.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Fluoxetine (Prozac) <i>FDA drug label: Informative PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Typical response expected. No additional therapeutic recommendations.		
Fluvoxamine (Luvox) <i>FDA drug label: Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. Be alert to lack of efficacy; consider alternative medication.	Efficacy	
Paroxetine (Paxil) <i>FDA drug label: Informative PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication frequently present with notably lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	
Sertraline (Zoloft) <i>FDA drug label: Not established for PGx</i>	 CYP2C19: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Statins				
Atorvastatin (Lipitor, Caduet) <i>FDA drug label: Not established for PGx</i>	 CYP3A4: Ultra-rapid metabolizer. Two alleles showing increased activity.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Consider increasing the dose, or using an alternative medication.	Efficacy	
Simvastatin (Zocor) <i>FDA drug label: Informative PGx</i>	 SLCO1B1: Normal liver uptake activity.	Individuals with normal SLCO1B1 liver uptake activity are expected to have a typical response to a standard dose of simvastatin.		

Drug	Finding	Recommendation	Concern	Evidence
Vesicular monoamine transporter 2 inhibitor				
Deutetrabenazine (Austedo) <i>FDA drug label:</i> <i>Actionable PGx</i>	 CYP2D6: Ultrarapid metabolizer. One normal function allele and one duplicated normal function allele.	Ultrarapid metabolizers of this medication may present with notably lower plasma concentrations of the active medication, thus an increased risk of pharmacotherapy failure. Be alert to lack of efficacy; monitor the patient's response to guide dosing.	Efficacy	
Xanthine Oxidase Inhibitor				
Allopurinol (Zyloprim)	 ABCG2: Normal function. Two normal function alleles.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		

SAMPLE

Clinical Evidence Levels

Strong

- Includes gene-drug pairs approved by the Global Research Institute for Medical Research Pharmacogenomics Advisory Group.
- Includes gene-drug pairs supported by multiple studies documenting consistent effects of specific genetic variant(s) on clinical outcomes.
- Includes gene-drug pairs approved by the Dutch Pharmacogenetics Working Group (DPWG) and/or guidelines published in Clinical Pharmacology and Therapeutics by the Clinical Pharmacogenetics Implementation Consortium (CPIC).

Moderate

- Includes gene-drug pairs supported by pharmacokinetic, pharmacodynamic, or molecular/cellular functional studies showing consistent effects of genetic variant(s).
- Includes Drug product information (e.g. This interpretation is based on guidance available in the FDA (Food and Drug Administration) drug label for ABILIFY® (10/2013).
- Includes gene-drug pairs for which potential clinical outcomes are inferred from similar gene-drug interactions approved by the Dutch Pharmacogenetics Working Group (DPWG), and/or guidelines published in Clinical Pharmacology and Therapeutics by the Clinical Pharmacogenetics Implementation Consortium (CPIC), and/or pharmacogenomic reports and submission from the Global Research Institute for Medical Research.

Emerging

- Includes gene-drug pairs supported by published studies of the drug, related drug, or a probing compound of interest involving limited data and/or inconsistent findings.

Patient Information Card

This card contains an abbreviated genetic summary.
It is not intended as a replacement for the complete GeneDose™ report.

GRI: <https://www.gri-labs.com/>

Patient: Doe, Jane
DOB: 1990-01-01
Sample ID: ex225

This card shows information about your genetics that relate to drug metabolism. Show to your doctors before being prescribed new medications.

Pharmacogenomic Summary

ABCG2	G G	Normal function
ADRA2A(C-1291G)	G G	Unknown Metabolizer
ANKK1	G G	Normal function
ApoE	ε3 ε3	See full GeneDose report
ATM	C C	Increased likelihood of treatment success when taking metformin
COMT(Val158Met)	G G	Normal function
CYP1A2	*1A *1A	Normal metabolizer
CYP2B6	*1A *1A	Normal metabolizer
CYP2C19	*1 *1	Normal metabolizer
CYP2C8	*1 *1	Normal metabolizer
CYP2C9	*1 *1	Normal metabolizer
CYP2D6	*1A _{x2} *1A	Ultrarapid metabolizer

CYP3A4	*1B *1B	Ultrarapid metabolizer
CYP3A5	*1D *1D; or *1A *1A; or *1A *1D	Normal metabolizer
CYP4F2	*1 *1	Normal metabolizer
Factor V Leiden	Variant	See full GeneDose report
GRIK4	T T	Altered function
HLA-B*1502	WT WT	Negative
HTR2A	A A	Normal function
HTR2C(-759C>T)	C/C	Unknown Metabolizer
IFNL3	C C	Normal function
MTHFR	Uncertain Allele	See full GeneDose report
MTHFR (A1298C)	Uncertain Allele	See full GeneDose report
MTHFR (C677T)	Uncertain Allele	See full GeneDose report
OPRM1(A118G)	A A	Normal function
Prothrombin (F2)	Normal	See full GeneDose report
SLCO1B1	*1 *1	Normal liver uptake activity
TPMT	*1 *1	Normal metabolizer
VKORC1	*1 *1	Normal (with respect to Warfarin)

Powered by GRI

↑ Cut on dotted lines.

↑ Fold Here