PharmaGene Genetic Response Report

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This report combines (i) an analysis of the patient's DNA by Next Biosciences, identifying relevant genetic variants that are informative for medication efficacy, safety, and dosing, with (ii) an interpretation of the identified DNA variants by Coriell Life Sciences 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: Schoeman, Ben
Date of Birth: May 02, 1995
Sex: Male

Date Collected: Jul 01, 2023
Date Accessioned: Jul 05, 2023
Date Processed: Aug 08, 2023
Specimen type: Blood
Sample ID: 220223

Table of Contents

Genetic Summary Information

† When multiple activities are listed, check information in Medication Report Details (Pg. 13) 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.1252G>C)	G|C	Positive
ANKK1	G|G	Normal function
ApoE	ε3|ε3	See ApoE Genotype Info
ATM(C11orf65)	C|C	Negative
BCHE	WT|WT	Normal function
BDNF	C|T	Decreased function
CACNA1C(270344G>A)	A|A	Positive
COMT(Val158Met)	G|G	Normal function
CYP1A2	*1F|*1F	Normal metabolizer
CYP2B6	*1|*1	Normal metabolizer
CYP2C19	*1|*2	Intermediate metabolizer
CYP2C8	*1|*1C	Indeterminate
CYP2C9	*1|*3	Intermediate metabolizer
CYP2D6	*5|*5	Poor metabolizer
CYP3A4	*1|*1	Normal metabolizer
CYP3A5	*1|*1	Normal metabolizer
CYP4F2	*1|*1	Normal metabolizer

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Gene	Result	Activity †
DBH(-1021C>T)	C|C	Positive
DPYD	*1|*2A	Intermediate metabolizer
Factor V Leiden	Normal	See Thrombosis Profile
FKBP5(rs1360780)	C|C	Positive
FKBP5(rs4713916)	Not Tested	n/a
G6PD	Not Tested	n/a
GRIK1(rs2832407)	C|C	Negative
GRIK4	T|C	Positive
GRIN2B(rs2058878)	T|A	n/a
HLA-A*3101	Not Tested	n/a
HLA-B*1502	Not Tested	n/a
HLA-B*5701	Not Tested	n/a
HLA-B*5801	Not Tested	n/a
HTR2A(rs7997012)	rs7997012 A/G	Positive
HTR2C(2565G>C)	Uncertain Allele	n/a
HTR2C(-759C>T)	C|T	Positive
IFNL3	C|C	Negative

Gene	Result	Activity †
MTHFR	GT|GG	See Thrombosis Profile
MTHFR (A1298C)	T|G	Decreased function
MTHFR (C677T)	G|G	Normal function
NUDT15	*1|*3	Intermediate metabolizer
OPRD1(rs678849)	T|T	Positive
OPRM1(A118G)	A|A	Normal function
Prothrombin (F2)	Normal	See Thrombosis Profile
SLCO1B1	*1|*1	Normal function
TPMT	*1|*1	Normal metabolizer
UGT2B15	*1|*2	Decreased function
VKORC1	*1|*2	Medium sensitivity to warfarin

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Future Prescribing Medications

Some DNA and medication combinations are more severe than others. These are the most severe for you.

AVOID the following medications:

These medications should be avoided because they are less likely to work for you or could put you at significant risk for harm.

Medication	Response		
	🐢	🐇	•••
Amitriptyline (CYP2C19, CYP2D6) (Elavil)	X		
Amoxapine (Asendin)	X		
Clomipramine (CYP2C19, CYP2D6) (Anafranil, Clomicalm)	X		
Clopidogrel (Plavix)	X		
Codeine	X		
Desipramine (Norpramin)	X		
Dextromethorphan-Quinidine (Nuedexta)	X		
Doxepin (CYP2C19, CYP2D6) (Quitaxon, Aponal, Sinequan)	X		
Imipramine (CYP2C19, CYP2D6) (Tofranil-PM, Tofranil)	X		
Nortriptyline (Pamelor)	X		
Piroxicam (Feldene)	X		
Protriptyline (Vivactil)	X		
Tamoxifen (Soltamox, Nolvadex)	X		
Thioridazine (Mellaril, Melleril)	X		
Trimipramine (CYP2C19, CYP2D6) (Surmontil)	X		
Venlafaxine (Effexor)	X		

USE WITH CAUTION or with dose change:

These treatments may require a modification in the dose or an alternative medication to be safe and effective for you.

Medication	Response		
	🐢	🐇	•••
Acenocoumarol (Sintrom, Acitrom)	X		
Amphetamine (CYP2D6) (Adzenys, Evekeo)	X		
Aripiprazole (Abilify)	X		
Aripiprazole Lauroxil (Aristada Initio, Aristada)	X		
Atomoxetine (Strattera)	X		
Azathioprine (NUDT15) (Imuran)	X		
Brexpiprazole (Rexulti)	X		
Brivaracetam (Briviact, Nubriveo, Brivajoy)	X		
Carisoprodol (Soma)	X		

WHY?

Your DNA controls the speed at which certain medications can move through your body.

🐢 If a medication is processed too slowly, it is less likely to have beneficial effects, or it can build up in your body and put you at risk of an accidental overdose.

🐇 If a medication is processed too fast, it can pass out of your body before it ever has a chance to work, or it can create too much of the active medicine and put you at risk of harm.

••• Certain medications are impacted by processes other than speed, or if your body processes medications differently than expected, they are less likely to be safe and/or effective for you.

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Carvedilol (Coreg)	X		
Celecoxib (Celebrex)	X		
Cevimeline (Evoxac)	X		
Citalopram (Celexa)	X		
Clobazam (Onfi)	X		
Clonidine (Clonidine, Kapvay)			X
Clozapine (Clozaril, Leponex, Versacloz)	X		
Dapoxetine (Priligy, EJ-30)	X		
Deutetrabenazine (Austedo)	X		
Dexlansoprazole (Dexilant, Kapidex)	X		
Diazepam (Valium)	X		
Diclofenac (Cataflam)	X		
Donepezil (Aricept)	X		
Duloxetine (Cymbalta)	X		
Eliglustat (Cerdelga)	X		
Escitalopram (Lexapro)	X		
Esomeprazole (Nexium)	X		
Fesoterodine (Toviaz)	X		
Flecainide (Tambocor)	X		
Flurbiprofen (Ocufen)	X		
Fluvoxamine (Luvox)	X		
Galantamine (Razadyne, Razadyne ER, Nivalin, Lycoremine, Reminyl)	X		
Gefitinib (Iressa)	X		
Gliclazide (Diamicron, Diaprel, Azukon)	X		
Glimepiride (Amaryl)	X		
Glyburide (Glibenclamide)	X		
Haloperidol (Haldol)	X		
Hydrocodone	X		
Ibuprofen (Motrin, Advil)	X		
Iloperidone (Fanapt)	X		
Lansoprazole (Prevacid)	X		
Lofexidine (Kai Er Ding, Lucemyra, Britlofex)	X		
Lorazepam (Ativan)			X
Lornoxicam (Xefo)	X		
Meclizine (Bonine, Antivert)	X		
Meloxicam (Mobic)	X		
Mercaptopurine (NUDT15) (Purinethol)	X		
Metformin (Glucophage)			X
Methotrexate (Trexall, Rheumatrex, Otrexup)			X
Methylphenidate (ADRA2A) (Concerta, Metadate, Ritalin, Ritalin LA, Quillivant, Daytrana, Methylin)			X
Metoclopramide (Primperan, Reglan)	X		
Metoprolol (Lopressor)	X		

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Moclobemide (Manerix, Aurorix, Amira, Clobemix, Depnil)	X		
Oliceridine (Olinvyk)	X		
Omeprazole (Prilosec, Zegerid)	X		
Ondansetron (Zofran)	X		
Oxazepam (Alepam)			X
Pantoprazole (Protonix)	X		
Paroxetine (Paxil)	X		
Perphenazine (Trilafon)	X		
Pimozide (Orap)	X		
Pitolisant (Wakix)	X		
Propafenone (Rythmol)	X		
Rabeprazole (Aciphex)	X		
Ranolazine (Ranexa)	X		
Risperidone (Risperdal)	X		
Sertindole (Serdolect, Serlect)	X		
Sertraline (Zoloft)	X		
Tacrolimus (Prograf, Hecoria)			X
Tamsulosin (Flomax)	X		
Tetrabenazine (Xenazine)	X		
Thioguanine (NUDT15) (6-TG, Tabloid, Lanvis)	X		
Timolol (Blocadren)	X		
Tolbutamide (Orinase)	X		
Tolperisone (Mydocalm)	X		
Tolterodine (Detrol)	X		
Tramadol (Ultracet, Ultram)	X		
Tropisetron (Navoban, Setrovel)	X		
Valbenazine (Ingrezza)	X		
Voriconazole (Vfend)	X		
Vortioxetine (Trintellix)	X		
Warfarin (CYP4F2) (Coumadin)			X
Zuclopenthixol (Cisordinol, Clopixol)	X		

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Thrombosis Profile

Tested Gene (Allele)	Genotype	Predicted Phenotype	Clinical Guidance
Prothrombin (F2)	Normal	Normal risk expected based on the patient's genotype.	The absence of these variant alleles of Prothrombin (Factor II) and Factor V Leiden suggests that the patient does not have the elevated risk of thrombosis associated with these genetic markers.
Factor V Leiden	Normal		
MTHFR (A1298C)	Heterozygous		
MTHFR (C677T)	Normal		

General Description

Genetic analyses of three genes (four alleles) considered to increase the risk for venous thromboembolism were performed using molecular genetic techniques. The presence of the Prothrombin (Factor 2) gene allele c.*97G>A (previously designated as 20210G>A) and Factor V Leiden allele c.1601G>A (previously designated as 1691G>A) are risk factors for venous thromboembolism. This risk may be further increased by the use of estrogen therapy, oral contraceptives, pregnancy, and surgery.

Patients who are homozygous for MTHFR C677T or MTHFR A1298C may have a further increased risk for venous thromboembolism if they also possess the Factor V Leiden c.1601G>A allele. However, the MTHFR alleles alone do not predict a significant risk for venous thromboembolism.

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References

- Zhang S, et al.; ACMG Laboratory Quality Assurance Committee. Venous thromboembolism laboratory testing (factor V Leiden and factor II c.*97G>A), 2018 update: a technical standard of the American College of Medical Genetics and Genomics (ACMG). Genet Med. 2018 Dec;20(12):1489-1498. doi: 10.1038/s41436-018-0322-z. Epub 2018 Oct 5. PMID: 30297698.
- Bhatt S, et al.; ACMG Professional Practice and Guidelines Committee. Addendum: American College of Medical Genetics consensus statement on factor V Leiden mutation testing. Genet Med. 2021 Mar 5. doi: 10.1038/s41436-021-01108-x. Epub ahead of print. PMID: 33674767.
- Lim MY, et al.; Thrombophilic risk of individuals with rare compound factor V Leiden and prothrombin G20210A polymorphisms: an international case series of 100 individuals. Eur J Haematol. 2016 Oct;97(4):353-60. doi: 10.1111/ejh.12738. Epub 2016 Feb 18. PMID: 26773706.
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- Stevens SM, et al.; Guidance for the evaluation and treatment of hereditary and acquired thrombophilia. J Thromb Thrombolysis. 2016 Jan;41(1):154-64. doi: 10.1007/s11239-015-1316-1. PMID: 26780744; PMCID: PMC4715840.

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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.

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Medication Summary

Therapeutic Class	Standard Precautions	Caution / Info	Change recommended
Adrenergic alpha-1 Receptor Antagonists		Tamsulosin	
Alpha-2-adrenergic agonists	Guanfacine	Clonidine Lofexidine	
Analgesics, Opioid	Alfentanil Buprenorphine Fentanyl Fentanyl (OPRM1) Hydromorphone Methadone (CYP2B6) Morphine Oxycodone Oxycodone (CYP3A4) Oxycodone (CYP3A5) Sufentanil	Hydrocodone Oliceridine Tramadol	Codeine

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Therapeutic Class	Standard Precautions	Caution / Info	Change recommended
Anti-angina medication		Ranolazine	
Antiarrhythmics		Flecainide Propafenone	
Anticholinergic Agents		Fesoterodine Tolterodine	
Anticoagulants		Acenocoumarol Warfarin (CYP4F2)	
Anticonvulsants		Brivaracetam Clobazam	
Antidepressants	Bupropion		
Antiemetics		Meclizine Ondansetron Tropisetron	
Antiestrogens			Tamoxifen
Antifungals	Ketoconazole	Voriconazole	
Antimetabolites		Methotrexate	
Antiplatelet Agents	Prasugrel Ticagrelor		Clopidogrel
Anxiolytics	Buspirone		
Atypical antipsychotics	Olanzapine Quetiapine	Aripiprazole Aripiprazole Lauroxil Brexpiprazole Clozapine Iloperidone Risperidone Sertindole	
Benzodiazepines	Alprazolam Clonazepam	Diazepam Lorazepam Oxazepam	

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Therapeutic Class	Standard Precautions	Caution / Info	Change recommended
Beta-3 Adrenergic Agonists	Mirabegron		
Beta Blockers	Nebivolol Propranolol	Carvedilol Metoprolol Timolol	
Biguanides		Metformin	
Central Monoamine-Depleting Agents		Tetrabenazine	
Central Nervous System Agents			Dextromethorphan-Quinidine
Cholinergic Agonists		Cevimeline	
Cholinesterase Inhibitors		Donepezil Galantamine	
CNS Stimulants	Amphetamine Dexmethylphenidate Dextroamphetamine Lisdexamfetamine Methylphenidate (COMT)	Amphetamine (CYP2D6) Methylphenidate (ADRA2A)	
Contraceptives	Estrogen-containing oral contraceptives		
Dipeptidyl peptidase-4 (DPP-4) inhibitor	Saxagliptin		
EGFR Inhibitors		Gefitinib	
Enzyme Inhibitors		Eliglustat	
H3 receptor antagonist		Pitolisant	
Hypnotics	Eszopiclone		
Immunosuppressants	Azathioprine Cyclosporine Sirolimus	Azathioprine (NUDT15) Tacrolimus	

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Therapeutic Class	Standard Precautions	Caution / Info	Change recommended
Monoamine Oxidase Inhibitors		Moclobemide	
Muscle Relaxants		Carisoprodol	
Neuromuscular Depolarizing Agents	Succinylcholine		
Non-nucleoside reverse transcriptase inhibitors	Efavirenz Nevirapine		
Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)		Celecoxib Diclofenac Flurbiprofen Ibuprofen Lornoxicam Meloxicam	Piroxicam
Platinum-containing compounds	Cisplatin		
Prokinetic agents		Metoclopramide	
Proton Pump Inhibitors (PPIs)		Dexlansoprazole Esomeprazole Lansoprazole Omeprazole Pantoprazole Rabeprazole	
Purine analogs	Thioguanine	Thioguanine (NUDT15)	
Purine antagonists	Mercaptopurine	Mercaptopurine (NUDT15)	
Selective Serotonin Reuptake Inhibitors (SSRIs)	Fluoxetine	Citalopram Dapoxetine Escitalopram Fluvoxamine Paroxetine Sertraline Vortioxetine	

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Therapeutic Class	Standard Precautions	Caution / Info	Change recommended
Serotonin and Norepinephrine Reuptake Inhibitors (SSNRI)		Atomoxetine Duloxetine	Venlafaxine
Serotonin Receptor Antagonists and Reuptake Inhibitors (SARIs)	Trazodone		
Skeletal muscle relaxant		Tolperisone	
Statins	Atorvastatin Simvastatin		
Sulfonylurea		Gliclazide Glimepiride Glyburide Tolbutamide	
Tetracyclic antidepressants	Mirtazapine		
Tricyclic antidepressants			Amitriptyline (CYP2C19, CYP2D6) Amoxapine Clomipramine (CYP2C19, CYP2D6) Desipramine Doxepin (CYP2C19, CYP2D6) Imipramine (CYP2C19, CYP2D6) Nortriptyline Protriptyline Trimipramine (CYP2C19, CYP2D6)
Typical antipsychotics	Flupenthixol	Haloperidol Perphenazine Pimozide Zuclopenthixol	Thioridazine

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Therapeutic Class	Standard Precautions	Caution / Info	Change recommended
Vesicular monoamine transporter 2 inhibitor		Deutetrabenazine Valbenazine	
Xanthine Oxidase Inhibitor	Allopurinol		

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Legend

- Typical response is expected
- Consider alternative therapy
- Change recommended
- Additional information available
- Response is uncertain

Clinical Evidence Level

- Strong
- Moderate
- Emerging

Medication Report Details (by therapeutic class)

Drug	Finding	Recommendation	Concern	Evidence
Adrenergic alpha-1 Receptor Antagonists				
Tamsulosin (Flomax) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Alpha-2-adrenergic agonists				
Clonidine (Clonidine, Kapvay) *FDA drug label: Not established for PGx*	ADRA2A(c.1252G>C): One wild type allele and one variant allele.	Individuals with these heterozygous alleles may present with increased risk of pharmacotherapy failure. Be alert to lack of efficacy.	Efficacy	
Guanfacine (Tenex, Intuniv) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Lofexidine (Kai Er Ding, Lucemyra, Britlofex) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	

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Drug	Finding	Recommendation	Concern	Evidence
Analgesics, Opioid				
Alfentanil (Rapifen, Alfenta) *FDA drug label: Not established for PGx*	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) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Codeine *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Fentanyl (Duragesic, Sublimaze) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Fentanyl (OPRM1) (Duragesic, Sublimaze) *FDA drug label: Not established for PGx*	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 *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Poor 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	
Hydromorphone (Dilaudid) *FDA drug label: Not established for PGx*	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.		
Methadone (CYP2B6) (Dolophine, Methadose) *FDA drug label: Not established for PGx*	CYP2B6: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		

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Drug	Finding	Recommendation	Concern	Evidence
Morphine (MS-IR) *FDA drug label: Not established for PGx*	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.		
Oliceridine (Olinvyk) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	
Oxycodone (Oxycontin) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Typical response expected. No additional therapeutic recommendations.		
Oxycodone (CYP3A4) (Oxycontin) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Oxycodone (CYP3A5) (Oxycontin) *FDA drug label: Not established for PGx*	CYP3A5: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Sufentanil (Sufenta) *FDA drug label: Not established for PGx*	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) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with 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	
Anti-angina medication				
Ranolazine (Ranexa) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	

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Drug	Finding	Recommendation	Concern	Evidence
Antiarrhythmics				
Flecainide (Tambocor) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Propafenone (Rythmol) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Anticholinergic Agents				
Fesoterodine (Toviaz) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication. Be alert to adverse reactions; monitor the patient's response to guide dosing.	ADR	
Tolterodine (Detrol) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	

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Drug	Finding	Recommendation	Concern	Evidence
Anticoagulants				
Acenocoumarol (Sintrom, Acitrom) *FDA drug label: Not established for PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication frequently present with 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	
Warfarin (CYP4F2) (Coumadin) *FDA drug label: Actionable PGx*	Multigenic: CYP2C9, VKORC1, CYP4F2: Intermediate metabolizer. One normal function allele and one little or no function allele.; Normal function. Two alleles with normal activity.	Individuals with this combination of alleles may benefit from a lower than standard therapeutic dose of warfarin. Consider a regimen of 2.1-4 mg/day (15-28 mg/week).	ADR & Efficacy	

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Drug	Finding	Recommendation	Concern	Evidence
Anticonvulsants				
Brivaracetam (Briviact, Nubriveo, Brivajoy) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication may present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	
Carbamazepine (Tegretol) *FDA drug label: Testing required*	HLA-B*1502: Not Tested	No recommendation for Carbamazepine is available due to absent laboratory assay results.		
Carbamazepine (HLA-A*3101) (Tegretol) *FDA drug label: Actionable PGx*	HLA-A*3101: Not Tested	No recommendation for Carbamazepine (HLA-A*3101) is available due to absent laboratory assay results.		
Clobazam (Onfi) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication may present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Fosphenytoin (HLA-B*1502, CYP2C9) (Cerebyx) *FDA drug label: Actionable PGx*	Multigenic: CYP2C9, HLA-B*1502: Intermediate metabolizer. One normal function allele and one little or no function allele.	No recommendation for Fosphenytoin (HLA-B*1502, CYP2C9) is available due to absent laboratory assay results.		
Oxcarbazepine (Trileptal) *FDA drug label: Testing recommended*	HLA-B*1502: Not Tested	No recommendation for Oxcarbazepine is available due to absent laboratory assay results.		
Phenytoin (HLA-B*1502, CYP2C9) (Dilantin) *FDA drug label: Actionable PGx*	Multigenic: CYP2C9, HLA-B*1502: Intermediate metabolizer. One normal function allele and one little or no function allele.	No recommendation for Phenytoin (HLA-B*1502, CYP2C9) is available due to absent laboratory assay results.		
Antidepressants				
Bupropion (Wellbutrin) *FDA drug label: Not established for PGx*	ANKK1: Normal function. Two normal function alleles.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		

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Drug	Finding	Recommendation	Concern	Evidence
Antiemetics				
Meclizine (Bonine, Antivert) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Ondansetron (Zofran) *FDA drug label: Informative PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with higher plasma concentrations of the active medication. Monitor the patient's response to guide dosing.	ADR	
Tropisetron (Navoban, Setrovel) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Poor 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	
Antiestrogens				
Tamoxifen (Soltamox, Nolvadex) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Antifungals				
Ketoconazole (Nizoral) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Voriconazole (Vfend) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication may present with higher plasma concentrations of the active medication. Be alert to adverse reactions; monitor the patient's response to guide dosing.	ADR	

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Drug	Finding	Recommendation	Concern	Evidence
Antimetabolites				
Methotrexate (Trexall, Rheumatrex, Otrexup) *FDA drug label: Not established for PGx*	Multigenic: MTHFR (C677T), MTHFR (A1298C): Normal function. Two normal function alleles.; Decreased function. One normal function allele and one decreased function allele.	Individuals with decreased function of this gene frequently present with increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Antiplatelet Agents				
Clopidogrel (Plavix) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication frequently present with lower plasma concentrations of the active medication, thus a significantly increased risk of pharmacotherapy failure. This medication should be avoided.	Efficacy	
Prasugrel (Effient) *FDA drug label: Informative PGx*	CYP2C19: *1|*2	Typical response expected. No additional therapeutic recommendations.		
Ticagrelor (Brilinta) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Anxiolytics				
Buspirone (Buspar) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		

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Drug	Finding	Recommendation	Concern	Evidence
Atypical antipsychotics				
Aripiprazole (Abilify) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Aripiprazole Lauroxil (Aristada Initio, Aristada) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Brexpiprazole (Rexulti) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	
Clozapine (Clozaril, Leponex, Versacloz) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Iloperidone (Fanapt) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	
Olanzapine (Zalasta, Zyprexa) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Typical response expected. No additional therapeutic recommendations.		

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Drug	Finding	Recommendation	Concern	Evidence
Quetiapine (Seroquel) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Risperidone (Risperdal) *FDA drug label: Informative PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Sertindole (Serdolect, Serlect) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Poor 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	

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Drug	Finding	Recommendation	Concern	Evidence
Benzodiazepines				
Alprazolam (Xanax, Niravam) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Clonazepam (Klonopin) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Diazepam (Valium) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication may present with 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	
Lorazepam (Ativan) *FDA drug label: Not established for PGx*	UGT2B15: Decreased function. One normal function allele and one decreased function allele.	Individuals with decreased function of this gene may present with 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	
Oxazepam (Alepam) *FDA drug label: Not established for PGx*	UGT2B15: Decreased function. One normal function allele and one decreased function allele.	Individuals with decreased function of this gene may present with 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	
Beta-3 Adrenergic Agonists				
Mirabegron (Myrbetriq) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication. No additional therapeutic recommendations.		

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Drug	Finding	Recommendation	Concern	Evidence
Beta Blockers				
Carvedilol (Coreg) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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.	ADR	
Metoprolol (Lopressor) *FDA drug label: Informative PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Nebivolol (Bystolic) *FDA drug label: Informative PGx*	CYP2D6: *5|*5	Typical response expected. No additional therapeutic recommendations.		
Propranolol (Inderal) *FDA drug label: Informative PGx*	CYP2D6: *5|*5	Typical response expected. No additional therapeutic recommendations.		
Timolol (Blocadren) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Poor 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	
Biguanides				
Metformin (Glucophage) *FDA drug label: Not established for PGx*	ATM(C11orf65): Two wild-type alleles.	Individuals with wild type alleles frequently present with increased medication efficacy. No additional therapeutic recommendations.	Efficacy	

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Drug	Finding	Recommendation	Concern	Evidence
Central Monoamine-Depleting Agents				
Tetrabenazine (Xenazine) *FDA drug label: Testing required*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	
Central Nervous System Agents				
Dextromethorphan-Quinidine (Nuedexta) *FDA drug label: Testing recommended*	CYP2D6: *5|*5	Poor 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	
Cholinergic Agonists				
Cevimeline (Evoxac) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Cholinesterase Inhibitors				
Donepezil (Aricept) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Galantamine (Razadyne, Razadyne ER, Nivalin, Lycoremine, Reminyl) *FDA drug label: Informative PGx*	CYP2D6: *5|*5	Poor 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	

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Drug		Finding	Recommendation	Concern	Evidence
CNS Stimulants					
Amphetamine (Adzenys, Evekeo) *FDA drug label: Not established for PGx*	✓	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.		●
Amphetamine (CYP2D6) (Adzenys, Evekeo) *FDA drug label: Informative PGx*	⚠	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	◒
Dexmethylphenidate (Focalin) *FDA drug label: Not established for PGx*	✓	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) *FDA drug label: Not established for PGx*	✓	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.		●
Lisdexamfetamine (Vyvanse) *FDA drug label: Not established for PGx*	✓	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) *FDA drug label: Not established for PGx*	⚠	ADRA2A(c.1252G>C): One wild type allele and one variant allele.	Individuals with these heterozygous alleles may present with increased risk of pharmacotherapy failure. Be alert to lack of efficacy.	Efficacy	◒
Methylphenidate (COMT) (Concerta, Metadate, Ritalin, Ritalin LA, Quillivant, Daytrana, Methylin) *FDA drug label: Not established for PGx*	✓	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.		●

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Drug	Finding	Recommendation	Concern	Evidence
Contraceptives				
Estrogen-containing oral contraceptives *FDA drug label: Not established for PGx*	F5: Two wild-type alleles.	Individuals with wild type alleles are expected to show typical response. No additional therapeutic recommendations.		
Dipeptidyl peptidase-4 (DPP-4) inhibitor				
Saxagliptin (Onglyza) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
EGFR Inhibitors				
Gefitinib (Iressa) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Enzyme Inhibitors				
Eliglustat (Cerdelga) *FDA drug label: Testing required*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider alternative medication, or reducing the dose.	ADR	
H3 receptor antagonist				
Pitolisant (Wakix) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	
Hypnotics				
Eszopiclone (Lunesta) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		

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Drug	Finding	Recommendation	Concern	Evidence
Immunosuppressants				
Azathioprine (Imuran) *FDA drug label: Testing recommended*	TPMT: *1|*1	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Azathioprine (NUDT15) (Imuran)	NUDT15: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Cyclosporine (Gengraf, Neoral) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Sirolimus (Rapamune) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Tacrolimus (Prograf, Hecoria) *FDA drug label: Not established for PGx*	CYP3A5: 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. Consider increasing the dose; monitor the patient's response to guide dosing.	Efficacy	
Monoamine Oxidase Inhibitors				
Moclobemide (Manerix, Aurorix, Amira, Clobemix, Depnil) *FDA drug label: Not established for PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication may present with 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	

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Drug	Finding	Recommendation	Concern	Evidence
Muscle Relaxants				
Carisoprodol (Soma) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication may present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Be alert to adverse reactions, or consider alternative medication.	ADR	
Neuromuscular Depolarizing Agents				
Succinylcholine (suxamethonium, Anectine) *FDA drug label: Actionable PGx*	BCHE: Normal function. Two normal function alleles.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		

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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.1252G>C): One wild type allele and one variant allele.	No additional therapeutic recommendations.		
ANKK1	ANKK1: Normal function. Two normal function alleles.	Normal function. Two alleles with normal activity.		
ApoE	ApoE: Often associated with normal lipid metabolism.	Typical cardiovascular disease risk expected.		
BDNF	BDNF: Decreased function. One normal function allele and one decreased function allele.	No additional therapeutic recommendations.		
CACNA1C(270344G>A)	CACNA1C(270344G>A): Two variant alleles detected.	No additional therapeutic recommendations.		
COMT(Val158Met)	COMT(Val158Met): Normal function. Two normal function alleles.	Typical response is expected; no additional therapeutic recommendations.		
CYP1A2	CYP1A2: Normal metabolizer. Two normal function alleles.	Typical response is expected; no additional therapeutic recommendations.		
CYP2B6	CYP2B6: Normal metabolizer. Two normal function alleles.	Typical response is expected; no additional therapeutic recommendations.		
CYP2C8	CYP2C8: Indeterminate metabolizer. One normal function allele and one uncertain function allele.	No additional therapeutic recommendations.		
CYP4F2	CYP4F2: Normal function. Two alleles with normal activity.	Typical response is expected; no additional therapeutic recommendations.		
DBH(-1021C>T)	DBH(-1021C>T): Two variant alleles detected.	No additional therapeutic recommendations.		

SAMPLE

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Drug	Finding	Recommendation	Concern	Evidence
DPYD	DPYD: Intermediate metabolizer. One normal function allele and one decreased function allele.	No additional therapeutic recommendations.		
FKBP5(rs1360780)	FKBP5(rs1360780): Two variant alleles detected.	No additional therapeutic recommendations.		
FKBP5(rs1902023)	FKBP5(rs4713916): Not Tested	No recommendation for FKBP5(rs1902023) is available due to absent laboratory assay results.		
G6PD	G6PD: Not Tested	No recommendation for G6PD is available due to absent laboratory assay results.		
GRIK1(rs2832407)	GRIK1(rs2832407): Two wild-type alleles.	Typical response is expected; no additional therapeutic recommendations.		
GRIK4	GRIK4: One wild type allele and one variant allele.	No additional therapeutic recommendations.		
HTR2A	HTR2A(rs7997012): One wild type allele and one variant allele.	No additional therapeutic recommendations.		
HTR2C(-759C>T)	HTR2C(-759C>T): One wild type allele and one variant allele.	No additional therapeutic recommendations.		
HTR2C(2565G>C)	HTR2C(2565G>C): Uncertain Allele	No recommendation for HTR2C(2565G>C) is available for this combination of variants/alleles.		
IFNL3	IFNL3: Two wild-type alleles.	Typical response is expected; no additional therapeutic recommendations.		
MTHFR (A1298C)	MTHFR (A1298C): Decreased function. One normal function allele and one decreased function allele.	No additional therapeutic recommendations.		
MTHFR (C677T)	MTHFR (C677T): Normal function. Two normal function alleles.	Typical response is expected; no additional therapeutic recommendations.		
NUDT15	NUDT15: Intermediate metabolizer. One normal function allele and one little or no function allele.	No additional therapeutic recommendations.		

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Drug		Finding	Recommendation	Concern	Evidence
OPRD1(rs678849)		OPRD1(rs678849): Two variant alleles detected.	No additional therapeutic recommendations.		
OPRM1(A118G)		OPRM1(A118G): Normal function. Two alleles with normal activity.	Normal function. Two alleles with normal activity.		
UGT2B15		UGT2B15: Decreased function. One normal function allele and one decreased function allele.	No additional therapeutic recommendations.		
Non-nucleoside reverse transcriptase inhibitors					
Efavirenz (Sustiva) *FDA drug label: Actionable PGx*		CYP2B6: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Nevirapine (Viramune) *FDA drug label: Not established for PGx*		CYP2B6: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		

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Drug	Finding	Recommendation	Concern	Evidence
Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)				
Celecoxib (Celebrex) *FDA drug label: Actionable PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Diclofenac (Cataflam) *FDA drug label: Not established for PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication may present with 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	
Flurbiprofen (Ocufen) *FDA drug label: Actionable PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Ibuprofen (Motrin, Advil) *FDA drug label: Not established for PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Lornoxicam (Xefo) *FDA drug label: Not established for PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	

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Drug	Finding	Recommendation	Concern	Evidence
Meloxicam (Mobic) *FDA drug label: Actionable PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Piroxicam (Feldene) *FDA drug label: Actionable PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus a significantly increased risk of side effects. This medication should be avoided.	ADR	
Nucleoside reverse transcriptase inhibitors				
Abacavir (Ziagen) *FDA drug label: Testing required*	HLA-B*5701: Not Tested	No recommendation for Abacavir is available due to absent laboratory assay results.		
Platinum-containing compounds				
Cisplatin (Platinol) *FDA drug label: Not established for PGx*	TPMT: *1|*1	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Prokinetic agents				
Metoclopramide (Primperan, Reglan) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	

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Drug	Finding	Recommendation	Concern	Evidence
Proton Pump Inhibitors (PPIs)				
Dexlansoprazole (Dexilant, Kapidex) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Esomeprazole (Nexium) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication may present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Lansoprazole (Prevacid) *FDA drug label: Informative PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Omeprazole (Prilosec, Zegerid) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Pantoprazole (Protonix) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Rabeprazole (Aciphex) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication may present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	

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Drug		Finding	Recommendation	Concern	Evidence
Purine analogs					
Thioguanine (6-TG, Tabloid, Lanvis) *FDA drug label: Testing recommended*	✓	TPMT: *1|*1	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		●
Thioguanine (NUDT15) (6-TG, Tabloid, Lanvis) *FDA drug label: Testing recommended*	⚠	NUDT15: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	●
Purine antagonists					
Mercaptopurine (Purinethol) *FDA drug label: Testing recommended*	✓	TPMT: *1|*1	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		●
Mercaptopurine (NUDT15) (Purinethol) *FDA drug label: Testing recommended*	⚠	NUDT15: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication frequently present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	●

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Drug	Finding	Recommendation	Concern	Evidence
Selective Serotonin Reuptake Inhibitors (SSRIs)				
Citalopram (Celexa) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication may present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Dapoxetine (Priligy, EJ-30) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Poor 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	
Escitalopram (Lexapro) *FDA drug label: Actionable PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication may present with higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Fluoxetine (Prozac) *FDA drug label: Informative PGx*	CYP2D6: *5|*5	Typical response expected. No additional therapeutic recommendations.		
Fluvoxamine (Luvox) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Paroxetine (Paxil) *FDA drug label: Informative PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	

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Drug	Finding	Recommendation	Concern	Evidence
Sertraline (Zoloft) *FDA drug label: Not established for PGx*	CYP2C19: *1|*2	Intermediate metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Vortioxetine (Trintellix) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	
Serotonin and Norepinephrine Reuptake Inhibitors (SSNRI)				
Atomoxetine (Strattera) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose; monitor the patient's response to guide dosing.	ADR	
Duloxetine (Cymbalta) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with 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	
Venlafaxine (Effexor) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with lower plasma concentrations of the active medication/medication ratio, thus an increased risk of side effects and/or pharmacotherapy failure. This medication should be avoided.	ADR & Efficacy	
Serotonin Receptor Antagonists and Reuptake Inhibitors (SARIs)				
Trazodone (Oleptro, Desyrel) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		

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Drug	Finding	Recommendation	Concern	Evidence
Skeletal muscle relaxant				
Tolperisone (Mydocalm) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Poor 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	
Statins				
Atorvastatin (Lipitor, Caduet) *FDA drug label: Not established for PGx*	CYP3A4: Normal metabolizer. Two normal function alleles.	Normal metabolizers of this medication are expected to show typical response. No additional therapeutic recommendations.		
Simvastatin (Zocor) *FDA drug label: Informative PGx*	SLCO1B1: Normal function. Two normal function alleles.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		

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Drug	Finding	Recommendation	Concern	Evidence
Sulfonylurea				
Gliclazide (Diamicron, Diaprel, Azukon) *FDA drug label: Not established for PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication may present with higher plasma concentrations of the active medication, frequently present with increased medication efficacy. No additional therapeutic recommendations.	Efficacy	
Glimepiride (Amaryl) *FDA drug label: Not established for PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication may present with higher plasma concentrations of the active medication, frequently present with increased medication efficacy. No additional therapeutic recommendations.	Efficacy	
Glyburide (Glibenclamide) *FDA drug label: Not established for PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication may present with 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	
Tolbutamide (Orinase) *FDA drug label: Not established for PGx*	CYP2C9: Intermediate metabolizer. One normal function allele and one little or no function allele.	Intermediate metabolizers of this medication may present with 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	
Tetracyclic antidepressants				
Mirtazapine (Remeron) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Typical response expected. No additional therapeutic recommendations.		

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Drug	Finding	Recommendation	Concern	Evidence
Tricyclic antidepressants				
Amitriptyline (CYP2C19, CYP2D6) (Elavil) *FDA drug label: Not established for PGx*	Multigenic CYP2D6: *5|*5 CYP2C19: *1|*2	Individuals with this combination of alleles frequently present with significantly increased risk of side effects. This medication should be avoided.	ADR	
Amoxapine (Asendin) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Clomipramine (CYP2C19, CYP2D6) (Anafranil, Clomicalm) *FDA drug label: Not established for PGx*	Multigenic CYP2D6: *5|*5 CYP2C19: *1|*2	Individuals with this combination of alleles frequently present with significantly increased risk of side effects. This medication should be avoided.	ADR	
Desipramine (Norpramin) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Doxepin (CYP2C19, CYP2D6) (Quitaxon, Aponal, Sinequan) *FDA drug label: Actionable PGx*	Multigenic CYP2D6: *5|*5 CYP2C19: *1|*2	Individuals with this combination of alleles frequently present with significantly increased risk of side effects. This medication should be avoided.	ADR	
Imipramine (CYP2C19, CYP2D6) (Tofranil-PM, Tofranil) *FDA drug label: Actionable PGx*	Multigenic CYP2D6: *5|*5 CYP2C19: *1|*2	Individuals with this combination of alleles frequently present with significantly increased risk of side effects. This medication should be avoided.	ADR	
Nortriptyline (Pamelor) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	

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Drug	Finding	Recommendation	Concern	Evidence
Protriptyline (Vivactil) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Trimipramine (CYP2C19, CYP2D6) (Surmontil) *FDA drug label: Not established for PGx*	Multigenic CYP2D6: *5|*5 CYP2C19: *1|*2	Individuals with this combination of alleles frequently present with significantly increased risk of side effects. This medication should be avoided.	ADR	

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Drug	Finding	Recommendation	Concern	Evidence
Typical antipsychotics				
Flupenthixol (Depixol, Fluanxol) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Typical response expected. No additional therapeutic recommendations.		
Haloperidol (Haldol) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	
Perphenazine (Trilafon) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Pimozide (Orap) *FDA drug label: Testing required*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	
Thioridazine (Mellaril, Melleril) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor 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	
Zuclopenthixol (Cisordinol, Clopixol) *FDA drug label: Not established for PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose, or using an alternative medication.	ADR	

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Drug	Finding	Recommendation	Concern	Evidence
Vesicular monoamine transporter 2 inhibitor				
Deutetrabenazine (Austedo) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication may present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	
Valbenazine (Ingrezza) *FDA drug label: Actionable PGx*	CYP2D6: *5|*5	Poor metabolizers of this medication frequently present with notably higher plasma concentrations of the active medication, thus an increased risk of side effects. Consider reducing the dose.	ADR	
Xanthine Oxidase Inhibitor				
Allopurinol (Zyloprim) *FDA drug label: Not established for PGx*	ABCG2: Normal function. Two normal function alleles.	Individuals with normal function of this gene are expected to show typical response. No additional therapeutic recommendations.		
Allopurinol (HLA-B*5801) (Zyloprim) *FDA drug label: Testing required*	HLA-B*5801: Not Tested	No recommendation for Allopurinol (HLA-B*5801) is available due to absent laboratory assay results.		

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Clinical Evidence Levels

Strong

- Includes gene-drug pairs approved by the Coriell 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 Coriell 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.

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Patient Information Card

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

NEXT BIOSCIENCES

Next Biosciences
www.nextbio.co.za

Patient: **Schoeman, Ben**
DOB: 1995-05-02
Sample ID: 220223

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.1252G>C)	G|C	Positive
ANKK1	G|G	Normal function
ApoE	ε3|ε3	See full GeneDose report
ATM(C11orf65)	C|C	Negative
BCHE	WT|WT	Normal function
BDNF	C|T	Decreased function
CACNA1C(270344G>A)	A|A	Positive
COMT(Val158Met)	G|G	Normal function
CYP1A2	*1F|*1F	Normal metabolizer
CYP2B6	*1|*1	Normal metabolizer
CYP2C19	*1|*2	Intermediate metabolizer
CYP2C8	*1|*1C	Indeterminate
CYP2C9	*1|*3	Intermediate metabolizer
CYP2D6	*5|*5	Poor metabolizer
CYP3A4	*1|*1	Normal metabolizer
CYP3A5	*1|*1	Normal metabolizer
CYP4F2	*1|*1	Normal metabolizer
DBH(-1021C>T)	C|C	Positive
DPYD	*1|*2A	Intermediate metabolizer
Factor V Leiden	Normal	See full GeneDose report
FKBP5(rs1360780)	C|C	Positive
FKBP5(rs4713916)	Not Tested	n/a
G6PD	Not Tested	n/a
GRIK1(rs2832407)	C|C	Negative
GRIK4	T|C	Positive
GRIN2B(rs2058878)	T|A	n/a
HLA-A*3101	Not Tested	n/a
HLA-B*1502	Not Tested	n/a
HLA-B*5701	Not Tested	n/a
HLA-B*5801	Not Tested	n/a
HTR2A(rs7997012)	rs7997012 A/G	Positive
HTR2C(2565G>C)	Uncertain Allele	n/a
HTR2C(-759C>T)	C|T	Positive
IFNL3	C|C	Negative
MTHFR	GT|GG	See full GeneDose report
MTHFR (A1298C)	T|G	Decreased function
MTHFR (C677T)	G|G	Normal function
NUDT15	*1|*3	Intermediate metabolizer
OPRD1(rs678849)	T|T	Positive
OPRM1(A118G)	A|A	Normal function
Prothrombin (F2)	Normal	See full GeneDose report
SLCO1B1	*1|*1	Normal function
TPMT	*1|*1	Normal metabolizer
UGT2B15	*1|*2	Decreased function
VKORC1	*1|*2	Medium sensitivity to warfarin

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The information contained in this report is intended to be interpreted by a licensed physician or other licensed healthcare professional. This report is not intended to take the place of professional medical advice. Decisions regarding use of prescribed medications must be made only after consulting with a licensed physician or other licensed healthcare professional, and should consider each patient's medical history and current treatment regimen. Portions © 2014-2023 Coriell Life Sciences, Inc.

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