medcheck™ from dnalife

PATIENT INFORMATION
NAME: Sample Patient
DOB: 16/Feb/2000
SEX AT BIRTH: Female

SPECIMEN DETAILS
BARCODE: GNL-DL-00000
SAMPLE ID: 0000
TYPE: Copan FLOQSwab
COLLECTED: 02/Dec/2023

ORDERED BY
Nordic Laboratories
REPORT GENERATED: 07/May/2024

This pharmacogenetic information is based on best evidence compiled from guidelines and databases including the FDA Table of Pharmacogenetic Associations and the Clinical Pharmacogenetics Implementation Consortium (CPIC). Please refer to the Methods, Limitations, and Liability Disclaimer at the end of this report.

Medication Summary

The Medication Summary is a list of medications with evidence for the use of pharmacogenetic information, organized by their therapeutic area. Medications are further organized based on drug-gene interactions. Health care providers should consider the information contained in the Medication Report before making any clinical or therapeutic decisions.

1 Mild or no known interaction
2 Moderate gene-drug interaction
3 Serious drug-gene interaction: evaluate and consider alternative medications

Analgesia

1
Alfentanil
Carisoprodol
Codeine
Fentanyl
Hydrocodone
Morphine
Tramadol
Venlafaxine

2
Amitriptyline
Celecoxib
Desipramine
Flurbiprofen
Ibuprofen
Imipramine
Meloxicam
Nortriptyline
Piroxicam
Tenoxicam

Autoimmune

1
Cyclosporine
Tacrolimus

2
Siponimod

Cancer

1
Erdafitinib

2
Tamoxifen

Cardiovascular

1
Atorvastatin
Carvedilol
Clopidogrel
Lovastatin
Nebivolol
Pitavastatin
Pravastatin
Propranolol
Rosuvastatin

...Cardiovascular

1
Simvastatin

2
Flecainide
Fluvastatin
Metoprolol
Propafenone
Warfarin

Gastroenterology

1
Metoclopramide
Ondansetron

2
Dexlansoprazole
Dronabinol
Lansoprazole
Meclizine
Omeprazole
Pantoprazole

Infection

1
Efavirenz
Voriconazole

Mental Health

1
Amoxapine
Amphetamine
Aripiprazole lauroxil
Atomoxetine
Citalopram
Clobazam
Escitalopram
Lofexidine
Protriptyline
Risperidone
Sertraline
Venlafaxine

2
Alprazolam
Amitriptyline
Aripiprazole
Asenapine
Brexpiprazole
Bromazepam
Cariprazine

...Mental Health

2

Chlordiazepoxide
Chlorpromazine
Clomipramine
Clonazepam
Clorazepate
Clozapine
Desipramine
Diazepam
Doxepin
Flupentixol
Fluphenazine
Flurazepam
Fluvoxamine
Haloperidol
Iloperidone
Imipramine
Lorazepam
Loxapine
Lurasidone
Methotrimeprazine
Molindone
Nitrazepam
Nortriptyline
Olanzapine
Oxazepam
Paliperidone
Paroxetine
Perphenazine
Pimozide
Prochlorperazine
Promethazine
Quetiapine
Temazepam
Thioridazine
Triazolam

...Mental Health

2

Trifluoperazine
Trimipramine
Vortioxetine
Ziprasidone

3

Zuclopenthixol

Neurology

1

Brivaracetam
Clobazam
Deutetrabenazine
Donepezil
Galantamine
Propranolol
Tetrabenazine
Valbenazine
Venlafaxine

2

Amitriptyline
Clonazepam
Desipramine
Diazepam
Fosphenytoin
Metoprolol
Nortriptyline
Phenytoin

Rheumatology

2

Celecoxib
Flurbiprofen
Ibuprofen
Meloxicam
Piroxicam
Tenoxicam

Urology

1

Darifenacin
Fesoterodine
Mirabegron
Tamsulosin
Tolterodine

Other

1

Avatrombopag
Cevimeline
Elagolix
Eltrombopag
Flibanserin
Oral contraceptives

3

Eliglustat

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Overview

This pharmacogenetic information is based on best evidence compiled from guidelines and databases including the FDA Table of Pharmacogenetic Associations and the Clinical Pharmacogenetics Implementation Consortium (CPIC). In some cases, PharmGKB and the Dutch Pharmacogenetics Working Group (DPWG) may also be referenced.

This document includes:
1. Medication Summary: A list of medications organized by their therapeutic area of use and sorted based on their drug-gene interaction severity.
2. Medication Report: Provides information about factors affecting medication response.
3. Guidelines: A table of guidelines used to produce each interpretation.
4. References: Sources of information used to create this report.
5. Laboratory Report: Contains genetic test results in a technical table.

TreatGx and ReviewGx are clinical decision support tools that expand on the contents on this report.

TreatGx

TreatGx is clinical decision support software for precision prescribing that identifies condition-specific medication options based on multiple patient factors.

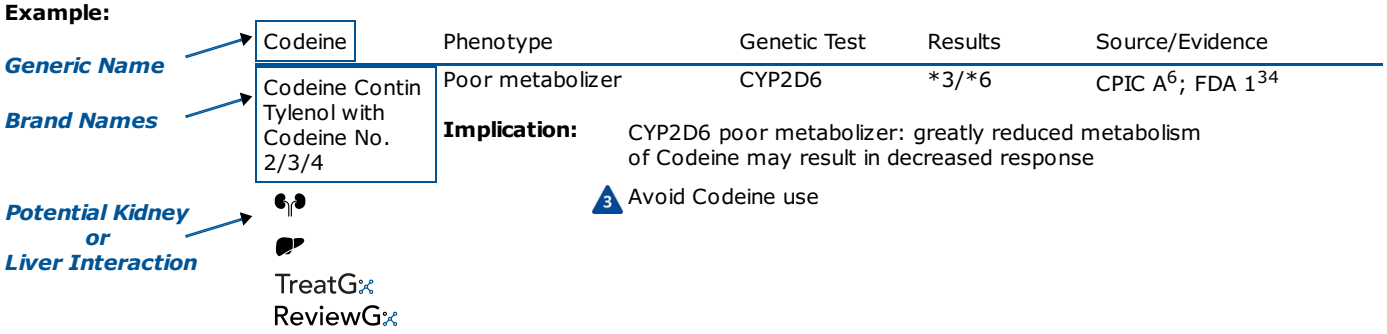
ReviewGx

ReviewGx uses patient factors including pharmacogenetics to highlight medication safety issues, help optimize medications, and identify deprescribing opportunities.

Components of the Medication Report

For all medications, clinical factors, medical conditions, lab values, drug-gene and drug-drug interactions may contribute to medication response and should be evaluated for each patient. The kidney and liver icon notations are intended for informational purposes only. The patient's kidney/liver function are not used for the purposes of displaying this information, and the potential interactions for that specific medication may not apply. TreatGx and ReviewGx help integrate this information to support precision prescribing and comprehensive medication management. The final genotype/phenotype call is at the discretion of the laboratory director. Medication changes should only be initiated at the discretion of the patient's healthcare provider after a full assessment.

Example:



Source/Evidence for Drug-Gene Interactions:

For each medication, a source is listed for each drug-gene interaction. This report prioritizes guidance from CPIC if the drug-gene pair is assigned a CPIC Level of A or B. This is the threshold that CPIC defines as having sufficient evidence for at least one prescribing action to be recommended. See cpicpgx.org/prioritization for a full explanation of CPIC Levels for Genes/Drugs.

Pharmacogenetic information from FDA-approved drug labels or the FDA Table of Pharmacogenetic Associations (https://www.fda.gov/medical-devices/precision-medicine/table-pharmacogenetic-associations) is included when available.

If there is no CPIC guideline (level A or B) or FDA guidance, other sources may be referenced, such as DPWG guidelines, PharmGKB clinical annotations, and in some instances, clinical studies. See https://www.pharmgkb.org/page/clinAnnLevels for a full explanation of PharmGKB levels of evidence. Use of any of this information is at the discretion of the health professional.

* Other clinical factors, medical conditions and drug-drug interactions may contribute to medication response.

Medication Report

The **Medication Report** provides information on how pharmacogenetic results affect each medication.

Use TreatGx and ReviewGx to explore personalized medication treatment options, dosing information and medication optimization.

Alfentanil	Phenotype	Genetic Test	Results	Source/Evidence
Alfenta ReviewGx	Typical response	OPRM1 rs1799971	A/A	PharmGKB 3
	Implication:	OPRM1 alleles indicate a typical response to Alfentanil		

Alprazolam	Phenotype	Genetic Test	Results	Source/Evidence
Xanax ReviewGx	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]
	Implication:	CYP2C9 alleles indicate increased risk of Alprazolam-related falls		

Amitriptyline	Phenotype	Genetic Test	Results	Source/Evidence
Elavil Levate TreatGx ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	CPIC A[16]; FDA 3[35]
	Normal metabolizer	CYP2C19	*1/*1	CPIC A[16]
	Implication:	CYP2D6 intermediate metabolizer: reduced metabolism of Amitriptyline to less active compounds Higher plasma concentrations of active drug may increase the risk of adverse drug reactions		
	2	Consider a reduction of the recommended dose for Amitriptyline (per CPIC moderate recommendation). Refer to TreatGx for alternatives and specific dosing recommendations.		

Amoxapine	Phenotype	Genetic Test	Results	Source/Evidence
ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	FDA 3[35]
	Implication:	CYP2D6 alleles do not indicate changes from recommended dose		

Amphetamine	Phenotype	Genetic Test	Results	Source/Evidence
Adzenys TreatGx ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]
	Implication:	CYP2D6 alleles do not indicate changes from recommended dose		

Aripiprazole	Phenotype	Genetic Test	Results	Source/Evidence
Abilify Aristada TreatGx ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	DPWG[9]; FDA 1[35]
	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
	Implication:	ANKK1 alleles indicate an increased risk of tardive dyskinesia		
		CYP2D6 alleles do not indicate changes from recommended dose		

Aripiprazole lauroxil	Phenotype	Genetic Test	Results	Source/Evidence
Aristada ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]
	Implication:	CYP2D6 alleles do not indicate changes from recommended dose		

Asenapine	Phenotype	Genetic Test	Results	Source/Evidence
Saphris	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
TreatG: ReviewG:	**Implication:** ANKK1 alleles indicate an increased risk of tardive dyskinesia			

Atomoxetine	Phenotype	Genetic Test	Results	Source/Evidence
Strattera	Intermediate metabolizer (AS 1.0)	CYP2D6 (Activity Score)	*2/*4	CPIC A[5]; FDA 1[35]
TreatG: ReviewG:	**Implication:** CYP2D6 alleles do not indicate changes from recommended dose			

Atorvastatin	Phenotype	Genetic Test	Results	Source/Evidence
Lipitor	Normal function	SLCO1B1	*1/*1	CPIC A[6]; FDA 3[35]
TreatG: ReviewG:	**Implication:** SLCO1B1 alleles indicate typical exposure to Atorvastatin Consider prescribing desired starting dose and adjust based on disease-specific guidelines			

Avatrombopag	Phenotype	Genetic Test	Results	Source/Evidence
Doptelet	Poor metabolizer	CYP2C9	*2/*3	FDA 3[35]
ReviewG:	**Implication:** CYP2C9 poor metabolizer: results in higher systemic concentrations of Avatrombopag There is a potential impact on pharmacokinetic properties. The impact of CYP2C9 variants on the safety of Avatrombopag has not been established.			

Brexpiprazole	Phenotype	Genetic Test	Results	Source/Evidence
Rexulti	Intermediate metabolizer	CYP2D6	*2/*4	DPWG[9]; FDA 1[35]
	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
TreatG: ReviewG:	**Implication:** ANKK1 alleles indicate an increased risk of tardive dyskinesia CYP2D6 alleles do not indicate changes from recommended dose			

Brivaracetam	Phenotype	Genetic Test	Results	Source/Evidence
Briviact Brivlera	Normal metabolizer	CYP2C19	*1/*1	FDA 1[35]
ReviewG:	**Implication:** CYP2C19 alleles do not indicate changes from recommended dose			

Bromazepam	Phenotype	Genetic Test	Results	Source/Evidence
	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]
ReviewG:	**Implication:** CYP2C9 alleles indicate increased risk of Bromazepam-related falls			

Cariprazine	Phenotype	Genetic Test	Results	Source/Evidence
Vraylar TreatG ReviewG	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
	Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia			

Carisoprodol	Phenotype	Genetic Test	Results	Source/Evidence
ReviewG	Normal metabolizer	CYP2C19	*1/*1	FDA 3[35]
	Implication: CYP2C19 alleles do not indicate changes from recommended dose			

Carvedilol	Phenotype	Genetic Test	Results	Source/Evidence
Coreg TreatG ReviewG	Intermediate metabolizer	CYP2D6	*2/*4	FDA 2[35]
	Implication: CYP2D6 alleles do not indicate changes from recommended dose			

Celecoxib	Phenotype	Genetic Test	Results	Source/Evidence
Celebrex TreatG ReviewG	Poor metabolizer	CYP2C9 (Star Alleles)	*2/*3	CPIC A[32]; FDA 1[35]
	Implication: CYP2C9 poor metabolizer: greatly reduced metabolism of Celecoxib to less active compounds Higher plasma concentrations of active drug may increase the risk of adverse drug reactions 2 Consider a 25-50% reduction of the recommended dose Dose titration should not occur until after steady state is reached (8 days after first dose)			

Cevimeline	Phenotype	Genetic Test	Results	Source/Evidence
Evoxac ReviewG	Intermediate metabolizer	CYP2D6	*2/*4	FDA 2[35]
	Implication: CYP2D6 alleles do not indicate changes from recommended dose			

Chlordiazepoxide	Phenotype	Genetic Test	Results	Source/Evidence
Librium ReviewG	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]
	Implication: CYP2C9 alleles indicate increased risk of Chlordiazepoxide-related falls			

Chlorpromazine	Phenotype	Genetic Test	Results	Source/Evidence
TreatG ReviewG	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
	Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia			

Citalopram	Phenotype	Genetic Test	Results	Source/Evidence
Celexa TreatG ReviewG	Normal metabolizer	CYP2C19	*1/*1	CPIC A[4]; FDA 1[35]
	Implication: Normal CYP2C19 metabolism Initiate therapy with recommended starting dose (per CPIC strong recommendation).			

Clobazam	Phenotype	Genetic Test	Results	Source/Evidence
Onfi Sympazan	Normal metabolizer	CYP2C19	*1/*1	FDA 1[35]

Implication: CYP2C19 alleles do not indicate changes from recommended dose (the FDA PGx Table does not have any information for this phenotype).

ReviewGx

Clomipramine	Phenotype	Genetic Test	Results	Source/Evidence
Anafranil	Intermediate metabolizer	CYP2D6	*2/*4	CPIC B[16]; FDA 3[35]
	Normal metabolizer	CYP2C19	*1/*1	CPIC B[16]

ReviewGx

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Clomipramine to less active compounds
Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 Consider a reduction of the recommended dose for Clomipramine (per CPIC optional recommendation). Refer to TreatGx for alternatives and specific dosing recommendations.

Clonazepam	Phenotype	Genetic Test	Results	Source/Evidence
Klonopin Rivotril	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]

Implication: CYP2C9 alleles indicate increased risk of Clonazepam-related falls

TreatGx
ReviewGx

Clopidogrel	Phenotype	Genetic Test	Results	Source/Evidence
Plavix	Normal metabolizer	CYP2C19	*1/*1	CPIC A[20]; FDA 1[35]

TreatGx

Implication: CYP2C19 alleles do not indicate changes from recommended dose

ReviewGx

Clorazepate	Phenotype	Genetic Test	Results	Source/Evidence
Gen-Xene Tranxene	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]

ReviewGx

Implication: CYP2C9 alleles indicate increased risk of Clorazepate-related falls

Clozapine	Phenotype	Genetic Test	Results	Source/Evidence
Clozaril Fazaclo ODT Versacloz	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]
	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3

TreatGx
ReviewGx

Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia

CYP2D6 alleles do not indicate changes from recommended dose

Codeine	Phenotype	Genetic Test	Results	Source/Evidence
Codeine Contin Tylenol with Codeine No. 2/3/4	Intermediate metabolizer	CYP2D6	*2/*4	CPIC A[7]; FDA 1[35]; FDA 2[35]

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Codeine to active metabolite

CYP2D6 alleles do not indicate changes from recommended dose. If no response to Codeine and opioid use is warranted, consider an opioid other than tramadol or codeine (per CPIC moderate recommendation). Refer to TreatGx for alternatives and specific dosing recommendations.

TreatGx
ReviewGx

Cyclosporine	Phenotype	Genetic Test	Results	Source/Evidence
Neoral Sandimmune	Poor metabolizer	CYP3A5	*3/*3	PharmGKB 3

Implication: CYP3A5 alleles do not indicate changes from recommended dose

ReviewGx

Darifenacin	Phenotype	Genetic Test	Results	Source/Evidence
Enablex	Intermediate metabolizer	CYP2D6	*2/*4	FDA 3[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

TreatGx
ReviewGx

Desipramine	Phenotype	Genetic Test	Results	Source/Evidence
Norpramin	Intermediate metabolizer	CYP2D6	*2/*4	CPIC B[16]; FDA 3[35]

TreatGx
ReviewGx

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Desipramine to less active compounds
Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 Consider a reduction of the recommended dose for Desipramine (per CPIC optional recommendation). Refer to TreatGx for alternatives and specific dosing recommendations.

Deutetrabenazine	Phenotype	Genetic Test	Results	Source/Evidence
Austedo	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

ReviewGx

Dexlansoprazole	Phenotype	Genetic Test	Results	Source/Evidence
Dexilant	Normal metabolizer	CYP2C19	*1/*1	CPIC B[22]; FDA 3[35]

TreatGx
ReviewGx

Implication: Optional CPIC recommendation: Initiate standard starting daily dose. Consider increasing dose by 50-100% of the standard dose for the treatment of Helicobacter pylori infection and erosive esophagitis.

Diazepam	Phenotype	Genetic Test	Results	Source/Evidence
Diastat Valium	Normal metabolizer	CYP2C19	*1/*1	FDA 3[35]
	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]

TreatGx
ReviewGx

Implication: CYP2C9 alleles indicate increased risk of Diazepam-related falls

CYP2C19 alleles do not indicate changes from recommended dose

Donepezil	Phenotype	Genetic Test	Results	Source/Evidence
Aricept	Intermediate metabolizer	CYP2D6	*2/*4	FDA 3[35]

TreatGx ReviewGx

Implication: CYP2D6 alleles do not indicate changes from recommended dose

Doxepin	Phenotype	Genetic Test	Results	Source/Evidence
Silenor Sinequan	Intermediate metabolizer	CYP2D6	*2/*4	CPIC B[16]; FDA 3[35]
	Normal metabolizer	CYP2C19	*1/*1	CPIC B[16]; FDA 3[35]

TreatGx ReviewGx

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Doxepin to less active compounds
Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 Consider a reduction of the recommended dose for Doxepin (per CPIC optional recommendation). Refer to TreatGx for alternatives and specific dosing recommendations.

Dronabinol	Phenotype	Genetic Test	Results	Source/Evidence
Marinol Syndros	Poor metabolizer	CYP2C9	*2/*3	FDA 1[35]

ReviewGx

Implication: CYP2C9 poor metabolizer: greatly reduced metabolism of Dronabinol to less active compounds

Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 This drug has an FDA therapeutic recommendation, refer to drug monograph or FDA labelling for dosing recommendations

Efavirenz	Phenotype	Genetic Test	Results	Source/Evidence
Sustiva	Normal metabolizer	CYP2B6	*1/*1	CPIC A[8]; FDA 2[35]

ReviewGx

Implication: CYP2B6 alleles do not indicate changes from recommended dose

Elagolix	Phenotype	Genetic Test	Results	Source/Evidence
Orilissa	Normal function	SLCO1B1	*1/*1	FDA 3[35]

ReviewGx

Implication: SLCO1B1 alleles indicate a typical response to Elagolix

Eliglustat	Phenotype	Genetic Test	Results	Source/Evidence
Cerdelga	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]

ReviewGx

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Eliglustat to less active compounds

Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

3 Concurrent use of a strong or moderate CYP3A inhibitor, use of both a moderate or strong CYP2D6 inhibitor and a moderate or strong CYP3A inhibitor, or use of a strong CYP3A inducer: Avoid Eliglustat use

2 Concurrent use of a moderate or strong CYP2D6 inhibitor: Consider reducing eliglustat dose, refer to drug monograph or FDA labelling for dosing recommendations

No concurrent use of interacting drugs: CYP2D6 alleles do not indicate changes from recommended dose, refer to drug monograph or FDA labelling for dosing recommendations

Eltrombopag	Phenotype	Genetic Test	Results	Source/Evidence
Promacta Revolade	Typical risk of adverse drug reactions	Factor V rs6025	C/C	Product monograph (actionable)[28]
	Typical risk of adverse drug reactions	Factor II rs1799963	G/G	PharmGKB 3

ReviewGx

Implication: F2 and F5 alleles do not indicate changes from recommended dose

Erdafitinib	Phenotype	Genetic Test	Results	Source/Evidence
Balversa	Poor metabolizer	CYP2C9 (Star Alleles)	*2/*3	FDA 1[35]

ReviewGx

Implication: CYP2C9 alleles do not indicate changes from recommended dose

Escitalopram	Phenotype	Genetic Test	Results	Source/Evidence
Cipralex Lexapro	Normal metabolizer	CYP2C19	*1/*1	CPIC A[4]; FDA 3[35]

Implication: Normal CYP2C19 metabolism

Initiate therapy with recommended starting dose (per CPIC strong recommendation).

TreatGx
ReviewGx

Fentanyl	Phenotype	Genetic Test	Results	Source/Evidence
Abstral Actiq Duragesic Fentora Lazanda Subsys	Typical response	OPRM1 rs1799971	A/A	PharmGKB 3

Implication: OPRM1 alleles indicate a typical response to Fentanyl

ReviewGx

Fesoterodine	Phenotype	Genetic Test	Results	Source/Evidence
Toviaz	Intermediate metabolizer	CYP2D6	*2/*4	FDA 3[35]
TreatG: ReviewG:	**Implication:** CYP2D6 alleles do not indicate changes from recommended dose			

Flecainide	Phenotype	Genetic Test	Results	Source/Evidence
Tambocor	Intermediate metabolizer	CYP2D6	*2/*4	DPWG[9]
TreatG: ReviewG:	**Implication:** CYP2D6 intermediate metabolizer: reduced metabolism of Flecainide to less active compounds Higher plasma concentrations of active drug may increase the risk of adverse drug reactions 2 Reduce the standard dose by 25%, record electrocardiogram, and monitor plasma concentration			

Flibanserin	Phenotype	Genetic Test	Results	Source/Evidence
Addyi	Normal metabolizer	CYP2C19	*1/*1	FDA 1[35]
ReviewG:	**Implication:** CYP2C19 alleles do not indicate changes from recommended dose			

Flupentixol	Phenotype	Genetic Test	Results	Source/Evidence
Fluanxol	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
TreatG: ReviewG:	**Implication:** ANKK1 alleles indicate an increased risk of tardive dyskinesia			

Fluphenazine	Phenotype	Genetic Test	Results	Source/Evidence
Modecate	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
TreatG: ReviewG:	**Implication:** ANKK1 alleles indicate an increased risk of tardive dyskinesia			

Flurazepam	Phenotype	Genetic Test	Results	Source/Evidence
TreatG: ReviewG:	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]
	Implication: CYP2C9 alleles indicate increased risk of Flurazepam-related falls			

Flurbiprofen	Phenotype	Genetic Test	Results	Source/Evidence
Ansaid	Poor metabolizer	CYP2C9 (Star Alleles)	*2/*3	CPIC A[32]; FDA 1[35]

TreatGx
ReviewGx

Implication: CYP2C9 poor metabolizer: greatly reduced metabolism of Flurbiprofen to less active compounds

Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 Consider a 25-50% reduction of the recommended dose

Dose titration should not occur until after steady state is reached (5 days after first dose)

Fluvastatin	Phenotype	Genetic Test	Results	Source/Evidence
Lescol	Poor metabolizer	CYP2C9	*2/*3	CPIC A[6]
	Normal function	SLCO1B1	*1/*1	CPIC A[6]

TreatGx
ReviewGx

Implication: SLCO1B1 alleles indicate typical exposure to Fluvastatin

CYP2C9 alleles indicate increased Fluvastatin exposure as compared with normal and intermediate metabolizers

2 For specific CPIC dosing recommendations refer to TreatGx

Fluvoxamine	Phenotype	Genetic Test	Results	Source/Evidence
Luvox	Intermediate metabolizer	CYP2D6	*2/*4	CPIC B[4]; FDA 3[35]

TreatGx
ReviewGx

Implication: Reduced metabolism of fluvoxamine to less active compounds when compared with CYP2D6 normal metabolizers. Higher plasma concentrations may increase the probability of side effects.

2 Initiate therapy with recommended starting dose (per CPIC moderate recommendation).

Fosphenytoin	Phenotype	Genetic Test	Results	Source/Evidence
Cerebyx	Poor metabolizer	CYP2C9	*2/*3	CPIC A[18]; FDA 1[35]

ReviewGx

Implication: CYP2C9 poor metabolizer: greatly reduced metabolism of Fosphenytoin to less active compounds

Higher plasma concentrations may increase the risk of cutaneous adverse reactions

2 For first dose, use typical initial dose. Consider a 50% reduction for subsequent doses

Galantamine	Phenotype	Genetic Test	Results	Source/Evidence
Razadyne	Intermediate metabolizer	CYP2D6	*2/*4	FDA 3[35]

TreatGx
ReviewGx

Implication: CYP2D6 alleles do not indicate changes from recommended dose

Haloperidol	Phenotype	Genetic Test	Results	Source/Evidence
Haldol	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3

TreatGx
ReviewGx

Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia

Hydrocodone	Phenotype	Genetic Test	Results	Source/Evidence
Hysingla Zohydro	Intermediate metabolizer	CYP2D6	*2/*4	CPIC B[7]

TreatGx
ReviewGx

Implication: CYP2D6 intermediate metabolizer: minimal evidence for pharmacokinetic or clinical effect for Hydrocodone

CYP2D6 alleles do not indicate changes from recommended dose. If no response to Hydrocodone and opioid use is warranted, consider an opioid other than tramadol or codeine (per CPIC optional recommendation). Refer to TreatGx for alternatives and specific dosing recommendations.

Ibuprofen	Phenotype	Genetic Test	Results	Source/Evidence
Advil Caldolor Duexis Motrin IB NeoProfen	Poor metabolizer	CYP2C9 (Star Alleles)	*2/*3	CPIC A[32]; FDA 3[35]

TreatGx
ReviewGx

Implication: CYP2C9 poor metabolizer: greatly reduced metabolism of Ibuprofen to less active compounds

Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 Consider a 25-50% reduction of the recommended dose

Dose titration should not occur until after steady state is reached (5 days after first dose)

Iloperidone	Phenotype	Genetic Test	Results	Source/Evidence
Fanapt	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]
	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3

TreatGx
ReviewGx

Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia

CYP2D6 alleles do not indicate changes from recommended dose

Imipramine	Phenotype	Genetic Test	Results	Source/Evidence
Tofranil	Intermediate metabolizer	CYP2D6	*2/*4	CPIC B[16]; FDA 3[35]
	Normal metabolizer	CYP2C19	*1/*1	CPIC B[16]

TreatGx
ReviewGx

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Imipramine to less active compounds
Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 Consider a reduction of the recommended dose for Imipramine (per CPIC optional recommendation). Refer to TreatGx for alternatives and specific dosing recommendations.

Lansoprazole	Phenotype	Genetic Test	Results	Source/Evidence
Prevacid	Normal metabolizer	CYP2C19	*1/*1	CPIC A[22]; FDA 3[35]

TreatGx
ReviewGx

Implication: Moderate CPIC recommendation: Initiate standard starting daily dose. Consider increasing dose by 50-100% of the standard dose for the treatment of Helicobacter pylori infection and erosive esophagitis.

Lofexidine	Phenotype	Genetic Test	Results	Source/Evidence
Lucemyra	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

ReviewGx

Lorazepam	Phenotype	Genetic Test	Results	Source/Evidence
Ativan	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]

ReviewGx

Implication: CYP2C9 alleles indicate increased risk of Lorazepam-related falls

Lovastatin	Phenotype	Genetic Test	Results	Source/Evidence
Altoprev	Normal function	SLCO1B1	*1/*1	CPIC A[6]

Implication: SLCO1B1 alleles indicate typical exposure to Lovastatin

Consider prescribing desired starting dose and adjust based on disease-specific guidelines

TreatGx
ReviewGx

Loxapine	Phenotype	Genetic Test	Results	Source/Evidence
Adasuve Loxapac	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3

TreatGx
ReviewGx

Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia

Lurasidone	Phenotype	Genetic Test	Results	Source/Evidence
Latuda	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3

Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia

TreatGx
ReviewGx

Meclizine	Phenotype	Genetic Test	Results	Source/Evidence
Antivert	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]

ReviewGx

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Meclizine to less active compounds

Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 This drug has an FDA therapeutic recommendation, refer to drug monograph or FDA labelling for dosing recommendations

Meloxicam	Phenotype	Genetic Test	Results	Source/Evidence
Anjeso Mobic Qmiiz ODT Vivlodex	Poor metabolizer	CYP2C9 (Star Alleles)	*2/*3	CPIC A[32]; FDA 1[35]

Implication: CYP2C9 poor metabolizer: greatly reduced metabolism of Meloxicam to less active compounds

Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

TreatGx
ReviewGx

2 Consider an alternative drug not predominantly metabolized by CYP2C9

Methotrimeprazine	Phenotype	Genetic Test	Results	Source/Evidence
Nozinan	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3

TreatG
ReviewG

Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia

Metoclopramide	Phenotype	Genetic Test	Results	Source/Evidence
Metonia Reglan	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

TreatG
ReviewG

Metoprolol	Phenotype	Genetic Test	Results	Source/Evidence
Kapspargo Sprinkle Lopressor Toprol-XL	Intermediate metabolizer	CYP2D6	*2/*4	DPWG[9]; FDA 3[35]

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Metoprolol to less active compounds

Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 If a gradual reduction in heart rate is desired, or in the event of clinically significant bradycardia, increase the dose in small steps and/or prescribe no more than 50% of the standard dose.

TreatG
ReviewG

Mirabegron	Phenotype	Genetic Test	Results	Source/Evidence
Myrbetriq	Intermediate metabolizer	CYP2D6	*2/*4	FDA 3[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

TreatG
ReviewG

Molindone	Phenotype	Genetic Test	Results	Source/Evidence
Moban	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3

TreatG
ReviewG

Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia

Morphine	Phenotype	Genetic Test	Results	Source/Evidence
Kadian M-Eslon Morphabond ER MS Contin MS-IR Statex	Typical response	OPRM1 rs1799971	A/A	PharmGKB 3[7]

Implication: OPRM1 alleles indicate a typical response to Morphine

TreatG
ReviewG

Nebivolol	Phenotype	Genetic Test	Results	Source/Evidence
Bystolic	Intermediate metabolizer	CYP2D6	*2/*4	FDA 3[35]
TreatGx ReviewGx	**Implication:** CYP2D6 alleles do not indicate changes from recommended dose			

Nitrazepam	Phenotype	Genetic Test	Results	Source/Evidence
Mogadon	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]
ReviewGx	**Implication:** CYP2C9 alleles indicate increased risk of Nitrazepam-related falls			

Nortriptyline	Phenotype	Genetic Test	Results	Source/Evidence
Aventyl Pamelor	Intermediate metabolizer	CYP2D6	*2/*4	CPIC A[16]; FDA 3[35]
TreatGx ReviewGx	**Implication:** CYP2D6 intermediate metabolizer: reduced metabolism of Nortriptyline to less active compounds Higher plasma concentrations of active drug may increase the risk of adverse drug reactions			
	2 Consider a reduction of the recommended dose for Nortriptyline (per CPIC moderate recommendation). Refer to TreatGx for alternatives and specific dosing recommendations.			

Olanzapine	Phenotype	Genetic Test	Results	Source/Evidence
Zyprexa	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
TreatGx ReviewGx	**Implication:** ANKK1 alleles indicate an increased risk of tardive dyskinesia			

Omeprazole	Phenotype	Genetic Test	Results	Source/Evidence
Losec Olex Prilosec	Normal metabolizer	CYP2C19	*1/*1	CPIC A[22]; FDA 3[35]
TreatGx ReviewGx	**Implication:** Moderate CPIC recommendation: Initiate standard starting daily dose. Consider increasing dose by 50-100% of the standard dose for the treatment of Helicobacter pylori infection and erosive esophagitis.			

Ondansetron	Phenotype	Genetic Test	Results	Source/Evidence
Zofran Zuplenz	Intermediate metabolizer	CYP2D6	*2/*4	CPIC A[2]
ReviewGx	**Implication:** CYP2D6 alleles do not indicate changes from recommended dose			

Oral contraceptives	Phenotype	Genetic Test	Results	Source/Evidence
ReviewGx	Typical risk of adverse drug reactions	Factor V rs6025	C/C	PharmGKB 1A
	Typical risk of adverse drug reactions	Factor II rs1799963	G/G	PharmGKB 3
	Implication: F2 and F5 alleles do not indicate changes from recommended dose			

Oxazepam	Phenotype	Genetic Test	Results	Source/Evidence
ReviewGx	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]
	Implication: CYP2C9 alleles indicate increased risk of Oxazepam-related falls			

Paliperidone	Phenotype	Genetic Test	Results	Source/Evidence
Invega	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
TreatGx ReviewGx	**Implication:** ANKK1 alleles indicate an increased risk of tardive dyskinesia			

Pantoprazole	Phenotype	Genetic Test	Results	Source/Evidence
Pantoloc Protonix Tecta	Normal metabolizer	CYP2C19	*1/*1	CPIC A[22]; FDA 1[35]
TreatGx ReviewGx	**Implication:** Moderate CPIC recommendation: Initiate standard starting daily dose. Consider increasing dose by 50-100% of the standard dose for the treatment of Helicobacter pylori infection and erosive esophagitis.			

Paroxetine	Phenotype	Genetic Test	Results	Source/Evidence
Brisdelle Paxil Pexeva	Intermediate metabolizer	CYP2D6	*2/*4	CPIC A[4]; FDA 3[35]
TreatGx ReviewGx	**Implication:** Reduced metabolism of paroxetine to less active compounds when compared with CYP2D6 normal metabolizers when starting treatment or at lower doses. Higher plasma concentrations may increase the probability of side effects. Paroxetine-associated phenoconversion of intermediate metabolizers to poor metabolizers due to CYP2D6 autoinhibition may occur and is dose-dependent and greater at steady-state concentrations.			
	2 Consider a lower starting dose and slower titration schedule as compared with normal metabolizers (per CPIC optional recommendation).			

Perphenazine	Phenotype	Genetic Test	Results	Source/Evidence
TreatGx ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	FDA 2[35]
	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
	Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia			
	CYP2D6 alleles do not indicate changes from recommended dose			

Phenytoin	Phenotype	Genetic Test	Results	Source/Evidence
Dilantin Tremytoine Phenytek	Poor metabolizer	CYP2C9	*2/*3	CPIC A[18]; FDA 1[35]
ReviewGx	**Implication:** CYP2C9 poor metabolizer: greatly reduced metabolism of Phenytoin to less active compounds			
	Higher plasma concentrations may increase the risk of cutaneous adverse reactions			
	2 For first dose, use typical initial dose. Consider a 50% reduction for subsequent doses			

Pimozide	Phenotype	Genetic Test	Results	Source/Evidence
Orap TreatG ReviewG	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]
	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
	Implication:	ANKK1 alleles indicate an increased risk of tardive dyskinesia CYP2D6 alleles do not indicate changes from recommended dose		

Piroxicam	Phenotype	Genetic Test	Results	Source/Evidence
Feldene TreatG ReviewG	Poor metabolizer	CYP2C9 (Star Alleles)	*2/*3	CPIC A[32]; FDA 1[35]
	Implication:	CYP2C9 poor metabolizer: greatly reduced metabolism of Piroxicam to less active compounds Higher plasma concentrations of active drug may increase the risk of adverse drug reactions 2 Consider an alternative drug not predominantly metabolized by CYP2C9		

Pitavastatin	Phenotype	Genetic Test	Results	Source/Evidence
Livalo Zypitamag TreatG ReviewG	Normal function	SLCO1B1	*1/*1	CPIC A[6]
	Implication:	SLCO1B1 alleles indicate typical exposure to Pitavastatin Consider prescribing desired starting dose and adjust based on disease-specific guidelines		

Pravastatin	Phenotype	Genetic Test	Results	Source/Evidence
Pravachol TreatG ReviewG	Normal function	SLCO1B1	*1/*1	CPIC A[6]
	Implication:	SLCO1B1 alleles indicate typical exposure to Pravastatin Consider prescribing desired starting dose and adjust based on disease-specific guidelines		

Prochlorperazine	Phenotype	Genetic Test	Results	Source/Evidence
Compro TreatG ReviewG	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
	Implication:	ANKK1 alleles indicate an increased risk of tardive dyskinesia		

Promethazine	Phenotype	Genetic Test	Results	Source/Evidence
Phenadoz Promethegan TreatG ReviewG	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
	Implication:	ANKK1 alleles indicate an increased risk of tardive dyskinesia		

Propafenone	Phenotype	Genetic Test	Results	Source/Evidence
Rythmol TreatG ReviewG	Intermediate metabolizer	CYP2D6	*2/*4	DPWG[9]; FDA 1[35]

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Propafenone to less active compounds

Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 Adjust dose in response to plasma concentration and record electrocardiogram or select an alternative drug

Propranolol	Phenotype	Genetic Test	Results	Source/Evidence
Inderal Innopran TreatG ReviewG	Intermediate metabolizer	CYP2D6	*2/*4	FDA 3[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

Protriptyline	Phenotype	Genetic Test	Results	Source/Evidence
Vivactil ReviewG	Intermediate metabolizer	CYP2D6	*2/*4	FDA 3[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

Quetiapine	Phenotype	Genetic Test	Results	Source/Evidence
Seroquel TreatG ReviewG	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3

Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia

Risperidone	Phenotype	Genetic Test	Results	Source/Evidence
Perseris Risperdal TreatG ReviewG	Intermediate metabolizer	CYP2D6	*2/*4	DPWG[9]; FDA 3[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

Rosuvastatin	Phenotype	Genetic Test	Results	Source/Evidence
Crestor Ezallor TreatG ReviewG	Normal function	SLCO1B1	*1/*1	CPIC A[6]; FDA 3[35]

Implication: SLCO1B1 alleles indicate typical exposure to Rosuvastatin

Sertraline	Phenotype	Genetic Test	Results	Source/Evidence
Zoloft TreatG ReviewG	Normal metabolizer	CYP2B6	*1/*1	CPIC B[4]
	Normal metabolizer	CYP2C19	*1/*1	CPIC A[4]

Implication: Normal CYP2B6 metabolism

Normal CYP2C19 metabolism

Initiate therapy with recommended starting dose (per CPIC strong recommendation).

Simvastatin	Phenotype	Genetic Test	Results	Source/Evidence
Zocor Flolipid TreatGx ReviewGx	Normal function	SLCO1B1	*1/*1	CPIC A[6]; FDA 2[35]

Implication: SLCO1B1 alleles indicate typical exposure to Simvastatin

Consider prescribing desired starting dose and adjust based on disease-specific guidelines

Siponimod	Phenotype	Genetic Test	Results	Source/Evidence
Mayzent ReviewGx	Poor metabolizer	CYP2C9 (Star Alleles)	*2/*3	FDA 1[35]

Implication: Reduced metabolism of Siponimod to less active compounds

Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 Consider a reduction of the recommended dose

2 This drug has an FDA therapeutic recommendation, refer to drug monograph or FDA labelling for dosing recommendations

Tacrolimus	Phenotype	Genetic Test	Results	Source/Evidence
Advagraf Astagraf XL Envarsus XR Prograf Protopic ReviewGx	Poor metabolizer	CYP3A5	*3/*3	CPIC A[3]; FDA 1[35]
	Normal metabolizer	CYP3A4	*1/*1	PharmGKB 1B; PharmGKB 2A

Implication: CYP3A5 alleles do not indicate changes from recommended dose

CYP3A4 alleles do not indicate changes from recommended dose

Use therapeutic drug monitoring to guide dose adjustments

Tamoxifen	Phenotype	Genetic Test	Results	Source/Evidence
Nolvadex Soltamox ReviewGx	Intermediate metabolizer (AS 1.0)	CYP2D6 (Activity Score)	*2/*4	CPIC A[12]; FDA 3[35]

Implication: CYP2D6 intermediate metabolizer with an activity score of 1.0: reduced metabolism of Tamoxifen to endoxifen

2 Optional CPIC recommendation for breast cancer therapy: Consider alternative hormonal therapy.

2 If aromatase inhibitor use is contraindicated, consideration should be given to use a higher but FDA approved tamoxifen dose (40 mg/day). Avoid CYP2D6 strong to weak inhibitors.

Recommendation for conditions other than breast cancer: There is a potential impact on pharmacokinetic properties. The impact of CYP2D6 variants on the safety of Tamoxifen has not been established (FDA PGx Table)

Tamsulosin	Phenotype	Genetic Test	Results	Source/Evidence
Flomax ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	FDA 3[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

Temazepam	Phenotype	Genetic Test	Results	Source/Evidence
Restoril TreatGx ReviewGx	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]

Implication: CYP2C9 alleles indicate increased risk of Temazepam-related falls

Tenoxicam	Phenotype	Genetic Test	Results	Source/Evidence
Mobiflex	Poor metabolizer	CYP2C9 (Star Alleles)	*2/*3	CPIC A[32]

Implication: CYP2C9 poor metabolizer: greatly reduced metabolism of Tenoxicam to less active compounds

Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 Consider an alternative drug not predominantly metabolized by CYP2C9

Tetrabenazine	Phenotype	Genetic Test	Results	Source/Evidence
Austedo Nitoman Xenazine	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

Thioridazine	Phenotype	Genetic Test	Results	Source/Evidence
TreatGx	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]
ReviewGx	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3

Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia

CYP2D6 alleles do not indicate changes from recommended dose

Tolterodine	Phenotype	Genetic Test	Results	Source/Evidence
Detrol	Intermediate metabolizer	CYP2D6	*2/*4	FDA 2[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

Tramadol	Phenotype	Genetic Test	Results	Source/Evidence
Conzip Durela Ralivia Ultram Zytram XL	Intermediate metabolizer	CYP2D6	*2/*4	CPIC A[7]; FDA 1[35]; FDA 2[35]

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Tramadol to active metabolite

CYP2D6 alleles do not indicate changes from recommended dose. If no response to Tramadol and opioid use is warranted, consider an opioid other than tramadol or codeine (per CPIC optional recommendation). Refer to TreatGx for alternatives and specific dosing recommendations.

Triazolam	Phenotype	Genetic Test	Results	Source/Evidence
Halcion	Poor metabolizer	CYP2C9	*2/*3	Case-control studies[14]

Implication: CYP2C9 alleles indicate increased risk of Triazolam-related falls

Trifluoperazine	Phenotype	Genetic Test	Results	Source/Evidence
TreatGx ReviewGx	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3

Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia

Trimipramine	Phenotype	Genetic Test	Results	Source/Evidence
Surmontil ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	CPIC B[16]; FDA 3[35]
	Normal metabolizer	CYP2C19	*1/*1	CPIC B[16]

Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Trimipramine to less active compounds
Higher plasma concentrations of active drug may increase the risk of adverse drug reactions

2 Consider a reduction of the recommended dose for Trimipramine (per CPIC optional recommendation). Refer to TreatGx for alternatives and specific dosing recommendations.

Valbenazine	Phenotype	Genetic Test	Results	Source/Evidence
Ingrezza ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	FDA 1[35]

Implication: CYP2D6 alleles do not indicate changes from recommended dose

Venlafaxine	Phenotype	Genetic Test	Results	Source/Evidence
Effexor XR TreatGx ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	CPIC B[4]; FDA 1[35]

Implication: Decreased metabolism of venlafaxine to active metabolite O-desmethylvenlafaxine (desvenlafaxine) and decreased O-desmethylvenlafaxine: venlafaxine ratio as compared with CYP2D6 normal metabolizers. There is insufficient evidence supporting the clinical impact of the decreased O-desmethylvenlafaxine: venlafaxine ratio in CYP2D6 intermediate metabolizers.

CPIC: No action recommended based on genotype for venlafaxine because of minimal evidence regarding the impact on efficacy or side effects.

Voriconazole	Phenotype	Genetic Test	Results	Source/Evidence
Vfend ReviewGx	Normal metabolizer	CYP2C19	*1/*1	CPIC A[26]; FDA 2[35]

Implication: CYP2C19 alleles do not indicate changes from recommended dose

Vortioxetine	Phenotype	Genetic Test	Results	Source/Evidence
Trintellix TreatGx ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	CPIC A[4]; FDA 1[35]

Implication: Reduced metabolism of vortioxetine to less active compounds when compared with CYP2D6 normal metabolizers. Higher plasma concentrations may increase the probability of side effects.

2 Initiate therapy with recommended starting dose (per CPIC moderate recommendation).

Warfarin	Phenotype	Genetic Test	Results	Source/Evidence
Coumadin Jantoven TreatGx ReviewGx	Poor metabolizer	CYP2C9	*2/*3	CPIC A[17]; FDA 1[35]
	Reduced response	VKORC1	G/G	CPIC A[17]; FDA 1[35]
	Implication: 2 The algorithm in TreatGx includes pharmacogenetics and other clinical factors in calculating initial warfarin dose			

Ziprasidone	Phenotype	Genetic Test	Results	Source/Evidence
Geodon Zeldox TreatGx ReviewGx	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
	Implication: ANKK1 alleles indicate an increased risk of tardive dyskinesia			

Zuclopenthixol	Phenotype	Genetic Test	Results	Source/Evidence
Clopixol TreatGx ReviewGx	Intermediate metabolizer	CYP2D6	*2/*4	DPWG[9]
	Increased risk of adverse drug reactions	ANKK1/DRD2 rs1800497	G/G	PharmGKB 3
	Implication: CYP2D6 intermediate metabolizer: reduced metabolism of Zuclopenthixol to less active compounds Higher plasma concentrations of active drug may increase the risk of adverse drug reactions Avoid Zuclopenthixol use ANKK1 alleles indicate an increased risk of tardive dyskinesia			

Table of Available References

Drug	Genetic Test	Sources
Alfentanil	OPRM1 rs1799971	PharmGKB
Alprazolam	CYP2C9	Case-control studies[14]
Amitriptyline	CYP2D6	CPIC[16]; FDA[35]
Amitriptyline	CYP2C19	CPIC[16]
Amoxapine	CYP2D6	FDA[35]
Amphetamine	CYP2D6	FDA[35]
Aripiprazole	CYP2D6	DPWG[9]; FDA[35]
Aripiprazole	ANKK1/DRD2 rs1800497	PharmGKB
Aripiprazole lauroxil	CYP2D6	FDA[35]
Asenapine	ANKK1/DRD2 rs1800497	PharmGKB
Atomoxetine	CYP2D6 (Activity Score)	CPIC[5]; FDA[35]
Atorvastatin	SLCO1B1	CPIC[6]; FDA[35]
Avatrombopag	CYP2C9	FDA[35]
Brexpiprazole	CYP2D6	DPWG[9]; FDA[35]
Brexpiprazole	ANKK1/DRD2 rs1800497	PharmGKB
Brivaracetam	CYP2C19	FDA[35]
Bromazepam	CYP2C9	Case-control studies[14]
Cariprazine	ANKK1/DRD2 rs1800497	PharmGKB
Carisoprodol	CYP2C19	FDA[35]
Carvedilol	CYP2D6	FDA[35]
Celecoxib	CYP2C9 (Star Alleles)	CPIC[32]; FDA[35]
Cevimeline	CYP2D6	FDA[35]
Chlordiazepoxide	CYP2C9	Case-control studies[14]
Chlorpromazine	ANKK1/DRD2 rs1800497	PharmGKB
Citalopram	CYP2C19	CPIC[4]; FDA[35]

Drug	Genetic Test	Sources
Clobazam	CYP2C19	FDA[35]
Clomipramine	CYP2D6	CPIC[16]; FDA[35]
Clomipramine	CYP2C19	CPIC[16]
Clonazepam	CYP2C9	Case-control studies[14]
Clopidogrel	CYP2C19	CPIC[20]; FDA[35]
Clorazepate	CYP2C9	Case-control studies[14]
Clozapine	CYP2D6	FDA[35]
Clozapine	ANKK1/DRD2 rs1800497	PharmGKB
Codeine	CYP2D6	CPIC[7]; FDA[35]
Cyclosporine	CYP3A5	PharmGKB
Darifenacin	CYP2D6	FDA[35]
Desipramine	CYP2D6	CPIC[16]; FDA[35]
Deutetrabenazine	CYP2D6	FDA[35]
Dexlansoprazole	CYP2C19	CPIC[22]; FDA[35]
Diazepam	CYP2C19	FDA[35]
Diazepam	CYP2C9	Case-control studies[14]
Donepezil	CYP2D6	FDA[35]
Doxepin	CYP2D6	CPIC[16]; FDA[35]
Doxepin	CYP2C19	CPIC[16]; FDA[35]
Dronabinol	CYP2C9	FDA[35]
Efavirenz	CYP2B6	CPIC[8]; DPWG[9]; FDA[35]
Elagolix	SLCO1B1	FDA[35]
Eliglustat	CYP2D6	DPWG[9]; FDA[35]
Eltrombopag	Factor V rs6025	FDA[28]
Eltrombopag	Factor II rs1799963	PharmGKB

Drug	Genetic Test	Sources
Erdafitinib	CYP2C9 (Star Alleles)	FDA[35]
Escitalopram	CYP2C19	CPIC[4]; FDA[35]
Fentanyl	OPRM1 rs1799971	PharmGKB
Fesoterodine	CYP2D6	FDA[35]
Flecainide	CYP2D6	DPWG[9]
Flibanserin	CYP2C19	FDA[35]
Flupentixol	ANKK1/DRD2 rs1800497	PharmGKB
Fluphenazine	ANKK1/DRD2 rs1800497	PharmGKB
Flurazepam	CYP2C9	Case-control studies[14]
Flurbiprofen	CYP2C9 (Star Alleles)	CPIC[32]; FDA[35]
Fluvastatin	CYP2C9	CPIC[6]
Fluvastatin	SLCO1B1	CPIC[6]
Fluvoxamine	CYP2D6	CPIC[4]; FDA[35]
Fosphenytoin	CYP2C9	CPIC[18]; FDA[35]
Galantamine	CYP2D6	FDA[35]
Haloperidol	ANKK1/DRD2 rs1800497	PharmGKB
Hydrocodone	CYP2D6	CPIC[7]
Ibuprofen	CYP2C9 (Star Alleles)	CPIC[32]; FDA[35]
Iloperidone	CYP2D6	FDA[35]
Iloperidone	ANKK1/DRD2 rs1800497	PharmGKB
Imipramine	CYP2D6	CPIC[16]; FDA[35]
Imipramine	CYP2C19	CPIC[16]
Lansoprazole	CYP2C19	CPIC[22]; FDA[35]
Lofexidine	CYP2D6	FDA[35]
Lorazepam	CYP2C9	Case-control studies[14]

Drug	Genetic Test	Sources
Lovastatin	SLCO1B1	CPIC[6]
Loxapine	ANKK1/DRD2 rs1800497	PharmGKB
Lurasidone	ANKK1/DRD2 rs1800497	PharmGKB
Meclizine	CYP2D6	FDA[35]
Meloxicam	CYP2C9 (Star Alleles)	CPIC[32]; FDA[35]
Methotrimeprazine	ANKK1/DRD2 rs1800497	PharmGKB
Metoclopramide	CYP2D6	FDA[35]
Metoprolol	CYP2D6	DPWG[9]; FDA[35]
Mirabegron	CYP2D6	FDA[35]
Molindone	ANKK1/DRD2 rs1800497	PharmGKB
Morphine	OPRM1 rs1799971	PharmGKB[7]
Nebivolol	CYP2D6	FDA[35]
Nitrazepam	CYP2C9	Case-control studies[14]
Nortriptyline	CYP2D6	CPIC[16]; FDA[35]
Olanzapine	ANKK1/DRD2 rs1800497	PharmGKB
Omeprazole	CYP2C19	CPIC[22]; FDA[35]
Ondansetron	CYP2D6	CPIC[2]
Oral contraceptives	Factor V rs6025	PharmGKB
Oral contraceptives	Factor II rs1799963	PharmGKB
Oxazepam	CYP2C9	Case-control studies[14]
Paliperidone	ANKK1/DRD2 rs1800497	PharmGKB
Pantoprazole	CYP2C19	CPIC[22]; FDA[35]
Paroxetine	CYP2D6	CPIC[4]; FDA[35]
Perphenazine	CYP2D6	FDA[35]
Perphenazine	ANKK1/DRD2 rs1800497	PharmGKB

Drug	Genetic Test	Sources
Phenytoin	CYP2C9	CPIC[18]; FDA[35]
Pimozide	CYP2D6	DPWG[9]; FDA[35]
Pimozide	ANKK1/DRD2 rs1800497	PharmGKB
Piroxicam	CYP2C9 (Star Alleles)	CPIC[32]; FDA[35]
Pitavastatin	SLCO1B1	CPIC[6]
Pravastatin	SLCO1B1	CPIC[6]
Prochlorperazine	ANKK1/DRD2 rs1800497	PharmGKB
Promethazine	ANKK1/DRD2 rs1800497	PharmGKB
Propafenone	CYP2D6	DPWG[9]; FDA[35]
Propranolol	CYP2D6	FDA[35]
Protriptyline	CYP2D6	FDA[35]
Quetiapine	ANKK1/DRD2 rs1800497	PharmGKB
Risperidone	CYP2D6	DPWG[9]; FDA[35]
Rosuvastatin	SLCO1B1	CPIC[6]; FDA[35]
Sertraline	CYP2B6	CPIC[4]
Sertraline	CYP2C19	CPIC[4]
Simvastatin	SLCO1B1	CPIC[6]; FDA[35]
Siponimod	CYP2C9 (Star Alleles)	FDA[35]
Tacrolimus	CYP3A5	CPIC[3]; FDA[35]
Tacrolimus	CYP3A4	PharmGKB
Tamoxifen	CYP2D6 (Activity Score)	Clinical trial[15]; CPIC[12]; FDA[35]
Tamsulosin	CYP2D6	FDA[35]
Temazepam	CYP2C9	Case-control studies[14]
Tenoxicam	CYP2C9 (Star Alleles)	CPIC[32]
Tetrabenazine	CYP2D6	FDA[35]

Drug	Genetic Test	Sources
Thioridazine	CYP2D6	FDA[35]
Thioridazine	ANKK1/DRD2 rs1800497	PharmGKB
Tolterodine	CYP2D6	FDA[35]
Tramadol	CYP2D6	CPIC[7]; FDA[35]
Triazolam	CYP2C9	Case-control studies[14]
Trifluoperazine	ANKK1/DRD2 rs1800497	PharmGKB
Trimipramine	CYP2D6	CPIC[16]; FDA[35]
Trimipramine	CYP2C19	CPIC[16]
Valbenazine	CYP2D6	FDA[35]
Venlafaxine	CYP2D6	CPIC[4]; FDA[35]
Voriconazole	CYP2C19	CPIC[26]; FDA[35]
Vortioxetine	CYP2D6	CPIC[4]; FDA[35]
Warfarin	CYP2C9	CPIC[17]; FDA[35]
Warfarin	VKORC1	CPIC[17]; FDA[35]
Ziprasidone	ANKK1/DRD2 rs1800497	PharmGKB
Zuclopenthixol	CYP2D6	DPWG[9]
Zuclopenthixol	ANKK1/DRD2 rs1800497	PharmGKB

References

https://www.genxys.com/lab-references

Methods

DNA was extracted from dried blood spot (DBS) card by Chemagic 360 system (Revvity) and processed in a Biomark X platform (Standard Biotools) with Advanta™ Pharmacogenomics Assay.

Limitations

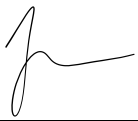
The annotations and interpretations provided in this report are based on scientific literature and do not take into account drug-drug interactions, medical conditions or other clinical factors that may affect medication response. Gene-drug interactions are ranked according to guidelines, level of evidence and clinical utility. GenXys reports and TreatGx Clinical Decision Support are regularly updated. Current predicted phenotype and allele functionality may change in the future depending on new evidence. Phenotype annotations for CYP2C9 are based on total activity scores as defined by CPIC[79]. Genetic test results and interpretation may be inaccurate for individuals who have undergone or are receiving non-autologous blood transfusion, tissue, or organ transplant therapies.

The report includes alleles of proteins involved in the metabolism of many medications. In rare cases, a variant that is not covered may be typed as *1 or other variants. In the case of pseudogenes and mutations in the untranslated regions of genes, incorrect allele typing may occur despite proper SNP detection. Preferential amplification of one allele over another present in the sample may also lead to incorrect genotyping.

Liability Disclaimer

This test was developed and its performance characteristics determined by GenXys Health Care Systems. It has not been cleared or approved by the US Food and Drug Administration. The report is not a diagnostic test, and TreatGx is not a prescribing system. You should discuss your pharmacogenetic information with a physician or other health care provider before you act upon the pharmacogenetic information resulting from this report. The medication brand names are not an exhaustive list and do not include combination therapies. Not all medications in this report are included in the TreatGx or ReviewGx software or other GenXys derivative works.

Laboratory Director



Dr Juha Matilainen, Laboratory Director, PhD

07/May/2024

Date of Signature

medcheck™ from dnalife

PATIENT INFORMATION
NAME: Sample Patient
DOB: 16/Feb/2000
SEX AT BIRTH: Female

SPECIMEN DETAILS
BARCODE: GNL-DL-00000
SAMPLE ID: 0000
TYPE: Copan FLOQSwab
COLLECTED: 02/Dec/2023

ORDERED BY
Nordic Laboratories
REPORT GENERATED: 07/May/2024

Laboratory Report

The **Laboratory Report** contains your genetic results.

Gene	rsID	HGVS	HGVS Reference	Result
ABCB1	rs1045642	c.3645T>C	NM_001348945.2	G/G
ANKK1/DRD2	rs1800497	c.2137G>A	NM_178510.1	G/G
APOE	rs429358	c.388T>C	NM_000041.3	T/T
APOE	rs7412	c.526C>T	NM_000041.3	C/C
COMT	rs4680	c.472G>A	NM_000754.3	G/G
CYP1A2	rs12720461	c.-10+113C>T	NM_000761.4	C/C
CYP1A2	rs2069514	g.74745879G>A	NC_000015.10	G/G
CYP1A2	rs56107638	g.9427G>A	NG_061543.1	G/G
CYP1A2	rs72547513	c.558C>T	NM_000761.4	C/C
CYP1A2	rs762551	c.-9-154A>C	NM_000761.3	C/C
CYP2B6	rs28399499	c.983T>C	NM_000767.4	T/T
CYP2B6	rs3745274	c.516G>T	NM_000767.5	G/G
CYP2C19	rs12248560	g.94761900C>T	NC_000010.11	C/C
CYP2C19	rs12769205	c.332-23A>G	NM_000769.2	A/A
CYP2C19	rs17884712	c.431G>A	NM_000769.4	G/G
CYP2C19	rs28399504	c.1A>G	NM_000769.4	A/A
CYP2C19	rs4244285	c.681G>A	NM_000769.4	G/G
CYP2C19	rs4986893	c.636G>A	NM_000769.4	G/G
CYP2C19	rs56337013	c.1297C>T	NM_000769.4	C/C
CYP2C19	rs6413438	c.680C>T	NM_000769.4	C/C
CYP2C19	rs72552267	c.395G>A	NM_000769.4	G/G
CYP2C19	rs72558186	g.94781999T>A	NC_000010.11	T/T
CYP2C9	rs1057910	c.1075A>C	NM_000771.4	A/C
CYP2C9	rs1799853	c.430C>T	NM_000771.4	T/C
CYP2C9	rs28371685	c.1003C>T	NM_000771.4	C/C
CYP2C9	rs28371686	c.1080C>G	NM_000771.4	C/C
CYP2C9	rs56165452	c.1076T>C	NM_000771.4	T/T
CYP2C9	rs72558187	c.269T>C	NM_000771.4	T/T
CYP2C9	rs72558190	c.485C>A/T	NM_000771.4	C/C
CYP2C9	rs7900194	c.449G>A/C/T	NM_000771.4	G/G
CYP2C9	rs9332131	c.818del	NM_000771.4	A/A
CYP2C9	rs9332239	c.1465C>T	NM_000771.4	C/C
CYP2D6	rs1065852	c.100C>T	NM_000106.6	G/A
CYP2D6	rs1135822	c.358T>A	NM_000106.6	A/A
CYP2D6	rs1135840	c.1457G>C	NM_000106.6	G/G

Gene	rsID	HGVS	HGVS Reference	Result
CYP2D6	rs16947	c.886C>T	NM_000106.6	G/A
CYP2D6	rs201377835	g.42129910C>G	NC_000022.11	C/C
CYP2D6	rs267608319	c.1319G>A	NM_000106.6	C/C
CYP2D6	rs28371706	c.320C>T	NM_000106.6	G/G
CYP2D6	rs28371725	c.985+39G>A	NM_000106.5	C/C
CYP2D6	rs35742686	c.775del	NM_000106.6	T/T
CYP2D6	rs3892097	g.42128945C>T	NC_000022.11	T/C
CYP2D6	rs5030655	c.454del	NM_000106.6	A/A
CYP2D6	rs5030656	c.841_843del	NM_000106.6	CTT/CTT
CYP2D6	rs5030862	c.124G>A	NM_000106.6	C/C
CYP2D6	rs5030865	c.505G>T/C/A	NM_000106.6:	C/C
CYP2D6	rs5030867	c.971A>C	NM_000106.6	T/T
CYP2D6	rs59421388	c.971A>C	NM_000106.6	C/C
CYP2D6	rs72549356	c.514_522dup	NM_000106.6	-/-
CYP2D6	rs72549346	c.1088_1089dup	NM_000106.6	-/-
CYP2D6	rs72549347	c.1030C>T	NM_000106.6	G/G
CYP2D6	rs72549352	c.805dup	NM_000106.6:	-/-
CYP2D6	rs72549353	c.765_768del	NM_000106.6	AGTT/AGTT
CYP2D6	rs72549354	c.635dup	NM_000106.6	-/-
CYP2D6	rs79292917	c.975G>A	NM_000106.6	C/C
CYP3A4	rs35599367	c.522-191C>T	NM_017460.6	G/G
CYP3A4	rs4987161	c.566T>C	NM_017460.6	A/A
CYP3A4	rs55785340	c.664T>C	NM_017460.6	A/A
CYP3A5	rs10264272	c.624G>A	NM_000777.5	C/C
CYP3A5	rs28365083	c.1193C>A	NM_000777.5	G/G
CYP3A5	rs41303343	c.1035dup	NM_000777.5	-/-
CYP3A5	rs776746	c.219-237A>G	NM_000777.5	C/C
Factor II	rs1799963	c.*97G>A	NM_000506.5	G/G
Factor V	rs6025	c.1601G>A	NM_000130.4	C/C
MTHFR	rs1801131	c.1286A>C	NM_005957.5	G/G
MTHFR	rs1801133	c.665C>T	NM_005957.5	G/G
OPRM1	rs1799971	c.118A>G	NM_000914.5	A/A
SLCO1B1	rs4149056	c.521T>C	NM_006446.5	T/T
VKORC1	rs9923231	g.31096368C>T	NC_000016.10	G/G (C/C)[1]

1: Pharmacogenetic testing may occasionally lead to unusual genotypes. In these situations pharmacogenetic laboratories will sometimes report on alternative genotypes. If this is done then both genotypes appear in the result table; a genotype in () is the alternative genotype chosen by the lab.

Copy Number Variation

Gene	Reference	Result (Copy/Copies)
CYP2D6	NG_008376.3 exon 9	2
CYP2D6_intron6	NG_008376.3 intron 6	2
CYP2D6_5pFlank	NG_008376.3 CYP2D6_5pFlank	3

Phenotype Table

Gene	Allele Result	Phenotype Result
CYP3A4	*1/*1	Normal Metabolizer
CYP2D6	*2/*4	Intermediate Metabolizer
CYP2C9	*2/*3	Poor Metabolizer
CYP2C19	*1/*1	Normal Metabolizer
SLCO1B1	*1/*1	Normal Function
CYP2B6	*1/*1	Normal Metabolizer
CYP3A5	*3/*3	Poor Metabolizer