

EXAMPLE REPORT · COMPLETE REPORT FOR YOUR DOCTOR OR PHARMACIST

Full Report

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Report version
4.5

Created
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Data source
23andMe

Genome build
GRCh37

120 medications · 30 genes · 26 drug classes

This complete edition includes every gene result and every medication in this report tier, including results labeled “Use as directed,” all source guidance, evidence levels and limitations.

This is not a clinical test. Results are predictions from consumer DNA data and published research. The quality of submitted data is not independently verified and errors can affect the report. Do not change a dose or stop a medication without talking to your prescriber. Confirm any result that matters with a clinical-grade test.

Coverage depends on your data and report tier. A medication missing from this report may still have guidance from a clinical guideline or product label.

Reading the guidance

CONSIDER ALTERNATIVE 14 **USE WITH CAUTION** 63 **USE AS DIRECTED** 36 **UNABLE TO DETERMINE** 7

Use as directed: no change suggested by the assessed genetic findings. Use with caution: a dose change, slower titration or monitoring may be suggested. Consider alternative: discuss another medication or the source’s dose advice. Unable to determine: the available data could not establish a result. These labels do not guarantee effectiveness or freedom from side effects.



Anesthesia genes couldn't be checked. RYR1 and CACNA1S can't be read reliably from array data, so 7 anesthesia medications show "Unable to determine." This is not a negative result. If you or a relative ever reacted badly to anesthesia, tell your anesthesia team.

Report contents

Gene results at a glance · Complete medication guidance · Gene details and frequencies · About this report

Antidepressants	14 medications	Antipsychotics	12 medications
Psychostimulants	2 medications	Movement disorders	3 medications
Anticonvulsants	4 medications	Pain management	13 medications
Cardiovascular	7 medications	Cholesterol medications	7 medications
Antiemetics	4 medications	Proton pump inhibitors	4 medications
Oncology	13 medications	Immunosuppressants	4 medications
Antivirals	5 medications	Antifungals	1 medication
Anesthetics	8 medications	Weight management	3 medications
Antidiabetics	1 medication	Antihistamines	1 medication
Drugs used in addictive disorders	1 medication	Female sexual health	1 medication
Gaucher's disease treatments	1 medication	Gout	1 medication
Hair loss	1 medication	Saliva production stimulators	1 medication
Urologicals	1 medication	Other substances	7 medications

Your genes at a glance

All 30 results. Evidence and actionability differ by gene and medication. An activity score adds the activity values of your gene copies; higher scores indicate more enzyme activity. The detailed gene section explains each result.

GENE	YOUR TWO COPIES	GENOTYPE	PHENOTYPE	ACTIVITY SCORE
ABCG2		rs2231142G/rs2231142G	Normal Function	-
ADH1B		rs1229984C/rs1229984C	Normal Function	-
AKT1		rs2494732C/rs2494732T	Decreased Function	-
ALDH2		rs671G/rs671G	Normal Function	-
BCHE		Reference/Reference	Normal Metabolizer	-
CACNA1S		Not determined	Not checked	-
CHRNA5		rs16969968A/rs16969968A	Increased Risk	-
COMT		rs4680A/rs4680G	Intermediate Function	-
CYP1A2		*1/*30	Rapid Metabolizer	-
CYP2A6		*1/*1	Normal Metabolizer	-
CYP2B6		*1/*1	Normal Metabolizer	-
CYP2C19		*1/*2	Intermediate Metabolizer	-
CYP2C9		*1/*2	Intermediate Metabolizer	1.5
CYP2D6		*4/*4	Poor Metabolizer	0.0
CYP3A4		*1/*1	Normal Metabolizer	-
CYP3A5		*1/*3	Intermediate Metabolizer	-
CYP4F2		*1/*3	Intermediate Metabolizer	-
DPYD		Reference/Reference	Normal Metabolizer	2.0
FAAH		rs324420C/rs324420C	Normal Function	-
GIPR		rs1800437C/rs1800437G	Decreased Function	-
GLP1R		rs10305420C/rs10305420C	Typical Response	-
IFNL3		rs12979860C/rs12979860C	Favorable Response Genotype	-
NAT2		*16/*5	Poor Metabolizer	-
NUDT15		*1/*1	Normal Metabolizer	-
RYR1		Not determined	Not checked	-
SLC01B1		*15/*1A	Decreased Function	-
SULT1A1		*1/*1	Normal Function	-
TPMT		*1/*1	Normal Metabolizer	-
UGT1A1		*1/*28+*60+*80	Intermediate Metabolizer	-
VKORC1		-1639A/-1639G	Decreased Expression	-

Color shows the overall gene result. Dot fill shows each copy's function; lettered dots show your DNA letters where copy function isn't defined.

Normal / typical / favorable Intermediate / decreased Poor / increased risk Rapid / increased Not determined

Filled dots: works normally. Half-filled: works less well. Empty: does not work. Ringed: more active than usual. Dotted gray: not determined. Letters show DNA bases without assigning copy function. A non-normal allele does not necessarily change medication guidance.

Complete medication guidance

All 120 medications, grouped by drug class. Each source’s wording and evidence level are retained; sources may offer different recommendations.

Antidepressants 14 medications

8 Consider alternative 6 Use with caution

SNRIS

Venlafaxine

CONSIDER ALTERNATIVE

Effexor XR

Your body breaks down this drug much more slowly, which has been linked to more side effects. A different antidepressant may be a better choice.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

CONSIDER ALTERNATIVE

Evidence: optional [Read the guideline](#)

WHAT IT MEANS Decreased metabolism of venlafaxine to the active metabolite O-desmethylvenlafaxine and greatly decreased O-desmethylvenlafaxine:venlafaxine ratio compared with normal and intermediate metabolizers. Although the clinical impact is unclear, poor metabolizer status has been associated with adverse effects.

WHAT THE GUIDELINE SUGGESTS Consider a clinically appropriate alternative antidepressant not predominantly metabolized by CYP2D6.

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

IN PLAIN WORDS Your body breaks down venlafaxine much more slowly than normal, causing the drug to build up in your system. A lower dose may be needed to avoid side effects.

WHAT IT MEANS Alters systemic parent drug and metabolite concentrations. Consider dosage reductions.

WHAT THE LABEL SUGGESTS Consider dosage reductions.

Citalopram

USE WITH CAUTION

Celexa

Your body may break down the drug more slowly, increasing side effects. Your doctor may use a lower dose or adjust it more slowly.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

CPIC GUIDELINE, CYP2C19

USE WITH CAUTIONEvidence: moderate[Read the guideline](#)

WHAT IT MEANS Reduced metabolism when compared with CYP2C19 normal metabolizers. Higher plasma concentrations may increase the probability of side effects.

WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended starting dose. Consider a slower titration schedule and lower maintenance dose than normal metabolizers.

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19

USE AS DIRECTED[See the FDA table](#)

IN PLAIN WORDS Your body breaks down citalopram slightly slower than normal. The standard dose should work as expected.

WHAT IT MEANS No FDA guidance for your genotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

Escitalopram

USE WITH CAUTION

Lexapro

Your body may break down the drug more slowly, increasing side effects. Your doctor may use a lower dose or adjust it more slowly.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

CPIC GUIDELINE, CYP2C19

USE WITH CAUTIONEvidence: moderate[Read the guideline](#)

WHAT IT MEANS Reduced metabolism when compared with CYP2C19 normal metabolizers. Higher plasma concentrations may increase the probability of side effects.

WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended starting dose. Consider a slower titration schedule and lower maintenance dose than normal metabolizers.

Fluvoxamine

USE WITH CAUTION

Luvox

Your body breaks down this drug much more slowly. A lower starting dose, a slower increase, or a different drug may be safer.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

USE WITH CAUTION

Evidence: optional [Read the guideline](#)

WHAT IT MEANS Greatly reduced metabolism of fluvoxamine to less active compounds compared with normal metabolizers. Higher plasma concentrations may increase the probability of side effects.

WHAT THE GUIDELINE SUGGESTS Consider a 25 to 50% lower starting dose and slower titration schedule as compared with normal metabolizers or consider a clinically appropriate alternative antidepressant not predominantly metabolized by CYP2D6.

Paroxetine

USE WITH CAUTION

Paxil, Seroxat

Your body processes this drug very slowly, so you may need half the usual dose to avoid side effects.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

USE WITH CAUTION

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS Greatly reduced metabolism compared with CYP2D6 normal metabolizers. Higher plasma concentrations may increase the probability of side effects.

WHAT THE GUIDELINE SUGGESTS Consider a 50% reduction in recommended starting dose, slower titration schedule, and a 50% lower maintenance dose as compared with normal metabolizers.

Sertraline

USE WITH CAUTION

Zoloft

Your body processes this drug a bit more slowly. You can start at the usual dose, but your doctor may raise it slowly, and a lower ongoing dose may be enough.

 **CYP2C19** Intermediate metabolizer  **CYP2B6** Normal metabolizer

CYP2C19: Intermediate metabolizer; **CYP2B6:** Normal metabolizer

CPIC GUIDELINE, BOTH GENES TOGETHER

USE WITH CAUTION

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS CYP2C19: Reduced metabolism of sertraline to less active compounds when compared to CYP2C19 normal metabolizers. CYP2B6: Normal metabolism of sertraline to less active compounds.

WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended starting dose. Consider a slower titration schedule and lower maintenance dose.

From the combined CYP2C19 and CYP2B6 table in CPIC's guideline for serotonin reuptake inhibitor antidepressants.

Sertraline

USE WITH CAUTION

Zoloft

Your body processes this drug a bit more slowly. You can start at the usual dose, but your doctor may raise it slowly, and a lower ongoing dose may be enough.

 **CYP2C19** Intermediate metabolizer  **CYP2B6** Normal metabolizer

CPIC reads your CYP2C19 and CYP2B6 results together for sertraline, so this label reflects both genes.

Vortioxetine

USE WITH CAUTION

Trintellix, Brintellix

Your body clears this drug much more slowly. Half the usual starting dose is advised, or a different antidepressant.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

USE WITH CAUTION

Evidence: moderate

[Read the guideline](#)

WHAT IT MEANS Greatly reduced metabolism of vortioxetine to inactive compounds compared with normal metabolizers. Higher plasma concentrations may increase the probability of side effects.

WHAT THE GUIDELINE SUGGESTS Initiate 50% of starting dose (e.g., 5 mg) and titrate to the maximum recommended dose of 10 mg or consider a clinically appropriate alternative antidepressant not predominantly metabolized by CYP2D6.

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

IN PLAIN WORDS Your body breaks down vortioxetine much more slowly than normal, causing the drug to build up to higher levels. A lower maximum dose is recommended to reduce the risk of side effects.

WHAT IT MEANS Results in higher systemic concentrations. The maximum recommended dose is 10 mg.

WHAT THE LABEL SUGGESTS The maximum recommended dose is 10 mg.

Amitriptyline

CONSIDER ALTERNATIVE

Elavil

Your two genes together change how your body handles this drug. It may cause more side effects or not work as well, so a different antidepressant is often suggested.

 **CYP2D6** Poor metabolizer  **CYP2C19** Intermediate metabolizer

CYP2D6: Poor metabolizer (activity score 0.0); **CYP2C19:** Intermediate metabolizer

CPIC GUIDELINE, BOTH GENES TOGETHER

CONSIDER ALTERNATIVE

Evidence: optional [Read the guideline](#)

WHAT IT MEANS CYP2D6: Greatly reduced metabolism of TCAs to less active compounds compared to normal metabolizers; Higher plasma concentrations of active drug will increase the probability of side effects CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers

WHAT THE GUIDELINE SUGGESTS Avoid amitriptyline use. If a amitriptyline is warranted, consider a 50% reduction of recommended starting dose. Utilizing therapeutic drug monitoring to guide dose adjustments is strongly recommended.

From the combined CYP2D6 and CYP2C19 table in CPIC's guideline for tricyclic antidepressants. CYP2D6 is matched on its activity score.

CPIC reads your CYP2D6 and CYP2C19 results together for amitriptyline, so this label reflects both genes.

Clomipramine

CONSIDER ALTERNATIVE

Anafranil

Your two genes together change how your body handles this drug. It may cause more side effects or not work as well, so a different antidepressant is often suggested.

 **CYP2D6** Poor metabolizer  **CYP2C19** Intermediate metabolizer

CYP2D6: Poor metabolizer (activity score 0.0); **CYP2C19:** Intermediate metabolizer

CPIC GUIDELINE, BOTH GENES TOGETHER

CONSIDER ALTERNATIVE

Evidence: optional [Read the guideline](#)

WHAT IT MEANS CYP2D6: Greatly reduced metabolism of TCAs to less active compounds compared to normal metabolizers; Higher plasma concentrations of active drug will increase the probability of side effects CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers

WHAT THE GUIDELINE SUGGESTS Avoid clomipramine use. If a clomipramine is warranted, consider a 50% reduction of recommended starting dose. Utilizing therapeutic drug monitoring to guide dose adjustments is strongly recommended.

From the combined CYP2D6 and CYP2C19 table in CPIC's guideline for tricyclic antidepressants. CYP2D6 is matched on its activity score.

CPIC reads your CYP2D6 and CYP2C19 results together for clomipramine, so this label reflects both genes.

Desipramine

CONSIDER ALTERNATIVE

Norpramin

Your body breaks down this drug much more slowly, so it can build up and cause side effects. A different medicine is usually suggested.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

CONSIDER ALTERNATIVE

Evidence: optional [Read the guideline](#)

WHAT IT MEANS Greatly reduced metabolism of TCAs to less active compounds compared to normal metabolizers. Higher plasma concentrations of active drug will increase the probability of side effects.

WHAT THE GUIDELINE SUGGESTS Avoid tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a TCA is warranted, consider 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.

Doxepin

CONSIDER ALTERNATIVE

Sinequan, Quitaxon, Aponal

Your two genes together change how your body handles this drug. It may cause more side effects or not work as well, so a different antidepressant is often suggested.

 **CYP2D6** Poor metabolizer  **CYP2C19** Intermediate metabolizer

CYP2D6: Poor metabolizer (activity score 0.0); **CYP2C19:** Intermediate metabolizer

CPIC GUIDELINE, BOTH GENES TOGETHER

CONSIDER ALTERNATIVE

Evidence: optional [Read the guideline](#)

WHAT IT MEANS CYP2D6: Greatly reduced metabolism of TCAs to less active compounds compared to normal metabolizers; Higher plasma concentrations of active drug will increase the probability of side effects CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers

WHAT THE GUIDELINE SUGGESTS Avoid doxepin use. If a doxepin is warranted, consider a 50% reduction of recommended starting dose. Utilizing therapeutic drug monitoring to guide dose adjustments is strongly recommended.

From the combined CYP2D6 and CYP2C19 table in CPIC's guideline for tricyclic antidepressants. CYP2D6 is matched on its activity score.

CPIC reads your CYP2D6 and CYP2C19 results together for doxepin, so this label reflects both genes.

Imipramine

CONSIDER ALTERNATIVE

Tofranil

Your two genes together change how your body handles this drug. It may cause more side effects or not work as well, so a different antidepressant is often suggested.

 **CYP2D6** Poor metabolizer  **CYP2C19** Intermediate metabolizer

CYP2D6: Poor metabolizer (activity score 0.0); **CYP2C19:** Intermediate metabolizer

CPIC GUIDELINE, BOTH GENES TOGETHER

CONSIDER ALTERNATIVE

Evidence: optional [Read the guideline](#)

WHAT IT MEANS CYP2D6: Greatly reduced metabolism of TCAs to less active compounds compared to normal metabolizers; Higher plasma concentrations of active drug will increase the probability of side effects CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers

WHAT THE GUIDELINE SUGGESTS Avoid imipramine use. If imipramine is warranted, consider a 50% reduction of recommended starting dose. Utilizing therapeutic drug monitoring to guide dose adjustments is strongly recommended.

From the combined CYP2D6 and CYP2C19 table in CPIC's guideline for tricyclic antidepressants. CYP2D6 is matched on its activity score.

CPIC reads your CYP2D6 and CYP2C19 results together for imipramine, so this label reflects both genes.

Nortriptyline

CONSIDER ALTERNATIVE

Pamelor

Your body breaks down this drug very slowly, so it builds up and side effects are more likely. A different drug is usually suggested.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

CONSIDER ALTERNATIVE

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Greatly reduced metabolism of TCAs to less active compounds compared to normal metabolizers. Higher plasma concentrations of active drug will increase the probability of side effects.

WHAT THE GUIDELINE SUGGESTS Avoid tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a TCA is warranted, consider 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.

Trimipramine

CONSIDER ALTERNATIVE

Surmontil

Your two genes together change how your body handles this drug. It may cause more side effects or not work as well, so a different antidepressant is often suggested.

 **CYP2D6** Poor metabolizer  **CYP2C19** Intermediate metabolizer

CYP2D6: Poor metabolizer (activity score 0.0); **CYP2C19:** Intermediate metabolizer

CPIC GUIDELINE, BOTH GENES TOGETHER

CONSIDER ALTERNATIVE

Evidence: optional [Read the guideline](#)

WHAT IT MEANS CYP2D6: Greatly reduced metabolism of TCAs to less active compounds compared to normal metabolizers; Higher plasma concentrations of active drug will increase the probability of side effects CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers

WHAT THE GUIDELINE SUGGESTS Avoid trimipramine use. If a trimipramine is warranted, consider a 50% reduction of recommended starting dose. Utilizing therapeutic drug monitoring to guide dose adjustments is strongly recommended.

From the combined CYP2D6 and CYP2C19 table in CPIC's guideline for tricyclic antidepressants. CYP2D6 is matched on its activity score.

CPIC reads your CYP2D6 and CYP2C19 results together for trimipramine, so this label reflects both genes.

Antipsychotics 12 medications

1 Consider alternative 10 Use with caution 1 Use as directed

Aripiprazole

USE WITH CAUTION

Abilify

Your body clears aripiprazole slowly, so more of it builds up and side effects are more likely. A lower maximum dose is advised.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

DPWG GUIDELINE, CYP2D6

USE WITH CAUTION

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS Decreased CYP2D6 activity raises the combined blood level of aripiprazole and its active metabolite, increasing the risk of side effects.

WHAT THE GUIDELINE SUGGESTS Administer no more than 10 mg/day, 300 mg/month or 720 mg/2 month (68-75% of the standard maximum dose of aripiprazole).

Aripiprazole

USE WITH CAUTION

Abilify

Your body clears aripiprazole slowly, so more of it builds up and side effects are more likely. A lower maximum dose is advised.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6USE WITH CAUTIONSee the FDA table

IN PLAIN WORDS Your body breaks down aripiprazole much more slowly than normal, causing the drug to build up and increasing the risk of side effects. A lower dose is recommended.

WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk. Dosage adjustment is recommended. Refer to FDA labeling for specific dosing recommendations.

WHAT THE LABEL SUGGESTS Adjust the dosage as the FDA label directs for CYP2D6 poor metabolizers.

Aripiprazole Lauroxil

USE WITH CAUTION

Aristada

Your body breaks down aripiprazole lauroxil more slowly than normal, causing higher levels of the drug in your system. A lower dose is recommended to reduce the risk of side effects.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6USE WITH CAUTIONSee the FDA table

WHAT IT MEANS Results in higher systemic concentrations. Dosage adjustment is recommended. Refer to FDA labeling for specific dosing recommendations.

WHAT THE LABEL SUGGESTS Adjust the dosage as the FDA label directs for CYP2D6 poor metabolizers.

Brexpiprazole

USE WITH CAUTION

Rexulti

Your body clears brexpiprazole slowly, so more of it builds up. Half the usual dose is advised.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

DPWG GUIDELINE, CYP2D6USE WITH CAUTIONEvidence: moderateRead the guideline

WHAT IT MEANS Decreased CYP2D6 activity reduces the metabolism of brexpiprazole, so the risk of side effects is theoretically increased.

WHAT THE GUIDELINE SUGGESTS Use half of the normal dose.

Brexpiprazole

USE WITH CAUTION

Rexulti

Your body clears brexpiprazole slowly, so more of it builds up. Half the usual dose is advised.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

IN PLAIN WORDS Your body breaks down brexpiprazole much more slowly than normal, causing the drug to build up in your system. A lower dose is recommended to reduce the risk of side effects.

WHAT IT MEANS Results in higher systemic concentrations. Dosage adjustment is recommended. Refer to FDA labeling for specific dosing recommendations.

WHAT THE LABEL SUGGESTS Adjust the dosage as the FDA label directs for CYP2D6 poor metabolizers.

Clozapine

USE WITH CAUTION

Clozaril

Your body breaks down clozapine much more slowly than normal, causing the drug to build up to higher levels in your system. A lower dose may be needed to reduce the risk of side effects.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

DPWG GUIDELINE, CYP2D6

USE AS DIRECTED

Evidence: moderate

[Read the guideline](#)

IN PLAIN WORDS Your CYP2D6 result does not change how clozapine should be dosed.

WHAT IT MEANS CYP2D6 variation can change clozapine blood levels, but this has no clinical consequences.

WHAT THE GUIDELINE SUGGESTS No action is required. Use standard clozapine dosing.

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations. Dosage reductions may be necessary.

WHAT THE LABEL SUGGESTS Dosage reductions may be necessary.

Haloperidol

USE WITH CAUTION

Haldol

Your body clears haloperidol slowly, which raises the concentration in your blood and increases side effect risk. A lower dose is typically recommended.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

DPWG GUIDELINE, CYP2D6

USE WITH CAUTION

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS Decreased CYP2D6 activity reduces conversion of haloperidol, increasing plasma concentration approximately 1.7-fold. This is associated with an increased risk of side effects.

WHAT THE GUIDELINE SUGGESTS Use 60% of the normal dose.

Iloperidone

USE WITH CAUTION

Fanapt

Your body breaks down iloperidone much more slowly than normal, causing the drug to build up and increasing the risk of heart rhythm problems. The dose should be cut in half.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk (QT prolongation). Reduce dosage by 50%.

WHAT THE LABEL SUGGESTS Reduce the dosage by 50%.

Perphenazine

USE WITH CAUTION

Trilafon

Your body breaks down perphenazine much more slowly than normal, causing the drug to build up in your system. This increases your risk of side effects.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk.

WHAT THE LABEL SUGGESTS No specific dosing change in the FDA table. Refer to FDA labeling.

Pimozide

USE WITH CAUTION

Orap

Your body clears pimozide slowly, which could raise the risk of heart rhythm side effects. Half the usual maximum dose is advised.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

DPWG GUIDELINE, CYP2D6

USE WITH CAUTIONEvidence: moderate[Read the guideline](#)

WHAT IT MEANS Decreased CYP2D6 activity raises the plasma concentration of pimozide, which theoretically increases the risk of QT prolongation and torsade de pointes. Following the dose limit offsets this.

WHAT THE GUIDELINE SUGGESTS Use no more than the following doses (50% of the normal maximum dose): 12 years and older, 10 mg/day; younger than 12 years, 0.05 mg/kg per day to a maximum of 2 mg/day.

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION[See the FDA table](#)

IN PLAIN WORDS Your body breaks down pimozide more slowly than normal, causing higher levels of the drug in your system. A lower dose is recommended to reduce the risk of side effects.

WHAT IT MEANS Results in higher systemic concentrations. Dosages should not exceed 0.05 mg/kg in children or 4 mg/day in adults who are poor metabolizers and dosages should not be increased earlier than 14 days.

WHAT THE LABEL SUGGESTS Do not exceed 0.05 mg/kg a day in children or 4 mg a day in adults, and do not increase the dose earlier than 14 days.

Quetiapine

USE AS DIRECTED

Seroquel

Your CYP3A4 gene works normally, so the standard dose of this drug is used.

 **CYP3A4** Normal metabolizer

CYP3A4: Normal metabolizer

DPWG GUIDELINE, CYP3A4

USE AS DIRECTEDEvidence: moderate[Read the guideline](#)

WHAT IT MEANS No clinically significant effect on quetiapine metabolism.

WHAT THE GUIDELINE SUGGESTS Use standard quetiapine dosing.

Risperidone

USE WITH CAUTION

Risperdal

Your body clears risperidone slowly, so more of it builds up and side effects are more likely. About two-thirds of the usual dose is advised, and less if side effects still occur.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

DPWG GUIDELINE, CYP2D6

USE WITH CAUTION

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS Decreased CYP2D6 activity raises the combined blood level of risperidone and its active metabolite, and a larger share of it is risperidone, which enters the brain more easily. The share of patients with therapy failure rises from 16% to 26%.

WHAT THE GUIDELINE SUGGESTS Use 67% of the normal dose. If problematic side effects originating in the central nervous system occur despite this reduced dose, then reduce the dose further to 50% of the normal dose.

Thioridazine

CONSIDER ALTERNATIVE

Mellaril

Your body breaks down thioridazine much too slowly, causing dangerous levels to build up. This significantly increases your risk of serious heart rhythm problems. This medication should not be used.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

CONSIDER ALTERNATIVE

Evidence: strong [See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk (QT prolongation). Predicted effect based on experience with CYP2D6 inhibitors. Contraindicated in poor metabolizers.

WHAT THE LABEL SUGGESTS Do not use thioridazine. It is contraindicated for poor metabolizers due to dangerous heart rhythm risks.

Zuclopenthixol

USE WITH CAUTION

Clopixol

Your body clears this drug slowly, so it builds up in your blood. Half the usual dose is advised.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

DPWG GUIDELINE, CYP2D6

USE WITH CAUTION

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS Markedly decreased CYP2D6 activity reduces conversion of zuclopenthixol, raising plasma concentration approximately 1.6-fold and elevating side effect risk.

WHAT THE GUIDELINE SUGGESTS Use 50% of the normal dose.

2 Use with caution

Amphetamine

USE WITH CAUTION

Adzenys ER

Your body breaks down amphetamine much more slowly than normal, which may cause the drug to build up and increase your risk of side effects. A lower dose or a different medication may be needed.

 CYP2D6 Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6USE WITH CAUTIONSee the FDA table

WHAT IT MEANS May affect systemic concentrations and adverse reaction risk. Consider lower starting dosage or use alternative agent.

WHAT THE LABEL SUGGESTS Consider a lower starting dosage or an alternative agent.

Atomoxetine

USE WITH CAUTION

Strattera

Your body processes this drug very slowly, so it builds up. It may work well but cause more side effects, so your doctor may start low and go slowly.

 CYP2D6 Poor metabolizer

CYP2D6: Poor metabolizer (activity score 0.0)

CPIC GUIDELINE, CYP2D6USE WITH CAUTIONEvidence: moderateRead the guideline

WHAT IT MEANS Significantly decreased metabolism of atomoxetine may result in higher concentrations as compared to non-poor metabolizers. This may increase the occurrence of treatment-emergent side effects, but also a greater improvement of ADHD symptoms as compared with non- poor metabolizers in those who tolerate treatment. Poor metabolizer status is associated with lower final dose requirements as compared to non- poor metabolizers.

WHAT THE GUIDELINE SUGGESTS Initiate with a dose of 40 mg/day and if no clinical response and in the absence of adverse events after 2 weeks increase dose to 80 mg/day. If response is inadequate after 2 weeks consider obtaining a plasma concentration 2-4 h after dosing. If concentration is <200 ng/ml, consider a proportional dose increase to achieve a concentration to approach 400 ng/ml. If unacceptable side effects are present at any time, consider a reduction in dose.

CYP2D6: Poor metabolizer (activity score 0.0)

FDA DRUG LABEL, CYP2D6USE WITH CAUTIONSee the FDA table

IN PLAIN WORDS Your body breaks down atomoxetine more slowly than normal, causing it to build up in your system. A lower dose or slower dose increases may be needed to reduce the risk of side effects.

WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk. Adjust titration interval and increase dosage if tolerated. Refer to FDA labeling for specific dosing recommendations.

WHAT THE LABEL SUGGESTS Adjust the titration interval and increase the dosage only if tolerated, as the FDA label directs.

3 Use with caution

INVOLUNTARY MOVEMENT REDUCERS

Deutetrabenazine

USE WITH CAUTION

Austedo

Your body breaks down deutetrabenazine much more slowly than normal, causing the drug to build up and raising the risk of heart rhythm problems. A lower maximum dose is recommended.

 CYP2D6 Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations and adverse reaction risk (QT prolongation). The maximum recommended dosage should not exceed 36 mg (maximum single dose of 18 mg).

WHAT THE LABEL SUGGESTS Do not exceed 36 mg a day (maximum single dose of 18 mg).

Tetrabenazine

USE WITH CAUTION

Xenazine

Your body breaks down tetrabenazine much more slowly than normal, causing the drug to reach higher levels in your system. A lower maximum dose is required to avoid side effects.

 CYP2D6 Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations. The maximum recommended single dose is 25 mg and should not exceed 50 mg/day.

WHAT THE LABEL SUGGESTS The maximum single dose is 25 mg; do not exceed 50 mg a day.

Valbenazine

USE WITH CAUTION

Ingrezza

Your body breaks down valbenazine much more slowly than normal, causing the drug to build up. This raises your risk of heart rhythm problems, so a lower dose may be needed.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION [See the FDA table](#)

WHAT IT MEANS Results in higher systemic active metabolite concentrations and may result in higher adverse reaction risk (QT prolongation). The recommended dosage for poor metabolizers is 40 mg once daily.

WHAT THE LABEL SUGGESTS The recommended dosage for poor metabolizers is 40 mg once daily.

Anticonvulsants 4 medications

4 Use with caution

Brivaracetam

USE WITH CAUTION

Briviact

Your body breaks down this drug more slowly, so more of it builds up. This can raise the risk of side effects.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19

USE WITH CAUTION [See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk.

WHAT THE LABEL SUGGESTS No specific dosing change for intermediate metabolizers. Refer to FDA labeling.

Clobazam

USE WITH CAUTION

Onfi, Frisium

Your body breaks down clobazam more slowly than normal, causing higher levels of the drug's active form to build up. A lower dose may be needed to reduce the risk of side effects.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19

USE WITH CAUTION [See the FDA table](#)

WHAT IT MEANS Results in higher systemic active metabolite concentrations. Poor metabolism results in higher adverse reaction risk. Dosage adjustment is recommended. Refer to FDA labeling for specific dosing recommendations.

WHAT THE LABEL SUGGESTS Dosage adjustment is recommended; the FDA label gives specific dosing for poor metabolizers.

Fosphenytoin

USE WITH CAUTION

Cerebyx

Your body clears this drug more slowly, so it can build up and cause nervous system side effects. A lower starting dose and blood level checks are suggested.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

CPIC GUIDELINE, CYP2C9

USE AS DIRECTED

Evidence: moderate

[Read the guideline](#)

IN PLAIN WORDS Your body slows the drug slightly, but no dose changes are usually needed.

WHAT IT MEANS Slightly reduced fosphenytoin metabolism; however, this does not appear to translate into increased side effects.

WHAT THE GUIDELINE SUGGESTS No adjustments needed from typical dosing strategies. Subsequent doses should be adjusted according to therapeutic drug monitoring, response, and side effects. An HLA-B*15:02 negative test does not eliminate the risk of phenytoin-induced SJS/TEN, and patients should be carefully monitored according to standard practice.

CYP2C9: Intermediate metabolizer (activity score 1.5)

FDA DRUG LABEL, CYP2C9

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS May result in higher systemic concentrations and higher adverse reaction risk (central nervous system toxicity). Consider starting at the lower end of the dosage range and monitor serum concentrations. Refer to FDA labeling for specific dosing recommendations. Carriers of CYP2C9*3 alleles may be at increased risk of severe cutaneous adverse reactions. Consider avoiding fosphenytoin as an alternative to carbamazepine in patients who are CYP2C9*3 carriers. Genotyping is not a substitute for clinical vigilance and patient management.

WHAT THE LABEL SUGGESTS Consider starting at the lower end of the dosage range and monitor serum concentrations. CYP2C9*3 carriers may be at higher risk of severe skin reactions; consider avoiding fosphenytoin as an alternative to carbamazepine in them.

Phenytoin

USE WITH CAUTION

Dilantin

Your body breaks down this drug more slowly, so it can build up. That raises the risk of side effects on the brain and nerves.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

CPIC GUIDELINE, CYP2C9

USE AS DIRECTED

Evidence: moderate

[Read the guideline](#)

IN PLAIN WORDS Your body slows the drug slightly, but no dose changes are usually needed.

WHAT IT MEANS Slightly reduced phenytoin metabolism; however, this does not appear to translate into increased side effects.

WHAT THE GUIDELINE SUGGESTS No adjustments needed from typical dosing strategies. Subsequent doses should be adjusted according to therapeutic drug monitoring, response, and side effects. An HLA-B*15:02 negative test does not eliminate the risk of phenytoin-induced SJS/TEN, and patients should be carefully monitored according to standard practice.

Phenytoin

USE WITH CAUTION

Dilantin

Your body breaks down this drug more slowly, so it can build up. That raises the risk of side effects on the brain and nerves.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

FDA DRUG LABEL, CYP2C9

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS May result in higher systemic concentrations and higher adverse reaction risk (central nervous system toxicity). Refer to FDA labeling for specific dosing recommendations. Carriers of CYP2C9*3 alleles may be at increased risk of severe cutaneous adverse reactions. Consider avoiding phenytoin as an alternative to carbamazepine in patients who are CYP2C9*3 carriers. Genotyping is not a substitute for clinical vigilance and patient management.

WHAT THE LABEL SUGGESTS Refer to FDA labeling for dosing. CYP2C9*3 carriers may be at higher risk of severe skin reactions; consider avoiding phenytoin as an alternative to carbamazepine in them.

Pain management 13 medications

2 Consider alternative 5 Use with caution 6 Use as directed

Carisoprodol

USE AS DIRECTED

Soma

Your body breaks down carisoprodol slightly slower than normal. The standard dose should work as expected.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19

USE AS DIRECTED

Evidence: moderate

[See the FDA table](#)

WHAT IT MEANS No FDA guidance for this phenotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

Celecoxib

USE AS DIRECTED

Celebrex

Your body slows the drug down slightly, but usually the normal starting dose is fine.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

CPIC GUIDELINE, CYP2C9

USE AS DIRECTED

Evidence: moderate

[Read the guideline](#)

WHAT IT MEANS Mildly reduced metabolism

WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for the shortest duration consistent with individual patient treatment goals.

Celecoxib

USE AS DIRECTED

Celebrex

Your body slows the drug down slightly, but usually the normal starting dose is fine.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

FDA DRUG LABEL, CYP2C9

USE AS DIRECTED

[See the FDA table](#)

IN PLAIN WORDS Your CYP2C9 result means somewhat lower CYP2C9 activity than usual, but the FDA gives no genetic dosing change for celecoxib at this result.

WHAT IT MEANS No FDA guidance for your genotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

Codeine

CONSIDER ALTERNATIVE

Tylenol 3

Your body turns very little codeine into its active form, so it likely won't ease your pain. A different pain reliever is usually suggested.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

CONSIDER ALTERNATIVE

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Greatly reduced morphine formation leading to diminished analgesia.

WHAT THE GUIDELINE SUGGESTS Avoid codeine use because of possibility of diminished analgesia. If opioid use is warranted, consider a non-tramadol opioid.

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

IN PLAIN WORDS Your body turns very little codeine into its active form, so it may not relieve your pain as well.

WHAT IT MEANS Results in lower systemic active metabolite concentrations and may result in reduced efficacy.

WHAT THE LABEL SUGGESTS No specific dosing change; codeine may be less effective. Refer to FDA labeling.

Flurbiprofen

USE AS DIRECTED

Ansaid, Ocufen, Strefen

Your body slows the drug down slightly, but usually the normal starting dose is fine.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

CPIC GUIDELINE, CYP2C9

USE AS DIRECTED

Evidence: moderate

[Read the guideline](#)

WHAT IT MEANS Mildly reduced metabolism

WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for the shortest duration consistent with individual patient treatment goals.

CYP2C9: Intermediate metabolizer (activity score 1.5)

FDA DRUG LABEL, CYP2C9

USE AS DIRECTED

[See the FDA table](#)

IN PLAIN WORDS Your body may break down this drug a little slower than average. The FDA label gives no dose change for your result.

WHAT IT MEANS No FDA guidance for your genotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

Hydrocodone

USE WITH CAUTION

Hysingla ER

Your body makes less of hydrocodone's stronger active form. It's not clear this changes pain relief, so the usual dose is recommended, with a different pain medicine to consider if it doesn't work.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

USE WITH CAUTION

Evidence: optional

[Read the guideline](#)

WHAT IT MEANS Decreased metabolism of hydrocodone to active metabolite, hydromorphone, but there is insufficient evidence to determine if these effects on pharmacokinetics translate into decreased analgesia or side effects.

WHAT THE GUIDELINE SUGGESTS Use hydrocodone label recommended age- or weight-specific dosing. If no response and opioid use is warranted, consider non-codeine and non-tramadol opioid.

Ibuprofen

USE AS DIRECTED

Advil

Your body slows the drug down slightly, but usually the normal starting dose is fine.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

CPIC GUIDELINE, CYP2C9	USE AS DIRECTED	Evidence: moderate	Read the guideline
WHAT IT MEANS Mildly reduced metabolism			
WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for the shortest duration consistent with individual patient treatment goals.			

Lornoxicam

USE AS DIRECTED

Xefo

Your body slows the drug down slightly, but usually the normal starting dose is fine.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

CPIC GUIDELINE, CYP2C9	USE AS DIRECTED	Evidence: moderate	Read the guideline
WHAT IT MEANS Mildly reduced metabolism			
WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for the shortest duration consistent with individual patient treatment goals.			

Meloxicam

USE WITH CAUTION

Mobic

Your body breaks down meloxicam slightly slower than normal. While there is no specific FDA guidance, your doctor may want to monitor you for side effects.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

CPIC GUIDELINE, CYP2C9	USE AS DIRECTED	Evidence: moderate	Read the guideline
IN PLAIN WORDS Your body slows the drug slightly, but usually the normal starting dose is fine.			
WHAT IT MEANS Mildly reduced metabolism			
WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended starting dose. In accordance with the meloxicam prescribing information, use the lowest effective dosage for the shortest duration consistent with individual patient treatment goals.			

Meloxicam

USE WITH CAUTION

Mobic

Your body breaks down meloxicam slightly slower than normal. While there is no specific FDA guidance, your doctor may want to monitor you for side effects.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

FDA DRUG LABEL, CYP2C9	USE WITH CAUTION	See the FDA table
WHAT IT MEANS No FDA guidance for this phenotype		
WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.		

Oliceridine

USE WITH CAUTION

Olinvyk

Your body clears this drug much more slowly, raising the risk of slowed breathing and deep drowsiness. You may need doses less often.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6	USE WITH CAUTION	See the FDA table
WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk (respiratory depression and sedation). May require less frequent dosing.		
WHAT THE LABEL SUGGESTS May require less frequent dosing.		

Piroxicam

USE WITH CAUTION

Feldene

Your body breaks down piroxicam more slowly than normal, which can cause higher drug levels. Your doctor may need to adjust your dosing.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

CPIC GUIDELINE, CYP2C9	USE AS DIRECTED	Evidence: moderate	Read the guideline
IN PLAIN WORDS Your body slows the drug slightly, but the usual starting dose is still fine.			
WHAT IT MEANS Mildly reduced metabolism			
WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for the shortest duration consistent with individual patient treatment goals.			

Piroxicam

USE WITH CAUTION

Feldene

Your body breaks down piroxicam more slowly than normal, which can cause higher drug levels. Your doctor may need to adjust your dosing.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

FDA DRUG LABEL, CYP2C9	USE WITH CAUTION	See the FDA table
WHAT IT MEANS Results in higher systemic concentrations.		
WHAT THE LABEL SUGGESTS No specific dosing change for intermediate metabolizers. Refer to FDA labeling.		

Pitolisant

USE WITH CAUTION

Wakix

Your body breaks down pitolisant much more slowly than normal, causing the drug to reach higher levels in your system. The lowest starting dose is recommended to reduce the risk of side effects.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6	USE WITH CAUTION	See the FDA table
WHAT IT MEANS Results in higher systemic concentrations. Use lowest recommended starting dosage. Refer to FDA labeling for specific dosing recommendations.		
WHAT THE LABEL SUGGESTS Use the lowest recommended starting dosage. Refer to FDA labeling.		

Tenoxicam

USE AS DIRECTED

Mobiflex

Your body slows the drug slightly, but the usual starting dose is still fine.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer (activity score 1.5)

CPIC GUIDELINE, CYP2C9	USE AS DIRECTED	Evidence: moderate	Read the guideline
WHAT IT MEANS Mildly reduced metabolism			
WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for the shortest duration consistent with individual patient treatment goals.			

Tramadol

CONSIDER ALTERNATIVE

Ultram, ConZip

Your body can't turn this drug into its active form well, so it may not relieve your pain. A different pain medicine is advised.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

CONSIDER ALTERNATIVE

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Greatly reduced O-desmethytramadol (active metabolite) formation leading to diminished analgesia.

WHAT THE GUIDELINE SUGGESTS Avoid tramadol use because of possibility of diminished analgesia. If opioid use is warranted, consider a non-codeine opioid.

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

Evidence: moderate [See the FDA table](#)

IN PLAIN WORDS Your body turns this drug into its active form slowly, so it may not relieve pain as well. Your doctor may check how well it works.

WHAT IT MEANS Results in lower systemic active metabolite concentrations and may result in reduced efficacy.

WHAT THE LABEL SUGGESTS The FDA notes reduced efficacy but gives no dosing change. Monitor for adequate pain relief.

Cardiovascular 7 medications

1 Consider alternative 6 Use with caution

ANTIARRHYTHMICS

Propafenone

USE WITH CAUTION

Rythmol SR

Your body breaks down this drug much more slowly, so an irregular heartbeat is more likely. Some other drugs raise this risk even more.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk (arrhythmia). Avoid use in poor metabolizers taking a CYP3A4 inhibitor.

WHAT THE LABEL SUGGESTS Avoid use in poor metabolizers taking a CYP3A4 inhibitor.

Hydralazine

USE WITH CAUTION

Apresoline

Your body breaks down hydralazine slowly, which means you need a lower starting dose. Higher doses may increase side effects, including a rare immune reaction.

 **NAT2** Poor metabolizer

NAT2: Poor metabolizer

CPIC GUIDELINE, NAT2

USE WITH CAUTION

Evidence: moderate

[Read the guideline](#)

WHAT IT MEANS Predicted to have increased hydralazine plasma concentrations compared to NAT2 rapid and intermediate metabolizers, which may lead to both increased efficacy and adverse effects, including drug-induced systemic lupus erythematosus.

WHAT THE GUIDELINE SUGGESTS Initiate therapy at a total daily dose of 40 to 75 mg. Carefully titrate dose upward to clinical effect or guideline-recommended dose; use caution with total daily hydralazine doses of 200 mg or more.

BETA BLOCKERS

Carvedilol

USE WITH CAUTION

Coreg, Coreg CR

Your body breaks down carvedilol much more slowly than normal, causing the drug to build up in your system. This increases your risk of dizziness and other side effects.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk (dizziness).

WHAT THE LABEL SUGGESTS No specific dosing change in the FDA table. Refer to FDA labeling.

Metoprolol

USE WITH CAUTION

Lopressor, Toprol XL

Your body clears this drug very slowly, so it can build up. Your doctor may start with the lowest dose and watch your heart rate.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer (activity score 0.0)

CPIC GUIDELINE, CYP2D6

USE WITH CAUTION

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS Decreased metabolism of metoprolol leading to markedly increased drug concentrations; this leads to greater heart rate and blood pressure reductions. The effect on clinical outcomes is unclear.

WHAT THE GUIDELINE SUGGESTS Initiate therapy with the lowest recommended starting dose. Carefully titrate dose upward to clinical effect or guideline-recommended dose; monitor more closely for bradycardia. Alternatively, consider selecting another beta-blocker.

BLOOD THINNERS

Clopidogrel

CONSIDER ALTERNATIVE

Plavix

Your body turns this drug into its active form more slowly, so it may not protect you as well. A different blood thinner is usually suggested.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

CPIC GUIDELINE, CYP2C19

CONSIDER ALTERNATIVE

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Reduced clopidogrel active metabolite formation; increased on-treatment platelet reactivity; increased risk for adverse cardiac and cerebrovascular events

WHAT THE GUIDELINE SUGGESTS Avoid standard dose (75 mg) clopidogrel if possible. Use prasugrel or ticagrelor at standard dose if no contraindication

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19

CONSIDER ALTERNATIVE

Evidence: moderate [See the FDA table](#)

IN PLAIN WORDS This drug may not work as well for you, which can raise the risk of heart problems. Your doctor may use a different drug to prevent clots.

WHAT IT MEANS Results in lower systemic active metabolite concentrations, lower antiplatelet response, and may result in higher cardiovascular risk. Consider use of another platelet P2Y12 inhibitor.

WHAT THE LABEL SUGGESTS Results in lower systemic active metabolite concentrations, lower antiplatelet response, and may result in higher cardiovascular risk. Consider use of another platelet P2Y12 inhibitor.

Warfarin

USE WITH CAUTION

Coumadin

Your genes suggest a lower dose may be safer. Your doctor can decide.

 **CYP2C9** Intermediate metabolizer  **VKORC1** Decreased expression  **CYP4F2** Intermediate metabolizer

CYP2C9: Intermediate metabolizer; **VKORC1:** Decreased expression; **CYP4F2:** Intermediate metabolizer

CPIC GUIDELINE, ALL THREE GENES TOGETHER

USE WITH CAUTION

Evidence: strong [Read the guideline](#)

Estimated dose: **3.2-4.4 mg/day** (lower than typical starting dose).

Based on your CYP2C9 (*2/*1) and VKORC1 (-1639A/-1639G) genotypes, your predicted stable warfarin dose is 3.2-4.4 mg/day (increased ~5-10% for CYP4F2 *3). This estimate is genotype-based only and does not account for age, weight, or interacting drugs. A clinician should confirm the starting dose using a validated pharmacogenetic dosing algorithm.

Base genotype dose (CYP2C9 *1/*2, VKORC1 GA): 3-4 mg/day. Because you carry CYP4F2*3 (rs2108622 T), your estimated dose is increased by about 5-10%.

CPIC reads your CYP2C9, VKORC1 and CYP4F2 results together for warfarin, so this label reflects all of them.

CARDIOMYOPATHY

Mavacamten

USE WITH CAUTION

Camzyos

Your body breaks down mavacamten slightly slower than normal, which may lead to higher drug levels. Your doctor will monitor you closely and adjust the dose based on your response.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19

USE WITH CAUTION

Evidence: moderate [See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations and may have higher adverse reaction risk (heart failure). Dosage is based on individual response. The dose titration and monitoring schedule accounts for differences due to CYP2C19 genetic variation, so adjustments based on CYP2C19 genotype are not necessary. Refer to FDA labeling for specific dosing recommendations and monitoring.

WHAT THE LABEL SUGGESTS Follow the label's dose titration and monitoring schedule; no genotype-based adjustment is needed.

Cholesterol medications

7 medications

1 Consider alternative 5 Use with caution 1 Use as directed

Atorvastatin

USE WITH CAUTION

Lipitor

More of this statin stays in your blood, which can raise the chance of muscle side effects. Your doctor may limit the dose.

 **SLCO1B1** Decreased function

SLCO1B1: Decreased function

CPIC GUIDELINE, SLCO1B1

USE WITH CAUTION

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS Increased atorvastatin exposure as compared with normal function, which may translate to increased myopathy risk.

WHAT THE GUIDELINE SUGGESTS Prescribe ≤ 40 mg as a starting dose and adjust doses of atorvastatin based on disease-specific guidelines. Prescriber should be aware of possible increased risk for myopathy especially for the 40-mg dose. If dose > 40 mg is needed for desired efficacy, consider combination therapy (i.e., atorvastatin plus nonstatin guideline-directed medical therapy).

Fluvastatin

USE WITH CAUTION

Lescol

Your genes make this statin build up in your blood, which can raise the risk of muscle problems. A lower starting dose or a dose limit is suggested.

 **CYP2C9** Intermediate metabolizer  **SLCO1B1** Decreased function

CYP2C9: Intermediate metabolizer (activity score 1.5); **SLCO1B1:** Decreased function

CPIC GUIDELINE, BOTH GENES TOGETHER

USE WITH CAUTION

Evidence: optional [Read the guideline](#)

WHAT IT MEANS CYP2C9: Increased fluvastatin exposure as compared to normal metabolizer which may translate to increased myopathy risk. SLCO1B1: Increased fluvastatin exposure as compared to normal function; Typical myopathy risk with ≤ 40 mg.

WHAT THE GUIDELINE SUGGESTS Prescribe ≤ 20 mg per day as a starting dose and adjust doses of fluvastatin based on disease-specific guidelines. If dose > 20 mg needed for desired efficacy, consider an alternative statin or combination therapy (i.e., fluvastatin plus non-statin guideline directed medical therapy) (PMID: 30423391).

From the combined CYP2C9 and SLCO1B1 table in CPIC's statin guideline. CYP2C9 is matched on its activity score.

CPIC reads your CYP2C9 and SLCO1B1 results together for fluvastatin, so this label reflects both genes.

Lovastatin

CONSIDER ALTERNATIVE

Mevacor

Your genes make this statin build up in your blood, which may raise your risk of muscle problems. A different statin, or a low dose of this one, is often suggested.

 **SLCO1B1** Decreased function

SLCO1B1: Decreased function

CPIC GUIDELINE, SLCO1B1

CONSIDER ALTERNATIVE

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS Increased lovastatin acid exposure as compared with normal function, which may translate to increased myopathy risk

WHAT THE GUIDELINE SUGGESTS Consider prescribing a lower-risk alternative such as atorvastatin (10 to 20 mg), pravastatin (40 mg), or rosuvastatin (5 to 10 mg). If lovastatin is warranted, limit the dose to ≤ 20 mg/day to reduce the risk of muscle-related side effects.

Pitavastatin

USE WITH CAUTION

Livalo

More of this statin stays in your blood, so muscle side effects are more likely. Your doctor may keep the dose low or suggest another statin.

 **SLCO1B1** Decreased function

SLCO1B1: Decreased function

CPIC GUIDELINE, SLCO1B1

USE WITH CAUTION

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS Increased pitavastatin exposure as compared with normal function, which may translate to increased myopathy risk

WHAT THE GUIDELINE SUGGESTS Prescribe ≤ 2 mg as a starting dose and adjust doses of pitavastatin based on disease-specific guidelines. Be aware of possible increased risk for muscle-related side effects, especially for doses > 1 mg. If dose > 2 mg is needed for desired efficacy, consider switching to a lower-risk alternative such as atorvastatin (10 to 20 mg), pravastatin (40 mg), or rosuvastatin (5 to 10 mg), or using combination therapy (e.g., pitavastatin plus nonstatin guideline-directed medical therapy).

Pravastatin

USE WITH CAUTION

Pravachol

Your body may process this drug more slowly, so higher doses might carry added risks.

 **SLCO1B1** Decreased function

SLCO1B1: Decreased function

CPIC GUIDELINE, SLCO1B1

USE WITH CAUTION

Evidence: moderate [Read the guideline](#)

WHAT IT MEANS Increased pravastatin exposure compared with normal function; typical myopathy risk with doses ≤ 40 mg

WHAT THE GUIDELINE SUGGESTS Prescribe desired starting dose and adjust doses of pravastatin based on disease-specific guidelines. Prescriber should be aware of possible increased risk for myopathy especially with doses >40 mg per day.

Rosuvastatin

USE AS DIRECTED

Crestor

Your genes support the usual starting dose of this statin.

 **ABCG2** Normal function  **SLCO1B1** Decreased function

ABCG2: Normal function; **SLCO1B1:** Decreased function

CPIC GUIDELINE, BOTH GENES TOGETHER

USE AS DIRECTED

Evidence: strong [Read the guideline](#)

WHAT IT MEANS ABCG2: Typical myopathy risk and rosuvastatin exposure SLCO1B1: Increased rosuvastatin exposure as compared to normal function; Typical myopathy risk with doses ≤ 20 mg.

WHAT THE GUIDELINE SUGGESTS Prescribe desired starting dose and adjust doses of rosuvastatin based on disease-specific and specific population guidelines. Prescriber should be aware of possible increased risk for myopathy especially for doses >20 mg.

From the combined ABCG2 and SLCO1B1 table in CPIC's statin guideline.

CPIC reads your ABCG2 and SLCO1B1 results together for rosuvastatin, so this label reflects both genes.

Simvastatin

USE WITH CAUTION

Zocor

More of this statin stays in your blood, so muscle side effects are more likely. Your doctor may use a different statin or a lower dose.

 **SLCO1B1** Decreased function

SLCO1B1: Decreased function

CPIC GUIDELINE, SLCO1B1

USE WITH CAUTION

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Increased simvastatin acid exposure compared with normal function; increased risk of muscle side effects (myopathy)

WHAT THE GUIDELINE SUGGESTS Prescribe an alternative statin depending on desired potency. Low-risk options: atorvastatin 10 to 20 mg, pitavastatin 1 mg, pravastatin 40 mg, rosuvastatin 5 to 10 mg. Moderate-risk options: fluvastatin 80 mg, pitavastatin 2 mg, pravastatin 80 mg. High-risk options (use with caution): lovastatin 40 to 80 mg, pitavastatin 4 mg, simvastatin 20 to 40 mg. If simvastatin is used, limit dose to <20 mg/day.

SLCO1B1: Decreased function

FDA DRUG LABEL, SLCO1B1

USE WITH CAUTION

[See the FDA table](#)

IN PLAIN WORDS Your body clears simvastatin more slowly than normal, causing it to build up in your system. This raises your risk of muscle pain or damage, especially at higher doses.

WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk (myopathy). The risk of adverse reaction (myopathy) is higher for patients on 80 mg than for those on lower doses.

WHAT THE LABEL SUGGESTS No specific dosing change in the FDA table. The risk of myopathy is higher at 80 mg than at lower doses.

Antiemetics 4 medications

2 Use with caution 2 Use as directed

Dronabinol

USE WITH CAUTION

Syndros

Your body breaks down dronabinol more slowly than normal, which may cause the drug to build up and increase the risk of side effects. Extra monitoring is recommended.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer

FDA DRUG LABEL, CYP2C9

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS May result in higher systemic concentrations and higher adverse reaction risk. Monitor for adverse reactions.

WHAT THE LABEL SUGGESTS Monitor for adverse reactions.

Metoclopramide

USE WITH CAUTION

Reglan

Your body breaks down metoclopramide much more slowly than normal, causing the drug to build up and increasing the risk of side effects. A lower dose is recommended.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk. The recommended dosage is lower. Refer to FDA labeling for specific dosing recommendations.

WHAT THE LABEL SUGGESTS Use the lower dosage the FDA label recommends.

Ondansetron

USE AS DIRECTED

Zofran

There is not enough evidence to know how your CYP2D6 result affects your response to ondansetron. CPIC makes no prescribing recommendation based on this result.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

USE AS DIRECTED

No recommendation

[Read the guideline](#)

WHAT IT MEANS Insufficient evidence demonstrating clinical impact

WHAT THE GUIDELINE SUGGESTS No recommendation based on insufficient evidence

Tropisetron

USE AS DIRECTED

Navoban

There is not enough evidence to know how your CYP2D6 result affects your response to tropisetron. CPIC makes no prescribing recommendation based on this result.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

USE AS DIRECTED

No recommendation

[Read the guideline](#)

WHAT IT MEANS Insufficient evidence demonstrating clinical impact

WHAT THE GUIDELINE SUGGESTS No recommendation based on insufficient evidence

Proton pump inhibitors 4 medications

4 Use with caution

Dexlansoprazole

USE WITH CAUTION

Dexilant

Your body clears this drug more slowly. A lower dose may be needed for long-term use to prevent side effects.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

CPIC GUIDELINE, CYP2C19

USE WITH CAUTION

Evidence: optional [Read the guideline](#)

WHAT IT MEANS Increased plasma concentration of PPI compared with CYP2C19 normal metabolizers; increased chance of efficacy and potentially toxicity

WHAT THE GUIDELINE SUGGESTS Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.

Lansoprazole

USE WITH CAUTION

Prevacid

Your body clears this drug more slowly. A lower dose may be needed for long-term use to prevent side effects.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

CPIC GUIDELINE, CYP2C19

USE WITH CAUTION

Evidence: optional [Read the guideline](#)

WHAT IT MEANS Increased plasma concentration of PPI compared with CYP2C19 normal metabolizers; increased chance of efficacy and potentially toxicity

WHAT THE GUIDELINE SUGGESTS Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.

Omeprazole

USE WITH CAUTION

Prilosec, Losec

Your body clears this drug more slowly. A lower dose may be needed for long-term use to prevent side effects.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

CPIC GUIDELINE, CYP2C19

USE WITH CAUTION

Evidence: optional

[Read the guideline](#)

WHAT IT MEANS Increased plasma concentration of PPI compared with CYP2C19 normal metabolizers; increased chance of efficacy and potentially toxicity

WHAT THE GUIDELINE SUGGESTS Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.

Pantoprazole

USE WITH CAUTION

Protonix

Your body clears this drug more slowly. A lower dose may be needed for long-term use to prevent side effects.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

CPIC GUIDELINE, CYP2C19

USE WITH CAUTION

Evidence: optional

[Read the guideline](#)

WHAT IT MEANS Increased plasma concentration of PPI compared with CYP2C19 normal metabolizers; increased chance of efficacy and potentially toxicity

WHAT THE GUIDELINE SUGGESTS Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19

USE AS DIRECTED

[See the FDA table](#)

IN PLAIN WORDS Your body processes this drug a bit slower than average. The FDA gives no dose change for your result, so the usual dose is used.

WHAT IT MEANS No FDA guidance for your genotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

1 Consider alternative 1 Use with caution 11 Use as directed

CHEMOTHERAPIES

Belinostat

USE AS DIRECTED

Beleodaq

Your body may process this drug a little more slowly. The FDA has no special advice for this, so the usual dose is used.

 **UGT1A1** Intermediate metabolizer

UGT1A1: Intermediate metabolizer

FDA DRUG LABEL, UGT1A1

USE AS DIRECTED

[See the FDA table](#)

WHAT IT MEANS No FDA guidance for your genotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

Belzutifan

USE AS DIRECTED

Welireg

Your CYP2C19 result means somewhat lower CYP2C19 activity than usual, but the FDA gives no genetic dosing change for belzutifan at this result.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19

USE AS DIRECTED

[See the FDA table](#)

WHAT IT MEANS No FDA guidance for this phenotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

Capecitabine

USE AS DIRECTED

Xeloda, Xitabin, Kapetral

Your body processes capecitabine normally. You have a typical risk of side effects, and the standard dose is expected to be appropriate.

 **DPYD** Normal metabolizer

DPYD: Normal metabolizer (activity score 2.0)

CPIC GUIDELINE, DPYD

USE AS DIRECTED

Evidence: strong

[Read the guideline](#)

WHAT IT MEANS Normal DPD activity and “normal” risk for fluoropyrimidine toxicity

WHAT THE GUIDELINE SUGGESTS Based on genotype, there is no indication to change dose or therapy. Use label-recommended dosage and administration

Capecitabine

USE AS DIRECTED

Xeloda, Xitabin, Kapetral

Your body processes capecitabine normally. You have a typical risk of side effects, and the standard dose is expected to be appropriate.

 **DPYD** Normal metabolizer

DPYD: Normal metabolizer (activity score 2.0)

FDA DRUG LABEL, DPYD	USE AS DIRECTED	See the FDA table
IN PLAIN WORDS Your body breaks down capecitabine at a normal rate. The standard dose should work as expected. WHAT IT MEANS No FDA guidance for your genotype WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.		

Erdafitinib

USE AS DIRECTED

Balversa

Your CYP2C9 result means somewhat lower CYP2C9 activity than usual, but the FDA gives no genetic dosing change for erdafitinib at this result.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer

FDA DRUG LABEL, CYP2C9	USE AS DIRECTED	See the FDA table
WHAT IT MEANS No FDA guidance for your genotype WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.		

Fluorouracil

USE AS DIRECTED

Adrucil, Carac

Your body breaks down this drug normally. Your risk of side effects is typical, and the usual dose is used.

 **DPYD** Normal metabolizer

DPYD: Normal metabolizer (activity score 2.0)

CPIC GUIDELINE, DPYD	USE AS DIRECTED	Evidence: strong	Read the guideline
WHAT IT MEANS Normal DPD activity and “normal” risk for fluoropyrimidine toxicity WHAT THE GUIDELINE SUGGESTS Based on genotype, there is no indication to change dose or therapy. Use label-recommended dosage and administration			

Fluorouracil

USE AS DIRECTED

Adrucil, Carac

Your body breaks down this drug normally. Your risk of side effects is typical, and the usual dose is used.

 **DPYD** Normal metabolizer

DPYD: Normal metabolizer (activity score 2.0)

FDA DRUG LABEL, DPYD	USE AS DIRECTED	See the FDA table
IN PLAIN WORDS Your body processes fluorouracil at a normal rate. The standard dose should work as expected.		
WHAT IT MEANS No FDA guidance for your genotype		
WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.		

Gefitinib

USE WITH CAUTION

Iressa

Your body breaks down gefitinib more slowly than normal, causing higher levels of the drug in your system. This increases the risk of side effects and closer monitoring may be needed.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6	USE WITH CAUTION	See the FDA table
WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk. Monitor for adverse reactions.		
WHAT THE LABEL SUGGESTS Monitor for adverse reactions.		

Irinotecan

USE AS DIRECTED

Camptosar, Onivyde

Your body breaks down irinotecan slightly slower than normal. The standard dose should work as expected.

 **UGT1A1** Intermediate metabolizer

UGT1A1: Intermediate metabolizer

FDA DRUG LABEL, UGT1A1	USE AS DIRECTED	See the FDA table
WHAT IT MEANS No FDA guidance for your genotype		
WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.		

Mercaptopurine

USE AS DIRECTED

Purinethol

Both genes that affect this drug look normal, so a standard starting dose is expected.

 **TPMT** Normal metabolizer  **NUDT15** Normal metabolizer

TPMT: Normal metabolizer; **NUDT15:** Normal metabolizer

CPIC GUIDELINE, BOTH GENES TOGETHER

USE AS DIRECTED

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Both TPMT and NUDT15 predict normal thiopurine metabolism and a normal risk of myelosuppression.

WHAT THE GUIDELINE SUGGESTS Initiate therapy with standard starting dose of mercaptopurine (e.g., 75 mg/m²/day for malignancy or 1.5 mg/kg/day for nonmalignancy). During therapy, adjust the doses of myelosuppressive agents, as per standard clinical practice. It usually takes at least 2 weeks of stable dosing to reach steady state after each dose adjustment.

From the combined TPMT and NUDT15 table in CPIC's thiopurine guideline.

CPIC reads your TPMT and NUDT15 results together for mercaptopurine, so this label reflects both genes.

Nilotinib

USE AS DIRECTED

Tasigna

Your UGT1A1 result means somewhat lower UGT1A1 activity than usual, but the FDA gives no genetic dosing change for nilotinib at this result.

 **UGT1A1** Intermediate metabolizer

UGT1A1: Intermediate metabolizer

FDA DRUG LABEL, UGT1A1

USE AS DIRECTED

[See the FDA table](#)

WHAT IT MEANS No FDA guidance for your genotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

Pazopanib

USE AS DIRECTED

Votrient

Your UGT1A1 gene works a bit less than average. The FDA gives no dose change for your result, so the usual dose is used.

 **UGT1A1** Intermediate metabolizer

UGT1A1: Intermediate metabolizer

FDA DRUG LABEL, UGT1A1

USE AS DIRECTED

[See the FDA table](#)

WHAT IT MEANS No FDA guidance for your genotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

Sacituzumab Govitecan-Hziy

USE AS DIRECTED

Trodelvy

Your body processes this drug a bit slower than average. The FDA gives no dose change for your result, so the usual dose is used.

 **UGT1A1** Intermediate metabolizer

UGT1A1: Intermediate metabolizer

FDA DRUG LABEL, UGT1A1	USE AS DIRECTED	See the FDA table
WHAT IT MEANS No FDA guidance for this phenotype		
WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.		

Thioguanine

USE AS DIRECTED

Lanvis, Tabloid

Both genes that affect this drug look normal, so a standard starting dose is expected.

 **TPMT** Normal metabolizer  **NUDT15** Normal metabolizer

TPMT: Normal metabolizer; **NUDT15:** Normal metabolizer

CPIC GUIDELINE, BOTH GENES TOGETHER	USE AS DIRECTED	Evidence: strong	Read the guideline
WHAT IT MEANS Both TPMT and NUDT15 predict normal thiopurine metabolism and a normal risk of myelosuppression.			
WHAT THE GUIDELINE SUGGESTS Initiate therapy with standard starting dose of thioguanine (e.g., 40 mg/m2/day for malignancy). During therapy, adjust the doses of myelosuppressive agents, as per standard clinical practice. It usually takes at least 2 weeks of stable dosing to reach steady state after each dose adjustment.			
From the combined TPMT and NUDT15 table in CPIC's thiopurine guideline.			

CPIC reads your TPMT and NUDT15 results together for thioguanine, so this label reflects both genes.

Tamoxifen

CONSIDER ALTERNATIVE

Nolvadex, Soltamox

Your body makes very little of this drug's active form, so it may not work well to stop breast cancer from coming back. Another hormone therapy is advised.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

CPIC GUIDELINE, CYP2D6

CONSIDER ALTERNATIVE

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Lower endoxifen concentrations compared to normal metabolizers; higher risk of breast cancer recurrence, event-free and recurrence-free survival compared to normal metabolizers.

WHAT THE GUIDELINE SUGGESTS Recommend alternative hormonal therapy such as an aromatase inhibitor for postmenopausal women or aromatase inhibitor along with ovarian function suppression in premenopausal women given that these approaches are superior to tamoxifen regardless of CYP2D6 genotype and based on knowledge that CYP2D6 poor metabolizers switched from tamoxifen to anastrozole do not have an increased risk of recurrence. Note, higher dose tamoxifen (40 mg/day) increases but does not normalize endoxifen concentrations and can be considered if there are contraindications to aromatase inhibitor therapy.

Immunosuppressants 4 medications

2 Use with caution 2 Use as directed

Abrocitinib

USE AS DIRECTED

Cibinqo

Your body may process this drug a little more slowly. The drug label has no special advice for this, so the usual dose is used.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19

USE AS DIRECTED

Evidence: moderate [See the FDA table](#)

WHAT IT MEANS No FDA guidance for this phenotype

WHAT THE LABEL SUGGESTS Abrocitinib - label recommended dosage and administration

Azathioprine

USE AS DIRECTED

Imuran

Both genes that affect this drug look normal, so a standard starting dose is expected.

 **TPMT** Normal metabolizer  **NUDT15** Normal metabolizer

TPMT: Normal metabolizer; **NUDT15:** Normal metabolizer

CPIC GUIDELINE, BOTH GENES TOGETHER

USE AS DIRECTED

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Both TPMT and NUDT15 predict normal thiopurine metabolism and a normal risk of myelosuppression.

WHAT THE GUIDELINE SUGGESTS Initiate therapy with standard starting dose (e.g., 2 mg/kg/day for autoimmune diseases). During therapy, adjust doses of azathioprine based on disease-specific guidelines. It usually takes at least 2 weeks to reach steady state after each dose adjustment.

From the combined TPMT and NUDT15 table in CPIC's thiopurine guideline.

CPIC reads your TPMT and NUDT15 results together for azathioprine, so this label reflects both genes.

Siponimod

USE WITH CAUTION

Mayzent

Your body breaks down siponimod slower than normal, causing the drug to reach higher levels in your system. Your doctor will need to adjust your dose based on your specific genetic profile.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer

FDA DRUG LABEL, CYP2C9

USE WITH CAUTION

[See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations. Adjust dosage based on genotype. Refer to FDA labeling for specific dosing recommendations.

WHAT THE LABEL SUGGESTS Adjust the dosage based on genotype as the FDA label directs.

Tacrolimus

USE WITH CAUTION

Prograf

Your body breaks down this drug faster than many people do, so the usual dose may fall short. A higher starting dose and blood tests are advised.

 **CYP3A5** Intermediate metabolizer

CYP3A5: Intermediate metabolizer

CPIC GUIDELINE, CYP3A5

USE WITH CAUTIONEvidence: strong[Read the guideline](#)

WHAT IT MEANS Lower dose-adjusted trough concentrations of tacrolimus and decreased chance of achieving target tacrolimus concentrations

WHAT THE GUIDELINE SUGGESTS Increase starting dose 1.5 to 2 times recommended starting dose. Total starting dose should not exceed 0.3mg/kg/day. Use therapeutic drug monitoring to guide dose adjustments

CYP3A5: Intermediate metabolizer

FDA DRUG LABEL, CYP3A5

USE WITH CAUTION[See the FDA table](#)

IN PLAIN WORDS Your body processes tacrolimus at a moderate rate. Your dose may need to be adjusted based on blood level monitoring to make sure you get the right amount.

WHAT IT MEANS Results in lower systemic concentrations, lower probability of achieving target concentrations and may result in higher rejection risk. Measure drug concentrations and adjust dosage based on trough whole blood tacrolimus concentrations.

WHAT THE LABEL SUGGESTS Measure drug concentrations and adjust the dosage based on trough whole blood tacrolimus concentrations.

5 Use as directed

ANTIRETROVIRALS

Atazanavir

USE AS DIRECTED

Reyataz, Evotaz, Others

Your body processes atazanavir a bit more slowly than normal, but you still have a low chance of developing jaundice (yellowing of skin or eyes). The standard dose is expected to be appropriate.

 **UGT1A1** Intermediate metabolizer

UGT1A1: Intermediate metabolizer

CPIC GUIDELINE, UGT1A1

USE AS DIRECTED

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Somewhat decreased UGT1A1 activity; low likelihood of bilirubin-related discontinuation of atazanavir.

WHAT THE GUIDELINE SUGGESTS There is no need to avoid prescribing of atazanavir based on UGT1A1 genetic test result. Inform the patient that some patients stop atazanavir because of jaundice (yellow eyes and skin), but that this patient's genotype makes this unlikely

Efavirenz

USE AS DIRECTED

Sustiva

Your body processes efavirenz normally. The standard dose is expected to be appropriate for you.

 **CYP2B6** Normal metabolizer

CYP2B6: Normal metabolizer

CPIC GUIDELINE, CYP2B6

USE AS DIRECTED

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Normal efavirenz metabolism

WHAT THE GUIDELINE SUGGESTS Initiate efavirenz with standard dosing (600 mg/day)

CYP2B6: Normal metabolizer

FDA DRUG LABEL, CYP2B6

USE AS DIRECTED

[See the FDA table](#)

IN PLAIN WORDS Your body processes efavirenz at a normal rate. The standard dose should work as expected.

WHAT IT MEANS No FDA guidance for your genotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

Peginterferon Alfa-2A

USE AS DIRECTED

Pegasys

Your genes make this hepatitis C drug more likely to work. You may be able to take it for a shorter time.

 **IFNL3** Favorable response genotype

IFNL3: Favorable response genotype

CPIC GUIDELINE, IFNL3

USE AS DIRECTED

Evidence: strong

[Read the guideline](#)

WHAT IT MEANS Approximately 70% chance for sustained virologic response (SVR) after 48 weeks of treatment. Consider implications before initiating PEG-IFN alpha and RBV containing regimens.

WHAT THE GUIDELINE SUGGESTS Approximately 90% chance for SVR after 24-48 weeks of treatment. Approximately 80-90% of patients are eligible for shortened therapy (24-28 weeks vs. 48 weeks). Weighs in favor of using PEG-IFN alpha and RBV containing regimens.

Peginterferon Alfa-2B

USE AS DIRECTED

PegIntron

Your genes make this hepatitis C drug more likely to work. You may be able to take it for a shorter time.

 **IFNL3** Favorable response genotype

IFNL3: Favorable response genotype

CPIC GUIDELINE, IFNL3

USE AS DIRECTED

Evidence: strong

[Read the guideline](#)

WHAT IT MEANS Approximately 70% chance for sustained virologic response (SVR) after 48 weeks of treatment. Consider implications before initiating PEG-IFN alpha and RBV containing regimens.

WHAT THE GUIDELINE SUGGESTS Approximately 90% chance for SVR after 24-48 weeks of treatment. Approximately 80-90% of patients are eligible for shortened therapy (24-28 weeks vs. 48 weeks). Weighs in favor of using PEG-IFN alpha and RBV containing regimens.

Ribavirin

USE AS DIRECTED

Copegus, Rebetol, Virazole

Your genes make this hepatitis C treatment more likely to work. You may be able to take it for a shorter time.

 **IFNL3** Favorable response genotype

IFNL3: Favorable response genotype

CPIC GUIDELINE, IFNL3

USE AS DIRECTED

Evidence: strong [Read the guideline](#)

WHAT IT MEANS Approximately 70% chance for sustained virologic response (SVR) after 48 weeks of treatment. Consider implications before initiating PEG-IFN alpha and RBV containing regimens.

WHAT THE GUIDELINE SUGGESTS Approximately 90% chance for SVR after 24-48 weeks of treatment. Approximately 80-90% of patients are eligible for shortened therapy (24-28 weeks vs. 48 weeks). Weighs in favor of using PEG-IFN alpha and RBV containing regimens.

Antifungals 1 medication

1 Use with caution

Voriconazole

USE WITH CAUTION

Vfend

Your body breaks down this drug more slowly, so levels can rise and side effects are more likely.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

CPIC GUIDELINE, CYP2C19

USE AS DIRECTED

Evidence: moderate [Read the guideline](#)

IN PLAIN WORDS Your body breaks down this drug a bit more slowly, so levels may run a little higher. The usual dose is still advised.

WHAT IT MEANS Higher dose-adjusted trough concentrations of voriconazole compared to normal metabolizers.

WHAT THE GUIDELINE SUGGESTS Initiate therapy with recommended standard of care dosing.

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19

USE WITH CAUTION

Evidence: moderate [See the FDA table](#)

WHAT IT MEANS Results in higher systemic concentrations and may result in higher adverse reaction risk.

WHAT THE LABEL SUGGESTS No specific dosing change in the FDA table. Refer to FDA labeling.

Anesthetics 8 medications

1 Use as directed 7 Unable to determine

Desflurane

UNABLE TO DETERMINE

We couldn't check the genes for this anesthesia reaction from your data. This does not mean that a normal response is expected.

 **RYR1** No result  **CACNA1S** No result

RYR1: No result; **CACNA1S:** No result

CPIC GUIDELINE, BOTH GENES TOGETHER

UNABLE TO DETERMINE [Read the guideline](#)

WHAT IT MEANS Malignant hyperthermia susceptibility could not be determined.

WHAT THE GUIDELINE SUGGESTS Clinical findings, family history and clinical evaluation should guide anesthesia decisions.

CPIC reads your RYR1 and CACNA1S results together for desflurane, so this label reflects both genes.

Enflurane

UNABLE TO DETERMINE

We couldn't check the genes for this anesthesia reaction from your data. This does not mean that a normal response is expected.

 **RYR1** No result  **CACNA1S** No result

RYR1: No result; **CACNA1S:** No result

CPIC GUIDELINE, BOTH GENES TOGETHER

UNABLE TO DETERMINE [Read the guideline](#)

WHAT IT MEANS Malignant hyperthermia susceptibility could not be determined.

WHAT THE GUIDELINE SUGGESTS Clinical findings, family history and clinical evaluation should guide anesthesia decisions.

CPIC reads your RYR1 and CACNA1S results together for enflurane, so this label reflects both genes.

Halothane

UNABLE TO DETERMINE

We couldn't check the genes for this anesthesia reaction from your data. This does not mean that a normal response is expected.

 **RYR1** No result  **CACNA1S** No result

RYR1: No result; **CACNA1S:** No result

CPIC GUIDELINE, BOTH GENES TOGETHER

UNABLE TO DETERMINE [Read the guideline](#)

WHAT IT MEANS Malignant hyperthermia susceptibility could not be determined.

WHAT THE GUIDELINE SUGGESTS Clinical findings, family history and clinical evaluation should guide anesthesia decisions.

CPIC reads your RYR1 and CACNA1S results together for halothane, so this label reflects both genes.

Isoflurane

UNABLE TO DETERMINE

We couldn't check the genes for this anesthesia reaction from your data. This does not mean that a normal response is expected.

 **RYR1** No result  **CACNA1S** No result

RYR1: No result; **CACNA1S:** No result

CPIC GUIDELINE, BOTH GENES TOGETHER

UNABLE TO DETERMINE [Read the guideline](#)

WHAT IT MEANS Malignant hyperthermia susceptibility could not be determined.

WHAT THE GUIDELINE SUGGESTS Clinical findings, family history and clinical evaluation should guide anesthesia decisions.

CPIC reads your RYR1 and CACNA1S results together for isoflurane, so this label reflects both genes.

Methoxyflurane

UNABLE TO DETERMINE

We couldn't check the genes for this anesthesia reaction from your data. This does not mean that a normal response is expected.

 **RYR1** No result  **CACNA1S** No result

RYR1: No result; **CACNA1S:** No result

CPIC GUIDELINE, BOTH GENES TOGETHER

UNABLE TO DETERMINE [Read the guideline](#)

WHAT IT MEANS Malignant hyperthermia susceptibility could not be determined.

WHAT THE GUIDELINE SUGGESTS Clinical findings, family history and clinical evaluation should guide anesthesia decisions.

CPIC reads your RYR1 and CACNA1S results together for methoxyflurane, so this label reflects both genes.

Mivacurium

USE AS DIRECTED

Mivacron

Your body breaks down this drug normally. Your doctor can use the usual dose.

 **BCHE** Normal metabolizer

BCHE: Normal metabolizer

FDA DRUG LABEL, BCHE

USE AS DIRECTED Evidence: strong [See the FDA table](#)

WHAT IT MEANS Normal BCHE activity and expected metabolism of mivacurium.

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose and adjust per standard clinical practice.

Sevoflurane

UNABLE TO DETERMINE

We couldn't check the genes for this anesthesia reaction from your data. This does not mean that a normal response is expected.

 **RYR1** No result  **CACNA1S** No result

RYR1: No result; **CACNA1S:** No result

CPIC GUIDELINE, BOTH GENES TOGETHER

UNABLE TO DETERMINE

[Read the guideline](#)

WHAT IT MEANS Malignant hyperthermia susceptibility could not be determined.

WHAT THE GUIDELINE SUGGESTS Clinical findings, family history and clinical evaluation should guide anesthesia decisions.

CPIC reads your RYR1 and CACNA1S results together for sevoflurane, so this label reflects both genes.

Succinylcholine

UNABLE TO DETERMINE

Quelicin, Anectine

We couldn't check the genes for this anesthesia reaction from your data. This does not mean that a normal response is expected.

 **RYR1** No result  **CACNA1S** No result  **BCHE** Normal metabolizer

RYR1: No result; **CACNA1S:** No result

CPIC GUIDELINE, BOTH GENES TOGETHER

UNABLE TO DETERMINE

[Read the guideline](#)

WHAT IT MEANS Malignant hyperthermia susceptibility could not be determined.

WHAT THE GUIDELINE SUGGESTS Clinical findings, family history and clinical evaluation should guide anesthesia decisions.

BCHE: Normal metabolizer

FDA DRUG LABEL, BCHE

USE AS DIRECTED

Evidence: strong

[See the FDA table](#)

IN PLAIN WORDS Your body breaks down this drug normally. Your doctor can use the usual dose.

WHAT IT MEANS Normal BCHE activity and expected metabolism of succinylcholine.

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose and adjust per standard clinical practice.

CPIC reads your RYR1 and CACNA1S results together for succinylcholine, so this label reflects both genes.

Weight management 3 medications

2 Use with caution 1 Use as directed

Retatrutide

USE WITH CAUTION

Your GIPR gene raises your chance of nausea or vomiting on retatrutide: roughly 4.4% of people with your genotype vomit, compared with about 2.5% at the lowest risk. Semaglutide is not affected by this gene.

 **GLP1R** Typical response  **GIPR** Decreased function

GLP1R: Typical response; **GIPR:** Decreased function

GENE2RX RESEARCH SUMMARY, BOTH GENES TOGETHER

USE WITH CAUTION Evidence: weak [See the drug page](#)

WHAT IT MEANS GLP1R: the more common Pro7/Pro7 form of the signal peptide (rs10305420 C/C). GIPR: one copy of the Gln354 partial loss-of-function allele (rs1800437 G/C). No pharmacogenetic study of retatrutide exists; by extrapolation from the tirzepatide data this pair is expected to carry roughly 1.8-fold the odds of moderate-to-severe vomiting seen with the lowest-risk genotype pair. Expected weight-loss efficacy from the GLP1R arm of retatrutide. The GIPR component of this risk is specific to dual GIP/GLP-1 agonists and does not apply to semaglutide.

WHAT THE RESEARCH SUGGESTS Use standard dosing but consider a slower dose-escalation schedule, and counsel on the elevated chance of nausea and vomiting. If GI symptoms are intolerable, a GLP1R-only agonist such as semaglutide is unaffected by the GIPR variant and may be better tolerated.

Gene2Rx guideline extrapolated from the tirzepatide results in Su et al., Nature (2026). Retatrutide, an investigational GIP, GLP-1 and glucagon receptor agonist, has no genetic study of its own, so this assumes the GLP1R and GIPR variants act as they do with tirzepatide, which also acts on both receptors.

Gene2Rx reads your GLP1R and GIPR results together for retatrutide, so this label reflects both genes.

Semaglutide

USE AS DIRECTED

Ozempic, Wegovy

Your genes point to a typical response to this drug, with average weight loss and side effects.

 **GLP1R** Typical response

GLP1R: Typical response

GENE2RX RESEARCH SUMMARY, GLP1R

USE AS DIRECTED Evidence: moderate [See the drug page](#)

WHAT IT MEANS The Pro7/Pro7 form of the GLP1R signal peptide (rs10305420 C/C). The Leu7 (T) allele is the less common one in every ancestry group studied. Expected weight-loss efficacy and typical nausea/vomiting risk.

WHAT THE RESEARCH SUGGESTS Standard dosing and titration are expected to produce an average response.

Tirzepatide

USE WITH CAUTION

Mounjaro, Zepbound

Your GIPR gene raises your chance of nausea or vomiting on tirzepatide: roughly 4.4% of people with your genotype vomit, compared with about 2.5% at the lowest risk. Semaglutide is not affected by this gene.

 **GLP1R** Typical response  **GIPR** Decreased function

GLP1R: Typical response; GIPR: Decreased function

GENE2RX RESEARCH SUMMARY, BOTH GENES TOGETHER

USE WITH CAUTION

Evidence: moderate

[See the drug page](#)

WHAT IT MEANS GLP1R: the more common Pro7/Pro7 form of the signal peptide (rs10305420 C/C). GIPR: one copy of the Gln354 partial loss-of-function allele (rs1800437 G/C). Estimated risk of moderate-to-severe vomiting on tirzepatide is about 4.4% versus 2.5% for the lowest-risk genotype pair (odds ratio 1.8), and nausea about 17% versus 14%. Expected weight-loss efficacy from the GLP1R arm of tirzepatide. The GIPR component of this risk is specific to dual GIP/GLP-1 agonists and does not apply to semaglutide.

WHAT THE RESEARCH SUGGESTS Use standard dosing but consider a slower dose-escalation schedule, and counsel on the elevated chance of nausea and vomiting. If GI symptoms are intolerable, semaglutide is unaffected by the GIPR variant and may be better tolerated.

Gene2Rx guideline based on Su et al., Nature (2026), which linked GLP1R rs10305420 and GIPR rs1800437 to nausea and vomiting on tirzepatide. The GIPR effect was specific to tirzepatide and was not seen with semaglutide.

Gene2Rx reads your GLP1R and GIPR results together for tirzepatide, so this label reflects both genes.

Antidiabetics 1 medication

1 Use as directed

Nateglinide

USE AS DIRECTED

Starlix

Your body breaks down nateglinide slightly slower than normal. The standard dose should work as expected.

 **CYP2C9** Intermediate metabolizer

CYP2C9: Intermediate metabolizer

FDA DRUG LABEL, CYP2C9

USE AS DIRECTED

[See the FDA table](#)

WHAT IT MEANS No FDA guidance for this phenotype

WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.

Antihistamines

1 medication

1 Use with caution

Meclizine

USE WITH CAUTION

Antivert

Your body breaks down meclizine much more slowly than normal, which may cause the drug to build up to higher levels and increase the risk of side effects. Close monitoring is recommended.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6	USE WITH CAUTION	See the FDA table
WHAT IT MEANS May affect systemic concentrations. Monitor for adverse reactions and clinical effect.		
WHAT THE LABEL SUGGESTS Monitor for adverse reactions and clinical effect.		

Drugs used in addictive disorders

1 medication

1 Use with caution

Lofexidine

USE WITH CAUTION

Lucemyra

Your body breaks down lofexidine more slowly than normal, causing it to build up in your system. This increases the risk of side effects like low blood pressure and a slow heart rate.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6	USE WITH CAUTION	See the FDA table
WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk. Monitor for orthostatic hypotension and bradycardia.		
WHAT THE LABEL SUGGESTS Monitor for orthostatic hypotension and bradycardia.		

Female sexual health

1 medication

1 Use as directed

Flibanserin

USE AS DIRECTED

Addyi

Your CYP2C19 result means somewhat lower CYP2C19 activity than usual, but the FDA gives no genetic dosing change for flibanserin at this result.

 **CYP2C19** Intermediate metabolizer

CYP2C19: Intermediate metabolizer

FDA DRUG LABEL, CYP2C19	USE AS DIRECTED See the FDA table
WHAT IT MEANS No FDA guidance for your genotype	
WHAT THE LABEL SUGGESTS Initiate therapy with recommended starting dose.	

Gaucher's disease treatments

1 medication

1 Use with caution

Eliglustat

USE WITH CAUTION

Cerdelga

Your body breaks down this drug much more slowly, which can raise the risk of heart rhythm problems. Your doctor will set your dose, and some other medicines can't be taken with it.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6	USE WITH CAUTION See the FDA table
WHAT IT MEANS Alters systemic concentrations, effectiveness, and adverse reaction risk (QT prolongation). Coadministration with strong CYP3A inhibitors is contraindicated in intermediate and poor CYP2D6 metabolizers. Refer to FDA labeling for specific dosing recommendations.	
WHAT THE LABEL SUGGESTS Use the dosage the FDA label gives for CYP2D6 poor metabolizers. Coadministration with strong CYP3A inhibitors is contraindicated.	

Gout 1 medication

1 Use as directed

Allopurinol

USE AS DIRECTED

Zyloprim

Your ABCG2 genotype does not change how you respond to allopurinol; standard dosing applies.

●● ABCG2 Normal function

ABCG2: Normal function

DPWG GUIDELINE, ABCG2USE AS DIRECTEDEvidence: moderateRead the guideline

WHAT IT MEANS Normal ABCG2 transporter function. Renal and intestinal uric acid excretion is not impaired by ABCG2 variation at p.Gln141Lys.

WHAT THE GUIDELINE SUGGESTS Use standard allopurinol dosing.

Hair loss 1 medication

1 Use as directed

Topical minoxidil

USE AS DIRECTED

Rogaine

Your SULT1A1 result suggests normal enzyme function. This enzyme helps activate topical minoxidil, but hair growth results can vary. Use topical minoxidil as directed and assess hair growth over time with your clinician.

●● SULT1A1 Normal function

SULT1A1: Normal function

GENE2RX RESEARCH SUMMARY, SULT1A1USE AS DIRECTEDEvidence: weakSee the drug page

WHAT IT MEANS Your SULT1A1 result suggests normal enzyme function. This enzyme helps activate topical minoxidil, but hair growth results can vary.

WHAT THE RESEARCH SUGGESTS Use topical minoxidil as directed and assess hair growth over time with your clinician.

Saliva production stimulators1 medication

1 Use with caution

Cevimeline

USE WITH CAUTION

Evoxac

Your body breaks down cevimeline much more slowly than normal, which may increase the risk of side effects. Careful monitoring by your doctor is recommended.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6	USE WITH CAUTION	See the FDA table
WHAT IT MEANS May result in higher adverse reaction risk. Use with caution.		
WHAT THE LABEL SUGGESTS Use with caution.		

Urologicals1 medication

1 Use with caution

Tolterodine

USE WITH CAUTION

Detrol

Your body breaks down tolterodine more slowly than normal, causing it to build up in your system. This increases the risk of side effects, including heart rhythm problems.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

FDA DRUG LABEL, CYP2D6	USE WITH CAUTION	See the FDA table
WHAT IT MEANS Results in higher systemic concentrations and higher adverse reaction risk (QT prolongation).		
WHAT THE LABEL SUGGESTS No specific dosing change in the FDA table. Refer to FDA labeling.		

Other substances 7 medications

5 Use with caution 2 Use as directed

Alcohol

USE AS DIRECTED

Your genes have little effect on how your body handles alcohol.

●● **ADH1B** Normal function ●● **ALDH2** Normal function

ADH1B: Normal function

GENE2RX RESEARCH SUMMARY, ADH1B

USE AS DIRECTED [See the drug page](#)

WHAT IT MEANS Two Arg48 alleles (rs1229984). Usual rate of ethanol oxidation. Compared with His48 carriers, associated with higher risk of alcohol dependence and, among heavy drinkers in East Asian studies, higher risk of esophageal and head and neck cancer. Only rs1229984 is assessed: ADH1B*3 (rs2066702), common in people of African ancestry, is not read, so its carriers are reported here.

WHAT THE RESEARCH SUGGESTS Follow standard guidelines for alcohol consumption.

ALDH2: Normal function

GENE2RX RESEARCH SUMMARY, ALDH2

USE AS DIRECTED [See the drug page](#)

IN PLAIN WORDS Your genes have little effect on how you clear the toxic by-product of alcohol.

WHAT IT MEANS Two Glu504 alleles (rs671 G/G, ALDH2*1/*1). Normal acetaldehyde clearance; typical risk of flushing, hangover and alcohol dependence for this gene.

WHAT THE RESEARCH SUGGESTS Standard advice on drinking limits.

Caffeine

USE WITH CAUTION

Coffee, Tea

Caffeine may wear off slightly sooner for you than average. The usual advice on caffeine limits applies.

●● **CYP1A2** Rapid metabolizer

CYP1A2: Rapid metabolizer

GENE2RX RESEARCH SUMMARY, CYP1A2

USE WITH CAUTION Evidence: moderate [See the drug page](#)

WHAT IT MEANS One rs762551 A allele (*1/*30). Modestly higher CYP1A2 activity, mainly in smokers. Note: in the coffee and cardiovascular literature, A/C carriers are classed as 'slow' metabolizers.

WHAT THE RESEARCH SUGGESTS Caffeine may be cleared somewhat faster than average. Standard advice on moderate intake applies.

Ketamine

USE AS DIRECTED

Ketalar

Your body processes ketamine at the usual rate.

 **CYP2B6** Normal metabolizer

CYP2B6: Normal metabolizer

GENE2RX RESEARCH SUMMARY, CYP2B6

USE AS DIRECTED

Evidence: strong [See the drug page](#)

WHAT IT MEANS Usual CYP2B6 activity and expected N-demethylation of ketamine to norketamine. CYP3A4 contributes to the same step, and the relative roles of the two enzymes are still debated.

WHAT THE RESEARCH SUGGESTS Initiate with standard ketamine doses per clinical practice and titrate to effect.

LSD

USE WITH CAUTION

Acid

You clear this drug slowly, so its effects may be stronger and last longer. Starting with a lower dose may help avoid a bad experience.

 **CYP2D6** Poor metabolizer

CYP2D6: Poor metabolizer

GENE2RX RESEARCH SUMMARY, CYP2D6

USE WITH CAUTION

Evidence: strong [See the drug page](#)

WHAT IT MEANS No functional CYP2D6. In the pooled analysis of 81 participants, poor metabolizers had longer LSD half-lives and about 75% higher area under the curve for LSD and for 2-oxo-3-hydroxy-LSD than carriers of functional CYP2D6, and reported greater alterations of mind and longer-lasting effects. In a separate analysis of 213 participants, acute anxiety was inversely correlated with genetically determined CYP2D6 function, although dose and pre-drug mood were much stronger predictors of the experience.

WHAT THE RESEARCH SUGGESTS Expect higher exposure and a longer duration of effect. In a research setting, consider a lower starting dose with gradual increases and a longer monitoring period.

MDMA

USE WITH CAUTION

Ecstasy

You have little or no activity of the main enzyme that clears MDMA. Studies have not shown that this makes MDMA poisoning more likely, and no genotype makes MDMA safe.

 **COMT** Intermediate function  **CYP2D6** Poor metabolizer

COMT: Intermediate function

GENE2RX RESEARCH SUMMARY, COMT

USE AS DIRECTED

Evidence: weak

[See the drug page](#)

IN PLAIN WORDS This is the middle result for this gene. It is not linked to a stronger or weaker reaction to MDMA.

WHAT IT MEANS One rs4680 G and one A allele (Val158/Met158). Intermediate COMT activity; no distinct cardiovascular or subjective pattern was reported for this genotype.

WHAT THE RESEARCH SUGGESTS No genotype-based adjustment. Watch for unexpected cognitive or cardiovascular effects.

CYP2D6: Poor metabolizer

GENE2RX RESEARCH SUMMARY, CYP2D6

USE WITH CAUTION

Evidence: weak

[See the drug page](#)

WHAT IT MEANS No functional CYP2D6. MDMA clearance depends on CYP2D6 for no more than about 30% of its metabolism in people, and a single typical dose inactivates most CYP2D6 regardless of genotype, so the difference from other phenotypes is smaller than once assumed. No clear link between inherited CYP2D6 deficiency and acute MDMA toxicity has been demonstrated.

WHAT THE RESEARCH SUGGESTS Exposure may be higher than in normal metabolizers, but the size of the effect is not established. If exposure occurs, intensive monitoring of vital signs, temperature and fluid intake is advised.

Nicotine

USE WITH CAUTION

Cigarettes, Zyn

This variant is linked to heavier smoking and finding it harder to quit. Stop-smoking medicines appear to help people with this result as much as or more than others.

 **CHRNA5** Increased risk  **COMT** Intermediate function  **CYP2A6** Normal metabolizer

CHRNA5: Increased risk

GENE2RX RESEARCH SUMMARY, CHRNA5

USE WITH CAUTION

Evidence: strong

[See the drug page](#)

WHAT IT MEANS One or two rs16969968 A alleles (Asn398). The Asn398 receptor shows reduced response to nicotinic agonists in vitro. Associated with more cigarettes per day, higher risk of nicotine dependence, later smoking cessation and earlier lung cancer diagnosis in smokers. In a cessation trial, carriers of the high-risk haplotype benefited more from cessation pharmacotherapy than non-carriers.

WHAT THE RESEARCH SUGGESTS Higher risk of heavy, persistent use. For patients who want to quit, offer cessation pharmacotherapy with counseling rather than an unassisted attempt.

Nicotine

USE WITH CAUTION

Cigarettes, Zyn

This variant is linked to heavier smoking and finding it harder to quit. Stop-smoking medicines appear to help people with this result as much as or more than others.

 **CHRNA5** Increased risk  **COMT** Intermediate function  **CYP2A6** Normal metabolizer

COMT: Intermediate function

GENE2RX RESEARCH SUMMARY, COMT

USE WITH CAUTION

Evidence: weak

[See the drug page](#)

IN PLAIN WORDS This result has been studied in relation to smoking, but the findings are mixed, so it tells you little about how you respond to nicotine.

WHAT IT MEANS rs4680 Val/Met. Moderately lower COMT activity. Associations with nicotine reward, withdrawal and smoking behavior are inconsistent across studies.

WHAT THE RESEARCH SUGGESTS No genotype-based change to cessation treatment; monitor craving as usual.

CYP2A6: Normal metabolizer

GENE2RX RESEARCH SUMMARY, CYP2A6

USE AS DIRECTED

Evidence: strong

[See the drug page](#)

IN PLAIN WORDS Your body is expected to clear nicotine at a typical rate.

WHAT IT MEANS No reduced-function allele detected among those assessed. Typical nicotine clearance. The CYP2A6*4 deletion, *12 hybrid and duplications are not assessed, so reduced activity cannot be ruled out.

WHAT THE RESEARCH SUGGESTS Typical response to nicotine. In smokers with normal nicotine metabolism, varenicline was more effective than the nicotine patch in a randomized trial.

THC

USE WITH CAUTION

Cannabis, Marijuana

You may be more likely to feel anxious or paranoid on THC. Starting with a lower dose can help.

 **AKT1** Decreased function  **COMT** Intermediate function  **CYP2C9** Intermediate metabolizer
 **FAAH** Normal function

AKT1: Decreased function

GENE2RX RESEARCH SUMMARY, AKT1

USE WITH CAUTION

Evidence: weak

[See the drug page](#)

WHAT IT MEANS One rs2494732 C allele. In a case-control study of first-episode psychosis the variant was not associated with psychosis, cannabis use or frequency of use on its own, but modified the association between cannabis use and psychotic disorder, and acute psychotomimetic symptoms rose with C-allele count in cannabis users. A later study of 720 people found no such association.

WHAT THE RESEARCH SUGGESTS Some research suggests that carriers of this variant may have a moderately higher risk of psychotic-like effects from THC. However these findings are not conclusive. Consider starting at a lower dose and monitoring for psychotic-like effects or avoiding THC altogether.

THC

USE WITH CAUTION

Cannabis, Marijuana

You may be more likely to feel anxious or paranoid on THC. Starting with a lower dose can help.

 **AKT1** Decreased function

 **COMT** Intermediate function

 **CYP2C9** Intermediate metabolizer

 **FAAH** Normal function

COMT: Intermediate function

GENE2RX RESEARCH SUMMARY, COMT

USE AS DIRECTED

Evidence: weak

See the drug page

INPLAIN WORDS Your genes point to a typical response to THC, with an average chance of side effects.

WHAT IT MEANS One rs4680 G and one A allele (Val158/Met158). Intermediate COMT activity and average dopamine clearance.

WHAT THE RESEARCH SUGGESTS No COMT-based adjustment. A typical response to THC is expected.

CYP2C9: Intermediate metabolizer (activity score 1.5)

GENE2RX RESEARCH SUMMARY, CYP2C9

USE AS DIRECTED

Evidence: weak

See the drug page

INPLAIN WORDS Your body may break down THC slightly more slowly than average, so effects could feel a little stronger or last a little longer.

WHAT IT MEANS Activity score 1.5 (one decreased-function allele, usually *2). Slightly reduced hydroxylation of THC. In the only published pharmacokinetic study of oral THC by CYP2C9 genotype, *2 status alone did not change THC exposure, so any increase at this activity score is expected to be small.

WHAT THE RESEARCH SUGGESTS Initiate at standard doses. Monitor for increased sedation or psychotropic intensity.

FAAH: Normal function

GENE2RX RESEARCH SUMMARY, FAAH

USE AS DIRECTED

Evidence: moderate

See the drug page

INPLAIN WORDS This gene works normally, so THC should affect you in the usual way.

WHAT IT MEANS Two rs324420 C alleles (Pro129). Usual hydrolysis of anandamide and related endocannabinoids, so baseline cannabinoid receptor tone is typical. FAAH does not metabolize THC.

WHAT THE RESEARCH SUGGESTS No FAAH-based adjustment. Response to THC is expected to match population norms.

Gene details and frequencies

All 30 genes. Frequency context describes populations, not your chance of a side effect. A missing frequency estimate means no supported reference is available for that result.

ABCG2 Normal function

 **rs2231142G/rs2231142G** · Both copies work normally.

A pump that clears uric acid and some drugs, such as rosuvastatin, from the body.

2 medications list this gene. Guidance unchanged

ABCG2 normal function: estimated in 48.0% to 98.8% of people across population groups

These CPIC estimates describe this phenotype, not your exact DNA combination or your chance of side effects. Frequencies vary by population; no ancestry is assumed for you.

African American/Afro-Caribbean	93.1%	American	64.0%
Central/South Asian	82.2%	East Asian	48.0%
European	80.4%	Latino	60.2%
Near Eastern	87.4%	Oceanian	63.2%
Sub-Saharan African	98.8%		

Estimated from published allele frequencies, rather than a direct count of people with this result. Study coverage and methods vary. Reference: CPIC ABCG2 frequency table and methods. Data retrieved 2026-10-17.

ADH1B Normal function

 **rs1229984C/rs1229984C** · Both copies work normally.

Turns alcohol into acetaldehyde, a toxic by-product.

1 medication lists this gene. Guidance unchanged

ADH1B rs1229984 C allele: 29.6% to 99.7% of DNA copies across ancestry groups

Your result has 2 copies of this allele. These gnomAD frequencies count DNA copies, not people who share your genotype or phenotype, and do not measure your chance of side effects. No ancestry is assumed for you.

Counts below show copies of the C allele / total DNA copies measured.

African / African American	98.8%	Admixed American	93.2%
	41,031 / 41,534		14,240 / 15,282
Amish	89.9%	Ashkenazi Jewish	73.1%
	820 / 912		2,539 / 3,472
East Asian	29.6%	Finnish	99.7%
	1,530 / 5,168		10,586 / 10,618
Middle Eastern	78.6%	European (non-Finnish)	96.4%
	231 / 294		65,617 / 68,036
South Asian	95.9%	Remaining ancestry group	88.4%
	4,626 / 4,822		1,861 / 2,106

Reference: gnomAD v4.1 genomes, GRCh38 4-99318162-T-C. Frequencies are allele count divided by allele number within each ancestry group. Study groups are not representative of the worldwide population. Data retrieved 2026-10-17.

AKT1 Decreased function

 **rs2494732C/rs2494732T**

A signaling gene linked to the risk of psychosis with heavy cannabis use.

You carry one copy of a variant linked to anxiety or paranoia from cannabis.

1 medication lists this gene. Changes the guidance for 1

AKT1 rs2494732 C allele: 33.2% to 72.2% of DNA copies across ancestry groups

Your result has 1 copy of this allele. These gnomAD frequencies count DNA copies, not people who share your genotype or phenotype, and do not measure your chance of side effects. No ancestry is assumed for you.

Counts below show copies of the C allele / total DNA copies measured.

African / African American	49.2% 20,373 / 41,440	Admixed American	55.2% 8,437 / 15,284
Amish	33.2% 303 / 912	Ashkenazi Jewish	42.2% 1,464 / 3,466
East Asian	72.2% 3,713 / 5,144	Finnish	43.7% 4,616 / 10,572
Middle Eastern	44.2% 130 / 294	European (non-Finnish)	43.3% 29,377 / 67,904
South Asian	59.8% 2,887 / 4,824	Remaining ancestry group	47.3% 998 / 2,110

Reference: gnomAD v4.1 genomes, GRCh38 14-104772855-T-C. Frequencies are allele count divided by allele number within each ancestry group. Study groups are not representative of the worldwide population. Data retrieved 2026-10-17.

ALDH2 Normal function

 **rs671G/rs671G** · Both copies work normally.

Clears acetaldehyde, the toxic by-product of alcohol.

1 medication lists this gene. Guidance unchanged

ALDH2 rs671 A allele: 0% to 22.5% of DNA copies across ancestry groups

Your result has 0 copies of this allele. These gnomAD frequencies count DNA copies, not people who share your genotype or phenotype, and do not measure your chance of side effects. No ancestry is assumed for you.

Counts below show copies of the A allele / total DNA copies measured.

African / African American	<0.1% 8 / 41,546	Admixed American	<0.1% 14 / 15,274
Amish	0% 0 / 912	Ashkenazi Jewish	0% 0 / 3,470
East Asian	22.5% 1,154 / 5,132	Finnish	<0.1% 1 / 10,598
Middle Eastern	0% 0 / 294	European (non-Finnish)	<0.1% 2 / 68,020
South Asian	<0.1% 4 / 4,820	Remaining ancestry group	0.5% 10 / 2,108

Reference: gnomAD v4.1 genomes, GRCh38 12-111803962-G-A. Frequencies are allele count divided by allele number within each ancestry group. Study groups are not representative of the worldwide population. Data retrieved 2026-10-17.

BCHE Normal metabolizer

 **Reference/Reference** · Both copies work normally.

Breaks down two muscle relaxers used in surgery. These are succinylcholine and mivacurium.

2 medications list this gene. Guidance unchanged

CACNA1S Not checked

 **Not determined** · We couldn't check this gene from your data. This does not mean that a normal response is expected.

A muscle channel. Rare changes in it can cause a dangerous reaction to some anesthetics.

7 medications list this gene. Shown as "Unable to determine"

CHRNA5 Increased risk

 **rs16969968A/rs16969968A**

A nicotine receptor in the brain linked to heavy smoking.

You carry a variant linked to heavier smoking and a harder time quitting.

1 medication lists this gene. Changes the guidance for 1

CHRNA5 rs16969968 A allele: 3.2% to 40.7% of DNA copies across ancestry groups

Your result has 2 copies of this allele. These gnomAD frequencies count DNA copies, not people who share your genotype or phenotype, and do not measure your chance of side effects. No ancestry is assumed for you.

Counts below show copies of the A allele / total DNA copies measured.

African / African American	5.9% 2,458 / 41,526	Admixed American	22.6% 3,458 / 15,290
Amish	40.7% 368 / 904	Ashkenazi Jewish	37.5% 1,302 / 3,470
East Asian	3.2% 166 / 5,186	Finnish	32.7% 3,455 / 10,568
Middle Eastern	40.1% 118 / 294	European (non-Finnish)	34.7% 23,587 / 67,982
South Asian	22.2% 1,069 / 4,826	Remaining ancestry group	27.5% 581 / 2,112

Reference: gnomAD v4.1 genomes, GRCh38 15-78590583-G-A. Frequencies are allele count divided by allele number within each ancestry group. Study groups are not representative of the worldwide population. Data retrieved 2026-10-17.

COMT Intermediate function

 **rs4680A/rs4680G** · One copy works and one works less well.

Breaks down dopamine and other brain chemicals.

3 medications list this gene. Changes the guidance for 1

COMT rs4680 A allele: 27.4% to 66.4% of DNA copies across ancestry groups

Your result has 1 copy of this allele. These gnomAD frequencies count DNA copies, not people who share your genotype or phenotype, and do not measure your chance of side effects. No ancestry is assumed for you.

Counts below show copies of the A allele / total DNA copies measured.

African / African American	31.0% 12,853 / 41,484	Admixed American	40.4% 6,184 / 15,292
Amish	66.4% 604 / 910	Ashkenazi Jewish	45.3% 1,571 / 3,466
East Asian	27.4% 1,414 / 5,152	Finnish	55.3% 5,854 / 10,592
Middle Eastern	46.9% 138 / 294	European (non-Finnish)	51.8% 35,191 / 67,942
South Asian	44.5% 2,147 / 4,822	Remaining ancestry group	41.8% 883 / 2,110

Reference: gnomAD v4.1 genomes, GRCh38 22-19963748-G-A. Frequencies are allele count divided by allele number within each ancestry group. Study groups are not representative of the worldwide population. Data retrieved 2026-10-17.

CYP1A2 Rapid metabolizer

 ***1/*30** · One copy works normally and one works faster than usual.

Breaks down caffeine and some medicines, such as clozapine.

1 medication lists this gene. Changes the guidance for 1

CYP2A6 Normal metabolizer

 ***1/*1** · Both copies work normally.

Breaks down nicotine.

1 medication lists this gene. Guidance unchanged

CYP2B6 Normal metabolizer

 *1/*1 · Both copies work normally.

Breaks down efavirenz, ketamine, methadone and some drugs for depression.

3 medications list this gene. Guidance unchanged

CYP2B6 normal metabolizer: estimated in 13.0% to 48.6% of people across population groups

These CPIC estimates describe this phenotype, not your exact DNA combination or your chance of side effects. Frequencies vary by population; no ancestry is assumed for you.

African American/Afro-Caribbean	33.4%	Central/South Asian	42.2%
East Asian	48.6%	European	43.0%
Latino	33.6%	Near Eastern	29.1%
Oceanian	13.0%	Sub-Saharan African	14.3%

Estimated from published allele frequencies, rather than a direct count of people with this result. Study coverage and methods vary. Reference: CPIC CYP2B6 frequency table and methods. Data retrieved 2026-10-17.

CYP2C19 Intermediate metabolizer

 *1/*2 · One copy works and one doesn't.

Handles several SSRIs, acid reducers such as omeprazole, and the blood thinner clopidogrel.

21 medications list this gene. Changes the guidance for 17

CYP2C19 intermediate metabolizer: estimated in 19.0% to 45.9% of people across population groups

These CPIC estimates describe this phenotype, not your exact DNA combination or your chance of side effects. Frequencies vary by population; no ancestry is assumed for you.

African American/Afro-Caribbean	31.4%	American	21.4%
Central/South Asian	40.8%	East Asian	45.9%
European	26.1%	Latino	19.0%
Near Eastern	23.5%	Oceanian	36.9%
Sub-Saharan African	29.9%		

Estimated from published allele frequencies, rather than a direct count of people with this result. Study coverage and methods vary. Reference: CPIC CYP2C19 frequency table and methods. Data retrieved 2026-10-17.

CYP2C9 Intermediate metabolizer

 ***1/*2** · One copy works and one works less well.

Clears warfarin, phenytoin, celecoxib and some other pain relievers.

Activity score: **1.5**. Typical range: 2.

16 medications list this gene. Changes the guidance for 8

CYP2C9 intermediate metabolizer: estimated in 8.7% to 36.2% of people across population groups

These CPIC estimates describe this phenotype, not your exact DNA combination or your chance of side effects. Frequencies vary by population; no ancestry is assumed for you.

African American/Afro-Caribbean	23.6%	American	16.4%
Central/South Asian	36.2%	East Asian	15.2%
European	34.5%	Latino	24.6%
Near Eastern	35.9%	Oceanian	8.7%
Sub-Saharan African	26.3%		

Estimated from published allele frequencies, rather than a direct count of people with this result. Study coverage and methods vary. Reference: CPIC CYP2C9 frequency table and methods. Data retrieved 2026-10-17.

CYP2D6 Poor metabolizer

 ***4/*4** · Neither copy works.

Turns on or clears about 1 in 4 prescription drugs. These include many drugs for depression, pain and ADHD.

Activity score: **0.0**. Typical range: 1.25 to 2.25.

47 medications list this gene. Changes the guidance for 45

CYP2D6 poor metabolizer: estimated in 0.3% to 6.5% of people across population groups

These CPIC estimates describe this phenotype, not your exact DNA combination or your chance of side effects. Frequencies vary by population; no ancestry is assumed for you.

African American/Afro-Caribbean	2.3%	American	2.0%
Central/South Asian	2.4%	East Asian	0.8%
European	6.5%	Latino	3.1%
Near Eastern	2.2%	Oceanian	0.3%
Sub-Saharan African	2.0%		

Estimated from published allele frequencies, rather than a direct count of people with this result. Study coverage and methods vary. Reference: CPIC CYP2D6 frequency table and methods. Data retrieved 2026-10-17.

CYP3A4 Normal metabolizer

 ***1/*1** · Both copies work normally.

Breaks down more prescription drugs than any other enzyme.

1 medication lists this gene. Guidance unchanged

CYP3A5 Intermediate metabolizer

 *1/*3 · One copy works and one doesn't.

Breaks down tacrolimus, a drug used after organ transplants.

1 medication lists this gene. Changes the guidance for 1

CYP3A5 intermediate metabolizer: estimated in 13.7% to 49.9% of people across population groups

These CPIC estimates describe this phenotype, not your exact DNA combination or your chance of side effects. Frequencies vary by population; no ancestry is assumed for you.

African American/Afro-Caribbean	49.6%	Central/South Asian	44.0%
East Asian	37.9%	European	13.7%
Latino	28.6%	Near Eastern	21.4%
Sub-Saharan African	49.9%		

Estimated from published allele frequencies, rather than a direct count of people with this result. Study coverage and methods vary. Reference: CPIC CYP3A5 frequency table and methods. Data retrieved 2026-10-17.

CYP4F2 Intermediate metabolizer

 *1/*3 · One copy works and one works less well.

Clears extra vitamin K from the body, which changes how much warfarin you need.

1 medication lists this gene. Changes the guidance for 1

DPYD Normal metabolizer

 Reference/Reference · Both copies work normally.

Breaks down the cancer drugs fluorouracil and capecitabine.

Activity score: 2.0. Typical range: 2.

2 medications list this gene. Guidance unchanged

FAAH Normal function

 **rs324420C/rs324420C** · Both copies work normally.

Breaks down chemicals your body makes that act like cannabis.

1 medication lists this gene. Guidance unchanged

FAAH rs324420 A allele: 14.5% to 35.9% of DNA copies across ancestry groups

Your result has 0 copies of this allele. These gnomAD frequencies count DNA copies, not people who share your genotype or phenotype, and do not measure your chance of side effects. No ancestry is assumed for you.

Counts below show copies of the A allele / total DNA copies measured.

African / African American	35.9% 14,873 / 41,480	Admixed American	30.4% 4,643 / 15,292
Amish	14.5% 132 / 910	Ashkenazi Jewish	14.7% 509 / 3,470
East Asian	17.6% 910 / 5,176	Finnish	27.8% 2,946 / 10,584
Middle Eastern	15.1% 44 / 292	European (non-Finnish)	20.7% 14,044 / 67,986
South Asian	19.6% 946 / 4,826	Remaining ancestry group	23.9% 506 / 2,116

Reference: gnomAD v4.1 genomes, GRCh38 1-46405089-C-A. Frequencies are allele count divided by allele number within each ancestry group. Study groups are not representative of the worldwide population. Data retrieved 2026-10-17.

GIPR Decreased function

 **rs1800437C/rs1800437G** · One copy works and one works less well.

A gut-hormone receptor that tirzepatide and retatrutide act on.

2 medications list this gene. Changes the guidance for 2

GIPR rs1800437 C allele: 11.5% to 29.5% of DNA copies across ancestry groups

Your result has 1 copy of this allele. These gnomAD frequencies count DNA copies, not people who share your genotype or phenotype, and do not measure your chance of side effects. No ancestry is assumed for you.

Counts below show copies of the C allele / total DNA copies measured.

African / African American	11.5% 4,770 / 41,492	Admixed American	13.2% 2,018 / 15,286
Amish	11.6% 106 / 910	Ashkenazi Jewish	29.5% 1,022 / 3,470
East Asian	19.9% 1,021 / 5,142	Finnish	22.8% 2,405 / 10,570
Middle Eastern	16.0% 47 / 294	European (non-Finnish)	20.6% 14,004 / 67,974
South Asian	15.1% 726 / 4,818	Remaining ancestry group	19.8% 417 / 2,110

Reference: gnomAD v4.1 genomes, GRCh38 19-45678134-G-C. Frequencies are allele count divided by allele number within each ancestry group. Study groups are not representative of the worldwide population. Data retrieved 2026-10-17.

GLP1R Typical response

 **rs10305420C/rs10305420C**

The receptor that semaglutide and other GLP-1 drugs act on.

You have the most common form of this receptor, so GLP-1 drugs should work as expected.

3 medications list this gene. Guidance unchanged

GLP1R rs10305420 T allele: 7.7% to 39.8% of DNA copies across ancestry groups

Your result has 0 copies of this allele. These gnomAD frequencies count DNA copies, not people who share your genotype or phenotype, and do not measure your chance of side effects. No ancestry is assumed for you.

Counts below show copies of the T allele / total DNA copies measured.

African / African American	7.7% 3,208 / 41,572	Admixed American	29.9% 4,573 / 15,294
Amish	26.2% 239 / 912	Ashkenazi Jewish	36.9% 1,279 / 3,470
East Asian	14.4% 740 / 5,154	Finnish	39.8% 4,217 / 10,590
Middle Eastern	36.3% 106 / 292	European (non-Finnish)	38.2% 25,971 / 67,946
South Asian	19.2% 926 / 4,830	Remaining ancestry group	28.4% 601 / 2,114

Reference: gnomAD v4.1 genomes, GRCh38 6-39048860-C-T. Frequencies are allele count divided by allele number within each ancestry group. Study groups are not representative of the worldwide population. Data retrieved 2026-10-17.

IFNL3 Favorable response genotype

 **rs12979860C/rs12979860C**

An immune gene that affects how well hepatitis C treatment works.

Hepatitis C treatment with peginterferon is more likely to work for you.

3 medications list this gene. Guidance unchanged

IFNL3 rs12979860 T allele: 7.1% to 60.3% of DNA copies across ancestry groups

Your result has 0 copies of this allele. These gnomAD frequencies count DNA copies, not people who share your genotype or phenotype, and do not measure your chance of side effects. No ancestry is assumed for you.

Counts below show copies of the T allele / total DNA copies measured.

African / African American	60.3% 25,033 / 41,510	Admixed American	37.4% 5,725 / 15,292
Amish	36.9% 332 / 900	Ashkenazi Jewish	39.4% 1,369 / 3,472
East Asian	7.1% 369 / 5,176	Finnish	24.1% 2,553 / 10,600
Middle Eastern	38.1% 112 / 294	European (non-Finnish)	31.5% 21,409 / 67,956
South Asian	22.7% 1,094 / 4,828	Remaining ancestry group	36.3% 767 / 2,114

Reference: gnomAD v4.1 genomes, GRCh38 19-39248147-C-T. Frequencies are allele count divided by allele number within each ancestry group. Study groups are not representative of the worldwide population. Data retrieved 2026-10-17.

NAT2 Poor metabolizer

 ***16/*5** · Both copies work less well.

Breaks down hydralazine, isoniazid and some other drugs.

1 medication lists this gene. Changes the guidance for 1

NUDT15 Normal metabolizer

 ***1/*1** · Both copies work normally.

Breaks down the active form of thiopurines such as azathioprine.

3 medications list this gene. Guidance unchanged

NUDT15 normal metabolizer: estimated in 79.2% to 98.6% of people across population groups

These CPIC estimates describe this phenotype, not your exact DNA combination or your chance of side effects. Frequencies vary by population; no ancestry is assumed for you.

Central/South Asian	86.6%	East Asian	79.2%
European	98.6%	Latino	87.7%

Estimated from published allele frequencies, rather than a direct count of people with this result. Study coverage and methods vary. Reference: CPIC NUDT15 frequency table and methods. Data retrieved 2026-10-17.

RYR1 Not checked

 **Not determined** · We couldn't check this gene from your data. This does not mean that a normal response is expected.

A muscle channel. Rare changes in it can cause a dangerous reaction to some anesthetics.

7 medications list this gene. Shown as "Unable to determine"

SLCO1B1 Decreased function

 ***15/*1A** · One copy works and one works less well.

Moves statins into the liver.

7 medications list this gene. Changes the guidance for 6

SLCO1B1 decreased function: estimated in 0% to 36.5% of people across population groups

These CPIC estimates describe this phenotype, not your exact DNA combination or your chance of side effects. Frequencies vary by population; no ancestry is assumed for you.

African American/Afro-Caribbean	2.0%	American	36.5%
Central/South Asian	13.0%	East Asian	21.8%
European	28.3%	Near Eastern	32.0%
Oceanian	0%	Sub-Saharan African	5.4%

Estimated from published allele frequencies, rather than a direct count of people with this result. Study coverage and methods vary. Reference: CPIC SLCO1B1 frequency table and methods. Data retrieved 2026-10-17.

SULT1A1 Normal function

 ***1/*1** · Both copies work normally.

Turns topical minoxidil into its active form in the scalp.

1 medication lists this gene. Guidance unchanged

TPMT Normal metabolizer

 ***1/*1** · Both copies work normally.

Breaks down thiopurines such as azathioprine and mercaptopurine.

3 medications list this gene. Guidance unchanged

TPMT normal metabolizer: estimated in 86.5% to 96.3% of people across population groups

These CPIC estimates describe this phenotype, not your exact DNA combination or your chance of side effects. Frequencies vary by population; no ancestry is assumed for you.

African American/Afro-Caribbean	86.5%	Central/South Asian	96.3%
East Asian	96.0%	European	90.9%
Latino	89.2%	Near Eastern	93.2%
Sub-Saharan African	89.3%		

Estimated from published allele frequencies, rather than a direct count of people with this result. Study coverage and methods vary. Reference: CPIC TPMT frequency table and methods. Data retrieved 2026-10-17.

UGT1A1 Intermediate metabolizer

 ***1/*28+*60+*80** · One copy works and one works less well.

Clears bilirubin and some drugs, such as the cancer drug irinotecan.

6 medications list this gene. Guidance unchanged

VKORC1 Decreased expression

A G -1639A/-1639G

Recycles vitamin K and is the protein warfarin blocks.

You make less of the protein warfarin blocks, so you may need a lower warfarin dose.

1 medication lists this gene. Changes the guidance for 1

VKORC1 rs9923231 -1639A allele: 10.0% to 89.2% of DNA copies across ancestry groups

Your result has 1 copy of this allele. These gnomAD frequencies count DNA copies, not people who share your genotype or phenotype, and do not measure your chance of side effects. No ancestry is assumed for you.

Counts below show copies of the -1639A allele / total DNA copies measured.

African / African American	10.0% 4,141 / 41,504	Admixed American	39.1% 5,974 / 15,262
Amish	44.2% 400 / 906	Ashkenazi Jewish	49.9% 1,734 / 3,472
East Asian	89.2% 4,612 / 5,172	Finnish	39.1% 4,127 / 10,558
Middle Eastern	53.4% 156 / 292	European (non-Finnish)	37.8% 25,693 / 67,986
South Asian	17.8% 859 / 4,824	Remaining ancestry group	38.9% 824 / 2,116

Reference: gnomAD v4.1 genomes, GRCh38 16-31096368-C-T. Frequencies are allele count divided by allele number within each ancestry group. Study groups are not representative of the worldwide population. Data retrieved 2026-10-17.

About this report

28 of 30 genes have results; 113 medications have a determined guidance label.

Not checked: CACNA1S, RYR1. A result that could not be determined is not a normal result.

CYP2D6 copy number is not measured. Deletions or duplications can change the CYP2D6 result.

Rare variants can be missed. Arrays test selected positions; imputation helps fill the gaps but can still miss rare variants.

How the results were read

Untested array positions are estimated using a reference panel (imputation). The two gene copies are named and matched to published phenotype tables and medication guidance.

Sources

CPIC - Clinical Pharmacogenetics Implementation Consortium: 64 medications. Peer-reviewed prescribing guidelines.

DPWG - Dutch Pharmacogenetics Working Group: 9 medications. Prescribing guidelines used across Europe.

FDA - U.S. Food and Drug Administration: 61 medications. Pharmacogenetic information in drug labels.

Gene2Rx - Gene2Rx research summaries: 11 medications. Published studies we summarize where no guideline exists yet.

Source links in the medication guidance remain clickable in the PDF. Gene2Rx is not affiliated with or endorsed by CPIC, the FDA or DPWG. Research summaries can have different evidence and actionability from clinical guidelines.

Questions

What do I do now?

If you may have an unusual response to a medication you take or are considering, talk with your healthcare provider or a genetic counselor before making changes. The sources beside each finding explain its evidence and limits. Not every finding supports a treatment change.

Should I change medications or my dose based on this report?

No. Do not change a dose or stop a medication without talking to your healthcare provider first. Consumer DNA data is not clinical grade. Use this report to start a conversation with your provider, who may order a clinical lab test. Research on consumer genetic testing.

Are these expert annotations?

Each finding names its source. CPIC, FDA, DPWG and Gene2Rx interpretations have different levels of evidence. These organizations do not endorse Gene2Rx interpretations, which explain the research and its limitations alongside each finding.

Why would my results change?

Your genes do not change, but research does. Guidelines and drug labels are updated when new research meets strict standards and experts agree. Your report preserves the guidance used when it was made; an updated report may use newer guidance.

I do not see my medication. Why not?

Not every medication is affected by genetics, and some need more research before guidance exists. A medication may also be missing because of your report tier, your data or what this report covers. A missing medication may still have guidance from a clinical guideline or drug label.

Why should I confirm results before changing treatment? Consumer data is not clinical grade and the findings are predictions. Additional genetic variation, health conditions and other medicines can affect response. Discuss any treatment decision with your healthcare provider or pharmacist.

More questions: contact@gene2rx.com. Full interactive report: gene2rx.com.